

ECONOMICS*Sociology*

Zeka, B., & Veri, F. (2022). The necessary and sufficient conditions for retirement funding adequacy: A fuzzy set analysis. *Economics and Sociology*, 15(1), 109-124. doi:10.14254/2071-789X.2022/15-1/7

THE NECESSARY AND SUFFICIENT CONDITIONS FOR RETIREMENT FUNDING ADEQUACY: A FUZZY SET ANALYSIS

Bomikazi Zeka*

University of Canberra, Faculty of
Business, Government and Law,
Canberra, Australia;

Nelson Mandela University,
Port Elizabeth, South Africa

E-mail:

bomikazi.zeka@canberra.edu.au

ORCID 0000-0002-7299-3203

*Corresponding author

Francesco Veri

University of Canberra,
Faculty of Business, Government
and Law, Canberra, Australia

E-mail:

francesco.veri@canberra.edu.au

ORCID 0000-0002-9295-6776

Received: September, 2021

1st Revision: March, 2022

Accepted: March, 2022

DOI: 10.14254/2071-
789X.2022/15-1/7

JEL Classification: J14, D14,
P46

ABSTRACT. Although retirement funding adequacy literature has explored perceptions of retirement preparations and savings targets, there remains a lack of understanding of which conditions are necessary and sufficient for it to occur. This study identifies the necessary and sufficient conditions for retirement funding adequacy by examining the extent to which demographic, psychological and behavioural variables predict its occurrence. Within the context of South Africa, fuzzy set qualitative comparative analysis was used to test a complex model and qualify the processes that lead to retirement funding adequacy. The results show that educated women of higher socio-economic status are associated with retirement provisions. Thus, the inclusion and empowerment of women in financial planning activities results in positive retirement outcomes. Furthermore, retirement provisions precede retirement funding adequacy, and financial knowledge is a necessary condition for both retirement provisions and retirement funding adequacy. This research is relevant for financial planners and institutions encouraging individuals to plan and save for retirement in order to reduce the retirement funding adequacy gap experienced by retirees.

Keywords: behavioural characteristics, demographics, fsQCA, psychology, retirement funding adequacy.

Introduction

Globally, we are experiencing an ageing society, and considerations for this must be made. Older adults face greater retirement insecurity than before, as Covid-19 has disproportionately affected their employment prospects and labour market opportunities. Due to the pandemic, recent research has reported a rise in the rates of early retirement among older adults, which has led to increased claims in social security benefits and income insecurity among retirees (Bui et al., 2020). Thus, accumulating the resources to achieve financial independence or adequate funding for retirement becomes paramount (Butler, 2012). Bazhenova and Krytsun (2013:74) state that the effect of future uncertainty creates the desire

in individuals to save. However, like citizens in most developing countries, the majority of South Africans cannot afford to retire (Reyers, 2018). Although existing literature offers essential results that examine, explain and quantify retirement funding adequacy (Butler, 2012; Reyers, 2018), the complexities involved in understanding retirement funding adequacy require more research attention. Existing literature has also favoured the use of quantitative statistical approaches in studying what influences and leads to its outcome. Quantitative statistical approaches, as pointed out by Greckhamer et al. (2013), assume causal linearity and singular causation. Assumptions of causal complexity (i.e., the outcome results from the configuration of multiple conditions) and equifinality (i.e., different causal conjunctions can produce the same outcome) are not explored, which leads to linear and mono-dimensional generalisable results. While quantitative approaches offer important attempts to compare and measure the effects of retirement funding adequacy, they do not sufficiently address the complexity of the phenomenon and do not employ a holistic perspective that establishes meaningful relationships between variables, nor do they provide any insight into the factors that contribute to negative cases. One such method that can be used to explain complex social phenomenon within the field of retirement planning is fuzzy set qualitative comparative analysis (fsQCA) (Carrera & Angelaki, 2020). This form of analysis has been employed in the fields of business research and finance (e.g., Garcia-Castro & Aguilera, 2014), business ethics (e.g., Leischnig & Woodside, 2019) and human behaviour research studies (e.g., Thai & Wang, 2020). Through the application of fsQCA, we provide a novel understanding of retirement income inequality by targeting the causal structures behind retirement funding adequacy. By employing fsQCA, we will gain a greater understanding of the issue by considering holistic views of interrelationships between variables that break the tradition of considering quantificatory approaches – such as Structural Equation Modelling, which merely highlights the symmetrical ‘net effect’ explanation amongst variables. As such, in this research, we apply fsQCA to investigate the necessary and sufficient conditions required for the outcome of retirement funding adequacy, and present alternative paths for retirement funding adequacy. The first part of the paper sheds light on the theoretical background of the research and reviews the pertinent literature on the research topic. Then, we present the research model and hypotheses in the second part of the paper. The third part of the paper concentrates on the research design and the fourth part of the paper presents the data set, calibration process and research results. The fifth part of the paper provides a discussion of the results and its implications. Finally, concluding remarks and recommendations are presented.

1. Theoretical framework and literature review

Modigliani’s life cycle framework has been a widely applied way of considering the spending patterns, consumption decisions, and savings incentives of individuals throughout their lives. The life cycle model proposes that individuals engage in intelligent choices about the amount they want to spend at different stages in their lives but are limited by the financial resources they have available (Browning & Crossley, 2001; Copur & Gutter, 2019; Modigliani, 1986). Baranzini (2005) contends that this theory assumes that individuals try to maximise the utility deriving from their entire life cycle consumption. Therefore, consumption must be continuous, even if income throughout the life cycle is discontinuous; and saving is primarily (perhaps even exclusively) done to finance consumption during the retirement period. Thus, the reason individuals save their disposable income is reflected by the incentive of retirement (Bazhenova & Krytsun, 2013). However, one of the challenges surrounding this model is related to its limited consideration of savings adequacy for retirement (Browning & Crossley, 2001; Copur & Gutter, 2019). For this reason, the life-cycle model partially provides a framework within which a more suitable retirement specific framework can be applied.

Through the theory of symbolic interactionism, we are informed that individuals manage and negotiate their lives based on their views of their circumstances (Bilton et al., 2002; Sinclair et al., 2021). Thus, the views that individuals have of themselves and the values they attach to financial independence at retirement, leads to a stronger motive to save adequately for retirement. Pragmatically, we acknowledge that the examination of individuals' perceptions of savings adequacy is preceded by their demographic, psychological and behavioural predisposition (Hershey et al., 2007). When these aspects and bodies of theory interact with one another, a clearer pathway towards retirement funding adequacy is provided.

1.1. Demographic variables

Retirement planning processes have traditionally been considered to concern the male population and gendered differences exist in retirement preparations and savings behaviours (Lee et al., 2018; Masud et al., 2006). While the economic position of women has improved over the years, women in the labour force are paid lower salaries and own a smaller fraction of businesses (Kock & Yoong, 2011), which leads to retirement income insecurity (Kumar et al., 2018). According to Brucker and Leppel (2013), age is an important element in determining whether an individual has a well-articulated retirement plan, and the current age of individuals can determine the financial preparations made for retirement (Topa et al., 2018; Kock & Yoong, 2011). As individuals age, they decrease their dependence on income from their employment and increase their dependence on their retirement benefits (Klammer, 2020; Kock & Yoong, 2011). Thus, income prior to retirement remains a strong indicator of income during retirement. (Carr et al., 2020; Masud et al., 2006).

While Hershey et al. (2007) rightfully consider income, gender and age as demographic variables that precede retirement savings contributions, we expand upon these demographic variables to include marital status, family structure and education, as these variables provide us with a more exhaustive and explicit representation of an individual's reality and how it influences the extent to which they plan and save for retirement. To this effect, researchers have reported that married couples are more likely to plan for their retirement and have a greater ability to save for retirement (Barnes & Taylor, 2006; Murari et al., 2021). More so, one's experience of the transition into retirement can be contingent on social contexts, such as family structure (Lee et al., 2018; Wang & Shultz, 2010). Family structures can involve caregiving responsibilities and the presence of financial dependents, which may lead to specific challenges in terms of limited contributions into retirement funds and a limited ability to save for retirement. Furthermore, the retirement wealth of individuals has been reported to be positively correlated with education (Cribb & Emmerson, 2019; Kock & Yoong, 2011).

1.2. Psychological variables

The impact of psychological variables, such as financial knowledge, on retirement funding adequacy has received significant attention in the literature (Hauff et al., 2020; Lusardi & Mitchell, 2011). Individuals need to know how to decide on the amount to save for retirement, how to invest their retirement benefits and the retirement savings vehicles that are suitable for their needs. Without this knowledge and its application, saving adequately for retirement becomes difficult. Furthermore, financial knowledge can lead to improved attitudes towards retirement. When higher levels of knowledge are attained on a given subject, a corresponding improvement in attitudes occurs (Andrade et al., 2014; Reyers, 2018). More so, the decision of individuals to engage in a behaviour, such as saving for retirement, is linked to their attitudes to perform that behaviour (Mutran et al., 1997; Reyers, 2018).

Hershey et al. (2007) consider future time perspective as a psychological determinant in establishing savings for retirement, as they propose that one's inclination to think about the future instead of the present or the past leads to a positive retirement savings outcome. However, we argue that future time perspective omits the consideration of one's overall attitude towards the life experience of retirement. If we understand one's attitude towards retirement, then we have a clearer understanding of how their beliefs about retirement will influence their retirement saving behaviour.

1.3. Behavioral variables

According to Hershey et al. (2007), psychological aspects predispose individuals to act or behave in a particular manner. In this case, the psychological variables of financial knowledge and retirement attitudes predict the extent to which individuals make provisions for retirement. In order to determine retirement funding adequacy, individuals' retirement provisions must be taken into account (Burnett et al., 2018; Yao et al., 2003).

2. Complex causation

These three groups of variables are assumed to interact together as demographic variables influence the way in which different psychological and behavioral attitudes are established. Through the interactive connections, the associations between variables might be better explained through configurational relationships instead of additive and linear associations. Configurational connections allow us to qualify the causation between conditions and outcomes and, therefore, to uncover non-linear causal patterns that explain the outcome of interest.

The interactive understanding of causation allows us to develop a model that makes it possible to explain and qualify the various conjunctions of conditions that lead to the outcome of retirement funding adequacy. Through equifinality, it is possible to hypothesise different causal patterns. This interactive understanding of causation is also consistent with a real-life scenario in which a viable outcome depends on a combination of various causes that collectively form different configurations of causes (Kaya et al., 2020). The hypothesised model (Figure 1) is built on this holistic understanding of social reality.

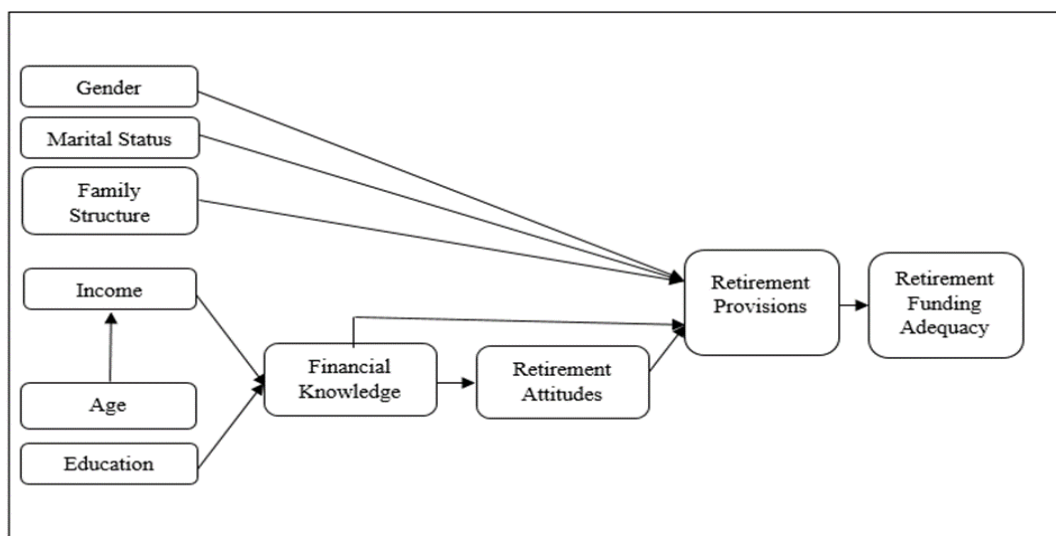


Figure 1. Hypothesised model for retirement funding adequacy

Source: Adapted from Hershey et al. 2007.

This model suggests the following hypotheses:

H¹: Retirement provisions (RP) are sufficient for retirement funding adequacy (RFA). The presence of retirement provisions (RP) is determined by the presence of financial knowledge (FK), moderate-to-high income (INCOME), and older age (AGE) or a high level of education (EDUCATION).

H²: Retirement provisions (RP) are sufficient for retirement funding adequacy (RFA). The presence of retirement provisions (RP) is determined by the presence of positive retirement attitudes (RA), the presence of financial knowledge (FK), moderate-to-high (INCOME), and older age (AGE) or a high level of education (EDUCATION).

H³: Family structure (FS) and the presence of retirement provisions (RP) are sufficient for retirement funding adequacy (RFA).

H⁴: Marital status, in terms of being married (MARRIED) and the presence of retirement provisions (RP) are sufficient for retirement funding adequacy (RFA).

H⁵: Gender, with reference to males (MALE) and the presence of retirement provisions (RP) are sufficient for retirement funding adequacy (RFA).

3. Research design

3.1. Demographic conditions

The demographic conditions of gender and marital status were categorised as (female vs male) and (married vs unmarried) respectively. For family structure, a self-constructed five-point response scale was used to assess the extent to which the respondents provide financial support to their relatives, with responses ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (5). An example of a statement is: “I provide financial support to extended family members/relatives when needed.” The poverty lines applicable in South Africa were consulted to determine the income range for low levels and high levels of income. As such, the total personal net income per month of the respondents was separated into two categories (1) < ZAR10 000 and (2) > ZAR10 000 according to the median income in South Africa (Statistics South Africa, 2018). The age of the respondents was split into two groups (1) younger than 30 years and (2) older than 30 years, based on the South African Government Social Welfare Policy (1997). To distinguish between low and high levels of education, the guidelines from the South African Qualifications Authority (2012) were followed whereby low levels of education were divided into two parts. Low levels of education include: (1) less than Matric (Grade 12), Matric (Grade 12), and a National certificate. High levels of education include: (2) Bachelor’s degree, Post graduate certificate, Master’s degree, and Doctoral degree.

3.2. Psychological conditions

Subjective assessments have been applied by researchers to ascertain individuals’ day-to-day financial conditions (Sass et al., 2015) and as such, it has been argued that subjective measures determine the extent to which individuals engage in financial practices (Lee et al., 2019). Respondents provided subjective assessments of their financial knowledge and retirement attitudes by means of a five-point response scale ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (5). The financial knowledge statements were adapted from Allgood and Walstad (2016) and an example of such statements includes: “If inflation increases, food prices will also increase.” The statements for retirement attitudes were developed by Anson et al.

(1989) and Lim (2003). The examples include: “Retirement gives people a chance to re-establish relationships with old friends and meet new people” and “Retired people can easily find things to do.”

3.3. Behavioural conditions

The statements relating to retirement provisions were developed by Hershey and Mowen (2000) and an example includes: “I have made significant contributions to a retirement fund.” The statements on retirement funding adequacy were adapted from Bradbury and Mendolia (2012), where a sample item is: “I believe I will be able to maintain my living standards during retirement.” The statements were measured on a five-point response scale ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (5).

3.4. fsQCA analysis

The configurational understanding of causation refers to causal complexity, or that the assumption that each case is a unique configuration of factors that leads to an outcome. In this respect the analytical focus is not the variable but the case. Case studies focus on describing and forecasting combinational conditional antecedents on outcomes. As such, variables retrieved by the survey dataset are treated as conditions as they do not strictly vary within cases, but they are fixed factors that characterise the causal dynamics within each case. In this respect, we consider the survey dataset not from a variable centered perspective, but from a participant centered point of view. This change of analytical perspective allows us to treat each survey participant as a configuration of demographic, psychological and behavioral conditions. In this respect, fsQCA (Thomann & Maggetti, 2020; Ragin, 2000) allows us to systematically compare within-case complexity and identify cross-case similarities and patterns which are employed to test the model displayed in Figure 1. fsQCA is based on set-theory and searches for causal dependencies by implementing techniques of dataset analysis based on Boolean algebra (Baumgartner & Thiem, 2020). Boolean algebra allows one to individuate set-relationships between conditions and outcomes in terms of subsets and supersets. In this respect, causal dependencies are scrutinised by considering cases as Boolean difference-makers of their effects (Baumgartner, 2015). This allows one to uncover deterministic causal structures that are in subset and superset relationships with the outcome of interest (i.e. retirement funding adequacy) (Baumgartner & Falks, 2019). Each configurational hypothesis can be rewritten into Boolean equations as follows:

$$H1: ((AGE * INCOME * FK) + (EDUCATION * FK) \rightarrow RP) * RP \rightarrow RFA$$

$$H2: ((AGE * INCOME * FK) + (EDUCATION * FK) \rightarrow RA) * RA * RP \rightarrow RFA$$

$$H3: (FS \rightarrow RP) * RP \rightarrow RFA$$

$$H4: (MARRIED \rightarrow RP) * RP \rightarrow RFA$$

$$H5: (MALE \rightarrow RP) * RP \rightarrow RFA$$

Boolean equations express the configurational relationship between conditions. The sign \rightarrow indicates relationship of sufficiency between sets; sign \leftarrow signifies relationship of necessity between sets; sign $*$ illustrates conjunction of sets; sign $+$ demonstrates disjunction of sets; and \sim sign indicates absence of a set. Thus, the results of fsQCA analysis will allow us to test our complex hypotheses and qualify the processes that lead to our outcome of interest.

The fsQCA analysis is operated following three different steps:

- 1) Dataset calibration: Each condition is transformed into fuzzy or crisp sets, which are values that express the membership value of a condition. Data are calibrated and the full data calibration process is available upon request to the authors.
- 2) Analysis of necessity: The analysis of necessity establishes which conditions or disjunction of the conditions are in a superset relationship with the outcome of interest.
- 3) Analysis of sufficiency: The analysis of sufficiency identifies the conditions or conjunction of conditions that are in a subset relationship with the outcome of interest.

Given that fsQCA is a relatively new method of data-analysis, readers not familiar with the method are referred to the fsQCA published articles (e.g. Thomann & Maggetti, 2020) or guidelines (e.g. Schneider & Wagemann, 2012).

4. Data set and calibration

The data set comprised of 395 pre-retirees. All the respondents were black South Africans, since black individuals make up the majority of the South African population (Statistics South Africa, 2019) and still experience socio-economic inequalities (Reyers, 2018). Sampling was restricted to pre-retirees, between the ages of 18 to 65 years inclusive and stratified on the basis of geographical region to ensure adequate representation. Thereafter, respondents were selected based on convenience. The respondents were informed of voluntary participation, were assured of anonymity, and confidentiality. As such, questionnaires were distributed in 2017 to those who agreed to participate in the study. Questionnaires were e-mailed and hand distributed to 550 individuals, of which 526 questionnaires were returned. Of those returned questionnaires, 131 could not be used due to either missing data or failure to meet inclusionary criteria, resulting in a 75 per cent response rate. Most of the respondents in this study indicated that they are female (54%), married (51%) and reside in urban areas (67%). Furthermore, the largest proportion of the sample are aged between 40 and 49 years (34%) and indicated that they earn a total personal net income of less than ZAR10 000 per month (31%).

Evidence of reliability was provided as Cronbach's Alpha Coefficients greater than 0.6 were returned. The data was calibrated into sets considering crisp and fuzzy set memberships. The crisp set operationalises conditions in a dichotomous way with two qualitative values: the value 1, meaning full membership in a set and the value of 0, meaning full non-membership in a set. This data operationalisation is suitable for dichotomous variables, such as gender. The fuzzy set refers to a gradual condition's membership between 0 and 1. The qualitative threshold between membership and non-membership assume a score of 0.5 (Schneider & Wagemann, 2012). Fuzzy set membership allows us to operationalise ordinal data such as the ones found on Likert-scale responses.

4.1. Analysis of necessity

With a consistency and a coverage of 0.98 and 0.93 respectively, the analysis of necessity highlights that financial knowledge (FK) is a necessary condition for retirement funding adequacy (RFA). In Boolean terms: $FK \leftarrow RFA$. This means that retirement funding adequacy cannot occur without financial knowledge. The result highlights that it is not plausible for people with a low level of financial knowledge to become financially independent at retirement (Lusardi & Mitchell, 2011; Prast & van Soest 2016). However, financial knowledge

alone does not explain retirement funding adequacy (Hauff et al., 2020) and additional analyses must be undertaken to determine the sufficient conditions for retirement funding adequacy.

4.2. Analysis of sufficiency

The analysis of sufficiency allows us to reveal other demographic, psychological and behavioral conditions that explain the outcome of interest, considering subset relationships. The analysis of sufficiency produces three different types of solution terms: the conservative (QCA-CS), the intermediate (QCA-IS), and the parsimonious (QCA-PS). In this analysis, we only consider QCA-PS because we are interested in the core causal patterns across the dataset (Fiss, 2011). This approach searches for cross-cases causal relationship drawing causal inference from the data at hand without the inference of substantial previous theoretical knowledge (Veri & Barrowman, 2021). For completeness, the full report on QCA-IS and QCA-CS as technical details of the minimization process is available upon request. Table 1 presents the sufficient conditions for retirement funding adequacy.

Table 1. Sufficient condition for RFA

Condition ID	Consistency	Coverage
RP	0.84	0.99

Source: *Calculated from fsQCA analyses.*

According to QCA-PS, the presence of retirement provisions (RP) is sufficient for the presence of retirement funding adequacy (RFA). The high level of consistency and coverage highlights the fact that RP is (nearly) always associated with RFA. This is visible by observing the distribution of points above the diagonal line in Figure 2 and its cluster in the top right corner of the scatter plot of the solution term. The data pattern in the scatter plot also confirms that the distribution of points are not randomly generated (Veri, 2019).

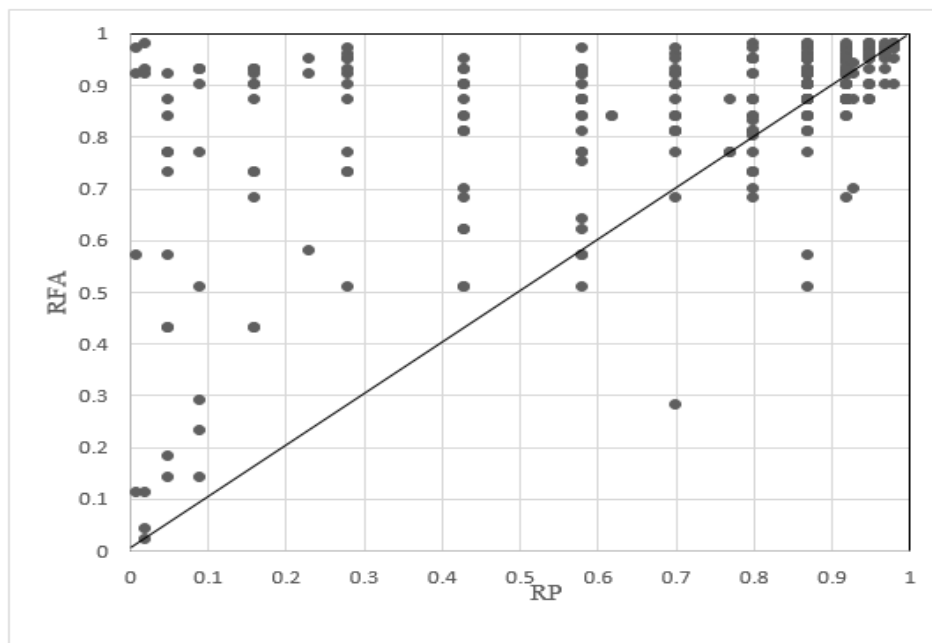


Figure 2. Scatter plot retirement provisions→retirement funding adequacy

Source: *Derived from fuzzy set qualitative comparative analyses.*

This result is not surprising considering that retirement funding adequacy is in part determined by the amount individuals need to retire comfortably, which intrinsically involves retirement provisions (Burnett et al., 2018; Butler, 2012). In this respect, these results also corroborate the latter parts of H1-H5 as follows:

$$RP \rightarrow RFA$$

In order to explore the former parts of our hypotheses, we proceed to a more in-depth analysis of sufficiency considering RP as an outcome. This secondary analysis of sufficiency will allow us to identify the conditions that are sufficient for RP and uncover the whole set of theoretic structures that are linked to RFA. In this respect, the focus is to individuate which demographic characteristics are interconnected with RP and therefore explain the behaviour of RP. Table 2 displays the sufficient conditions that characterise the presence of RP.

Table 2. Sufficient conditions for RP

High level of retirement provisions	Consistency	Coverage
FS+AGE	0.849	0.95
FS*AGE*INCOME +EDUCATION*~MALE+~MALE*INCOME	0.9	0.69

Source: *Calculated from fsQCA analyses.*

According to the first solution term, individuals that are over 30 years old (AGE) or people that are concerned with the wellbeing of their relatives (FS) are associated with the presence of retirement provisions (RP) and, therefore the outcome retirement funding adequacy (as presented in Table 1). These solutions can be rewritten as follows:

$$[(FS \rightarrow RP) + (AGE \rightarrow RP)] * RP \rightarrow RFA$$

These findings support H3 as there is a positive association between family structure and retirement provisions. Through the second solution formula, it also possible to have a more precise picture of the actual demographic structure within the sample that refers to the family structure (FS). The second solution term specifies the first solution term, as the presence of FS for individuals that are over 30 years old with a moderate-to-high level of income are associated with the presence of retirement provisions (RP). This solution can be rewritten as follows:

$$(FS * AGE * INCOME \rightarrow RP) * RP \rightarrow RFA$$

H1 is refined to illustrate that: $((AGE * INCOME * FK) \rightarrow RP) * RP \rightarrow RFA$.

These results refine H3 and uncover an additional dimension that people over the age of 30 with moderate-to-high income, are able to support their family and achieve financial wellbeing at retirement. This analysis also extends the findings of previous researchers by providing other equifinal paths to the outcome of interest (Murari et al., 2021; Brucker & Leppel, 2013). The second and the third part of the solution formula asserts that female individuals with a high level of education or female individuals with moderate-to-high income are associated with retirement provisions. These solutions can be rewritten as follow:

$$[(EDUCATION * \sim MALE \rightarrow RP) + (INCOME * \sim MALE \rightarrow RP)] * RP \rightarrow RFA$$

Figure 3 provides an overview of the main findings of the research where each solution path is schematised into a Euler diagram and a relational schema.

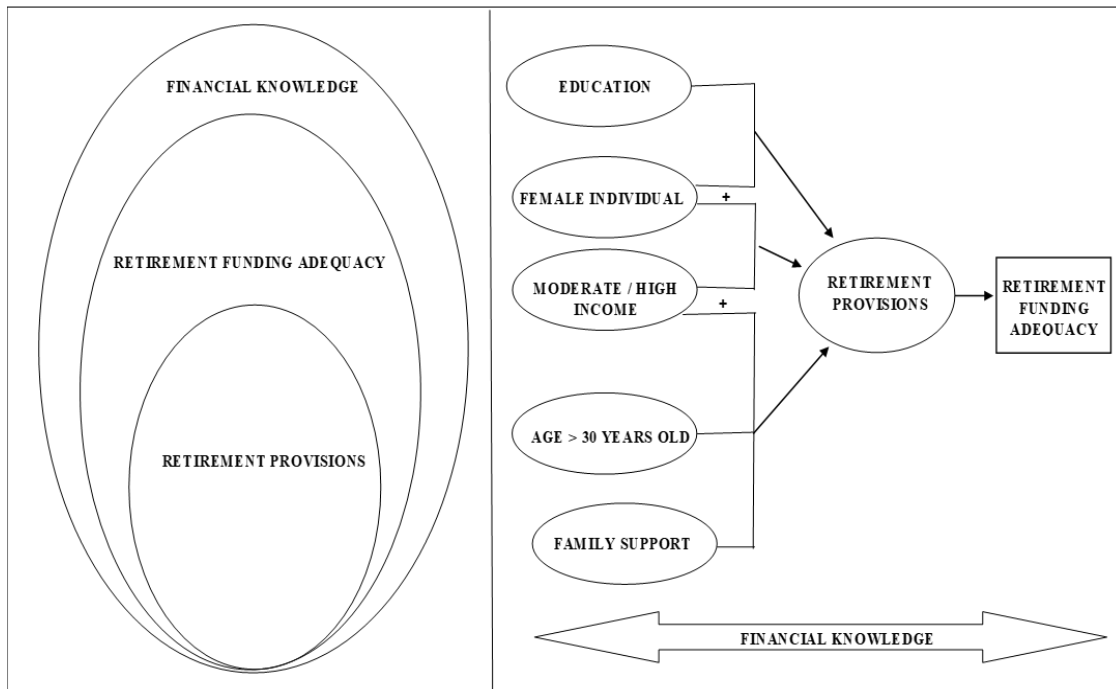


Figure 3. Solution paths for retirement funding adequacy sufficiency

Source: *Authors' own construction.*

The Euler diagram (on the left side of Figure 3) allows us to visualise the set-theoretic relationship between conditions and the outcome. Furthermore, the Euler diagram depicts how RP is a subset of RFA and FK is a superset of RP and RFA. The relational schema (on the right side of Figure 3) summarises the dataset pattern, and it highlights that three different demographic patterns lead to RP, and ultimately RFA.

5. Discussion and implications of the results

The results of this research highlight that financial knowledge is the only necessary condition for retirement funding adequacy. In other words, we have demonstrated that retirement funding adequacy cannot be achieved without financial knowledge and financial knowledge appears in conjunction with sufficient paths. Furthermore, this aligns with previous research that asserts that individuals necessitate a high level of understanding of financial concepts in order to become financially independent at retirement (Hauff et al., 2020; Refera et al., 2016). As such, financial planning advice prior to retirement should include financial knowledge assessments, as difficulties may be encountered in attaining financial security without adequate levels of financial knowledge.

Retirement provision was established as a sufficient condition for retirement funding adequacy. This implies that the presence of retirement funding adequacy is determined by retirement provisions, as per prior studies (Burnett et al., 2018; Hershey et al., 2007) that emphasise how financial resources are required to ensure individuals retirement comfortably. Voluntary retirement contributions remain paramount for South Africans, given the limited access to employment-based retirement funds and the means tested social security retirement benefit. Retirement annuity funds offer an effective and tax-efficient way of saving for

retirement, yet most retirement funds in South Africa charge high administration fees that significantly impact the final value of retirement savings payouts. In South Africa, pension fund members pay charges in excess of international norms, and there is no regulation on the size of fees which may be charged by retirement funds (South African National Treasury, 2013). Financial institutions and government policy need to address the fees charged on retirement savings products to allow for more individuals to accumulate their retirement capital without the added expenditure of miscellaneous fees. Han and Staňko (2020) advise that matters such as minimising retirement fund fees and taxes are important in the retirement planning of an individual.

In this study, it was ascertained that individuals over the age of 30, as well as individuals concerned with the wellbeing of their families are associated with retirement provisions. It is conceivable that presence of retirement provisions is determined by age and family wellbeing, as those older than 30 are more likely to have retirement provisions in place. Studies confirm that family structures indeed influence retirement provisions for a combination of reasons including caregiving responsibilities and dynamics within the family. Strong family networks within South African communities, particularly for older adults, are advantageous if financial support is used to improve precautionary savings.

This research found that educated and moderate-to-high income earning female respondents are associated with retirement provisions. Not surprisingly, income remains an important determinant of retirement provisions, as higher income makes more discretionary income available, thus increasing the likelihood of retirement savings occurring. As women are more associated with retirement provisions, the involvement and empowerment of women in financial planning activities can lead to more significant and positive retirement outcomes.

In this data set, marital status was not found to be associated with retirement provisions, which contradicts research that reports a positive relationship between marital status and retirement savings (Folk, 2019; Knoll et al., 2012). Furthermore, retirement attitudes were not found to be associated with retirement provisions. As such, the dominant psychological variable in this dataset is financial knowledge, confirming that this psychological characteristic does indeed precede retirement funding adequacy. fsQCA thus allows us to analyse retirement funding adequacy through a novel epistemological perspective. Specifically, fsQCA provides a holistic understanding of retirement funding adequacy considering a case-oriented perspective that permits us to qualify the phenomenon of interest and provide a complete understanding of its complexity.

Conclusion

Inadequate retirement funding is an important issue that effects individuals, families, and on a larger scale, government spending. Yet, a limited number of studies have advanced our knowledge of the pathways leading to retirement funding adequacy. To address this research gap, this study made a substantial contribution in bringing together three bodies of theory (i.e. the life cycle theory, the theory of symbolic interactionism and the psychological foundations of financial planning for retirement), in building our understanding of what leads to retirement funding adequacy. This is a significant contribution to the literature as previous research has traditionally considered one, and at most two theoretical frameworks in grasping the determinants of retirement funding adequacy. A further research contribution was made through the inclusion of additional demographic variables (i.e. marital status, family support and education), in order to provide a more nuanced approach in understanding the conditions that contribute towards better retirement funding adequacy prospects. A methodological contribution was made as a fsQCA approach was applied to unveil the necessary and sufficient conditions for the retirement funding adequacy of South Africans.

Items from several authors were used to develop the scales adopted in this study. The reliability assessments provide further support for these scales in future studies. In this respect, it is important to point out the generalisability of the findings considering: the sample characteristics, QCA configurational ontology, and the strict criteria of consistency and coverage applied to the analysis. Specifically, QCA allows one to identify generalisable patterns of sufficiency and necessity across the sample considering Boolean difference-makers as a proxy of causation (Baumgartner & Falk, 2019). This ultimately allow us to identify clear causal patterns across the sample, which is empirically validated by the high level of coverage and consistency. The direction of the generalisation in QCA is therefore analytical. This implies that the configurations established in this study would assist future policy-makers to undertake retirement fund adequacy estimations considering our evaluation *within* the context of our sample. The findings of this study can be used by financial planners and financial institutions to identify gaps in the retirement planning process by considering and applying the pathways leading to retirement funding adequacy.

Despite the contributions of the study, certain limitations must be highlighted. The conclusions drawn in this study are tied to the specific variables under investigation in the research. Furthermore, the study was based on individual responses of pre-retired South Africans, and this may present social desirability bias as the respondents may inflate their responses to be socially acceptable. However, the items in the measuring instrument were randomised to address this problem. Notwithstanding these limitations, this research has provided valuable insight into the demographic, psychological and behavioural attributes that influence the retirement funding adequacy of South Africans. These insights are an important consideration in understanding the retirement income inequality gap that exists and the pathways to reduce it.

Acknowledgements

The authors would like to express gratitude to Prof. Raechel Johns and Prof. Linda Botterill for reviewing this article. The researchers would also like to thank and acknowledge the The South Africa National Research Foundation (Grant No. 99346) and BANKSETA (Project No. 572) for funding this study. However, these institutions played no role in the design, execution, analysis and interpretation of the data nor did they contribute in the writing up of this paper.

Ethics approval

The data for this study was collected in South Africa, through the Nelson Mandela University's Business and Economic Sciences' Faculty Research, Technology and Innovation committee. As the data that was solicited in this study was not of a private or personal nature, ethical approval was granted, as this study did not pose any risk of harm, embarrassment or offence to the respondents under investigation. The respondents were also informed of the purpose of the study, the type of information solicited along with their rights (i.e. confidentiality, anonymity, voluntary participation and option to opt-out).

Disclaimer

The authors hereby disclose that the submitted article is their own opinion/work and not an official position of the Nelson Mandela University or the University of Canberra.

References

- Allgood, S., & Walstad, W. B. (2016). The effects of perceived and actual financial literacy on financial behaviors. *Economic inquiry*, 54(1), 675-697. <https://doi.org/10.1111/ecin.12255>
- Andrade, C., Bazalais, W., & Das, N. (2014). *The effect of financial literacy on retirement planning*. *Academy of Financial Services*. Retrieved November 23, 2020, from https://academyfinancial.org/resources/Documents/Proceedings/2013/B2_Andrade_Bazalais_Das.pdf.
- Anson, O., Antonovsky, A., Sagy, S., & Adler, I. (1989). Family, gender, and attitudes toward retirement. *Sex Roles*, 20(7), 355-369. <https://doi.org/10.1007/BF00287996>
- Baranzini, M. (2005). Modigliani's life-cycle theory of savings fifty years later. *PSL Quarterly Review*, 6, 109-72. <https://doi.org/10.13133/2037-3643/9846>
- Barnes, H., & Taylor, R. F. (2006). *Work, saving and retirement among ethnic minorities: A qualitative study*. Corporate Document Services. Retrieved November 23, 2020, from <https://westminsterresearch.westminster.ac.uk/item/923y5/work-saving-and-retirement-among-ethnic-minorities-a-qualitative-study>.
- Baumgartner, M., & Falk, C. (2019). Boolean difference-making: a modern regularity theory of causation. *The British Journal for the Philosophy of Science*. <https://doi.org/10.1093/bjps/axz047>
- Baumgartner, M., & Thiem, A. (2020). Often trusted but never (properly) tested: evaluating qualitative comparative analysis. *Sociological Methods & Research*, 49(2), 279-311. <https://doi.org/10.1177/0049124117701487>
- Baumgartner, M. (2015). Parsimony and causality. *Quality & Quantity*, 49(2), 839-856. <https://doi.org/10.1007/s11135-014-0026-7>
- Bazhenova, O. V., & Krytsun, K. I. (2013). The Modigliani–Addo–Brumberg life-cycle model: Applying To Ukraine's economy. *Ekonomika*, 92(4), 73-81. <https://doi.org/10.15388/Ekon.2013.0.2343>
- Bilton, T., Bonnett, K., Jones, P., Skinner, D., Stanworth, M., & Webster, A. (Eds.). (2002). *Introductory sociology*. Palgrave Macmillan.
- Bradbury, B., & Mendolia, S. (2012). *Living standards after retirement: perceptions and expenditure patterns*. Social Policy Research Centre. Retrieved November 23, 2020, from https://www.melbourneinstitute.com/downloads/hilda/Bibliography/Other_Publications/2012/Bradbury_etal_ExpenditureCostsFinalReport.pdf.
- Browning, M., & Crossley, T. F. (2001). The life-cycle model of consumption and saving. *Journal of Economic Perspectives*, 15(3), 3-22.
- Brucker, E., & Leppel, K. (2013). Retirement plans: Planners and nonplanners. *Educational Gerontology*, 39(1), 1-11. <https://doi.org/10.1080/03601277.2012.660859>
- Bui, T. T. M., Button, P., & Picciotti, E. G. (2020). Early evidence on the impact of coronavirus disease 2019 (COVID-19) and the recession on older workers. *Public Policy & Aging Report*, 30(4), 154-159.
- Burnett, J., Davis, K., Murawski, C., Wilkins, R., & Wilkinson, N. (2018). Measuring the adequacy of retirement savings. *Review of Income and Wealth*, 64(4), 900-927. <https://doi.org/10.1111/roiw.12307>
- Carr, D. C., Moen, P., Perry Jenkins, M., & Smyer, M. (2020). Postretirement life satisfaction and financial vulnerability: The moderating role of control. *The Journals of Gerontology: Series B*, 75(4), 849-860. <https://doi.org/doi:10.1093/geronb/gby105>
- Carrera, L. N., & Angelaki, M. (2020). The diversity and causality of pension reform pathways: a fuzzy-set qualitative comparative analysis. *Journal of Social Policy*, 49(3), 582-600. <https://doi.org/10.1017/S0047279419000679>

- Copur, Z., & Gutter, M. S. (2019). Economic, sociological, and psychological factors of the saving behavior: Turkey case. *Journal of Family and Economic Issues*, 40(2), 305-322. <https://doi.org/10.1007/s10834-018-09606-y>
- Cribb, J., & Emmerson, C. (2019). Can't wait to get my pension: the effect of raising the female early retirement age on income, poverty and deprivation. *Journal of Pension Economics & Finance*, 18(3), 450-472. <https://doi.org/10.1017/S1474747218000057>
- Fiss, P. C. (2011). Building better causal theories: A fuzzy set approach to typologies in organization research. *Academy of management journal*, 54(2), 393-420. <https://doi.org/10.5465/AMJ.2011.60263120>
- Folk, J. Y. (2019). Factors affecting age cohorts on life cycle retirement planning. *Asian Journal of Advanced Research and Reports*, 1-17.
- Garcia-Castro, R., & Aguilera, R. V. (2014). Family involvement in business and financial performance: A set-theoretic cross-national inquiry. *Journal of Family Business Strategy*, 5(1), 85-96. <https://doi.org/10.1016/j.jfbs.2014.01.006>
- Greckhamer, T., Misangyi, V. F., & Fiss, P. C. (2013). The two QCAs: From a small-N to a large-N set theoretic approach. In Fiss, P. C., Cambre, B., & Marx, A. (Eds.), *Configurational theory and methods in organizational research*. Emerald.
- Han, T., & Staňko, D. (2020). Pension scheme fees and charge ratios in 44 countries: A comparative study. *International Social Security Review*, 73(1), 99-137.
- Hauff, J. C., Carlander, A., Gärling, T., & Nicolini, G. (2020). Retirement financial behaviour: how important is being financially literate?. *Journal of Consumer Policy*, 43(3), 543-564. <https://doi.org/10.1007/s10603-019-09444-x>
- Hershey, D. A., Jacobs-Lawson, J. M., McArdle, J. J., & Hamagami, F. (2007). Psychological foundations of financial planning for retirement. *Journal of Adult Development*, 14(1-2), 26-36. <https://doi.org/10.1007/s10804-007-9028-1>
- Hershey, D. A., & Mowen, J. C. (2000). Psychological determinants of financial preparedness for retirement. *The Gerontologist*, 40(6), 687-697. <https://doi.org/10.1093/geront/40.6.687>
- Kaya, B., Abubakar, A. M., Behraves, E., Yildiz, H., & Mert, I. S. (2020). Antecedents of innovative performance: Findings from PLS-SEM and fuzzy sets (fsQCA). *Journal of Business Research*, 114, 278-289. <https://doi.org/10.1016/j.jbusres.2020.04.016>
- Klammer, U. (2020). Regulating the Transition From Work to Retirement: Towards a New Distribution of Responsibilities Between the State, Social Partners and Companies?. *German Politics*, 29(3), 339-357. <https://doi.org/10.1080/09644008.2019.1660773>
- Knoll, M. A., Tamborini, C. R., & Whitman, K. (2012). I do... want to save: Marriage and retirement savings in young households. *Journal of Marriage and Family*, 74(1), 86-100. <https://doi.org/10.1111/j.1741-3737.2011.00877.x>
- Kock, T. H., & Yoong, F. J. (2011). Knowing when to retire: The first step towards financial planning in Malaysia. *Educational Gerontology*, 37(10), 854-884. <https://doi.org/10.1080/03601277.2010.485008>
- Kumar, S., Tomar, S., & Verma, D. (2018). Women's financial planning for retirement: Systematic literature review and future research agenda. *International journal of bank marketing*, 37(1), 120-141. <https://doi.org/10.1108/IJBM-08-2017-0165>
- Lee, J. M., Park, N., & Heo, W. (2019). Importance of subjective financial knowledge and perceived credit score in payday loan use. *International Journal of Financial Studies*, 7(3), 53. <https://doi.org/10.3390/ijfs7030053>
- Lee, Y. D., Hassan, M. K., & Lawrence, S. (2018). Retirement preparation of men and women in their positive savings periods. *Journal of Economic Studies*, 45(3), 543-564. <https://doi.org/10.1108/JES-12-2016-0266>

- Leischnig, A., & Woodside, A. G. (2019). Who approves fraudulence? Configurational causes of consumers' unethical judgments. *Journal of Business Ethics*, 158(3), 713-726. <https://doi.org/10.1007/s10551-017-3703-3>
- Lim, V. K. (2003). An empirical study of older workers' attitudes towards the retirement experience. *Employee Relations*, 25(4), 330-346. <https://doi.org/10.1108/01425450310483361>
- Lusardi, A., & Mitchell, O. S. (2011). Financial literacy around the world: an overview. *Journal of Pension Economics and Finance*, 10(4), 497-508.
- Masud, J., Haron, S. A., Hamid, T. A., & Zainaludin, Z. (2006). Economic wellbeing of the elderly: Gender differences. *Consumer Interest Annual*, 56, 426-431.
- Modigliani, F. (1986). Life cycle, individual thrift, and the wealth of nations. *Science*, 234(4777), 704-712.
- Murari, K., Shukla, S., & Adhikari, B. (2021). Do psychological social and financial perceptions of post-retirement life and demography influence the retirement planning behaviour?. *International Journal of Social Economics*, 48(11), 1545-1566. <https://doi.org/10.1108/IJSE-08-2020-0581>.
- Mutran, E. J., Reitzes, D. C., & Fernandez, M. E. (1997). Factors that influence attitudes toward retirement. *Research on aging*, 19(3), 251-273.
- Prast, H. M., & van Soest, A. (2016). Financial literacy and preparation for retirement. *Intereconomics*, 51(3), 113-118.
- Ragin, C. C. (2000). *Fuzzy-set social science*. University of Chicago Press.
- Refera, M. K., Dhaliwal, N. K., & Kaur, J. (2016). Financial literacy for developing countries in Africa: A review of concept, significance and research opportunities. *Journal of African Studies and development*, 8(1), 1-12. <https://doi.org/10.5897/JASD2015.0331>
- Reyers, M. (2018). Perceptions of retirement adequacy: Evidence from South Africa. *Journal of Financial Counselling and Planning*, 29(2), 343-356. <https://doi.org/10.1891/1052-3073.29.2.343>
- Sass, S. A., Belbase, A., Cooperrider, T., & Ramos-Mercado, J. D. (2015). What do subjective assessments of financial well-being reflect?. *CRR WP*, 3.
- Schneider, C. Q., & Wagemann, C. (2012). *Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis*. Cambridge University Press.
- Sinclair, C., Bajic-Smith, J., Gresham, M., Blake, M., Bucks, R. S., Field, S., Clayton, J.M., Radoslovich, H., Agar, M., & Kurrle, S. (2021). Professionals' views and experiences in supporting decision-making involvement for people living with dementia. *Dementia*, 20(1), 84-105. <https://doi.org/10.1177/1471301219864849>
- South African Government Social Welfare Policy. (1997). *White Paper For Social Welfare*. Retrieved June 20, 2020, from <http://www.kzndsd.gov.za/Documents/2015/August/documents/WhitePaperforSocialWelfare1997.pdf>.
- South African National Treasury. (2013). *Charges in South African retirement funds*. Retrieved August 12, 2020 from <http://www.treasury.gov.za/public%20comments/Charges%20in%20South%20African%20Retirement%20Funds.pdf>.
- South African Qualifications Authority. (2012). *Level Descriptors for the South African National Qualifications Framework*. Retrieved June 05, 2020, from https://www.saqa.org.za/sites/default/files/2019-11/level_descriptors.pdf.
- Statistics South Africa. (2018). *Quarterly employment statistics*. Retrieved February 16, 2019 from <http://www.statssa.gov.za/publications/P0277/P0277December2018.pdf>.
- Statistics South Africa. (2019). *Mid-year population estimates*. Retrieved September 02, 2018 from <http://www.statssa.gov.za/publications/P0302/P03022019.pdf>.
- Thai, T. D. H., & Wang, T. (2020). Investigating the effect of social endorsement on customer brand relationships by using statistical analysis and fuzzy set qualitative comparative

- analysis (fsQCA). *Computers in Human Behavior*, 113, 106499. <https://doi.org/10.1016/j.chb.2020.106499>
- Thomann, E., & Maggetti, M. (2020). Designing research with qualitative comparative analysis (QCA): Approaches, challenges, and tools. *Sociological Methods & Research*, 49(2), 356-386. <https://doi.org/10.1177/0049124117729700>
- Topa, G., Lunceford, G., & Boyatzis, R. E. (2018). Financial planning for retirement: a psychosocial perspective. *Frontiers in psychology*, 8, 2338. <https://doi.org/10.3389/fpsyg.2017.02338>
- Veri, F., & Barrowman, H. (2021). The added value of configurational meta-analyses. *Swiss Political Science Review*. <https://doi.org/10.1111/spsr.12485>
- Veri, F. (2019). Aggregation bias and ambivalent cases: A new parameter of consistency to understand the significance of set-theoretic sufficiency in fsQCA. *Comparative Sociology*, 18(2), 229-255. <https://doi.org/10.1163/15691330-12341496>
- Wang, M., & Shultz, K. S. (2010). Employee retirement: A review and recommendations for future investigation. *Journal of Management*, 36(1), 172-206. <https://doi.org/10.1177/0149206309347957>
- Yao, R., Hanna, S. D., & Montalto, C. P. (2003). The capital accumulation ratio as an indicator of retirement adequacy. *Journal of Financial Counselling and Planning*, 14(2), 1-11.