

Financial Literacy, Risk and Use of Finance in Post-Apartheid South Africa*

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Abstract

Access to finance is critical for economic growth and development, but its limited and ineffective use remains a concern for developing economies. This paper examines the distribution and role of financial literacy, controlling for risk perceptions, in the use of financial services, following financial sector reforms in South Africa. I construct a financial literacy index using secondary data and use discrete (multiple) choice models to investigate the probability that a financially literate consumer chose a formal, and not a semi-formal or informal financial product. I find low levels of financial literacy, and the distribution pattern mimics the education, labour market and related inequalities characteristic of post-apartheid South Africa. While the likelihood of using formal financial products increased with financial literacy, this effect was dampened by the consumer's risk attitude by the same magnitude. Moreover there is weak evidence of cross-elasticity between formal and informal credit, savings and insurance financial products, that points to risk-aversion towards the formal financial system. Overall, the results are in line with empirical studies.

JEL Classification: *D12, D14, D18, G21, O16, O17*

Key words: *Financial Literacy, Financial Literacy Index, Risk Attitudes, Informal Financial products.*

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1 Introduction

Access to finance remains central to the debate in development economics owing to its posited role in the reduction of inequality, poverty alleviation and economic development (CGAP, 2012; Cole et al., 2011; Beck, Demirgüç-Kunt & Honohan, 2009; Demirgüç-Kunt and Levine, 2009; Beck, et al., 2007; Karlan & Morduch, 2009; Yunus, 2006). Central to this debate are the determinants of participation in the financial sector both from the demand-side (cost of services, consumer risk preferences and information about products and services) and the supply-side (accessibility, availability and appropriateness of products). While the growth in financial intermediaries and agents might have improved accessibility, this access, accompanied by an increase in complex financial instruments, and the increasing responsibility for consumers to manage their inter-temporal consumption, now poses a new challenge related to financial skills to navigate and use the cocktail of products and services.

Researchers argue that besides the high costs associated with formal financial services, consumers might not demand financial services if they are not familiar or comfortable with them due lack of financial knowledge (Cole et al, 2011). Empirical findings so far show that these skills, referred to as financial literacy, are lacking among various segments of the population globally (see for example Lusardi and Mitchell, 2014, Zia & Xu, 2011), leading to financial mistakes or ineffective use of financial services. The argument is that, a financially literate population can engage effectively in the financial sector, thus improving household livelihoods, enabling them to make a meaningful contribution to economic growth. In realisation of such arguments, governments and financial sector stakeholders are embarking on financial education strategies to increase the financial knowledge base of their citizens and consumers.¹ But the challenge facing research, that should ultimately guide policy, is the measure and thus the exact channel through which financial literacy affects the use of financial services that consumers are exposed to. While in the developed economies it is associated with consumer sophistication (such as participation in complex financial markets for portfolio diversification), financial literacy in developing economies is merely associated with opening a bank account or take-up of basic financial products (Xu and Zia, 2011). But what can we say about dual economies that are characterised by an equally sophisticated informal financial sector?

The existing literature has focused on extreme cases of either developed or developing economies, with emphasis on the formal financial sector and less on informal financial products or dual economies. This might be of importance for financial inclusion strategies. Relatedly, many studies also omit the potential effect of individual risk preferences and perceptions, which are closely related household wealth accumulation (Behrman et al., 2012) and; to the individualistic (or collectivism) and uncertainty avoidance tendencies of society (Hofstede, 2001), with implications for financial sector participation.² For instance, financially literate but risk-averse individuals might not engage with the formal sector if alternatives exist. On the other hand, a high degree of collectivism might lead to risk-seeking behaviour owing to the existence of a ‘social cushion’ (Hsee & Weber, 1999). With the exception of cross-country studies that employ macro data and use proxies/instruments for financial literacy (e.g. Jappelli & Padula, 2011; van Rooij et al., 2009), most micro studies on this subject

¹For instance April [2008] Financial Literacy Month for USA; Reserve Bank of India’s financial literacy and credit counseling centres; Indonesia’s [2008] year of financial education to improve access to and use of finance through financial literacy

²Cox, Brounen & Neuteboom (2011) find that households with high financial literacy and lower risk-aversion are likely to use interest-only mortgages, and individuals who are sophisticated, understand risks and benefits are likely to use alternative low-cost credit products

conduct tailored surveys, which have cost implications especially in low-income economies.

This paper examines the interplay between financial skills, risk attitudes and financial products choice from formal and informal sources. I am interested in establishing the extent to which consumer levels of financial literacy can be associated with the observed financial sector participation in post-apartheid South Africa, following a period of financial sector reforms. To do this, I abstract from using financial sector outcomes as a proxy for financial skills,³ and build on the arguments of the capability theory by Nussbaum and Sen (1993) as well as behavioural economics (De Meza, et al., 2008), to construct a composite financial literacy measure, from two domains: 1) financial knowledge and 2) financial capability (see Kempson et al., 2005). This allows me firstly, to examine the distribution and determinants of financial literacy in the country. Second, I investigate the significance of the duality of South Africa's population and compare my findings to studies that link financial literacy with financial sophistication for the high income quintiles while linking it to basic financial services take-up for the lower income quintiles. Lastly, I subject the financial literacy measure to rigorous econometric analysis for statistical significance of its role in the observed patterns of use of financial services in post-apartheid South Africa, controlling for individual risk attitudes. I then consider the implication of these behavioural characteristics on the formulation of a national financial education policy and for financial inclusion. To the best of my knowledge this is the first study that examines this relationship in a dual economy like South Africa.

But constructing a representative measure, without a standard definition of financial literacy, can be challenging. For this reason, I adopt a general definition by the Organisation for Economic Co-operation and Development (OECD), and identify a battery of 15 questions that capture the different aspects of financial knowledge and financial capability. Using multivariate analysis (principal component analysis), I obtain a weighted score for each individual based on their responses to these questions. The average of the scores is used to get an insight into the distribution and correlates of financial literacy in the country. I then distinguish between formal, semi-formal and informal products and sources, since they are all available to the consumer. In keeping with discrete (multiple) choice models in the use of financial services, I employ [an ordered] multinomial logit model to accommodate these various sources of financial products and test for their significance. Since the choice to use or not to use these products happens simultaneously, I attempt to capture the semi-elasticities across sources and not across product categories. This provides insight into the extent to which financial literacy influences the switch between use and no-use on one hand, and between formal and non-formal financial products on the other. I incorporate the individual's risk attitudes to conform to behavioural finance and inter-temporal consumption maximization approaches that embody an individual's discounting preferences based on risk attitude in the consumer's optimization problem, with recent arguments positing that risk attitudes and financial sector participation should be modelled simultaneously (Rieger, Wang & Hens, 2013; Garcia, 2011). The role of education, age, ethnic background, marital status, geo-area, and others, provides more insights into the potential opportunities and challenges of financial education policy to affect the patterns of use of financial

³The outcome based approach argues that individuals who are financially knowledgeable will demand formal financial products, thus the extent of use of financial products is a reflection of the level of financial literacy in the country. But up-take could be policy driven and not necessarily a reflection of knowledge (demand driven). For instance, the Broad Based Black Economic Empowerment (BBBEE) in South Africa that advocated for the financial inclusion of the previously excluded from the formal financial sector, and the Equal Credit Opportunity Act of 1974 in the US (Hawley and Fujii, 1991), might have led to supply driven financial products uptake

services.

My analysis, based on cross-sectional data from the FinScope surveys of South Africa (2003-2012), shows that financial literacy was low among South Africans, and below average for women, Blacks, the young, the aged and the less educated. While these results are in line with empirical literature, they also seem to reflect the education, labour market and related inequalities characteristic of post-apartheid South Africa. Indeed regional differences greatly mimic the distribution of poverty in the country. Results suggest that financial literacy was associated with an increase in the use of formal financial products, but the effect was greatly dampened by the risk attitudes of the individuals, as captured by the interaction between these two variables. This result might suggest that South Africans exhibit individualism and uncertainty avoidance tendencies when it comes to financial decisions, particularly towards the formal financial sector, amidst a strong stokvel culture. Furthermore, the interplay between race-education-income and products usage shows that Whites and Asians are more likely users than their Colored and Black counterparts. Moreover access to financial services centres had the effect of increasing the use of some formal financial products while reducing the use of some informal financial products, pointing to evidence of a weak elasticity of substitution between the two financial sectors. What stands out in the with-in products estimates is that, while financial literacy was associated with use of formal insurance products, overall, insurance products were not responsive to risk attitudes of users but rather to age, income and education levels of individuals. Overall, our results are in line with other empirical findings.

The rest of the paper is organised as follows. In the next section I provide an overview of South Africa's post-apartheid financial sector reforms before discussing the empirical strategy used. This is followed by a brief description of the data and presentation of the results. The final section concludes with recommendations for policy and next research steps.

2 Motivation and Context

The apartheid financial practices inadvertently excluded the majority of South Africans.⁴ After years of marginalisation, the post-apartheid government inherited an economy characterised by a highly sophisticated financial sector, among the top ten in the world (Ludwig, 2006), that served the interests of the elite few, alongside an equally vibrant informal sector that served the credit, risk management, saving and investment demands of the under privileged majority. Among the major reforms was the Broad Based Black Economic Empowerment (BBBEE), leading to the development of the Financial Sector Charter of 2003, to ensure access to finance and participation of all races in the development of the country. The Usury Act of 1968⁵ was slowly amended leading to the Micro Finance Regulatory Council⁶ and later to the National Credit Act of 2005⁷. As a result of these reforms, affordable financial services were extended to the previously excluded notably, low cost transactional (Mzansi

⁴The Finscope survey of 2003 shows that even after 10 years into democracy, as many as 60% of the population were not banked

⁵The Usury Act had a discriminatory effect on the supply of loans in that, by imposing interest rate caps that were meant to protect consumers, it compromised access to credit by low income consumers of the population since financial institutions, in fear of not covering their costs on small loans, they reduced the supply of financial services to the poor

⁶See www.mfrc.co.za

⁷The NCA was meant to regulate the credit industry which was by then characterised by abuse and exploitation of consumers following the liberation of access to credit

account⁸) and savings accounts and; affordable credit. However, earlier research showed that formal financial sector participation was still limited to the elite, and access to credit was not statistically significant for Blacks (Ardington & Leibbrandt, 2004; Srinivasan, 2006).

But the relatively easy access to credit has to date claimed as many as 38% heavily indebted individuals of the total credit active consumers.⁹ By 2010, household debt-to-disposable income skyrocketed to almost 80% while household savings sunk as low as -0.2%.¹⁰ Yet the country is shifting from employer-sponsored defined benefits to defined contribution plans, implying that consumers are increasingly being exposed to financial market risks and mandatory inter-temporal consumption choices amidst economic uncertainty. As the country witnesses increasing job uncertainties, employees quickly cash-in their retirement savings in the event of job switching or job loss, missing out on the benefits of compound interest rate. On the other hand, a reasonable proportion of the country's population remains outside of the formal financial sector. The stokvel sector (informal savings groups) boosts as many as 12 million registered members pooling together R44 billion per year.¹¹ There are concerns that perhaps these [negative] results highlighted so far are a result of consumers' low levels of financial skills to engage in the formal financial market, which if compounded with the fear of dealing with such a structured system keeps many in the comfort of working with the informal financial markets.

Following in the footsteps of mainly developed countries, the Government of South Africa is formulating a national financial education strategy, albeit with little or no empirical findings of the extent of financial illiteracy nor the role it plays in a South African setting, since it exhibits characteristics of both a developed and developing economy. These stylized facts inform the objectives of this study.

3 Empirical Strategy

3.1 Measuring Financial Literacy

Defining financial literacy as *'the combination of consumers'/investors' understanding of financial facts and concepts, and their ability to appreciate financial risks and opportunities to make informed choices, to know where to go for help and to take other effective actions to improve their financial well-being'* (OECD, 2009), two domains are identified as in Kempson et al. (2005): 1) financial awareness and knowledge (knowledge of financial concepts and financial regulations); and 2) financial capability (making ends meet and planning for the future including knowing where and how to find reliable financial information).¹² I then followed the Principal Component method of factor analysis to find the one factor that can provide the appropriate weights to the questions that are contained in each domain, while retaining as much information as possible. The intuition is that these two domains

⁸Low income transactions banking account provided by deposit taking banks and mandated by the Financial Sector Charter to all banks. (Required minimum balance was R325). More recently, a Social Security Account (SASSA) was introduced through which social support recipients are required to access their funds

⁹7.9million of the 19.8million credit active consumers are over-indebted, that is, delinquent for over 90 days (NCR, 2012)

¹⁰South Africa Reserve Bank (SARB, 2012)

¹¹African Response 2012: <http://www.bdlive.co.za/articles/2011/11/22/stokvel-numbers-in-sa-larger-than-any-metro>

¹²This approach allows us to make some comparison with studies that have used it. Since the surveys do not contain data on potential instruments, the IV or proxy technique could not be used.

are interrelated in a way that might not easily be captured by simply summing or averaging of the responses of individuals, which is also equivalent to weighting all questions equally. Although more commonly used in psychology and sociology, this approach has been recommended by the OECD as a better method of capturing the underlying correlations among questions, and it has subsequently been used in studies by the World Bank in Romania (Stanculescu, 2010), Bosnia-Herzegovina (Dragan, 2011), UK (Atkinson, 2011) and by Diagne and Villa (2012). Analogous to the literature on the construction of socio-economic status indices, a variable with a positive factor score is associated with a high financial literacy level, while a variable with a negative factor score is associated with a lower financial literacy level.¹³ Thus, each individual receives a weighted score, which translates into his financial literacy level. The Index is based on the following general expression:

$$FLX_i = \sum_{j=1}^J \left[F_j \frac{Q_{ij} - Q_j^-}{S_j} \right] \quad (1)$$

for $i=1, \dots, N$ and $j=1, \dots, J$; where FLX_i is the financial literacy score for individual i , Q_{ij} is the score for question j for individual i , Q_j^- is the sample mean, S_j is the sample standard deviation and F_j is the eigenvector of the first principal component weights.

I re-scale the scores through a linear transformation for ease of interpretation and comparability of the sub-indices with the composite financial literacy index. The higher the score, the higher the implied financial literacy level of the individual (see Vyas & Kumaranayake, 2006). For example, on a 0-100 index, an individual scoring zero has a financial literacy of zero (financially illiterate) while a score of 100 is equivalent to a financial literacy level of 100 (financially sophisticated).¹⁴ By comparing the mean financial literacy scores across the socio-economic and demographic characteristics of individuals in the sample and weighting the data, we obtain the financial literacy landscape of South Africa.

3.2 Demand for Financial Products

I model the demand for financial services subject to an individual's level of financial literacy, given that the individual wishes to improve his financial health. This follows from the theory of consumer choice in the presence of discrete (multiple) options, which makes my estimates the probability that an individual selects a given financial product to maximise his/her well-being. Unlike McFadden's transportation modes, financial products serve different purposes and as such, the error terms are not independent across product categories since a consumer can use more than one product. But we can overcome this challenge by getting the possible product combinations.¹⁵ Similarly in this study, a consumer can use a product from multiple sources (say formal and informal credit). By ranking the product sources such that *formal* > *semi-formal* > *informal* > *no-use*,¹⁶ and getting the possible combinations, it is possible to ensure that the error terms are independently distributed (McFadden, 1984). I therefore assume that a rational individual, who seeks to maximise his financial well-

¹³See Filmer & Pritchett, 2001; McKenzie, 2003; Gwatkin et al, 2000; Vyas & Kumaranayake, 2006

¹⁴The definition of financial sophistication is closely aligned to Calvet, Campbell & Sodini (2009), that is, 'the ability to avoid making investment mistakes, invest in ways that are reconcilable with standard financial theory'. Cox et al. (2011) measure sophistication as self-assessed financial knowledge and participation in the financial market.

¹⁵An attempt to estimate such a model was not successful due to few observations for some of the product combinations, causing computational challenges

¹⁶see Klapper & Singer (2013) for a similar ranking of sources of financial services

being, will demand financial services and products, subject to individual unobservable and observable characteristics (which include his level of financial literacy), as well as product characteristics. He chooses either to use or not use any of the product categories for transaction (TXN), credit and loans (CL), insurance (INS) or savings and investment (SI), in the formal, semi-formal or informal sectors. I include the informal channels given the history, product and membership diversity of South Africa's informal sector. Thus the specification I use follows Sahn, Younger and Genicot (2002), which is a set of ordered multinomial logits for the sectors (sector-specific effect) and for product categories (within-product effect) such that for each product option, the utility derived by an individual is given by expression (2).

$$U_{ij}(FLX, X, Z) = f(FLX_i) + D(X_{ij}, Z_j) \quad (2)$$

where FLX_i is the financial literacy index, which is a weighted score of the financial literacy level of the individual that chooses option j , X_i is a set of individual specific characteristics that do not vary with the discrete choice, Z_j is a set of choice specific variables, the function D indicates the quality of financial product j and is a function of the characteristics of the product as well as those of the individual. This functional form allows for separability of the individual's attributes as well as the choice-specific characteristics. Notice that even if the relationship was quadratic, we could still recover a linear logarithmic function.

Thus, the assumption is that the choice of a product depends on the financial literacy of the individual among other individual-specific variables, his income level and the product-specific characteristics. The function D is assumed to be linear in X_i and Z_j variables. The X variables include: age, education, marital status, income, occupation/source of money, province/region and risk preferences. The Z_j variables measure the quality of the product/option which include: accessibility (distance), affordability (cost in terms of user fees, charges), appropriateness, etc. Unfortunately the survey consistently asked for distance to the nearest service point (banks or shopping centres where a financial institution is likely to be). This time measure of access is used as a proxy the cost associated with formal products. I expect an increase in access time to reduce demand for formal products in favour of non-formal alternatives. Additionally, I expect an increase in the financial literacy of a consumer to increase his/her demand for formal products and reduce the demand for non-formal products.

Since discrete choice models identify the difference between $U_j - U_0$, where U_0 refers to the base utility, which in our case is the choice of non-use, I normalise the characteristics for the non-use option to zero. The regressions are estimated along three dimensions: 1) Use vs Non-Use of formal financial services¹⁷; 2) use by financial product source; and 3) use by financial product type. The estimated model is given by expression (3).¹⁸

$$P(y_{ij}|FLX_i) = \alpha_j + \delta_i access_{ij} + \gamma_i FLX_i + \tau_i Risk_i + \theta_i FLX_i * Risk_i + \beta_i X_{ij} + \varepsilon_{ij} \quad (3)$$

¹⁷See product classification in Appendix A2

¹⁸I do not include a policy/regulatory variable because there was none introduced during the period of this study. An attempt to isolate the Mzansi account as a proxy was futile due to very low frequencies of users. But for the risk variable, the dataset contains questions about the risk attitudes of individuals. Two candidate questions were: i) You hate owing money; and ii) In life, one must take risks

where y_{ij} is the outcome of any of the three dimensions, for individual i choosing option j , and the interactive term captures the combined effect of individual's financial literacy level and risk type. The covariates include both choice-specific and individual-specific socio-demographic characteristics.

I use a logit model to estimate outcomes for dimension (1) since the outcome is binary, that is, use versus non-use of formal financial services and products. For the second and third dimensions, the outcome is categorical and is thus estimated using a multinomial model. The product sources considered in this study are formal (regulated financial institutions, mainly banks and insurance companies); semi-formal (merchant institutions that have registered as financial service providers and exchange their goods for the equivalent of these services, such as retail stores) and; informal (use of informal savings clubs, family and friends, mashonisas or informal lenders, etc). For the product categories, I estimate four sub-regressions one for each of the four product categories of transaction; credit and loans; insurance (short & long-term); and savings and investments. Finally, I estimate ordered logits to test the significance of the sectors as cut-off points. If the coefficients of the cut-offs are significant, then the sectors should not be merged into one category.

4 Data

I utilise the FinScope surveys for South Africa for the period 2003 -2012. These are repeated cross-section surveys conducted annually in South Africa (since 2003) and in 16 other developing countries, focussing on financial access, needs and profiles of users and the financial institutions. They also provide a considerable amount of detail on characteristics of respondents such as age, level of education, sources of income, occupation and indicators of economic well-being (income, housing quality and tenure, deprivation). Additionally, there are questions designed to determine financial literacy, attitudes and perceptions to finances, savings and investment, as well as the psychological profile of respondents. Thus these questions can be aligned to those used in financial literacy surveys in several countries. The financial concepts relate directly to terminologies used in the country, although some might be applicable universally (selected questions are highlighted in Appendix A2). The sampling approach follows a stratified multi-stage random procedure and interviews are conducted face-to-face with individuals from 18 years to post retirement years, although in some cases respondents 16 – 17 years were also interviewed.¹⁹

Since the samples are drawn with independent probabilities, for the purpose of this study, I pooled data for the period 2005 to 2009 by stacking/ appending the individual surveys, which provided a consistent and reasonable sample size of approximately 18 000 observations. The assumption is that different individuals were interviewed in each survey such that on average changes will reflect either the behaviour of the individuals (model effect) or changes in the make of the population over time (distribution effect).

Since the surveys were not conducted exclusively for financial literacy, the questions used to proxy the financial knowledge domain do not properly capture the numeracy ability. However, Hung et al. (2009:5) argue that although financial literacy benefits from numeracy which is more aligned to cognitive ability than to financial matters, it should only be treated as a supporting construct. This is echoed by Kempson et al. (2009) who argue that financial literacy is better captured in the

¹⁹See www.finscope.co.za for more on the survey methodology and scope

capability component which reflects the ability of an individual to convert knowledge into practice. I therefore believe that this skill was captured in other questions that reflect perceptions and attitudes within the survey. Additionally, while cross-sections of nine years were available, this paper only utilised data from five cross-sections so as to caution analysis to consistent questions across surveys. Furthermore, this not being a panel survey, it was not possible to track individual and thus difficult to establish causal order. Furthermore, the surveys did not collect data on the option-specific variables (such as the cost structure associated with product types and across product sources), except for the duration to the nearest formal financial facility (such as a bank or a shopping centre). This variable was used as an indirect or opportunity cost in terms of access time to a financial services point. There is therefore, an omitted variable that might be crucial for the estimation of the use of financial products within and across the three sectors. I discuss this problem in the ‘Robustness’ section, where I attempt to establish its effect by excluding the option-specific variables from the estimations.

5 Empirical Results

5.1 Descriptive Statistics

The weighted descriptive statistics show that on average individuals were not knowledgeable about the financial concepts used in the country. For instance 43% claimed to know ‘Bad Debt’ compared with 10% who understood credit bureaus. Less than 1% understood the terms - budgeting, interest rate or life insurance, etc and how they operated. On the other hand, up to 47% claimed to save regularly and up to 20% said they spent wisely or have saved enough for retirement. Sadly less than 1% trusted banks.²⁰ While results are not shown here, most South Africans scored less than half of the points awarded to the 15 financial literacy questions.

58.3% of South Africans reported being banked over the period, 10.3% were previously banked while 31.4% were formally excluded. 59% of the population used formal financial products compared to 38.9% using informal financial products, while 27.2% used no products at all. Formal products comprised mainly of transactions, semi-formal products were mostly credit and loans, while informal products were mostly short-term insurance. Consumers saved equally using the formal and informal mechanisms. These statistics are summarised in Appendix A3. On average, individuals used at least one product in the formal financial sector. Moreover, majority were within 15-45 minutes of access to a financial services point. About 64% self-identified as risk-lovers while as many as 87% claimed to be risk-averse when ‘you hate owing money’ was used as a measure of risk attitude. Demographically, there was a slightly higher proportion of females at 52% compared to 48% males, with Blacks at 76% while the rest of the population groups made up the remaining 23%. The majority of the sample had some high school education (40%), the largest age group was the 18-29 year-olds with the oldest respondent being 92 years. More respondents were interviewed in the urban area (57%) with a regional distribution in favour of Gauteng, Kwa-Zulu Natal, Eastern Cape and Western Cape Provinces. 27% of population was formally employed, followed by pensioners and the self-employed. About 60% earned a personal monthly income of less than R1000, with 16.5% grant recipients, and in some cases individuals held more than one job. The average household size was four with a household

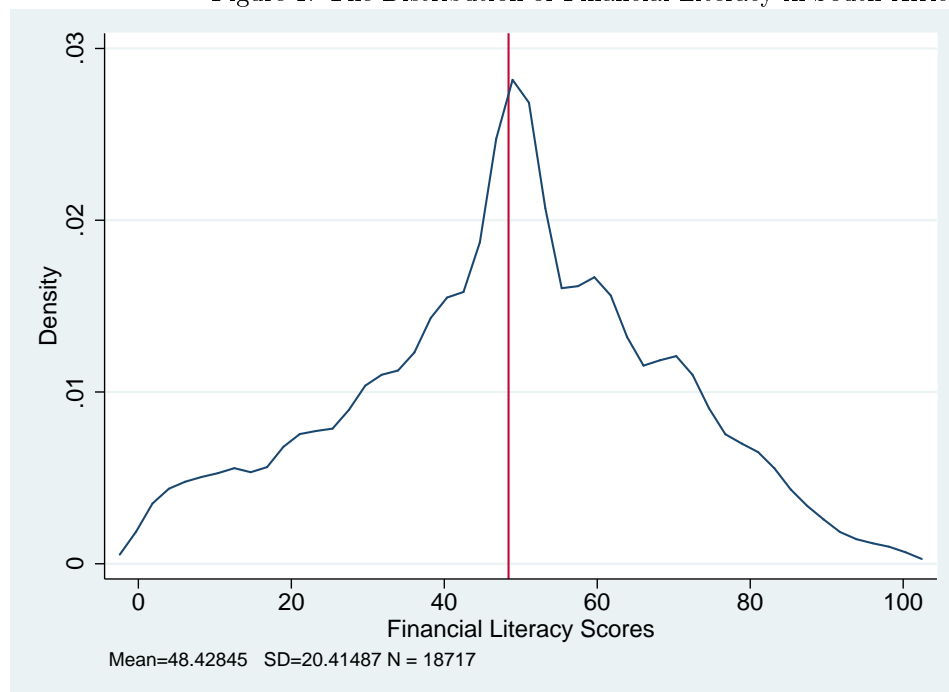
²⁰see Appendix A1 for these statistics

income of less than R6000 per month. The data is weighted using the Statistics South Africa weights as benchmarks. This sample is therefore nationally representative of the major population groups of the country as well as gender and regional balance.

5.2 Distribution of Financial Literacy

The mean financial literacy for South Africans was found to be 48.42 on a scale of 0-100, with a standard deviation 20.4 as shown in Figure 1. The distribution is slightly skewed to the left implying that a reasonable proportion of South Africans had low levels of financial literacy during the period of the study.

Figure 1: The Distribution of Financial Literacy in South Africa



Figures 2-4 provide a comparison of the average scores by socio-economic and demographic characteristics of the population. There was evidence of an inverted U-shape relationship with age, the scores increased with education, and Whites scored higher than all population groups. Regionally, the affluent/business hubs of the country, Western Cape and Gauteng provinces (and urban dwellers) had above national average scores while Eastern Cape and rural dwellers had the lowest and below average score. This regional pattern mimics the poverty distribution of the country.²¹ Overall, these results seem to be in line with similar demographic and regional differences reported in other studies (see Lusardi & Mitchell, 2014; Zia & Xu, 2012 for a summary).

²¹See Woolard & Leibbrandt (2009) for poverty trends in South Africa

Figure 2: Financial Literacy by Age, Gender, Education and Ethnic Background

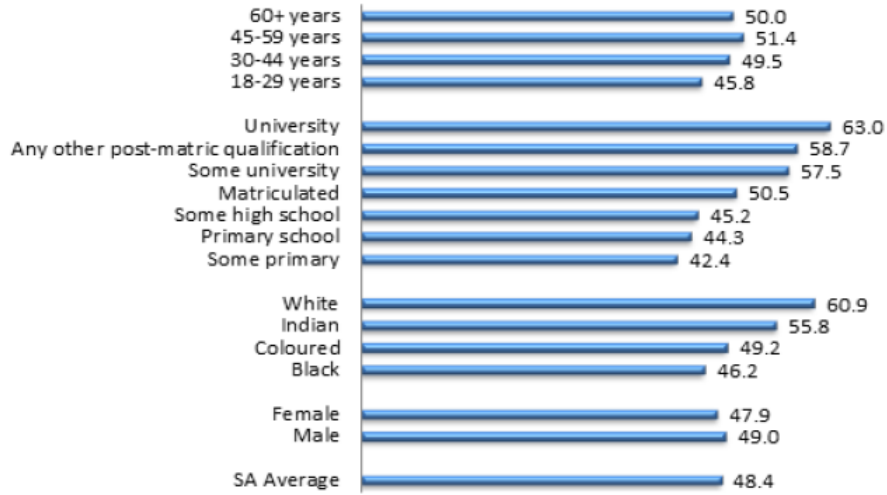
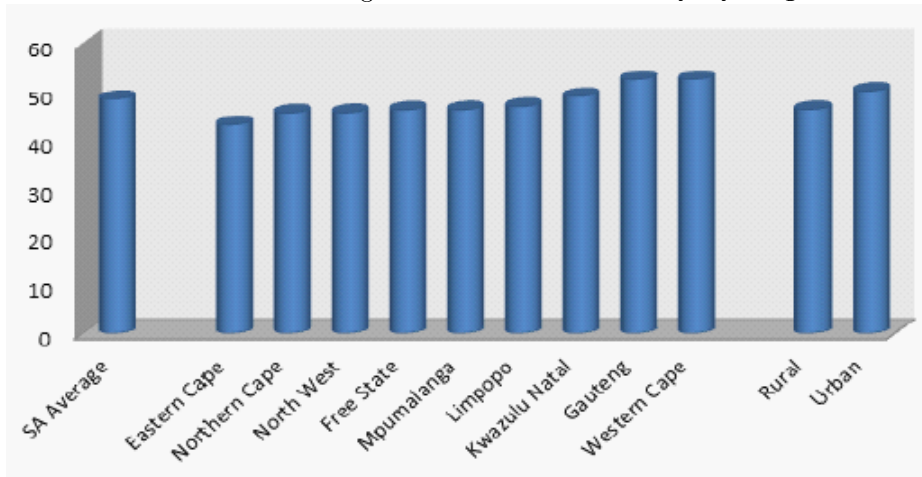
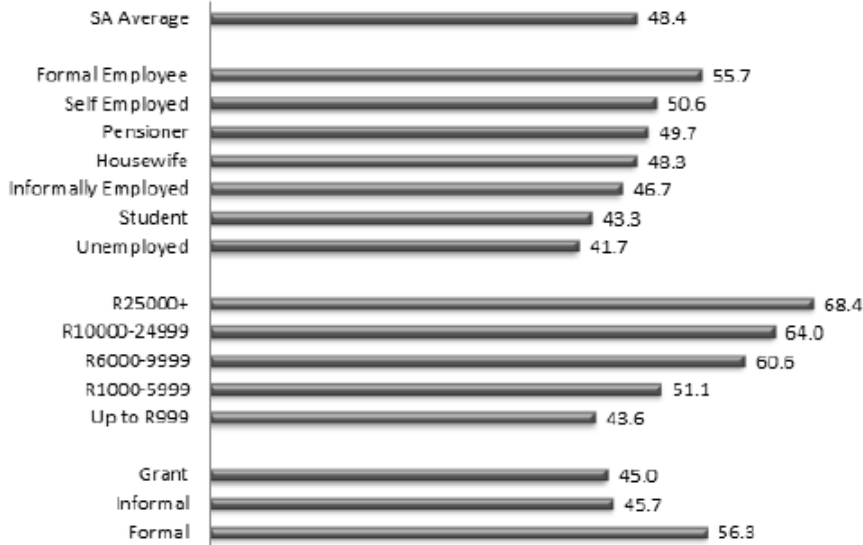


Figure 3: Financial Literacy by Region



Note: Mimics the poverty distribution in South Africa (see Woolard & Leibbrandt, 2009)

Figure 4: **Financial Literacy by Occupation, Income and Source of Money**



To establish the confounders of financial literacy, I regress financial literacy scores on the individual’s socio-economic and demographic variables using ordinary least squares. The regression estimates revealed that except for race, education and income, the relationship between financial literacy and the rest of the variables was not statistically significant. This implies that improving financial literacy levels would be more effective in the presence of policies that improve education attainment (especially matric and above), and augment income generation to ensure stable incomes.

I split the population into two to investigate the dual nature of South Africa, and the t-test results of the two sub-groups are presented in Appendix A4. We expect that in line with the operational definition used to generalize financial literacy in developed and developing economies, the ‘high-income group’ (HIG) would use more of the formal than the non-formal products and that their financial literacy levels should, on average be higher than the ‘lower-income group’ (LIG). Additionally, the LIG would use more transactional products among all product categories, or use more of the non-formal products. Indeed, more LIG individuals use formal transactional products than even the HIG, as well as than any other formal products, and those who use the formal products exhibit higher than the national average level of financial literacy. However, despite the fact that a bigger proportion of the HIG uses more of the formal products within any product category, there is an equally large number of individuals that is excluded, albeit with above average financial literacy. But the differences in financial literacy between the two groups is statistically significant. These results confirm the existence of the duality and it fits well within the empirical literature (see Xu & Zia, 2012). The next section reports the association between financial literacy and use of financial services/products.

5.3 Financial Literacy and Use of Financial Services

Table 1 presents the logit estimates for the use of formal financial services. Results in column 1 show that financially literate consumers have a higher likelihood of using formal financial products compared to using non-formal financial products. Introducing the risk attitudes in columns 2-3 shows

that the probability of using formal financial products by financially literate consumers remains positive but the interaction term shows an overall effect of reducing the significance of financial literacy for both risk-averse and risk-lovers. Moreover access to formal financial service point within 15-45 minutes decreases the likelihood of using formal products by 0.09 while access in excess of 45 minutes is insignificant. These results suggest that South Africans might be sensitive to access time or distance to financial services, which is in line with financial intermediation literature. Our significant correlates of financial literacy- age, education and income- are also associated with increasing the likelihood of using formal financial services for the older, educated and relatively high income earners.

Results for the sector-specific effect of financial literacy, reported in log-odds, are presented in Table 2, and they confirm the logit estimates in Table 1. Recall that log-odds can be either greater or less than one, where values above one reflect an increase in the log-odds while values below one are associated with a decrease in the log-odds. These estimates can be interpreted as percentages. All models use up to 12,000 observations that are weighted to be nationally representative.

The base model shows that financial literacy has the effect of increasing the log-likelihood of using formal and semi-formal financial sector products by 1.024% and 1.015% respectively, while the log-likelihood decreases by 0.996% at a 10 per cent level of significance for the use of informal products (Table 2: Columns 1-3). The demographics show that Whites have a [2.46%] higher likelihood of using formal products compared to their Black counterparts and a [0.454%] less likelihood of using informal products. Having some formal education is associated with a higher likelihood of using formal than non-formal products compared to having no formal education at all, and this likelihood is greater at higher education levels. Finally, and as expected, higher incomes are associated with a higher likelihood of using formal products and less of informal products.

I incorporate two measures of risk attitudes, which are meant to capture the simultaneous effect of financial literacy given differences in the risk attitudes of individuals. Risk measure “*in life, one must take risks*” marginally reduces the significance of using semi-formal products with no effect on informal products, as shown in columns 4-6. Except for the log-odds increasing by 1.7% for using formal products by the risk-lovers, risk does not seem to have an effect on product usage by sector. On the other hand, using risk measure “*you hate owing money*”, it would appear that odds move in favour of the informal sector products especially for the risk-lovers but there is no statistically significant effect of financial literacy on the use of financial services in all sectors.

both the risk-averse and risk-lovers prefer using the informal financial sector than the formal sector, and the effect is stronger for risk-lovers. The marginal effects of the interactive term between financial literacy and risk-attitude show that increasing financial literacy for risk-lovers and risk-lovers has no statistically significant effect on the use of non-formal services, but the effect remains marginally positive and statistically significant for the use of formal sector products.

From a sector-characteristic point of view, even 15 minutes away from formal financial service points is paradoxically associated with increasing the log-odds of using informal products by up to 1.25% at a 5% level of significance, and this likelihood increases to 1.5% at a 1% level of significance for financial access points that are 45 minutes away. On the other hand, there appears to be no statistically significant effect in the semi-formal and formal sectors at this aggregate level of sectoral use.

Turning to the within-products effect, I present the multinomial results of the four models estimated for each product category in Tables 3 and 4. As in the previous cases, I expect that an

Table 1: The Effect of Financial Literacy on the Use of Formal Financial Services

		(1)	(2)	(3)	(4)	
VARIABLES		Base Model	Risk1	Risk2	Probit Est	
Access (<15 minutes)	15-45 minutes	-0.090*	-0.094*	-0.093*	-0.059*	
		(0.054)	(0.054)	(0.054)	(0.031)	
	> 45 minutes	-0.077	-0.065	-0.073	-0.061	
		(0.093)	(0.093)	(0.093)	(0.054)	
Financial Literacy		0.026***	0.017**	0.016***	0.015***	
		(0.001)	(0.007)	(0.004)	(0.001)	
Risk1 = 'you hate owing money'	Risk1-Averse (Neutral)		0.080			
			(0.340)			
	Risk1-Loving		0.526			
			(0.389)			
Race: (Blacks)	Coloreds	-0.232***	-0.238***	-0.242***	-0.137***	
		(0.066)	(0.066)	(0.066)	(0.038)	
	Indian/Asians	-0.129	-0.147	-0.138	-0.095	
		(0.114)	(0.115)	(0.114)	(0.065)	
	Whites	0.946***	0.935***	0.960***	0.482***	
		(0.127)	(0.127)	(0.127)	(0.070)	
Education: (No Formal Education)	Primary School	0.720***	0.717***	0.674***	0.420***	
		(0.146)	(0.146)	(0.147)	(0.082)	
	High School	1.538***	1.529***	1.465***	0.908***	
		(0.144)	(0.144)	(0.144)	(0.081)	
	Post-Matric	2.746***	2.729***	2.673***	1.567***	
		(0.185)	(0.185)	(0.186)	(0.104)	
Age: (18-29years)	30-44 years	0.162**	0.161**	0.155**	0.105***	
		(0.064)	(0.064)	(0.064)	(0.037)	
	45-59 years	0.331***	0.334***	0.325***	0.205***	
		(0.083)	(0.083)	(0.084)	(0.048)	
	60 years	0.671***	0.658***	0.670***	0.402***	
		(0.107)	(0.107)	(0.107)	(0.062)	
Income (Up to R999)	R1000-5999	2.217***	2.214***	2.208***	1.299***	
		(0.058)	(0.058)	(0.058)	(0.033)	
	R6000-9999	3.653***	3.639***	3.636***	1.907***	
		(0.327)	(0.327)	(0.327)	(0.140)	
	R10000-24999	2.783***	2.749***	2.747***	1.438***	
		(0.335)	(0.336)	(0.336)	(0.149)	
Risk2= 'in life, one must take risk'	Risk2-Averse (Neutral)			-0.028		
				(0.239)		
				0.140		
				(0.217)		
		Risk2-Averse*Financial Literacy			0.011**	
					(0.005)	
		Risk2-Loving*Financial Literacy			0.009**	
				(0.005)		
	Risk1-Averse*Financial Literacy		0.010			
			(0.007)			
	Risk1_Loving*Financial Literacy		-0.003			
			(0.008)			
Constant		-3.330***	-3.431***	-3.305***	-1.938***	
		(0.180)	(0.369)	(0.260)	(0.102)	
Observations		12,058	12,058	12,058	12,058	

Robust standard errors in parentheses: ***p<0.01, **p<0.05, *p<0.1. The table shows results of three logit estimates. The outcome variable is binary, 1= use of financial products, 0 otherwise. The reference category for each covariate is provided in brackets. I control for gender, area, province and marital status of the individuals. The results are weighted to be nationally representative and the weights are aligned to those from Statistics South Africa.

Table 2: The Effect of Financial Literacy and Risk-Attitudes on Use of Financial Services by Sector

VARIABLES	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)				
	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal			
Access (<15 minutes)																					
15-45minutes	1.248** (0.133)	1.053 (0.220)	1.254** (0.134)	1.049 (0.085)	1.254** (0.134)	1.058 (0.221)	1.254** (0.134)	1.057 (0.086)	1.254** (0.134)	1.058 (0.221)	1.254** (0.134)	1.057 (0.086)	1.254** (0.134)	1.057 (0.086)	1.249** (0.133)	1.049 (0.219)	1.249** (0.133)	1.045 (0.085)	1.249** (0.133)	1.045 (0.085)	
>45 minutes	1.500*** (0.233)	0.452* (0.185)	1.525*** (0.238)	1.057 (0.138)	1.525*** (0.238)	0.462* (0.189)	1.525*** (0.238)	1.086 (0.142)	1.525*** (0.238)	0.462* (0.189)	1.525*** (0.238)	1.086 (0.142)	1.525*** (0.238)	1.496*** (0.232)	0.451* (0.184)	1.496*** (0.232)	0.451* (0.184)	1.500*** (0.233)	0.451* (0.184)	1.500*** (0.233)	
Financial Literacy	0.996* (0.002)	1.015*** (0.004)	0.993 (0.007)	1.024*** (0.002)	0.993 (0.007)	1.034** (0.014)	0.993 (0.007)	1.020*** (0.006)	0.993 (0.007)	1.034** (0.014)	0.993 (0.007)	1.020*** (0.006)	0.993 (0.007)	1.015 (0.015)	1.003 (0.013)	1.015 (0.015)	1.003 (0.013)	0.996* (0.002)	1.015 (0.015)	0.996* (0.002)	
Risk-Averse (Risk-Neutral)			1.125 (0.395)	2.643 (2.049)	1.125 (0.395)	2.643 (2.049)	1.125 (0.395)	1.338 (0.467)	1.125 (0.395)	2.643 (2.049)	1.125 (0.395)	1.338 (0.467)	1.125 (0.395)	1.338 (0.467)	1.249** (0.133)	1.049 (0.219)	1.249** (0.133)	1.045 (0.085)	1.249** (0.133)	1.045 (0.085)	
Risk-Loving			1.150 (0.374)	2.965 (2.142)	1.150 (0.374)	2.965 (2.142)	1.150 (0.374)	1.703* (0.545)	1.150 (0.374)	2.965 (2.142)	1.150 (0.374)	1.703* (0.545)	1.150 (0.374)	1.703* (0.545)	1.496*** (0.232)	0.451* (0.184)	1.496*** (0.232)	0.451* (0.184)	1.500*** (0.233)	0.451* (0.184)	
Risk-Averse*Financial Literacy			1.001 (0.008)	0.976 (0.015)	1.001 (0.008)	0.976 (0.015)	1.001 (0.008)	1.005 (0.007)	1.001 (0.008)	0.976 (0.015)	1.001 (0.008)	1.005 (0.007)	1.001 (0.008)	1.005 (0.007)	1.496*** (0.232)	0.451* (0.184)	1.496*** (0.232)	0.451* (0.184)	1.500*** (0.233)	0.451* (0.184)	
Risk-Loving*Financial Literacy			1.005 (0.007)	0.981 (0.014)	1.005 (0.007)	0.981 (0.014)	1.005 (0.007)	1.004 (0.007)	1.005 (0.007)	0.981 (0.014)	1.005 (0.007)	1.004 (0.007)	1.005 (0.007)	1.004 (0.007)	1.496*** (0.232)	0.451* (0.184)	1.496*** (0.232)	0.451* (0.184)	1.500*** (0.233)	0.451* (0.184)	
Risk-Averse (Risk-Neutral)																					
Risk-Loving																					
Risk-Averse*Financial Literacy																					
Risk-Loving*Financial Literacy																					
Constant	0.138** (0.038)	0.001*** (0.001)	0.131*** (0.050)	0.033*** (0.009)	0.131*** (0.050)	0.001** (0.001)	0.131*** (0.050)	0.025*** (0.010)	0.131*** (0.050)	0.001** (0.001)	0.131*** (0.050)	0.025*** (0.010)	0.131*** (0.050)	0.051*** (0.036)	0.002*** (0.003)	0.051*** (0.036)	0.002*** (0.003)	0.138** (0.038)	0.001*** (0.001)	0.131*** (0.050)	
Observations	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	

Standard Errors (Eform) in parentheses: ***p<0.01, **p<0.05, *p<0.1. The table shows multinomial estimates of three models of financial products use by sector, reported on log-odds. In the base model risk is not controlled for but the two risk measures are included in the subsequent models. The base category in all models is 'Non-Use' of products, while for covariates the reference category is provided in brackets. I control for gender, race, education, income, age, area, province and marital status. The results are weighted to be nationally representative and weights are aligned to those from Statistics South Africa. Results are also robust using ordered logit.

Table 3: The Effect of Financial Literacy on Use of Financial Services by Product Categories (Base Model)

VARIABLES	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)			
	Semi-formal	Formal	Semi-formal	Formal	Informal	Formal	Semi-formal	Formal	Formal	Formal	Informal	Formal	Semi-formal	Formal	Semi-formal	Formal	Informal	Formal	Informal	Formal		
Access: (< 15minutes)																						
15-45 minutes	1.048 (0.500)	0.961 (0.052)	1.141 (0.105)	1.079 (0.076)	1.161 (0.128)	0.866 (0.081)	1.079 (0.076)	1.161 (0.128)	0.866 (0.081)	1.161 (0.128)	0.866 (0.081)	1.161 (0.128)	0.934 (0.249)	1.281** (0.123)	0.857** (0.063)	1.281** (0.123)	0.857** (0.063)	1.281** (0.123)	0.857** (0.063)	1.281** (0.123)	0.857** (0.063)	0.946 (0.072)
> 45 minutes	0.550 (0.480)	0.609*** (0.059)	1.167 (0.161)	0.537*** (0.077)	0.670** (0.123)	0.323*** (0.079)	0.537*** (0.077)	0.670** (0.123)	0.323*** (0.079)	0.670** (0.123)	0.323*** (0.079)	0.670** (0.123)	0.865 (0.385)	0.695** (0.128)	1.045 (0.117)	0.695** (0.128)	1.045 (0.117)	0.695** (0.128)	1.045 (0.117)	0.695** (0.128)	1.045 (0.117)	0.923 (0.129)
Financial Literacy	1.004 (0.011)	1.031*** (0.001)	0.990*** (0.002)	1.023*** (0.002)	1.021*** (0.003)	1.019*** (0.002)	1.023*** (0.002)	1.021*** (0.003)	1.019*** (0.002)	1.019*** (0.002)	1.019*** (0.002)	1.021*** (0.003)	0.998 (0.006)	1.022*** (0.002)	0.998 (0.002)	1.022*** (0.002)	0.998 (0.002)	1.022*** (0.002)	0.998 (0.002)	1.022*** (0.002)	0.998 (0.002)	1.026*** (0.002)
Constant	0.000 (0.000)	0.024*** (0.005)	0.062*** (0.017)	0.006*** (0.002)	0.005*** (0.002)	0.000*** (0.001)	0.006*** (0.002)	0.005*** (0.002)	0.000*** (0.001)	0.000*** (0.001)	0.000*** (0.001)	0.005*** (0.002)	0.000 (0.000)	0.000*** (0.000)	0.038*** (0.009)	0.000*** (0.000)	0.038*** (0.009)	0.000*** (0.000)	0.038*** (0.009)	0.000*** (0.000)	0.001*** (0.000)	0.000 (0.000)
Observations	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117

Standard Errors (Eform) in parentheses: ***p<0.01, **p<0.05, *p<0.1. The table shows the results of models, one for each product category. Estimates are reported in log-odds. The base category for the dependent variable in all models is 'Non-Use'. The models exclude the individual's risk-attitudes but I control for gender, age, education, race, personal income, area, province and marital status. Results are weighted to be nationally representative and the weights are aligned to those of Statistics South Africa.

Table 4: The Effect of Financial Literacy and Risk-Attitudes on the Use of Financial Services by Product Category

VARIABLES	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)			
	Semi-formal	Formal	Semi-formal	Formal	Informal	Semi-formal	Formal	Semi-formal	Formal	Informal	Semi-formal	Formal	Informal	Semi-formal	Formal	Informal	Semi-formal	Formal	Informal	Semi-formal		
Access: (< 15 minutes)																						
15-45 minutes	0.957 (0.468)	0.964 (0.052)	1.146 (0.105)	1.088 (0.076)	1.167 (0.128)	0.894 (0.084)	1.088 (0.076)	1.167 (0.128)	0.894 (0.084)	1.167 (0.128)	0.928 (0.247)	1.269** (0.122)	0.858** (0.063)	0.928 (0.247)	1.269** (0.122)	0.858** (0.063)	0.928 (0.247)	1.269** (0.122)	0.858** (0.063)	0.928 (0.247)	1.269** (0.122)	0.858** (0.063)
> 45 minutes	0.447 (0.407)	0.616*** (0.060)	1.190 (0.165)	0.548*** (0.079)	0.676** (0.124)	0.338*** (0.084)	0.548*** (0.079)	0.676** (0.124)	0.338*** (0.084)	0.676** (0.124)	0.853 (0.380)	0.684** (0.126)	1.053 (0.118)	0.853 (0.380)	0.684** (0.126)	1.053 (0.118)	0.853 (0.380)	0.684** (0.126)	1.053 (0.118)	0.853 (0.380)	0.684** (0.126)	1.053 (0.118)
Financial Literacy	0.950** (0.02)	1.046*** (0.006)	0.975*** (0.006)	1.046*** (0.008)	1.028*** (0.009)	1.044*** (0.015)	1.046*** (0.008)	1.028*** (0.009)	1.044*** (0.015)	1.028*** (0.009)	1.002 (0.021)	1.025** (0.012)	0.994 (0.005)	1.002 (0.021)	1.025** (0.012)	0.994 (0.005)	1.002 (0.021)	1.025** (0.012)	0.994 (0.005)	1.002 (0.021)	1.025** (0.012)	0.994 (0.005)
Risk-Averse (Neutral)	0.048** (0.069)	1.971** (0.668)	0.589* (0.179)	4.425*** (2.052)	2.153 (1.114)	7.674** (6.616)	4.425*** (2.052)	2.153 (1.114)	7.674** (6.616)	2.153 (1.114)	1.928 (2.159)	2.610 (1.802)	0.940 (0.258)	1.928 (2.159)	2.610 (1.802)	0.940 (0.258)	1.928 (2.159)	2.610 (1.802)	0.940 (0.258)	1.928 (2.159)	2.610 (1.802)	0.940 (0.258)
Risk-Loving	0.015*** (0.019)	3.665*** (1.150)	0.926 (0.248)	5.186*** (2.276)	1.487 (0.732)	9.533*** (7.855)	5.186*** (2.276)	1.487 (0.732)	9.533*** (7.855)	1.487 (0.732)	1.359 (1.477)	2.283 (1.518)	1.101 (0.276)	1.359 (1.477)	2.283 (1.518)	1.101 (0.276)	1.359 (1.477)	2.283 (1.518)	1.101 (0.276)	1.359 (1.477)	2.283 (1.518)	1.101 (0.276)
Risk-Averse*Financial Literacy	1.069** (0.035)	0.991 (0.006)	1.020*** (0.008)	0.977*** (0.008)	0.988 (0.010)	0.973* (0.015)	0.977*** (0.008)	0.988 (0.010)	0.973* (0.015)	0.988 (0.010)	0.996 (0.024)	0.997 (0.013)	1.006 (0.006)	0.996 (0.024)	0.997 (0.013)	1.006 (0.006)	0.996 (0.024)	0.997 (0.013)	1.006 (0.006)	0.996 (0.024)	0.997 (0.013)	1.006 (0.006)
Risk-Loving*Financial Literacy	1.080*** (0.031)	0.982*** (0.006)	1.014** (0.007)	0.976*** (0.008)	0.994 (0.009)	0.974* (0.014)	0.976*** (0.008)	0.994 (0.009)	0.974* (0.014)	0.994 (0.009)	0.997 (0.023)	0.996 (0.012)	1.004 (0.006)	0.997 (0.023)	0.996 (0.012)	1.004 (0.006)	0.997 (0.023)	0.996 (0.012)	1.004 (0.006)	0.997 (0.023)	0.996 (0.012)	1.004 (0.006)
Constant	0.000 (0.000)	0.009*** (0.003)	0.082*** (0.029)	0.002*** (0.001)	0.003*** (0.002)	0.000*** (0.000)	0.002*** (0.001)	0.003*** (0.002)	0.000*** (0.000)	0.003*** (0.002)	0.000 (0.000)	0.000*** (0.000)	0.039*** (0.012)	0.000 (0.000)	0.000*** (0.000)	0.039*** (0.012)	0.000 (0.000)	0.000*** (0.000)	0.039*** (0.012)	0.000 (0.000)	0.000*** (0.000)	0.039*** (0.012)
Observations	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117	12,117

Standard Errors (Eform) in parentheses: ***p<0.01, **p<0.05, *p<0.1. The table reports multinomial estimates of four models, one for each product category, incorporating the risk-attitudes of individuals. Estimates are reported on log-odds. The base category in all models is 'Non Use' while the base category for the risk variable is 'Risk-Neutral'. The risk measure used is 'in life, one must take risks', and it is coded as: 'yes=risk-loving'; 'no=risk-averse'; 'don't know=risk-neutral'. I control for gender, age, education, race, personal income, area, province and marital status. The results are weighted to be nationally representative and the weights are aligned to those of Statistics South Africa.

increase in financial literacy should conventionally work in favour of using formal financial products and less for non-formal products. Other factors remaining constant, an increase in financial skills should highlight the benefits, and costs, of using formal products compared to non-formal products. I also expect that the closer the formal products service points, the higher the likelihood of one using these products, and a simultaneous reduction in the likelihood of using non-formal products. Thus this variable, in addition to the effect of financial literacy within a product category, should capture some form of switching between a particular formal and non-formal financial product category.

In Table 3, we see that financial literacy was associated with a statistically significant increase in the log-odds of using formal products, but equally so for semi-formal credit and informal insurance, while reducing the log-odds of using informal credit usage. Access to formal financial products within 15-45minutes had the effect of increasing the log-odds of using only the formal insurance products and reducing the log-odds of using informal savings. Beyond 45 minutes, the effect is to reduce the log-odds of using formal transaction, formal and semi-formal credit and; informal and formal insurance, otherwise no significant effect in the rest of the product categories/sectors. Thus, while proximity does not seem to increase formal products usage, greater time distance quickly switches usage from this sector.

In Table 4, I use *'in life, one must take risks'* as the measure for the individual's risk-attitudes, plus an interactive term between risk and financial literacy as I do in previous models. Results show that, whereas an increase in financial literacy has the effect of increasing the log-odds of using formal products across product categories, increasing financial literacy for risk-averse individuals has the effect of a switch from formal to semi-formal transactions and from semi-formal to informal credit. Similarly for the risk-lovers, there is a switch across all product categories except in the insurance and informal savings products where there is no significant risk-related effect. These results are robust when I compute the marginal effects of financial literacy and risk, where the magnitudes decline slightly. This confirms the dampening effect of risk on the probability of financially literate consumers using formal financial products. This effect is higher for the risk-lovers, which is consistent with the sectoral results. Finally, the effect of access to formal financial services points is similar to the results in the base model. It should be noted that these results incorporate the effect of other covariates of interest like income, education and age of the individual.

Further analysis using an alternative measure of risk attitude, *'you hate owing money'* shows no major changes on the main effect of financial literacy or on the interacted terms, although there is a significant reduction in the use of semi-formal credit and formal insurance. However, these results seem to be closely related to the framing of the question.

The above results are somewhat paradoxical in as far as the role of financial literacy for the case of South Africa is concerned. Nonetheless I endeavour interpret them by product categories. The results for the increased use of formal transactional products might be a reflection of the confounders of financial literacy like employment or income and thus picking up involuntary use. For instance, employers may require that salaries be paid via bank accounts and for the lower end of the income spectrum, low-cost accounts like Mzansi provide an alternative for such a requirement or for receiving transfers/remittances. But since financial literacy introduces awareness to the operations of such a formal system, users quickly work out the costs and benefits associated therewith and hence switch to using other alternatives that provide immediate rewards such as cash-back or royalty points which can be exchanged for merchandise, thus keeping their engagement with the formal sector to the bare

minimum - if at all. This behaviour is what the risk measure captures. It should be noted however, that the utility derived from transactional products in the semi-formal sector is secondary utility, and unless an individual's demand for the first line products increases, the individual is less likely to demand for semi-formal financial products. The intensified use can thus be interpreted as a cost-benefit analysis by the consumer of say, immediate rewards from retail stores versus the costs that might be associated with maintaining a cheque account. Indeed the effect of decreased use of formal transactions is significant, and in favour of an equally significant use of semi-formal transactional product especially for the risk-lovers. This result is more of involuntary uptake of financial products than knowledge based demand. From a South African perspective, such an argument is probable considering that the financial reforms set out to increase access (see the Financial Sector Sector, 2003).

For credit products, though the effect of financial literacy is positive, it is dampened by the individual's risk attitudes for both the formal and semi-formal sector in favour of informal credit, which emphasizes the dampening effect of consumers' risk attitudes, a result that is further corroborated by the marginal effects of these variables. This result might reflect ex-poste credit or debt related knowledge acquired when consumers become credit active. So as more terminologies and credit operations are taught, consumers shy away from formal credit.

Usage of insurance products was not responsive to risk attitudes of individuals, neither did the interactive terms have any significant effect. These results could be indicative of either indifference when it comes to insurance products or involuntary insurance. This product category is perhaps one of the most complex among formal products, but with a range of instruments that is equally represented in the informal sector. For instance, funeral policies, which form 29% of formal insurance products in our representative sample, are also available in form of burial societies or from undertakers, and form over 90% of informal insurance (FinScope Surveys, 2005-2009). Case et al., (2013) argue that the change in mortality patterns in South Africa, that claim middle-aged individuals, necessitate that contingency plans be put in place to cater for cost of funerals and ensure continued support for the deceased's family. Thus, this product can be viewed as a necessity from a societal perspective such that the choice of the source of the product becomes a matter of affordability, and the role of financial literacy thus minimal if at all. The involuntary perspective can be linked to credit services in the formal and semi-formal products, which often come with mandatory insurance. For instance vehicle financing requires that the vehicle be insured at least until its paid off; personal/consumer loans carry a credit insurance fee; even cell-phone companies often make provision for insuring contract phones. That the value of financial literacy is not great for this product is indicated by Table A2 where users of informal insurance are as financially literate as formal insurance users. Thus, the formal use might once again reflect involuntary insurance on other services like formal or semi-formal credit or simply a matter of affordability associated with high income, whereas inform insurance use could be voluntary and for low income earners, where the latter two are driven by cultural or societal norms.

Similarly, results for savings products seem to also suggest that perhaps savings and investments practices in the informal sector are guided by factors other than financial literacy, such as habits and culture. For instance, if an individual is accustomed to using rotating savings clubs (ROSCAs) or stokvels (which are popular in South Africa), even financial education on the dangers of saving informally might not change his attitude towards this practice. Indeed the summary statistics revealed that the proportion of people saving informally is the same as that saving formally, indicating the

popularity of the informal savings sector.

Finally for the choice-specific characteristics, we would expect shorter travel durations to have the effect of reducing the log-odds of using non-formal products. The insignificance of the log-odds of using most of the products even in close proximity confirms our earlier argument that perhaps the motivation to use formal products lies outside of the conventional factors of financial knowledge, and now, accessibility to formal sources. Indeed evidence from recent studies conducted using the Findex dataset shows that factors such as users fees, documentation, etc., prevent many financially excluded individuals from using formal financial services (Demirgüç-Kunt, & Klapper, 2013) .

The above results are empirically supported by studies in both the developing and developed economies. For instance, Clarke et al. (2012) show an increased participation of financially literate consumers in the 401k savings plans in the USA, while Jappelli & Padula (2011) endogenize financial literacy and find that financial literacy and saving are positively correlated. Gine et al. (2008), Cohen & Young (2007) and; Tran & Yun (2004) report an increase in insurance take-up in Guatemala, India, Uganda and Vietnam following a financial education intervention. The burgeoning literature of using randomised control experiments also shows that providing financial skills to individuals improves their use of formal financial products, which opens up opportunities associated with welfare improvement. They argue that the effect is greater for individuals with lower initial levels of education, which is linked to cognitive ability and therefore exogenous financial literacy.²² Intuitive in these experiments is that there are instances when financial literacy might not drive or explain financial products uptake.

5.4 Robustness checks

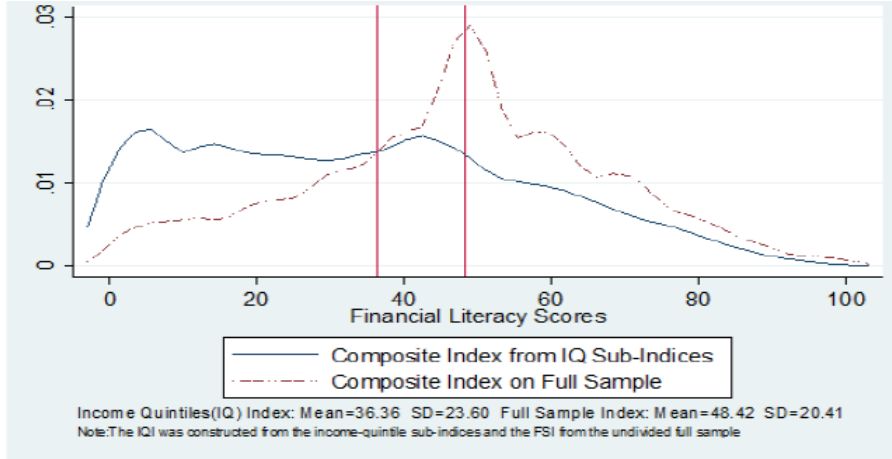
The bivariate results in Appendix A4 raised concerns about the representativity of the index constructed on the full sample, and which was used in the analysis thus far. I therefore split the sample along income quintiles to form two distinct sub-samples²³, then constructed two sub-indices on the sub-populations and additively combined the sub-sample indices to obtain an overall index for the country. The average financial literacy score for the high-income individuals was almost twice that of their low-income counterparts using this approach. Thus the index constructed for the full sample would appear to be heavily driven by the scores of the high-income sub-group although it could also be viewed as a weighted average of the sub-sample indices. Figure 5 shows an overlay of this index on the index constructed without dividing up the population.

While it is clear that I might have over-estimated the average financial literacy level of the country by using the full sample index, the patterns in the distribution of financial literacy, as well as its confounders remain similar to my earlier findings. Using this new index as the covariate in the regressions did not change the results. The intuition of these results is that the questions selected, as well as the multivariate approach used to construct the index, minimised any potential bias that might have existed. In any case, the initial index would seem to provide the best-case scenario of financial literacy in the country while the composite from the sub-samples provides the worst-case scenario.

²²There are arguments that financial literacy is indeed a proxy for education attainment (see Behrman et al., 2012)

²³Cole et al. (2011) use per capita expenditure to split the Indonesian and Indian population.

Figure 5: Pessimistic versus Optimistic Financial Literacy for South Africa



I also tested whether there was an omitted variable problem relating to the quality/characteristics of the financial services and products. To determine the extent of the bias that might arise from this omission, I re-estimated the models excluding the alternative-specific characteristics, which in this case were represented by the variable ‘access’ to formal financial services point, measured in minutes. The idea was to assess the difference in the coefficients estimated with the exclusion of this variable. The estimation results, though not included, showed that there was hardly any change in the estimated coefficients with the exclusion of the access variable. This result suggests that the potential bias from the lack of information on the quality of financial services from the formal, semi-formal and informal sectors, might not be important in our estimates. On the other hand, it might also suggest that the proxy used was poor and if other measures were used, such as direct costs or fees relating to products in each sector, a better assessment of their impact would be obtained.

Finally, I cross examination the three significant confounders of financial literacy - race, education and income, and how they relate use of financial services in the country. The idea is to establish the extent of the interactive effect of these variables compared to the financial literacy effect in explaining the observed patterns in the use of financial services. Figures 6-8 trace this interplay and indeed we notice that, formal financial usage is skewed to Whites who mainly have high school and above, in terms of formal education, and subsequently high financial literacy levels, whereas Blacks and Coloreds use more of informal services partly due to their low levels of formal education attainment. Incorporating the above interactions in the main regressions showed that the effect of the age-race interaction term is to slightly reduce the significance of financial literacy in the use/non-use of semi-formal financial services and no effect on the informal products use across all racial groups and age brackets. However, Whites aged 45 and above had a higher likelihood of using formal financial services than their younger counterparts. It should be noted that although the descriptive statistics revealed a high correlation between education, race and products usage, an attempt to include the education-race interactive term was not possible due to empty cells for Whites and Indians with less than high school education.

Figure 6: Formal Use by Age, Education and Race

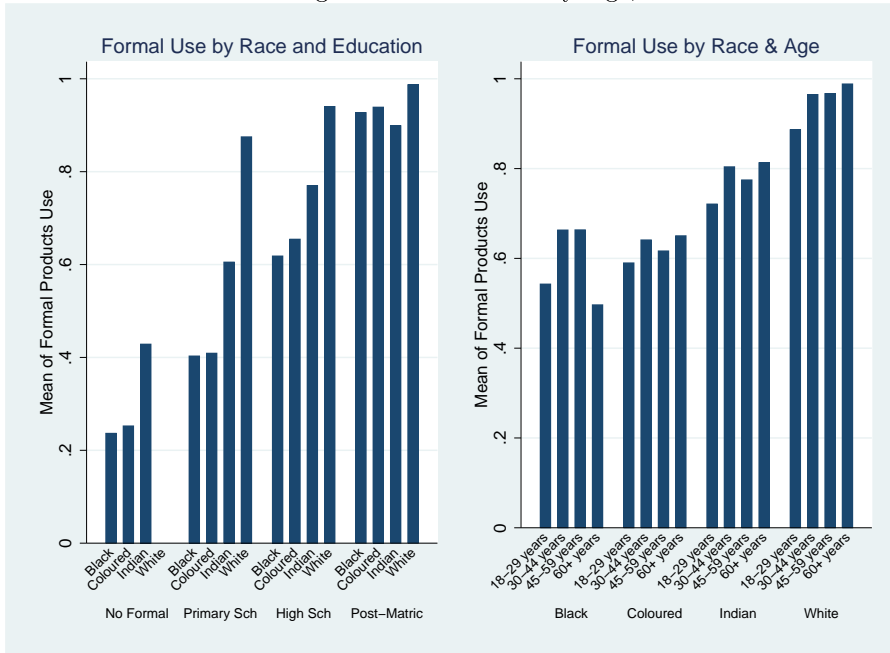


Figure 7: Informal Use by Age, Education and Race

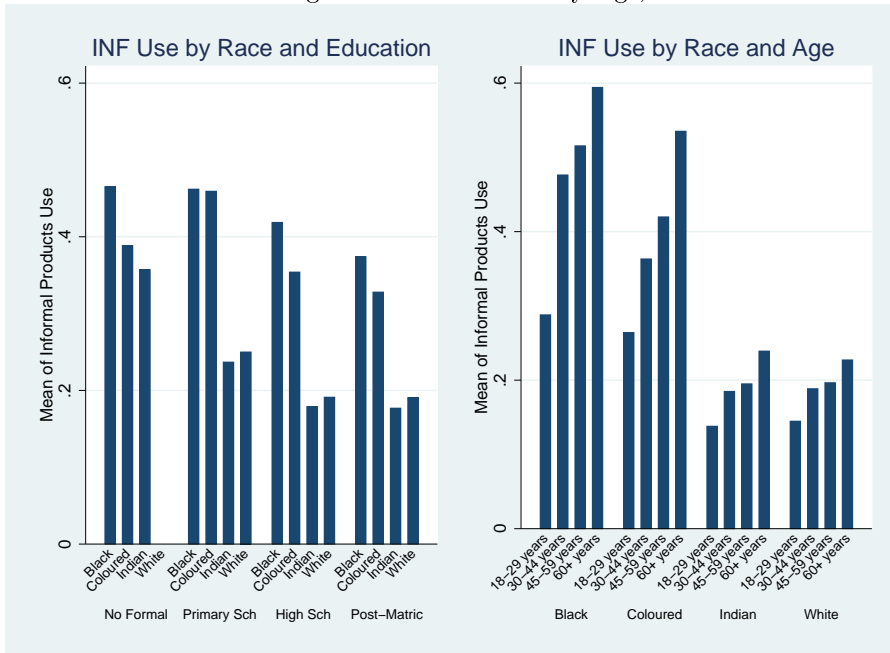
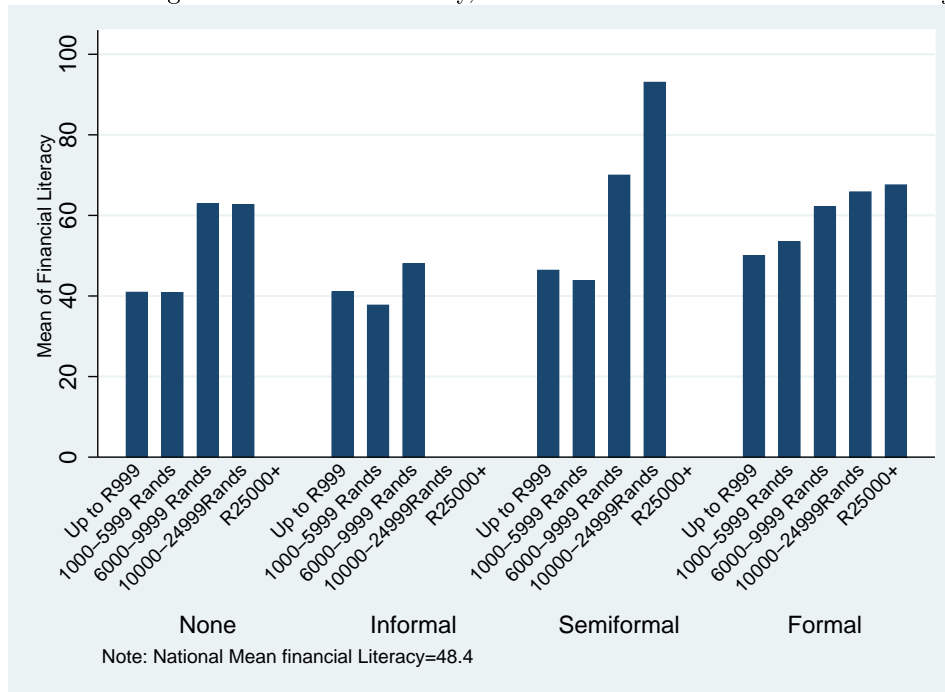


Figure 8: Financial Literacy, Income and Use of Financial Services by Sector



In terms of the role of personal income in use of financial services, Figure 7 shows that while individuals earning R10 000 and above were most likely to use formal products, a good number was also excluded. indeed the estimates in the preceding section showed that higher incomes were significantly associated with formal products usage. Excluding this variable from the regressions to establish its relative importance showed a larger effect of financial literacy. Furthermore, in the absence of choice-specific characteristics, income might in part proxy the costs associated with services offered by the different sectors. This might explain why the exclusion of access to formal financial services while retaining income did not alter the results drastically. In factor exclusion of both yielded an even greater effect of financial literacy.

Given that the choice of a base category might have implications to the results in a multinomial regression, I re-estimated the models using risk-averse on the one hand and risk-loving on the the other, as base categories. My results do not change especially in terms of level of significance of usage of formal financial services.

6 Summary and Conclusions

There is burgeoning literature linking financial literacy to economic growth, based on the well documented role financial literacy plays in access to and effective use of finance with spill-over effects to the broader economy such as improving livelihoods of users of financial services and products. But the challenge that faces research in this area is the definition and subsequently the measurement of financial literacy. While many studies conduct tailored surveys, in this paper I have shown that it is possible to construct a measure of financial literacy from finance related micro-secondary data, and for an economy that exhibits both high-income and low-income economy characteristics. Given the

dual characteristics, such a measure provides an optimistic level of financial literacy. In this study, the constructed measure shows that financial literacy in South Africa is on average low, 48.42 on a scale of 0-100, lower among women, the young and the old, and increases with education as well as with income. Regional and racial differences are also evident. These patterns mimic empirical results obtained for many developed economies as summarised in Lusardi and Mitchell (2014) and Xu & Zia (2012), but they also reflect the education, labour market and related inequalities characteristic of post-apartheid South Africa. These findings a combination of both the exogenous financial literacy (linked to family background and cognitive ability/education) versus endogenous financial literacy that can either be acquired by using the financial services or by use of financial advisers by the affluent members of society. Thus, establishing an effective national financial education strategy should consider provision of free financial education for the young, the less educated and the marginalised who cannot afford to pay for it, as well as ensure sufficient financial education for potential users, to minimise the extent of potential financial mistakes. In addition, it be augmented by policies that address especially education attainment (matric and above) and that ensure stable incomes.

The results of this paper show that there was greater use of formal products by consumers with financial literacy levels above the national average of 48.4. However, this effect was dampened by the risk attitudes of consumers. Moreover, for credit products, consumer's risk attitudes led to a subtle switch between formal and informal financial products, but no significant effect on insurance products which remained equally used in the formal and informal sectors. This result suggests that while formal products users exhibited an understanding of the relevant financial concepts, formal use might also be a reflection of involuntary use of insurance arising from demand of other services such as mortgage and vehicle finance, credit insurance, etc., while the informal effect might represent a need by the low income group that is serviced by the informal sector. While access to financial service points is crucial for formal financial sector participation, my results are not water-tight based on the proxy I used. It would appear that higher income levels are associated with a greater likelihood of formal products usage than proximity of financial services points. Hence, use of a more direct cost measure like product costs in the three financial sectors might yield better results, to allow for an assessment into the magnitude of cross-elasticity of products usage, especially between the formal and informal financial sectors.

Thus, while there is compelling evidence that financial literacy is associated with use of formal financial products, this knowledge alone is not sufficient to drive demand of such products if non-formal alternatives exist. Indeed the dynamics revealed in this study suggest that there other factors over and above financial literacy, perhaps related to policy/regulations or to Hofstede (2001)'s cultural dimensions of individualism/collectivism and uncertainty avoidance (such as beliefs systems, cultural practices, social networks), that either interactively or individually influenced financial decisions in South Africa over the period of the study, although these could not be captured on account of data. The effect of 'risk' in this study shows that South Africans might not be sophisticated enough to take advantage of the benefits associated with the formal product range available in the South African financial system. This result differs slightly from Cox et al., (2011) for the Dutch Households. It is therefore possible that the effect of financial literacy picked up in the study was more a result of the financial sector reforms in post-apartheid South Africa during the period 2005 - 2009 such as the enforcement of financial access, leading to individuals learning by doing. This argument is corroborated by the responses to the questions used to capture financial literacy in this study as well

as the results obtained by the incorporation of a risk measure.²⁴ But the effect of increased use of formal financial services is not uniform for all product categories. The results show an overall positive effect of financial literacy for the transactional and savings product categories but no significant effect for the insurance and credit products, neither on informal savings. The decline in the log-odds of using savings and investment products reflects to some extent, the poor savings culture of South Africans. Indeed the period of this study is characterized by the lowest rate of household savings in post-apartheid South Africa of close to -0.2% of household disposable income (SARB, 2012). However, the positive association with use of non-formal products suggests that the effect of factors other than financial skills is stronger in determining the use of informal financial products in South Africa. These results are robust when using an ordered logit. Not only are the directions consistent, but the sectors as defined in this study, are statistically significant, implying that the products therein are unique.

Thus, the presence of a vibrant informal financial sector amidst low trust in the formal financial system, has the potential of crowding-out the use of formal financial products regardless of the financial literacy levels of the population. However, financial inclusion could be achieved if it is augmented by policies that ensure stable incomes, in order to increase the uptake of formal transactional and savings/investment products. Providing low-cost insurance products would increase the uptake by the low-income group that is currently using informal insurance products. Designing a financial education programme requires that the content is function-specific or based on product categories, to target the needs of the different demographic groups, as opposed to a one-size-fits-all curriculum.

²⁴Notice that in Table A1 individuals exhibited knowledge of some concepts but not others closely associated with the ones they knew. For instance one could have learnt about 'bad debt' as a victim of delinquency and not known how interest rates work, or not known the 'National Credit Act' which regulates debt/credit related transactions nor credit bureaus

Appendix

Appendix A1: Financial Literacy Variables

<i>Financial Knowledge Domain</i>	<i>Percent</i>
Knowledge and understanding of Bad-debt	43.61
Knowledge and understanding of the National Credit Act	2.32
Knowledge and understanding of Credit Bureaus	10.84
Knowledge of compounding interest (saving small amounts and investing overtime)	23.94
Knowledge of Services & Products Usage	14.17
Knowledge of how Interest Rates work and are calculated	1.85
Knowledge of how to Draw & Manage Budget	0.72
Knowledge of Life Insurance	0.19
Knowledge on how to Check Credit Worthiness	0.13
Trust Banks	0.82
<i>Financial Capability Domain</i>	
You try to save regularly	47.05
You are saving for something specific	3.92
You go without basics so you can save	4.38
You have enough for retirement	21.22
You spend wisely	19.45
<i>Source of Financial Information</i>	
Friends & Family	61.26
Financial Pages	6.55
Other (financial advisers, money lenders, churches, schools, community, employers)	32.2

Note: The Table shows the percentage of respondents who responded 'yes' to the questions that were used to construct the composite financial literacy measure. 'Trust in banks' and 'Source of financial information' were not included in the computation

Appendix A2: Products Classification in South Africa

Transactional	Credit	Insurance	Savings and Investment	Retirement Planning
<i>Formal Use</i>				
ATM card	Credit card	Funeral policy company	Money market	Pension Fund
Debit card	Overdraft	Household contents	Savings account	Retirement
Current/cheque account	Home loan or bond	Life cover for debt	Fixed deposit account	Annuity
Garage card	Vehicle finance	Disability cover	Unit trusts	Provident Fund
Mzansi account	Personal loan from bank	Cover for dreaded	Postbank savings book	Life assurance
Transactions account	(includes micro-lenders like	diseases		Endowment
Postbank account	African Bank)	Medical insurance and hospital plans		policies
				Education policy
<i>Semi-formal Use</i>				
Store card cash back (e.g. pick n pay, woolworths, clicks, etc)	Store cards	Cell phone companies	n/a	Life cover from employer or trade unions
Loyalty cash back (cellphone companies, airlines, etc)	Government Employer	Funeral cover from employer		
	Retail stores	Disability cover from employer		
<i>Informal Use</i>				
n/a	vehicle loan, home loan, personal loan from family, mashonisa, friends , Stokvel, Local spaza	Funeral policy with an undertaker or burial society	Savings with stokvels or family and friends	n/a

Notes: The table shows the categorisation of financial products and services in the South African context. Formal financial use refers to services from the banks, insurance companies and micro-lenders such as smaller banks like African bank and Capitec. Retirement planning in this study is combined with savings and investment category

Appendix A3: Products Use, Risk-Attitudes and Access

<i>Variable</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Formal	18694	0.590	0.492	0	1
Semi-formal	18694	0.190	0.392	0	1
Informal	18694	0.389	0.488	0	1
<i>Product categories</i>					
F: Transaction	18694	0.575	0.494	0	1
F: Credit & Loans	18693	0.098	0.298	0	1
F: Short-term insurance	18694	0.233	0.423	0	1
F: Long-term insurance	18694	0.175	0.380	0	1
F: Savings & Investment	18694	0.128	0.334	0	1
SF: Transaction	7433	0.049	0.217	0	1
SF: Credit & Loans	18694	0.147	0.354	0	1
SF: Insurance	4941	0.266	0.442	0	1
INF: Credit & Loans	18694	0.096	0.295	0	1
INF: Insurance	7594	0.645	0.478	0	1
INF: Savings & Investment	18694	0.124	0.330	0	1
<i>Risk1: In life, one must take risks</i>					
Neutral	18694	0.111	0.314	0	1
Risk averse	18694	0.255	0.436	0	1
Risk loving	18694	0.635	0.482	0	1
<i>Risk2: Hate owing money</i>					
Neutral	18694	0.0370	0.189	0	1
Risk averse	18694	0.865	0.342	0	1
Risk loving	18694	0.0980	0.297	0	1
<i>Access</i>					
Less than 15 minutes	18694	0.313	0.464	0	1
15-45 minutes	18694	0.524	0.499	0	1
Over 45 minutes	18694	0.0938	0.292	0	1

Notes: F=Formal, SF= Semiformal, INF= Informal

Appendix A4: Financial Literacy and Products Usage by Sub-Samples

		Low-Income Group		High-Income Group		Full Sample	
		Obs.	Mean	Obs.	Mean	Obs.	Mean
Overall Financial Literacy		8531	44.84	3984	56.97	12515	48.7
<u>Sector:</u>	Formal	3699	50.51	3799	57.79	7478	54.19
	SF	194	46.07	16	47.93	210	46.21
	Informal	1269	39.91	69	41.12	1338	39.97
	Non-use	3369	40.40	120	41.52	3489	40.44
<u>Transaction</u>	Formal	1886	56.06	1448	63.19	3334	59.16
	Non-use	6622	41.62	2535	53.42	9157	44.89
<u>Credit & Loan</u>	Formal	182	57.56	1156	62.98	1338	62.98
	SF	756	54.67	731	59.59	1487	57.09
	INF	545	38.97	207	44.71	752	40.55
	Non-use	7048	43.91	1890	53.62	8938	45.97
<u>Insurance</u>	Formal	307	59.63	682	63.78	989	62.49
	SF	40	48.24	31	53.87	71	50.70
	INF	438	51.25	26	59.60	464	51.71
	Non-use	7746	43.88	3245	55.54	10991	47.32
<u>Savings & Investment</u>	Formal	414	56.43	1158	63.07	1572	61.32
	INF	616	43.48	411	50.13	1027	46.14
	Non-use	7501	44.31	2415	55.20	9916	46.97

Notes: Diff = mean (LIG) – mean (HIG); H₀: diff = 0, H_a: diff < 0; ***p<0.01, **p<0.05, *p<0.1

The table shows the results of a two-sample t-test for differences in financial literacy levels of users and non-users of financial services by financial sector and product categories, for the low-income and high-income groups. The data is pooled for the period 2005-2009 and weighted to be nationally representative

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