

Can Patience Predict Choice Of Savings Mechanisms And The Quality Of Life? Evidence From Zambia

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Abstract

This paper investigates the role of patience in the choice of savings mechanisms and in the quality of life of individuals irrespective of their savings behaviour. Using data on financial access, use and perceptions in Zambia, a discrete choice model predicts that more patient individuals are more likely to use formal savings mechanisms while the less patient individuals choose informal options. Moreover patience is associated with better quality of life. Conditional on savings mechanism however, I find a subtle but significant role of patience in predicting a better quality of life for individuals saving formally. I conclude that in this setting, irrespective of the savings mechanism used, the difference between below-average or above-average quality of life is insignificant.

JEL: D14, D60, D91

Keywords: Patience, Savings Mechanisms, Quality of Life

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1. Introduction

Quality of life remains an undisputed development indicator. But the multi-dimensional nature of this concept poses a challenge in its measurement and in identifying its confounders. Modern economic theory measures quality of life by observing the explicit choices made by individuals. It is assumed that these choices satisfies their preferences for the best quality of life (Diener and Suh, 1997). But the choice process itself is guided by both observable and non-observable factors, including behaviour. For instance, while there is substantial evidence that the use of saving products can improve the user's wellbeing (Ashraf, Karlan and Yin, 2006; Cassidy and Fafchamps, 2015), it is unclear whether the unobservable confounders of the saving behaviour can predict the individual's quality of life. This paper therefore examines the role of patience in the patterns of saving and the associated quality of life. Time preference and discount rates have been found to play a role in behaviours such as saving, investing and smoking (Ainslie and Haendel, 1983; Ashraf et al., 2006; Chabris et al., 2008). There are also some arguments that time preference can transmit poverty if parents do not invest in their children, which in turn might give rise to a generation of impatient children (Becker and Mulligan, 1997; Lang and Ruud, 1986).

I use Zambian data from the 2009 Financial Access survey to model the choice of savings mechanisms used by individuals, and what these behavioural characteristics imply for their quality of life. First, I am interested in the extent to which time-preferences predicts the mechanism of saving – formal or informal. Researchers have often used discount rates or time preferences to investigate behaviour such as saving and smoking (Chabris et al. 2008). I build on such works by disaggregating saving into available savings options. Second, I investigate the existence of a direct link between time preference and an individual's observed quality of life without conditioning on saving.

Methodologically, the vast majority of empirical work has been conducted using field or laboratory experiments, to solicit individuals' discounting rates (Chabris et al., 2008; Fredrick et al., 2002; Harrison et al., 2005). This study differs from existing literature by using survey data collected for the purpose of profiling access to and use of financial services by individuals, and their risk attitudes and perceptions. Discrete choice models are employed to estimate first, the probability of using a particular savings mechanism given an individual's discount rate. The multinomial logit is then employed to investigate the probability of realising bad or good life outcome given the choice savings mechanism and one's time preference. Finally, a linear model is fitted to establish the direct link between discount rate and the observed individual's quality of life measured by a quality of life index.

Results show that individuals with a low discount rate (patient) are more likely to use formal savings mechanisms than informal alternatives. This result suggests that perhaps the formal savings mechanisms are considered to be long-term compared to the informal mechanisms. Alternatively,

given that there is selection into the use of this type of services, individuals who use these services have a predisposition to saving for long term. This result should not be interpreted as the informal savers saving less than formal savers in absolute terms, but rather that they seem to save for shorter periods. In terms of the direct link between patience and quality of life, the results show that impatient people have a lower quality of life compared to their patient counterparts. However, conditioning quality of life on the savings mechanism used shows not statistically significant difference in welfare outcomes by both the patient and the less patient individuals, but a slightly significant better quality of life for individuals using formal savings mechanisms, as formal mechanisms are associated with patience.

The rest of the paper is structured as follows: section 2 provides a brief overview of related literature. This is followed by an overview of savings behaviour from the perspective of financial access in Zambia and the welfare, in Section 3. The conceptual framework is provided in Section 4, followed by the empirical strategy in Section 5. Results are presented and discussed in Section 6 and Section 7 concludes.

2. Contribution to existing literature

There is a large body of literature on the role of time preference and/or discounting rates in asset pricing and financial decisions such as saving and investment (Bergman, 1985; Ashraf et al., 2006; Tran and Zeckhauser, 2011; Dupas and Robinson, 2013; Karlan et al., 2013). Because such decisions result in choices that are a means to an end, often the individual's well-being, there is burgeoning empirical work on the subject especially in developing economies. In a randomised experiment in the Philippines for instance, Ashraf et al. (2006) find that more forward looking individuals (in their case women with lower discount rates for the future) have a preference for commitment to save. But does the savings mechanism have to be overly formal or regulated by monetary authorities? Just like Ashraf et al (2006), Dupas and Robinson (2013) devise an informal savings technology for investment in preventative health in Kenya. They find a reduction in the vulnerability to health shocks, adding that once one has the commitment, any safe place to keep the money is sufficient to execute their savings plan. I contribute to this literature by investigating if time preference can lead individuals to self-select into available savings mechanisms.

Several arguments have been investigated for the relationship between patience and welfare. For instance, theoretical and empirical evidence suggests that impatience transmits poverty mainly through minimal investment in human development by parents (Lang & Ruud, 1986; Becker & Mulligan, 1997). Becker & Mulligan (1997) further argue that within individual variation in patience exist such that the same individual exhibits varying degrees of patience during periods of scarcity (less

patient) and during periods of plenty (more patient). That the poor are impatient is thus a case of the condition of scarcity they find themselves in, having to satisfy basic needs. But if the poor indeed have fewer opportunities available to them, such as credit and investment, as argues Banerjee (2001), then this will curtail their accumulation of wealth, making the case more of inaccessible opportunities rather than that of patience. It is therefore clear that there is discontent on the direction of causality between patience or time preference and welfare. Indeed Becker and Mulligan (1997) find that wealth affect the degree of patience. Since results are mixed regarding the discount rates between the poor and the non-poor (see Carvallo, 2010 for a summary) and the direction of causality, this paper contributes to these debates by testing the direction of causality from time preference to well-being and by analysing a sample that has a similar motive of delaying immediate consumption but using different mechanisms.

Finally the paper contributes to a dynamic discussion on the determinants of individual well-being. Behavioural psychologists relate cognitive resources to one's state of well-being and that improving one's welfare is a function of one's choices plus broader factors such as the nature and quality of employment, wages earned, standards and cost of living, and also the role of government welfare policy (Mullainathan, 2011). But as several researchers argue, such as Shiv and Fedorikhin (1999) and Mischel, Shoda and Rodriguez (1989), one's decisions in a state of plenty are different from that in a state of scarcity. Thus these choices can improve or worsen one's well-being. But implicit in this argument is the role of patience, which is intimated by Becker and Mulligan (1997). This study therefore explicitly investigates the role of patience (which falls between behavioural psychology and economics) as a determinant of welfare.

3. The Context: Savings Behaviour and Quality of Life in Zambia

Zambia is one of the countries where a large population remains outside the formal financial sector. As many as 7.2 million Zambians live in extreme poverty, with a Gini coefficient of 55.6.¹ In 2012 after the Maya Declaration², the Zambia government made a commitment through its Financial Sector Development Plan, to increase financial access for its citizens as one of one of the channels of addressing poverty. Subsequently, the country's mobile network operators and commercial banks started offering mobile services for bill payments and money transfers. Additional technological innovations were adopted to facilitate agency banking. Zambia's efforts were reinforced by the World Bank through the Financial Inclusion Support Framework, to help it to scale-up financial inclusion and

¹ <http://www.worldbank.org/en/country/zambia/overview>

² The Maya Declaration is a commitment to unlock the economic and social potential of the 2.5 billion unbanked through financial inclusion. It was agreed upon in Maya, Mexico in 2011 by the G20 countries. See www.afi-global.org/maya-declaration

access.³ By 2015, up to 59.3% of Zambians were either formally or informally included compared to just 37.3% in 2009. However formal accounts holding was only 24.8% by 2015 (FinScope Zambia, 2015). But financial access seems to be skewed in favour of the Central, Copperbelt, Lusaka and Southern provinces shown in Figure 1. In fact Zambia is so sparsely populated which could explain the low penetration of financial services infrastructure by the financial sector, with majority of banks operating in Lusaka (the capital city), followed by Copperbelt and Southern provinces as shown in Table 1. Nonetheless one would expect the level of financial sector participation to follow a similar pattern.

Figure 1: The Geography of Zambia



From the data used in this study, I define saving as *'putting money aside [in a special place or account] to stop it from being used or to use it later'* (see Table 4). Consequently, although 63.1% of the adult population claim to save or put away money, most savers save at home or using non-formal mechanisms as shown Table 1. The savings pattern closely follows the financial access, but there seems to be a similar pattern for informal savings too as shown in Table 1. The reasons advanced for saving is mainly for something specific. In terms of time preference, Zambians can be considered to be impatient based on a study conducted by Wang, Rieger and Hens (2011).⁴ So, can this explain the observed savings patterns in the country or the welfare outcomes of the self-reported savers? Table 1 also shows the Gini coefficient by province but there does not seem to be a link between financial the provincial levels of poverty and financial access.

³ See <http://allafrica.com/stories/201511090242.html>

⁴ This study was conducted for 45 countries using a standard question. Africa was represented by Nigeria

Table 1: Financial Access, Use and Welfare in Zambia

Province	Number of Banks	Percentage of Savers	Saving informally	Saving Formally	Gini Coefficient
Central	19	12.60	16.10	10.32	0.61
Copperbelt	66	15.11	7.88	19.95	0.34
Eastern	18	7.97	9.25	7.11	0.79
Luapula	8	6.59	7.88	5.73	0.80
Lusaka	131	16.35	18.49	14.91	0.24
Northern	17	14.76	23.97	8.49	0.73
North Western	14	8.79	5.48	11.01	0.67
Southern	41	12.23	6.85	15.83	0.68
Western	7	5.63	4.11	6.65	0.80

Source: FinScope Zambia Report, 2015. Only 30.2% of the adult population report saving formally. Data on number of banks is obtained from Linthorst (2013)

4. Conceptual framework

Time preference is often referred to as a trade-off or the marginal rate of substitution between present and future consumption or the value attached to the costs and benefits that occur in the future versus those in the present (Fisher, 1930; Chabris et al., 2008). According to these authors, the rate of time preference or the discount rate is said to be influential in decisions that affect the well-being of individuals such as saving and even smoking. It therefore differs among individuals implying that the utility derived across time is intertemporally separable across individuals. But Fisher (1930) argues that the degree of preference between the present and future consumption can also vary within an individual across two time periods of settings which manifest as rational or irrational behaviour. Implicitly, utility in this case ceases to be separable. Given that this paper looks at preferences across individuals, I follow Becker and Mulligan (1997) and represent the value of the costs and benefits or utility by the following general expression:

$$V = f_1(c_1) + \beta f_2(c_2) \quad (1)$$

where c_1 and c_2 are present and future consumption streams respectively, β is the discount rate which greater than zero.

Let us assume that the two consumption streams represent savings mechanisms such as informal (use of savings clubs, home moneybox or friends) and formal (bank accounts). Empirical work such as Ashraf et al. (2006) and Dupas and Robinson (2013) shows that individuals will look for mechanisms that will help them resist temptation of immediate consumption or plan for emergencies such as healthcare. Such mechanisms include commitment savings schemes, piggy-banks, savings accounts, health insurance, etc. Thus in this framework of various savings options, one can think of the preferred option or mechanism as representing the degree of restraint one is subjecting himself

to, which might as well represent the degree of patience or time-preference. Formal mechanisms have rules and regulations compared to informal mechanisms. It is thus safe to associate choice of formal savings mechanisms with exercising more restraint and hence more patience and the choice of informal mechanisms, with less patience.

Let us assume further that the utility derived from the use any savings mechanism can be measured using the quality of life observed when the individual uses these mechanisms. Drawing from Fisher (1930)'s argument about the degree of discounting, the choice of the savings mechanism will depend on the degree of discounting of a given individual. The associated welfare outcomes can then be represented by expression (2) below:

$$QOL_i = f_n(s_n(1 - \beta_i)) + f_f(s_f(\beta_i)) \quad (2)$$

Where s_n and s_f are informal and formal savings mechanisms, β_i is the individual's degree of discounting which ranges between zero and one inclusive ($0 \leq \beta \leq 1$). Expression (2) shows that saving is a function of the discount rate or time preference of the individual. Given that discount rates differ across individuals, the choice of savings mechanism will differ and to the extent or the degree of discounting. If β_i tends towards one, then the individual will choose formal mechanisms, if it tends towards zero, then the choice will be for informal mechanisms, while if it lies between zero and one, the individual will use both mechanisms. Subsequently, we should expect variation in the welfare outcomes of individuals using these mechanisms. Using the concept of patience to operationalise the terms discount rate or time preference, an impatient (patient) individual is said to have a low (high) discount rate but a high (low) rate of time preference (Becker and Mulligan, 1997).⁵ According to these authors, a more patience individual is expected to be wealthier than a less patient individual. Table 2 shows the expected outcomes models (1) and (2) in this study.

Table 2: Summary of Predictions

	Choice of savings mechanism	Quality of life
Discount rate		
Low	Formal	Poor
Moderate	Formal/Informal	Poor/Good
High	Informal	Good
Time preference		
Present bias	Informal	Poor
Future bias	Formal	Good

Finally, if we normalise the choice of savings mechanisms such that $f_f = f_n$, then $s_f = s_n$, making quality of life directly dependant on patience. Such a model can thus be used to investigate the direct link between patience and quality of life.

⁵ I use time –preference and discount rate synonymously but cognisant of the difference between them.

5. Data and Empirical strategy

5.1 Data

Appendix A1 describes some of the demographic characteristics of a sample of 728 self-reported savers from the 2009 FinScope survey for Zambia, which is used in this study. The dataset was collected for the purposes of profiling access and use of financial services in Zambia, both formal and non-formal. Information was also collected on the risk attitudes of individuals and indicators of patience and well-being. Savers reported using either formal or informal mechanisms, with only 3 admitting to using both formal and informal mechanisms. Additional information on the reasons why they save was also provided. 60 percent of the sample are male, 70 percent have attained high school level of education, 42 percent are between 30 and 44 years of age, 72 percent are married or living with a partner, majority are either employees or self-employed, and there is an equal representation of rural and urban dwellers.

To solicit for the individual's degree of patience, the following questions were asked: **Question 1.** *"If you receive K1 Million what do you do?"* **Question 2.** *"you go without certain things to save".* Question 1 is akin to experimental studies that present subjects with gambles and ask them whether they would prefer the small now to a larger amount at a later time of vice versa. In this case, response to Question 1 gives an indication of the options that would ordinarily be given to the experiment subjects. I adopt this question to measure the individual's discounting factor.⁶ Individuals who opt for saving in the bank are coded as having a 'low' discounting rate and therefore more patient, whereas those using other savings mechanisms (such as family, friends, savings clubs) are coded as having a 'high' discounting rate and are thus impatient. Question 2 is used to capture time-preference with zero equal to 'neutral', for individuals that don't know, one equal to 'present bias', for individuals who respond in negative and two equated to 'future bias', for individuals who respond in affirmative.

To capture the quality of life, I use a set of subjective indicators at individual level following the deliberations of the 'Beyond GDP' conference in 2007 and the Stiglitz, Sen and Fitoussi (2009) report.⁷ These indicators capture health, wealth and material dimensions of the quality of life. In the dataset used, individuals were asked how often they or their families went without food, shelter, cash income, medication and energy for cooking or heating. The responses were coded as: 'always', 'often', 'sometimes', 'rarely', 'never' and 'don't know'. A quality of life index is constructed by summing the individual's responses, which assumes equal weights as in Finn et al. (2013). Additionally, information on risk attitudes is considered in light of arguments in behaviour finance that saving and financial management in general, are behavioural concepts where factors such as risk play a crucial role (see

⁶ See for instance Mischel et al. (1989), Tran et al. (2011)

⁷ The Beyond GDP Initiative is a project that seeks to identify indicators that are as appealing as GDP but that more inclusive of environmental and social factors.

Garcia, 2013; Rieger, Wang and Hens, 2013). Table 3 shows a brief overview of the sample's characteristics on the key variables.

Table 3: Selected Individual Characteristics

	Mean	Std Dev	Min	Max	N
Time Preference					
Neutral	0.028		0	1	693
Present bias	0.402		0	1	693
Future bias	0.570		0	1	693
Discount factor					
Low	0.879		0	1	727
High	0.121		0	1	727
Risk Preference					
Neutral	0.035		0	1	725
Risk averse	0.305		0	1	725
Risk loving	0.660		0	1	725
Quality of Life (Index range: 9 – 35; Mean 28.3)					
Below average	0.360		0	1	728
Above average	0.640		0	1	728
Financial Decisions					
Female HH decision maker	0.322		0	1	726
Saving Mechanism					
Formal	0.419		0	1	728
Non-formal	0.581		0	1	728

Source: Author's computation from the 2009 FinScope Survey for Zambia

Up to 57 percent of the sample are future biased and almost 88 percent have a low discount rate. These statistics point to a somewhat patient sample. Majority are also risk-loving. Only one-third are decision making females in their households, which reflects low bargaining power for women in this society. Indeed the summary statistics in Appendix A1 show a small number of female participants in the saving component of financial management. There is evidence that saving empowers women thus increasing their household bargaining power and household welfare (see Ashraf et al., 20006; Karlan and Zinman, 2010). But what constitutes saving? In the dataset used, individuals were asked what they considered to be equivalent to 'saving'. As reported in Table 4, up to 51 percent of the sample understand the term 'saving' to coincide with the notion of deferred consumption.

Table 4: Description of 'Saving'

Definition	Mean	N
Putting money aside in a special place or account to keep it safe	0.437	728
Putting money aside to stop you from spending it so that you have it later when you need it	0.354	728
Putting money aside so that you have some more after a while	0.016	728
Putting money aside for you to use later for something specific	0.160	728
Don't know	0.033	728

Source: 2009 FinScope Survey for Zambia

Finally I cross-tabulate the key variables of this study to check whether the results are consistent with the predictions in Table 3. Results in Table 5 show that both the ‘present’ and ‘future’ bias individuals seem to use formal mechanisms contrary to our expectations. However, using the discount rate shows that individuals with a low discount rate use formal mechanisms while those with a high discount rate choose informal mechanisms as predicted. On the other hand, regardless of the individual’s time preference or discount rate, the quality of life scores are comparable and are above the average of 28.3. The significance of all these results will be investigated in the empirical section.

Table 5: Summary Statistics of the Predictions

	Choice of savings mechanism	Quality of life
Time preference		
Present bias	Formal	29.60
Future bias	Formal	29.61
Discount rate		
Low	Formal	29.98
High	Informal	29.53

Source: Author’s computations from the 2009 FinScope Survey for Zambia

5.2 Empirical Strategy

I model the choice of particular savings mechanism given an individual’s time preference as well as his/her demographics and other characteristics related to savings behaviour. There are two mechanisms for saving – through bank accounts or non-bank channels. This presents a binary choice that allows for the use of discrete choice models as in McFadden (1984). In the data used, there were almost no individuals using both formal and non-formal mechanisms, making the savings mechanisms mutually exclusive even though in reality it is possible to use both mechanisms concurrently.

In the framework of consumer theory, I use the logit model to estimate the probability of choosing either a formal or an informal savings mechanism given one’s degree of patience or time preference. The dependent variable in this case is savings mechanism equal to one if the individual uses formal mechanisms and zero if informal mechanisms are used. The estimable model is provided by the general expression below:

$$Pr(\text{SaveMode}_{ij} | \text{Patience}_i) = \alpha_j + \gamma \text{Patience}_i + \beta X_{ij} + \varepsilon_{ij} \quad (3)$$

where SaveMode_{ij} is the savings mechanism j chosen by individual i and X_{ij} is a vector of individual-specific covariates which includes socio-demographic characteristics. Since discount rate and time preference are used synonymously, two models are estimated, replacing one proxy with another.

To achieve the second object of establishing whether there is a direct link between time preference and quality of life subject use of a particular savings mechanism, I employ the multinomial logit model since the dependent variable now has four categories, which are the possible

combinations between the two binary variables – savings mechanism and quality of life. The four outcomes are thus: formal mechanism – below average quality of life, formal mechanism – above average quality of life, informal mechanism – below average quality of life and informal mechanism – above average quality of life. Expression (3) is thus modified to obtain the multinomial structure but the right hand side remains the same. Two models are again estimated using the two proxies of patience: time-preference and discount rate. Finally a linear probability model is estimated using the quality of life index constructed from the responses in section 5.1.

6. Results

6.1 Logit regressions

Table 6 provides the results of the preferred model specifications for the estimation of the link between patience and the choice of mechanism. Columns (1) and (2) show the results of the t-test of the measures of patience – discount rate and time-preference respectively, in this study. The results show that the impatient have a lower probability of using formal savings mechanisms. In columns (3) and (4), the models are re-run including all possible confounders of choice of savings mechanism. The results show that whether using the discount rate or time preference measures, impatient individuals are statistically less likely to use formal savings mechanisms compared to their counterparts with a low discount rate or those that have future bias, although the latter is not statistically significant as shown in columns (4). These results are in line with the predictions in section 5.1. Appendix A2 shows the full set of results showing that the only significant predictors of using formal savings mechanisms, in addition to one's degree of patience are the following: income levels above K200 (about US\$15)⁸, high school education attainment, 45 years of age and above, urban dwelling or residing in the Copperbelt, Eastern, Northern or Southern provinces. These provinces are reasonably well resourced in terms of financial access infrastructure. Such as bank branches.

⁸ According to the Bank of Zambia there is no fee on a savings account, savers are entitle to up to 4 free over the counter withdrawals. See www.boz.zm

Table 6: Logit Estimates of Patience and Choice of Savings Mechanism

Variables	(1)	(2)	(3)	(4)
Discount Rate (Low)				
High = <i>impatient</i>	-2.223*** (0.288)		-1.738*** (0.459)	
Time preference (future bias)				
Neutral		-1.796*** (0.477)		-0.754 (0.702)
Present bias = <i>impatient</i>		-0.131 (0.163)		0.059 (0.276)
Constant	0.665*** (0.084)	0.592*** (0.105)	-4.629*** (1.688)	-5.582*** (1.666)
Observations	728	693	671	642

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Notes: Columns (1) and (2) show estimates without controlling for any confounders while estimates in columns (3) and (4) include covariates shown in Appendix A2. Results are weighted to be nationally representative.

6.2 Multinomial Logit and Linear Probability Estimates

Table 7 reports results of two scenarios. The multinomial logit estimates in columns (1) – (3) use the discount rate as the measure of patience while columns (4) – (6) use time preference. The base outcome for these estimates is ‘below average quality of life given that one uses informal savings mechanisms’. The reference categories for the covariates are indicated in bold in parentheses, and the full set of results is reported in Appendix A3.

First, while there is a significant predictive power of patience on the choice of savings mechanisms in section 6.1, there is no such effect on the welfare outcomes of the choices made by individuals. There is however, a significant effect of impatience leading to above average quality of life when using informal mechanisms that below average quality of life. The implication of this result is that for as long as one is saving, the result is likely to be better welfare outcomes regardless of the mechanism used. Secondly, results in column (7) show that except for category of ‘above average quality of life given the use of formal mechanisms’ (i.e. Good/Formal), the rest of the categories are not statistically different from each other. Overall, this result is in line with Dupas and Robinson (2013) who argue that the decision to save might be more important than the mechanism used to save. This is plausible given that formal and informal mechanisms exhibit different characteristics that might in themselves lead to self-selection into using them.

Finally, I estimate a linear probability model on the full sample of 4000 respondents, weighted to be nationally representative of Zambia. The measure of patience used in this case is the discount rate, measured by the question “if you receive K1 million (about US\$75), what would you do?” I do not use time preference in this regression because the framing of the question used inadvertently eliminates

some people – those who do not save. Results in column (8) show that without conditioning the quality of life on saving and thus irrespective of the savings mechanism used, less patient people have a lower quality of life compared to their more patient counterparts. This result is consistent Lang & Ruud (1986), Mullainathan (2005) and Carvalho (2010) who find that poverty is indeed associated with impatience. Mullainathan (2005) argues that poor people are considered impatient but their problem is that of satisfying basic and immediate survival needs. An alternative interpretation of the regression result could be that a switch from being patient to impatience leads to a lower quality of life. This is possible in the case of an individual exhibiting different time preferences under different circumstances or in different time periods. According to Becker and Mulligan (1997), an individual experiencing scarcity might also exhibit impatience compared when that same individual experiences plenty.

7. Conclusion

This paper has attempted to extend the role of patience in behaviour such as saving by investigating whether one's degree of patience can predict the choice of savings mechanism. A further attempt has been made to examine the existence of a significant direct link between the degree of patience and an individual's quality of life. These issues have hitherto been studied in isolation in the literature, yet in reality individuals are faced with a myriad of options that are interlinked. Thus studying them in an interactive manner might be crucial especially for financial inclusion strategies.

The rich dataset used on Financial Access – the 2009 FinScope survey for Zambia – has allowed for the construction of measures of patience without necessarily undertaking a lab experiment, and for tracing out the saving behaviour of individuals as well as the associated self-reported subjective quality of life. I find that the degree of patience is a significant predictor of the choice of savings mechanism whereby, *ceteris paribus*, more patient individuals are more likely to use formal savings mechanisms while the less patient are more likely to use informal mechanisms. There is also evidence that less patient people have a lower quality of life compared to their more patient counterparts. This result can also be interpreted as a shift from more patience to being less patient having the effect of reducing one's quality of life. This is particularly important given the argument that patience can vary within an individual across time periods, such in periods of plenty versus periods of scarcity. A key result of this paper is that the quality of life from using formal savings products is not statistically different from using informal savings mechanisms. Implicit in this result is that the decision to save in itself is sufficient for one to realise a better welfare outcomes irrespective of the saving mechanism used. Indeed savings mechanisms have different characteristics that can lead to selection bias.

These results suggest areas for further research such as real dynamic analysis of the degree of patience of an individual in a panel setting, and the related changes in the quality of life, if any.

Table 7: Estimates of Patience and Quality of Life

VARIABLES	Multinomial logit						Ologit	LPM
	(1) Poor welfare with use of formal mechanisms	(2) Good welfare with use of informal mechanisms	(3) Good welfare with use of formal mechanisms	(4) Poor welfare with use of formal mechanisms	(5) Good welfare with use of informal mechanisms	(6) Good welfare with use of formal mechanisms	(7) Quality of life by saving mechanism	(8) Quality of life in general
Discount rate (Low) High = <i>impatient</i>	0.312 (0.246)	3.552*** (1.408)	0.537 (0.348)				0.369 (0.249)	-0.378* (0.212)
Time preference (future bias)								
Neutral				0.153 (0.262)	0.998 (0.646)	3.069 (3.181)		
Present bias = <i>impatient</i>				1.928 (0.813)	1.268 (0.447)	1.131 (0.453)		
Constant cut1							0.123 (1.004)	
Constant cut2							1.152 (0.994)	
Constant cut3							2.361** (1.001)	
Constant	0.010** (0.023)	1.196 (1.772)	4.88e-08*** (9.63e-08)	0.002** (0.004)	1.828 (2.753)	4.37e-09*** (8.79e-09)		27.68*** (0.715)
Observations	671	671	671	642	642	642	671	3,190
R ²								0.135

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Notes: The table reports estimates from the multinomial logit, o-logit and the linear probability models for quality of life and patience. The categories used in columns (1) – (7) are: below average quality of life given the use of informal savings mechanisms (Poor/Informal), below average given the use of formal mechanisms (Poor/Formal), above average given the use of informal mechanisms (Good/Informal) and above average given the use of formal mechanisms (Good/Formal). Qlife in the linear probability model in column (8) is a continuous variable.

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Appendix

Appendix A1: Detailed Summary Statistics of Savers

	variable	Mean	Std.	Min	Max
Gender	Male	0.602	0.490	0	1
Source of Money	Salary	0.410	0.492	0	1
	Farming	0.259	0.438	0	1
	Family	0.014	0.116	0	1
	Self-employed	0.299	0.458	0	1
	Other	0.019	0.136	0	1
Monthly income	No income	0.220	0.414	0	1
	Up to K200000	0.121	0.326	0	1
	K200001 – 600000	0.183	0.387	0	1
	K600001 – 1000000	0.112	0.315	0	1
	K1 million	0.364	0.482	0	1
Employment status	Self employed	0.415	0.493	0	1
	Employee	0.381	0.486	0	1
	Other employment	0.079	0.269	0	1
	Unemployed	0.125	0.331	0	1
Education attainment	No formal education	0.023	0.151	0	1
	Primary school	0.269	0.444	0	1
	High school	0.420	0.494	0	1
	Post high school	0.287	0.453	0	1
Age category	16 – 29 years	0.306	0.461	0	1
	30 – 44 years	0.422	0.494	0	1
	45 – 60 years	0.217	0.413	0	1
	60+ years	0.055	0.228	0	1
Metro area	Urban	0.491	0.500	0	1
Province/Region	Central	0.135	0.342	0	1
	Copperbelt	0.189	0.391	0	1
	Eastern	0.077	0.266	0	1
	Luapula	0.040	0.197	0	1
	Lusaka	0.199	0.399	0	1
	Northern	0.146	0.353	0	1
	North Eastern	0.055	0.229	0	1
	Southern	0.109	0.312	0	1
	Western	0.051	0.220	0	1
	Marital status	Never married	0.169	0.375	0
Married		0.727	0.446	0	1
Separated		0.045	0.207	0	1
Widowed		0.059	0.236	0	1
Group membership	Member	0.407	0.492	0	1
Financial decision making	Alone	0.180	0.384	0	1
	With spouse	0.640	0.480	0	1
	With spouse & other family	0.106	0.308	0	1
	Not included	0.073	0.261	0	1

Note: Income figures are reported before the Kwacha was devaluated in 2012/13. The devaluation led to a cancellation of the last three zeros. The total number of savers is 728 observations

Appendix A2: Logit estimates of Patience and the Choice of Savings Mechanism

Variables	(1)	(2)	(3)	(4)	(5)
Discount rate (low)		-2.223***		-1.738***	
High = impatience		(0.288)		(0.459)	
Male				0.225	0.330
				(0.306)	(0.306)
Up to K200000				-0.0755	0.0960
				(0.507)	(0.504)
K200001 - 600000				0.543	0.739*
				(0.379)	(0.388)
K600001 - 1000000				1.162**	1.293***
				(0.453)	(0.460)
Over K1 million				1.788***	1.874***
				(0.447)	(0.456)
Employee				1.295***	1.372***
				(0.355)	(0.362)
Other employment				-0.654	-0.505
				(0.572)	(0.557)
Unemployment				-0.0172	0.431
				(0.521)	(0.547)
Married				-0.476	-0.430
				(0.675)	(0.675)
Separated				-1.351*	-1.535**
				(0.705)	(0.701)
Widowed				0.209	0.247
				(0.770)	(0.787)
Primary school				0.963	1.317
				(1.280)	(1.225)
High school				2.598**	2.745**
				(1.295)	(1.239)
Post-high school				4.750***	4.910***
				(1.392)	(1.342)
30 – 44 years				0.0849	0.0319
				(0.346)	(0.348)
45 – 60 years				1.227***	1.193**
				(0.455)	(0.471)
Over 60 years				1.897***	1.775***
				(0.612)	(0.617)
urban				0.909***	0.926***
				(0.284)	(0.286)
Group membership = yes				-0.0682	-0.00628
				(0.285)	(0.288)
Copperbelt				1.458***	1.560***
				(0.563)	(0.566)
Eastern				1.212*	1.470**
				(0.629)	(0.640)
Luapula				0.816	0.921
				(0.640)	(0.630)
Lusaka				0.684	0.795
				(0.508)	(0.512)
Northern				0.520	0.677

North East				(0.553)	(0.559)
				1.687***	1.665***
				(0.637)	(0.622)
Southern				2.060***	2.391***
				(0.591)	(0.601)
Western				0.701	0.934
				(0.691)	(0.681)
With spouse				0.268	0.240
				(0.581)	(0.588)
With spouse and other family				-0.283	-0.218
				(0.668)	(0.686)
With spouse and family				-0.341	-0.161
				(0.846)	(0.835)
Not included				-0.471	-0.464
				(0.757)	(0.753)
Risk averse				0.0899	0.313
				(0.681)	(0.696)
Risk loving				0.192	0.282
				(0.682)	(0.695)
Present bias			-1.796***		-0.754
			(0.477)		(0.702)
Future bias			-0.131		0.0590
			(0.163)		(0.276)
Constant	0.401***	0.665***	0.592***	-4.629***	-5.582***
	(0.0756)	(0.0837)	(0.105)	(1.688)	(1.666)
Observations	728	728	693	671	642

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix A3: Multinomial logit, Ordered Logit and Linear Probability Estimates of Patience and Quality of Life

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Poor_Formal	Good_Informal	Good_Formal	Poor_Formal	Good_Informal	Good_Formal	Quality of life	Quality of life index
Present bias				0.153 (0.262)	0.998 (0.646)	3.069 (3.181)		
Future bias				1.928 (0.813)	1.268 (0.447)	1.131 (0.453)		
Discount rate	0.312 (0.246)	3.552*** (1.408)	0.537 (0.348)				0.369 (0.249)	-0.378* (0.212)
High = impatient								
Male	1.576 (0.779)	0.725 (0.277)	0.972 (0.422)	1.928 (1.035)	0.709 (0.288)	1.141 (0.523)	-0.123 (0.229)	-0.678*** (0.199)
Up to K200000	1.667 (1.284)	1.307 (0.585)	0.483 (0.392)	1.691 (1.336)	1.122 (0.524)	0.667 (0.546)	-0.0400 (0.343)	-0.949*** (0.251)
K200001 – 600000	3.824** (2.424)	1.781 (0.853)	1.529 (0.767)	4.761** (3.138)	1.801 (0.889)	1.962 (1.058)	0.255 (0.312)	-0.522* (0.294)
K600001 – 1000000	4.313* (3.334)	6.680*** (3.857)	7.522*** (4.470)	4.120* (3.076)	5.492*** (3.236)	8.918*** (5.444)	1.293*** (0.327)	1.732*** (0.395)
Over K1 million	10.18*** (6.906)	1.703 (1.120)	4.473** (2.686)	13.00*** (9.543)	2.401 (1.915)	6.357*** (4.045)	0.497 (0.354)	0.604 (0.457)
Employee	4.821** (3.055)	2.149 (1.279)	9.256*** (5.518)	4.475** (2.782)	1.668 (0.983)	7.916*** (4.665)	0.837*** (0.290)	1.090*** (0.334)
Other employment	0.157* (0.162)	0.631 (0.305)	0.284 (0.222)	0.158* (0.159)	0.561 (0.280)	0.315 (0.228)	-0.347 (0.441)	0.248 (0.313)
Unemployed	0.274 (0.254)	1.067 (0.590)	1.433 (0.962)	0.311 (0.347)	0.927 (0.537)	2.065 (1.641)	0.320 (0.390)	-0.0177 (0.429)
Married	1.084 (1.137)	1.227 (1.208)	0.848 (0.919)	1.111 (1.134)	1.052 (0.978)	0.768 (0.758)	-0.183 (0.606)	0.397 (0.403)
Separated	0.178* (0.181)	0.195 (0.221)	0.0571*** (0.0514)	0.156 (0.177)	0.301 (0.297)	0.0506*** (0.0470)	-1.816** (0.745)	-0.740* (0.450)
Widowed	3.428 (3.897)	0.352 (0.427)	0.844 (0.890)	8.911* (10.78)	0.852 (1.064)	1.561 (1.771)	-0.529 (0.629)	-1.053** (0.472)
Primary school	0.791 (1.195)	0.875 (0.618)	477,823*** (396,502)	1.218 (1.585)	0.897 (0.639)	5.173e+06*** (4.477e+06)	0.251 (0.520)	0.564* (0.335)
High school	6.023 (8.950)	1.616 (1.197)	4.788e+06*** (4.024e+06)	6.628 (8.587)	1.639 (1.233)	4.321e+07*** (3.697e+07)	1.251** (0.537)	1.702*** (0.400)
Post-high school								

	48.90**	0.952	4.561e+07***	51.71***	0.900	4.261e+08***	2.038***	2.414***
	(80.56)	(1.071)	(4.888e+07)	(75.29)	(1.059)	(4.711e+08)	(0.655)	(0.563)
30 – 44 years	0.844	0.769	0.938	0.542	0.515	0.719	-0.0299	-0.342
	(0.489)	(0.307)	(0.503)	(0.327)	(0.217)	(0.411)	(0.253)	(0.223)
45 – 60 years	3.744**	0.577	3.270*	2.224	0.405	2.358	0.149	-0.537*
	(2.465)	(0.309)	(1.993)	(1.590)	(0.236)	(1.615)	(0.338)	(0.286)
Over 60 years	8.088**	0.912	7.429**	4.977*	0.477	4.727*	0.419	-0.198
	(7.342)	(0.645)	(5.869)	(4.512)	(0.387)	(4.093)	(0.436)	(0.371)
urban	2.500*	0.415**	1.258	2.283*	0.407**	1.045	-0.292	-0.505**
	(1.178)	(0.145)	(0.504)	(1.088)	(0.152)	(0.423)	(0.225)	(0.229)
Group membership	0.898	1.826*	1.916*	0.833	1.675	1.993*	0.447**	0.719***
	(0.375)	(0.660)	(0.713)	(0.365)	(0.635)	(0.785)	(0.211)	(0.204)
Copperbelt	4.271	0.537	2.714	3.261	0.376	2.693	0.294	-0.861**
	(3.887)	(0.408)	(2.156)	(2.978)	(0.305)	(2.088)	(0.409)	(0.369)
Eastern	2.890	0.458	2.209	2.660	0.481	1.999	0.0951	-0.979**
	(2.905)	(0.351)	(1.816)	(2.744)	(0.368)	(1.702)	(0.543)	(0.409)
Luapula	6.435	0.463	1.151	6.997	0.454	1.245	-0.451	-1.346***
	(7.664)	(0.391)	(1.285)	(8.352)	(0.397)	(1.396)	(0.540)	(0.406)
Lusaka	1.493	0.669	0.788	1.621	0.732	0.898	-0.229	-0.560
	(1.309)	(0.353)	(0.521)	(1.533)	(0.404)	(0.613)	(0.337)	(0.470)
Northern	1.520	1.165	1.476	1.357	1.178	1.610	0.345	0.450
	(1.461)	(0.732)	(1.172)	(1.390)	(0.796)	(1.343)	(0.366)	(0.353)
North eastern	6.995*	0.162*	0.945	8.728**	0.340	1.090	-0.964**	-2.627***
	(7.427)	(0.153)	(0.803)	(9.596)	(0.299)	(0.969)	(0.384)	(0.425)
Southern	8.067**	1.024	10.94***	8.615**	0.637	11.59***	0.988**	-0.236
	(7.896)	(0.750)	(9.198)	(8.784)	(0.512)	(9.948)	(0.413)	(0.355)
Western	2.123	0.747	1.601	2.093	0.798	1.896	0.078	-1.262***
	(2.540)	(0.585)	(1.606)	(2.607)	(0.688)	(1.972)	(0.463)	(0.378)
With spouse	1.888	0.685	1.011	2.361	0.898	1.217	-0.336	-0.304
	(1.768)	(0.606)	(0.985)	(2.203)	(0.714)	(1.155)	(0.448)	(0.349)
With spouse and Family	1.850	0.675	0.603	2.610	0.831	0.654	-0.736	0.173
	(1.665)	(0.632)	(0.549)	(2.393)	(0.813)	(0.639)	(0.683)	(0.405)
With spouse and Extended family	1.439	0.400	0.670	1.499	0.276	0.626	-0.477	-0.246
	(1.929)	(0.584)	(0.735)	(1.815)	(0.359)	(0.625)	(0.664)	(0.472)
Not included	5.241	1.979	1.741	5.036	1.586	1.128	-0.295	-0.215
	(6.823)	(2.334)	(2.021)	(6.186)	(1.621)	(1.221)	(0.659)	(0.508)
Risk averse	0.507	0.722	0.935	2.138	0.777	0.896	0.037	0.047
	(0.607)	(0.522)	(1.404)	(3.184)	(0.578)	(1.348)	(0.648)	(0.311)
Risk loving	0.462	0.524	0.649	1.511	0.528	0.506	-0.162	-0.203

Constant cut1	(0.548)	(0.379)	(0.963)	(2.221)	(0.392)	(0.754)	(0.645)	(0.316)
Constant cut2							0.123 (1.004)	
Constant cut3							1.152 (0.994)	
Constant	0.00959** (0.0227)	1.196 (1.772)	4.88e-08*** (9.63e-08)	0.00162** (0.00426)	1.828 (2.753)	4.37e-09*** (8.79e-09)	2.361** (1.001)	27.68*** (0.715)
Observations	671	671	671	642	642	642	671	3,190
R ²								0.135

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The multinomial logit and ordered logit categories are: Poor outcome – informal saving, poor outcome – formal saving, good outcome – informal saving and good outcome - formal base outcome for the multinomial logit is Poor – Informal. The dependent variable for the linear probability model is a quality of life index, a continuous variable.

