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Investing decisions and life satisfaction for the elderly investors

Adrian-Gabriel Enescu[a] and Monica Răileanu Szeles[b]

[a]Finance, Accounting and Economic Theory, Transilvania University of Brasov, Brasov, Romania; [b]Finance, Accounting and Economic Theory, Transilvania University of Brasov, Institute for Economic Forecasting, Romanian Academy, Brasov, Romania

ABSTRACT

Our paper examines the impact of investment choices on life satisfaction among elderly investors, using longitudinal data from waves 4-8 of the Survey of Health, Ageing and Retirement in Europe (SHARE). We applied a two-stage regression approach: first, a logit regression to address endogeneity with an instrumental variable, followed by ordered logit regressions. Countries were grouped based on economic conditions. The results illustrate that aggressive investing is a significant predictor of life satisfaction among elderly investors in less developed countries. Furthermore, the positive impact of aggressive investing among elderly investors is maintained robust after replacing the response variable with the positive outlook on life for both groups of countries. Mediation analysis suggests that life meaning mediates the link between aggressive investing and life satisfaction, with investment behavior potentially providing elderly individuals with a sense of purpose. Another finding of our paper is that investors from less developed European countries reported higher life satisfaction than non-investors while controlling for other factors that may influence the relationship. We have formulated policy recommendations aimed at increasing the life satisfaction of the elderly.

IMPACT STATEMENT

This study shows that aggressive investing is linked to higher life satisfaction among elderly Europeans, especially in less developed countries. Using SHARE data and robust regression methods, we find that investment behavior can provide a sense of purpose, with life meaning acting as a mediator. The results support policies promoting financial inclusion to enhance well-being in later life.

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1. Introduction

Retirement represents a period of life associated with concurrent and contrasting consequences for individuals, some of them being perceived positively and others negatively. On one side, individuals may appreciate the free time that they have for spending time with family, and friends, and for pursuing their hobbies. On the other side, the retirement phase coincides with aging and its drawbacks, such as cognitive decline, unexpected health shocks and diagnosis of chronic conditions, possible loss of income and reliance on pensions, lack of a purpose and less social interaction with members outside of the family due to the exit from the labor force, which may be more pronounced for people that had a job that required frequent social interactions.

Therefore, considering the consequences and the associated lifestyle changes given retirement, individuals may reshape their risk attitudes and motives regarding the investment process. Even though theoretical models suggest that the risk preferences of individuals are time-invariant across the life cycle, empirical literature provided evidence for a substantial variation in the risk preferences of individuals across the life cycle (Chuang & Schechter, 2015; Schildberg-Hörisch, 2018).

According to a large strand of convergent papers across disciplines, the cognitive decline in elderly people has been associated with sub-optimal financial decision-making including, for instance,

CONTACT Adrian-Gabriel Enescu adrian.enescu@unitbv.ro Finance, Accounting and Economic Theory, Transilvania University of Brasov, Brasov, Romania

mismanagement of retirement funds (Tilse et al., 2003), failure to optimize credit card balance transfers and susceptibility to financial fraud (Mueller et al., 2020). It has been shown that elderly people with cognitive impairment often experience an important decline in financial skills (Martin et al., 2019), some of them being even unaware of their cognitive loss (metacognition) which makes them more likely to report decreases in financial wealth (Mazzonna & Peracchi, 2024). Within affective science, it has been advanced that individual financial planning and decision-making for elderly individuals could be influenced by age-related changes in affective processing which could further result in a less-than-optimal financial decision, thus proving that financial decision-making at advanced ages is not as rational as it should be (Forgas, 1995). This finding contradicts the rationality of traditional economic models concerning explaining the decision-making of the elderly is challenged by specific patterns that occur at older ages, as identified by Cartensen's Socioemotional Selectivity Theory (SST). This theory proposes that factors such as aging and illness generate motivational changes, that lead to the prioritization of meaningful goals and the positivity effect (Carstensen, 2021). The positivity effect relates that the elderly tend to favor positive stimuli over negative stimuli regarding cognitive processing (Reed & Carstensen, 2012). Significant differences were observed regarding the temporal discounting across ages, namely older individuals tend to discount future gains less often than younger counterparts, therefore assigning relatively more value to future positive outcomes as opposed to younger individuals (Löckenhoff et al., 2011).

Regarding the cognitive performance of the elderly in contrast to younger individuals, fluid cognitive abilities tend to deteriorate with age, while crystallized cognitive abilities tend to improve, as older individuals tend to accumulate experience and knowledge (Samanez-Larkin, 2013). Consequently, older individuals may be at a disadvantage to younger individuals in situations that require adaptive learning and solving new problems, since those require fluid cognitive abilities. Contrastingly, older individuals tend to outperform younger adults when prior knowledge and experience are required in decision-making.

Consequently, even though aging coincides with greater knowledge and experience about investing, overall investment skill degrades as investors age, due to the negative consequences age has on cognitive abilities (Korniotis & Kumar, 2011). On the other hand, elderly adults often accumulate greater financial wealth compared to the cohort of younger individuals, as identified empirically, as individuals tend to conserve home equity until later ages (Poterba et al., 2011).

The extent to which elderly people still can rely on past investing experience to forecast their financial asset dynamics remains controversial. However, in the future elderly people will have to make more complicated and sophisticated investment decisions under higher uncertainty and risk, as life expectancy increases, as well as post-retirement financial needs. In developed economies, the individual responsibility for financial decision-making and planning seems to become a matter of increased importance in the future for elderly people as well, as they must directly deal with managing investment assets and balancing them with increased healthcare costs. For instance, the great shift in Europe from defined benefit pensions to individualized defined contribution retirement accounts (e.g. Sweden's premium pension framework, Germany's *Riester-Rente*, and the UK's auto-enrollment policies, among others) has revealed the biases and heuristics in retirement saving behavior (Benartzi & Thaler, 2007), claiming for interventions aiming to improve the investment decision-making, such as sensible default options, opportunities to increase savings rates and automatic enrolment.

Active aging has been identified as being strongly related to life satisfaction and happiness (Agahi & Parker, 2008; Ramia & Voicu, 2022), although the empirical evidence regarding the underlying mechanisms and channels is mixed. According to the World Health Organization (2002), quality of life stands as the final goal of active aging which refers to the process of optimizing opportunities for health, participation, and security. As investing in financial markets could be seen as a form of active aging, the elderly adult's happiness could be enhanced by their financial decisions. Moreover, elderly individuals' exposure to risk could vary together with their investing skills and knowledge, together with their risk preferences, which could further differently impact the elderly happiness. Age-related investment diversification has been examined so far (Fong et al., 2021), along with elderly individuals' attitudes toward risk (Banks et al., 2020), but as far as we know, the direct impact of portfolio risk on life satisfaction among elderly investors has not yet been examined. There are unique vulnerabilities that occur for elderly individuals, including age-related cognitive decline (Salthouse, 2011), higher reliance on investments post-retirement to supplement the decrease in income, and shorter time horizons to recover potential

portfolio losses. For the other age groups, the literature focuses on themes such as wealth accumulation motives in midlife, considering a higher share of risky assets owned (Fagereng et al., 2017), and financial literacy gaps that shape retirement planning (Boisclair et al., 2017).

It is known that risk attitudes evolve over the life cycle in the sense that the older are less willing to take financial risks (Dohmen et al., 2011), but it is not clear whether a lower or a higher financial risk aversion, as reflected in the portfolio structure, eventually leads to higher life satisfaction when controlling for cognitive decline, skills, and other control variables.

We investigate how aggressive investing is influencing the life satisfaction of elderly investors in both developed and less developed countries, considering the non-monetary benefits of aggressive investing such as thrills and self-attribution. Such non-monetary benefits might be more pronounced for elderly investors who may lack dynamism and a sense of purpose due to retirement. Therefore, we hypothesize that the non-pecuniary reasons may be a strong driver for active investment in equities for elderly individuals, which may in turn influence life satisfaction. The results remain robust after we replace the response variable with optimism about the future.

Our contribution consists of investigating the impact of investment portfolio structure on life satisfaction for elderly investors. To our knowledge, no paper directly examines this research question, as previous studies focused on stated financial risk aversion's impact on life satisfaction rather than portfolio riskiness for elderly investors. Our study differs by depicting how portfolio riskiness affects the life satisfaction of elderly investors, suggesting that portfolio structure may be more revealing than the stated risk preferences. Furthermore, we have conducted intensive and extensive margin analysis, namely, to identify if investors have greater life satisfaction than non-investors, as well as to compare differences in life satisfaction between aggressive and less aggressive investors. We applied a mediation analysis and identified that aggressive investing influences life satisfaction among less developed countries through the mechanism of non-monetary benefits, by providing a life purpose. Other potential non-pecuniary benefits of investing were identified in the literature: thrills similar to fast driving (Grinblatt & Keloharju, 2009) and self-attribution (Daniel et al., 1998; Gervais & Odean, 2001).

We propose the following hypothesis, after reviewing the relevant literature:

H_1: (Intensive margin): Among elderly investors in less developed countries, those with aggressive portfolios report higher life satisfaction than those with non-aggressive portfolios.

H_2: (Intensive margin): Among elderly investors in developed countries, those with aggressive portfolios report higher life satisfaction than those with non-aggressive portfolios.

H_3: Financial risk aversion negatively predicts aggressive investment behavior among elderly investors.

H_4: The positive relationship between aggressive investment behavior and life satisfaction in less developed countries is mediated by non-monetary benefits (i.e. life has a meaning).

H_5: (Extensive margin): Investor status is positively associated with life satisfaction among elderly individuals in less developed countries.

The pension system in Europe is characterized by a shift towards placing financial responsibility on individuals (Hinrichs, 2021); therefore, institutional and social support structures influence the investing behavior of the elderly, besides financial and cognitive factors. Therefore, social support plays an essential role in moderating the level of financial risk assumed by individuals, especially during a vulnerable phase of life that represents retirement, through familial networks, safety nets provided by the states, as well as community support and engagement. Evidence was identified that life satisfaction and happiness at older ages are complex separate strategies that should be aimed at maintaining life satisfaction at older ages and that active aging is not enough (Ramia & Voicu, 2022). The drivers for investing between less developed and developed countries may be heterogeneous, considering financial and non-financial drivers. For instance, robust social security systems in developed European countries may reduce the need to rely on investment income since pensions ensure a better standard of living, while in less developed countries, individuals may potentially invest aggressively to supplement their income.

The selection of explanatory variables is established by Europe's socio-economic context and existing gaps in literature. We control for trust, since societies that are characterized by sociability and trust are

more likely to own equities (Georgarakos & Pasini, 2011), we control for financial security through a proxy of making ends meet at the level of the household (Fan et al., 2022), we capture for intra-household dynamics through a partner in household (Addoum, 2017), critical for cultures where family support represents a safety net. Other additional controls are included in the regressions. We distinguish our paper by identifying the mediation analysis framework regarding non-monetary benefits, identifying evidence that life purpose may mediate the link between aggressive investing and life satisfaction in less developed European countries.

We propose policy interventions that consist of financial literacy programs, active aging initiatives, as well as institutional safeguards, that aim to amplify life satisfaction among elderly individuals from Europe by harmonizing the non-monetary purpose provided by aggressive investing with monetary security, with an emphasis on less developed regions.

2. Literature review

2.1. The nexus between portfolio choices, life satisfaction and risk aversion

The relationship between life satisfaction and portfolio decisions has been investigated, emphasizing the way investment decisions impact life satisfaction, while the reverse causal pathway has been less examined (Apergis et al., 2019; De Neve & Oswald, 2012), namely that life satisfaction is shaping investor behavior. Other studies analyze the impact of stock market price modifications on the well-being of investors (Frijters et al., 2015), but fewer studies are contextualized within the vulnerable category of elderly individuals. The key determinants of financial satisfaction are financial behaviors and risk tolerance (Joo & Grable, 2004). Financial satisfaction may in turn influence life satisfaction, especially for vulnerable categories such as retirees. Investing activities pose non-monetary benefits, such as gambling thrills (Kumar, 2009), entertainment (Dorn & Sengmueller, 2009), and self-attribution (Daniel et al., 1998; Gervais & Odean, 2001), which serve as evidence for the formulation of hypothesis H_4, namely investing behavior may influence life satisfaction through the channel of non-monetary benefits.

Risk aversion represents a preference for certain outcomes rather than uncertain ones, profoundly shapes the financial decisions of elderly individuals, and may impact life satisfaction. For instance, risk-averse individuals are often investing in low-risk assets, such as bonds or savings accounts, to avoid potential losses, even though the expected returns are lower than those for riskier assets (Charness & Gneezy, 2010). The tendency toward risk-averse behavior is frequently explained by the desire to reduce regrets, which may be more pronounced by individuals who suffer from depression (Fu et al., 2005; Schwartz et al., 2002), an illness that is associated with lower life satisfaction (Young et al., 2024).

The interplay between stated financial risk aversion and portfolio riskiness is validated empirically, namely that individuals with a greater risk aversion tend to invest less wealth in riskier assets (Xia, 2011). We have included the actual portfolio riskiness in our study, as opposed to the stated risk preferences, to empirically test the H_3. Elderly individuals are vulnerable to cognitive decline and may misjudge risk levels. Previously, discrepancies were identified regarding the assessment of risks between experts and laypersons (Pollak, 1998; Wright et al., 2000). The misalignment of risks may exacerbate financial exclusion, especially for a vulnerable category of individuals, elderly individuals, who are more prone to suffer from cognitive decline.

The role of affective states in financial decision-making remains contested. The traditional utility models assume rationality concerning wealth maximization (Grable & Roszkowski, 2008) and overlook the impact of emotions on risk preferences, especially for a vulnerable category to cognitive decline as the elderly. Conflicting theories are present: Affect Infusion Model (AIM) suggests that risk tolerance is increased by positive moods (Forgas, 1995), while the Mood Maintenance Hypothesis (MMH) argues that happier individuals are more risk-averse (Isen & Labroo, 2003).

The impact of stock price modification on life satisfaction and health was previously analyzed. Bull markets are associated with small improvements in life satisfaction for young and middle-aged men (Frijters et al., 2015). Wealth shocks from stock declines are associated with worsening physical and

mental health for the elderly (Schwandt, 2018). Other studies link stock volatility to psychological issues and hospitalizations (Engelberg & Parsons, 2016; McInerney et al., 2013).

2.2. The pursuit of happiness and investing drivers for the elderly

Happiness is a broad, subjective concept studied through various proxies. One key measure is subjective well-being, which represents a combination of positive emotions, the lack of negative emotions, and the presence of life satisfaction (Diener & Biswas-Diener, 2002). Life satisfaction is another method for assessing happiness and is reflected by living a purposeful life and having positive moods daily (Xiao, 2014). Essential factors contributing to happiness social interactions and having a meaningful life (Biswas-Diener, 2008; Lyubomirsky, 2008; Seligman, 2004). Happiness is also affected by income, especially at the lower levels (Biswas-Diener, 2008). Contrary to expectations, life satisfaction peaks for individuals in the early 70s, attributed to focusing on positive experiences and reducing harmful social ties (Steptoe & Lassale, 2018).

Regarding the investing drivers for the elderly, they may be different than the ones of the younger generations. Younger individuals may take more risks due to longer time horizons. Elderly individuals show lower risk tolerance due to health shocks and other life events, such as retirement, marital change, and widowhood (Banks et al., 2020). Cognitive decline also contributes to the reduction of risk appetite (Bonsang & Dohmen, 2015).

On the other hand, the influence of non-pecuniary reasons for investment may be greater than the potential monetary benefits for retired individuals. Active stock market investing provides thrills comparable to fast driving (Grinblatt & Keloharju, 2009). Therefore, an individual who obtained relatively low returns by investing in the stock market may still be satisfied with the performance attained, considering the thrills experienced. Gambling tendencies may also explain the preference of investors for investing with a small probability of becoming rich (Kumar, 2009). Other non-pecuniary investment motives may be related to the feeling of achievement and competence after obtaining even small returns, by attributing the trading success to their knowledge and abilities, while negative returns may be attributed to exogenous factors. This concept of self-attribution bias was identified previously (Daniel et al., 1998; Gervais & Odean, 2001).

Consequently, we posit that there may be a link between life satisfaction and investing decisions, considering the non-monetary benefits of the investing activity, such as the sense of purpose, and thrills, that may fulfill psychological and social needs, that serve as the foundation for H_1 and H_2. We divide the analysis between less developed and developed countries to account for the heterogeneity in institutional support during retirement, necessary for active aging. The non-monetary benefits of investing activities align with the Self-Determination Theory from Psychology, according to which autonomy and competency act as drivers of self-motivation and mental health, reflecting the important role of intrinsic motivation on well-being (Ryan & Deci, 2000). The Self-Determination Theory is in line with our hypothesis that the financial engagement associated with aggressive portfolios may foster individuals with a sense of control and purpose that enhances subjective well-being. Furthermore, outperforming the portfolio returns of other people when investing is associated with enhanced happiness, as previously identified by Merkle et al. (2015).

As for the negative link between risk aversion and aggressive investing, it aligns with Modern Portfolio Theory, where rational individuals aim to minimize the level of risk for a desired level of return obtained (Roman & Mitra, 2009), which stands for our H_3. The hypothesis regarding the mediating role of non-monetary benefits (H_4) is supported by previous studies, that identify non-pecuniary benefits of the investing activity, such as thrills and self-attribution (Daniel et al., 1998; Gervais & Odean, 2001; Grinblatt & Keloharju, 2009). Therefore, we posit that the transmission mechanism of aggressive investment to increased life satisfaction is by providing a life purpose, especially for a vulnerable category such as elderly individuals (H_4), considering that previous evidence illustrated that having a purpose in life is associated with enhanced life satisfaction across various age groups (Cotton Bronk et al., 2009).

We disentangle the effects of portfolio riskiness on the life satisfaction of the elder investors, based on the conjecture that investments in risky financial assets may provide a life purpose, that may be in turn associated with the achievement of life satisfaction and happiness.

The decrease in financial investments during retirement is suggested by Modigliani's life-cycle theory, where individuals save during working years and disburse savings in retirement. Therefore, individuals who continue to invest may do so also for non-monetary purposes. The preference for present gratification and financial illiteracy may lead to a deviation from the typical life-cycle behavior, which can subsequently lead to poor retirement savings decisions (Hastings & Mitchell, 2020).

Technological shifts occurred recently, with considerable advances in technology and financial technology (fintech), that reshaped the investment behaviors of the population, including elderly individuals. The adoption of technological tools such as mobile banking apps, trading platforms, and robo-advisors, has modified the traditional financial paradigms by making information more accessible to investors, expanding financial market participation, and diversifying portfolio management options. Evidence suggests that fintech is driving innovation in the financial sector and is considered to be a game-changer (Lee & Shin, 2018). Such technologies represent both opportunities and challenges for the elderly population.

On one hand, greater access to market data is provided given the proliferation of online financial resources, which leads to the democratization of access to market data, enabling market participants to conduct independent research regarding equities, without necessarily needing to rely on financial advisors. Fintech has the potential to disrupt financial intermediaries and banking, enabling easier access to capital markets, because big data can be analyzed easier, considering the advancements in computing power and artificial intelligence (Lee & Shin, 2018). However, easier access to uncontrolled information can potentially exacerbate the risk of exposing individuals, especially elderly individuals to misinformation or fraud (Lokanan & Liu, 2021), considering the cognitive decline and digital literacy gaps. Even though robo-advisors simplify portfolio management and often lead to considerable decreases in behavioral biases and lead to diversification (D'Acunto et al., 2019), low trust in algorithms due to personal preferences for personal interaction and transparency concerns regarding data may derive conservative portfolio choices, which could lead to a preference towards highly experienced human advisors rather than robo-advisors (Zhang et al., 2021). Furthermore, another drawback of robo-advisors is that they limit individualization (Scherer & Lehner, 2023). In a seminal paper, age was identified to act as a mediator regarding the use and adoption of technology (Venkatesh et al., 2012), which may in turn influence the adoption of fintech services for elderly individuals.

Another factor that is influencing the allocation of capital towards equities is represented by financial literacy. Previous evidence suggests that lower financial literacy is associated with overinvestment in speculative assets (Cascavilla, 2024). Furthermore, significant regional disparities in digital literacy can be identified even within a single economic region such as the European Union. Northern European countries such as Germany, the Netherlands, Sweden, and Denmark report the highest levels of financial literacy (roughly 65% of the individuals being financially literate), while the lowest levels are found in Romania (22%), as well as in Bulgaria and Cyprus (both around 35%) (Klapper & Lusardi, 2020). The cognitive decline is amplifying poor financial decisions, even though older investors have more experience (Korniotis & Kumar, 2011).

3. Data and methods

3.1. Data

We have conducted our study using longitudinal data from waves 4-8 from the Survey of Health, Retirement and Ageing in Europe (SHARE), which represents a multidisciplinary survey aimed at investigating various related to the aging and retirement processes among the European elderly. The SHARE database is comprised of individuals aged 50 years and over when the sampling occurred. The respondents that were present in a previous wave of SHARE research are part of the longitudinal study and are traced and interviewed again in the next waves. The data collection consisted of computer-assisted personal interviewing (CAPI), namely respondents were physically placed in the same room with the interviewers and the responses were registered using a laptop with CAPI software. For most countries, the waves are associated with the following periods: wave 4 (2011), wave 5 (2013), wave 6 (2015), wave 7 (2017) and wave 8 (2019/2020). Each wave of the SHARE database covers multiple modules related to different aspects such as demographics, physical health, behavioral risks, employment and pensions, financial

transfers, etc. We have merged the modules for each wave using the key variable 'mergeid' and afterward we have appended waves 4-8. Each individual from the SHARE database is uniquely identified using the variable 'mergeid'.

Table 1 presents the descriptive statistics for the entire sample that ranges from waves 4-8, as well as subpanels of individuals based on the country group they adhere to (i.e. less developed countries or developed countries). Life satisfaction is a self-measurement variable that ranges from 0 to 10, where respondents are asked how satisfied they are with their life, with a higher value corresponding to increased life satisfaction. For the entire sample, the mean value for life satisfaction is 7.652. Respondents' average age is 67.994 and age-squared was included as a control variable to account for non-linear relationships. Most of the respondents are female (50.96%). Education is measured and recoded based on ISCED-97 classification, namely 0 corresponds to no schooling, while 6 represents the second stage of tertiary education, the average for the sample is 2.846. Health is measured on a 1 to 5 scale, 1 represents poor health, while 5 represents excellent health. The average value for the sample regarding health is 2.79. Trust in other people is measured on a 0 to 10 scale and the average value for the sample is 5.813, a higher value corresponding to enhanced trust in other individuals. Household making ends meet is measured on a 1 to 4 scale, higher values are associated with easiness in managing financial pressure. The average value for the household making ends meet is 2.833. Financial risk aversion is also measured on a 1 to 4 scale, with higher values indicating more prudent behavior. Most of the respondents are not willing to take any financial risks (74.29%). We have created a classification regarding the portfolio profiles of investors that we will subsequently describe. According to our classification, 42.92% of the investors have an aggressive investment portfolio. We have created the variable

Table 1. Descriptive statistics.

Entire panel – all countries	N	Mean	SD	p25	p50	p75	Min	Max
Life satisfaction	19627	7.652	1.801	7	8	9	0	10
Aggressive investors	19627	.429	0.495	0	0	1	0	1
Health	19627	2.79	1.068	2	3	3	1	5
Age	19627	67.994	10.274	60	67	75	22	111
ISCED-1997 Education	19627	2.846	1.483	2	3	4	0	6
Trust	19627	5.813	2.376	5	6	8	0	10
Household making ends meet	19627	2.833	1.006	2	3	4	1	4
Man	19627	.434	0.496	0	0	1	0	1
Savings accounts enlarged	19627	.052	0.223	0	0	0	0	1
Household income (log)	19627	7.43	1.134	6.745	7.378	8.006	0	41.447
Partner in household	19627	.72	0.449	0	1	1	0	1
Financial risk aversion	19627	3.711	0.571	4	4	4	1	4
Subpanel A – Less developed countries	N	Mean	SD	p25	p50	p75	Min	Max
Life satisfaction	15050	7.606	1.810	7	8	9	0	10
Aggressive investors	15050	.477	0.499	0	0	1	0	1
Health	15050	2.795	1.076	2	3	3	1	5
Age	15050	67.876	10.210	60	67	75	22	111
ISCED-1997 Education	15050	2.88	1.454	2	3	4	0	6
Trust	15050	5.866	2.391	5	6	8	0	10
Household making ends meet	15050	2.786	1.018	2	3	4	1	4
Man	15050	.432	0.495	0	0	1	0	1
Savings accounts enlarged	15050	.053	0.224	0	0	0	0	1
Household income (log)	15050	7.382	1.152	6.685	7.313	8.006	0	41.447
Partner in household	15050	.717	0.450	0	1	1	0	1
Financial risk aversion	15050	3.693	0.586	3	4	4	1	4
Subpanel B – Developed countries	N	Mean	SD	p25	p50	p75	Min	Max
Life satisfaction	4577	7.845	1.747	7	8	9	0	10
Aggressive investors	4577	.257	0.437	0	0	1	0	1
Health	4577	2.768	1.034	2	3	3	1	5
Age	4577	68.482	10.519	60	68	76	25	106
ISCED-1997 Education	4577	2.705	1.589	1	3	3	0	6
Trust	4577	5.593	2.297	4	6	7	0	10
Household making ends meet	4577	3.031	0.929	2	3	4	1	4
Man	4577	.444	0.497	0	0	1	0	1
Savings accounts enlarged	4577	.05	0.219	0	0	0	0	1
Household income (log)	4577	7.636	1.026	7.09	7.56	8.006	0	27.631
Partner in household	4577	.729	0.444	0	1	1	0	1
Financial risk aversion	4577	3.784	0.499	4	4	4	1	4

Note. N stands for the number of observations, SD represents standard deviation, while p25, p50 and p75 represent the 25th, 50th and 75th percentiles of the distribution.

savings account expanded, which contains the individuals that either have contractual savings or retirement accounts, namely 5.23% for the entire sample. We have also included household income (log) as a control variable. Household partner takes values 1 for having a partner in the household and 0 for not having a partner in the household. For the entire sample, 72% of individuals have a partner in the household.

Hereby, we describe our methodology regarding the classification of individuals based on portfolio choices. We have created three variables that measure if individuals are investors (i), if the investors have aggressive portfolios (ii), and if the investors have conservative portfolios (iii). The variable that measures if individuals are investors (i) assumes a value of 1 if one of the following conditions is satisfied for a given individual, and 0 otherwise, namely investing in one of the following asset classes: bonds or mutual funds or individual retirement accounts or contractual savings or stocks. Investors are aggressive (ii) if one of the following conditions is met: the mutual funds' compositions are mostly in stocks or if they directly own stocks or the individual retirement accounts are composed mostly of stocks. On a similar note, our classification of conservative investors (iii) considers individuals who either have mutual funds that are invested mostly in bonds or have bonds or have individual retirement accounts directed mostly to bonds. The classification of aggressive and conservative investors is mutually exclusive, namely that individuals can take part in only one of the two groups.

We have divided the countries into two groups based on the level of their economic development, developed and less developed countries. For the developed countries group, we have considered the following countries: Luxembourg, Switzerland, Belgium, Netherlands, Austria, Germany, France, Finland, Denmark, Sweden and Israel. For the less developed countries, we have included in our classification: Spain, Italy, Greece, Czech Republic, Poland, Hungary, Portugal, Slovenia, Estonia, Croatia, Cyprus and Malta. We proxy for development in our classification by the GDP per capita measure, which is a well-established practice in the economics literature. Consequently, we have created a dummy that takes value 1 for countries that take part from the developed countries, and 0 for the rest of the countries. This classification aims to capture the heterogeneity regarding investing behavior between developed and less developed countries.

Figure 1 illustrates the graphical representation between investing style and average life satisfaction, across two dimensions: gender (Panel A) and country development level (B). For Panel A, the highest levels of life satisfaction were registered for aggressive investors, both for males and females, with a slightly higher mean value for males. Contrastingly, non-investors report the lowest levels of life satisfaction, both for males and females. Panel B depicts the comparison between the less developed and developed countries, indicating that aggressive investors register the highest average life satisfaction in both groups, with higher values exhibited for developed countries. That relationship is consistent with our expectations, and we intend to further examine this relationship after controlling for socio-demographic factors and accounting for endogeneity. The difference in mean life satisfaction between individuals who do not invest and conservative investors is present for both genders.

3.2. Methods

We employ a two-stage modeling approach to address potential endogeneity issues of the response variable due to reverse causality by using financial risk aversion as an instrumental variable (IV). More details regarding the potential endogeneity and the selection of the instrumental variable are provided in the next subsection.

In the first-stage regression, we apply a random-effects logit model on panel data that takes the following general form:

$$Pr(y_{i1},\ldots,y_{in_i}\ |X_{i1},\ldots,x_{in_i}) = \int_{-\infty}^{\infty} \frac{e^{\frac{-v_i^2}{2\sigma_v^2}}}{\sqrt{2\pi\sigma_v}} \left\{ \prod_{t=1}^{n_i} F(y_{it}, x_{it}\beta + v_i) \right\} dv_i \tag{1}$$

where:

$$F(y,z) = \begin{cases} \dfrac{1}{1+\exp(-z)} & \text{if } y \neq 0 \\ \dfrac{1}{1+\exp(z)} & \text{otherwise} \end{cases} \tag{2}$$

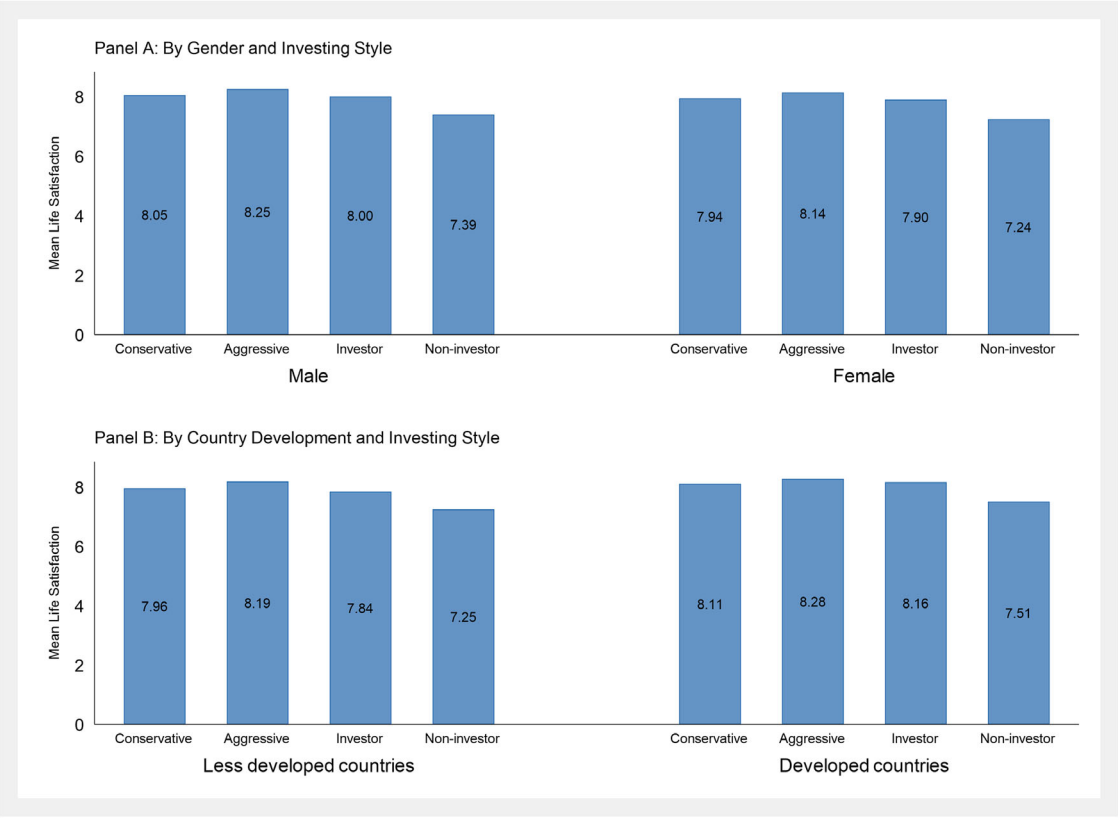

Figure 1. Average life satisfaction by gender and investing style.

y_{i1} represents a binary variable that takes value 1 for being an aggressive investor and 0 otherwise; X_{it} represents a vector of explanatory variables, that include health, age, age squared, education ISCED, trust, household making ends meet, being a man, retirement enlarged, household income log, and having a partner in the household, as well as the instrumental variable that is financial risk aversion; β is the vector of coefficients to be estimated; we assume a normal distribution $N(0, \sigma_v^2)$ for the random effects v_i.

To test H_1 and H_2 and to differentiate the impact of investing on life satisfaction among elderly investors, we estimate the aforementioned model separately for both country groups, namely developed and less developed countries. To address the potential endogeneity of aggressive investment behavior, we employ a two-stage regression approach, where the predicted values from the first-stage regressions (i.e. instrumenting with financial risk aversion) are introduced as predictors in the second-stage regressions. This approach also allows us to examine H_3, which assumes a negative relationship between the role of financial risk aversion and aggressive investment behavior.

In the second-stage regression we apply random-effects ordered logistic models on panel data that take the following general form fitted with maximum likelihood:

$$\Pr(y_{it} > k | k, x_{it}, v_i) = H(x_{it}\beta + v_i - k_k) \tag{3}$$

Where y_{it} is life satisfaction measured as an ordinal categorical variable; X_{it} represents the vector of explanatory variables mentioned earlier, which include health, age, age squared, education ISCED, trust, household making ends meet, being a man, retirement enlarged, household income log, and having a partner in the household, as well as the predicted value from the first-stage regression for being an aggressive investor after addressing endogeneity with an instrumental variable; β is the vector of coefficients estimated by the model.

The term v_i is assumed to be independent and identically distributed $N(0, \sigma_v^2)$, k represents a set of cut points $k_1, k_2, \ldots, k_K$, where K is the number of possible outcomes, for $i = 1, \ldots, n$ panels, where $t = 1, \ldots, n_i$; $H(\cdot)$ represents the logistic cumulative distribution function.

This model can be expressed also in the following form, in terms of a latent linear response, where the ordinal response variable y_{it} is generated from the latent continuous responses:

$$y_{it}^{*} = x_{it}\beta + v_i + \epsilon_{it} \tag{4}$$

and

$$y_{it} = \begin{cases} 1 \;\; if \;\; y_{it}^{*} \leq k_1 \\ 2 \;\; if \;\; k_1 \leq y_{it}^{*} \leq k_2 \\ \quad . \\ \quad . \\ \quad . \\ K \;\; if \;\; k_{K-1} < y_{it}^{*} \end{cases} \tag{5}$$

ϵ_{it} represent the errors that are distributed as a logistic with mean zero and variance $\frac{\pi^2}{3}$ and are independent of v_i.

We have reapplied the second-stage regression after replacing the response variable with an ordinal categorical variable regarding optimism about the future, while maintaining the same regressors, to examine the outlook about the future besides the present life satisfaction.

Furthermore, to test H_4, we adopt the mediation framework proposed by Baron and Kenny (1986). Firstly, we regress the response variable (i.e. life satisfaction) on the predictor (i.e. aggressive investment behavior). Secondly, we regress the response variable (i.e. life satisfaction) on the mediator that accounts for the non-monetary benefits proxy (i.e. life has meaning). Finally, we regress life satisfaction on both aggressive investment and the non-monetary benefits proxy. All models control for relevant covariates that are identified in the literature. We also conduct an extensive margin analysis, to test H_5, where we regress investor status (i.e. a dummy that takes value 1 if the individual invests in financial assets) on the vector of variables presented earlier, to identify if the elderly investors registered a higher life satisfaction.

3.3. The validity of the instrumental variable for addressing endogeneity

We have decided to include financial risk aversion as an IV to address the endogeneity of the explanatory variable (i.e. the portfolio choices regarding risky investments) due to the reverse causality concerning the response variable (i.e. life satisfaction), based on theoretical rationale and reiterated by empirical support. The appropriateness of using an instrumental variable arises from jointly satisfying the following criteria: the relevance and exogeneity of the instrument with the error term (Angrist & Krueger, 2001). As far as the relevance of the instrument is concerned, financial risk aversion appeared to be a valid instrument after empirically testing in the first stage regression, indicating a high correlation with the endogenous regressor a (i.e. aggressive portfolio), while controlling for the other exogenous regressors. In the case of a single instrument and a single endogenous regressor, the t-value for the IV should be higher than 3.2 or have a corresponding p value below 0.0016 to have a relevant instrument (Ibid). Our instrumental variable satisfies this condition after testing and obtaining a t-value of 36.2761 and a p value of 0.0000, indicating empirical support in favor of containing it as an IV in the model.

We have applied the under-identification test Kleibergen-Papp LM, to check whether the instrument (i.e. financial risk aversion) is sufficiently correlated with the endogenous variable, namely aggressive investing. The Kleibergen-Paap LM test ($p = 0.000$ for both less developed and developed countries) confirms the instrument is relevant and the model is identified for the intensive margin analysis (H_1 and H_2). Furthermore, we have applied the weak-identification test proposed by Kleibergen-Paap Wald F-statistic. The Kleibergen-Paap Wald F-statistic ($F = 476.92$ for the less developed countries and $F = 222.33$ for the developed countries) exceeds the Stock-Yogo critical value of 10, confirming the instrument's strength. The results of the tests applied support the validity of financial risk aversion as a strong and relevant instrument for aggressive investment behavior in our analysis of the intensive margin (H_1 and H_2).

Furthermore, we have identified theoretical evidence for the instrument exogeneity. Firstly, the mechanism through which the instrument influences the endogenous regressor was thoroughly investigated in the literature. The interplay between risk aversion and portfolio selection was previously identified in the literature, indicating that a risk-averse agent would invest less wealth in risky assets (Xia, 2011). Besides, such a theoretical assumption is consistent with the expectations, namely, that a higher risk aversion will pertain to cautious financial choices too. The causality between risk aversion and portfolio selection is also in line with the Modern Portfolio Theory (MPT), where the choice between financial assets is based on solving an optimization problem by minimizing the portfolio risk for a desired expected return (Roman & Mitra, 2009).

Secondly, we have identified evidence regarding the lack of causality between the instrumental variable and the response variable. Past research has supported that risk preferences were not correlated with life satisfaction for individuals in perfect health conditions, and such an association is not yet established for those who suffer from depression (Young et al., 2024). On a similar note, using a general measure of risk-taking behavior, no statistically significant evidence was identified for the relationship between the tendency towards risky behavior and life satisfaction for young people who attend secondary school (Music et al., 2013).

We conducted an additional robustness check to address concerns regarding a potential violation of the exclusion restriction, namely that the instrumental variable (i.e. financial risk aversion) may directly affect the outcome variable (i.e. life satisfaction) rather than only through the exposure variable, which is aggressive investing. Considering that such an assumption cannot be tested using behavioral data, we have applied a falsification analysis that enables us to conduct a counterfactual analysis, as proposed in the literature (Keele et al., 2019). Therefore, we have restricted to the subsample of non-investors and applied a falsification test, to identify if financial risk aversion has a significant association with life satisfaction for the subsample. In the group of non-investors, the IV (i.e. financial risk aversion) did not significantly impact life satisfaction ($\beta = .010$, $p = 0.455$), indicating no evidence that a direct pathway would violate the exclusion restriction.

4. Empirical results

Table 2 reports the empirical results after applying the main regression using the two-stage procedure, namely the endogenous binary regressor (i.e. aggressive investor) was introduced as the response variable in the first-stage logit regression, and the endogeneity concerns were addressed by including financial risk aversion as an IV, while life satisfaction serves as the response variable in the second-stage

Table 2. Explaining life satisfaction—two-stage ordered logit and logit regressions.

Variables	Less developed	Developed
Dependent variable: Life satisfaction (second-stage regression)		
Aggressive investor	0.22*** (0.07)	−0.009 (0.01)
Health	−0.68*** (0.01)	−0.80*** (0.01)
Age	0.01 (0.01)	0.11*** (0.01)
Age square	−0.000 (.00)	−0.0006*** (0.0001)
Education	−0.14*** (0.03)	−0.02* (0.01)
Trust	0.13*** (0.05)	0.16*** (0.007)
Savings accounts enlarged	0.17** (0.08)	0.11** (0.05)
Making ends meet	0.55*** (0.02)	0.72*** (0.02)
Man	−0.22** (0.04)	−0.15** (0.03)
Household income (log)	0.11*** (0.01)	0.04*** (0.01)
Household partner	−0.25*** (0.01)	−0.28*** (0.01)
Dependent variable: aggressive investor (first-stage regression)		
Health	0.16*** (0.05)	−0.17*** (0.03)
Age	0.0003 (0.07)	−0.06* (0.03)
Age square	−0.0001 (0.0002)	0.0006*** (0.0002)
Education	0.38*** (0.05)	0.09*** (0.02)
Trust	−0.02 (0.02)	0.09*** (0.01)
Savings accounts enlarged	−0.94*** (0.14)	−0.38*** (0.09)
Making ends meet	0.28*** (0.06)	0.38*** (0.04)
Man	0.49*** (0.11)	0.26*** (0.06)
Financial risk aversion	−0.36*** (0.08)	−1.30*** (0.06)
Household income (log)	0.01 (0.05)	0.09*** (0.02)
Household partner	0.0008 (0.06)	−0.20*** (0.03)

Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

ordered logit regression, as mentioned in the Methods subsection. We provide the regression output for the regression applied for both country groups, for less developed and developed countries, to investigate potential heterogeneous impacts across the groups.

We account for standard demographic variables with the control variables. Regarding the first-stage regression, health is statistically significant as a regressor for both groups of countries, with contrasting coefficients for the groups of countries, indicating a heterogenous impact across the developed group of countries and less developed group of countries. For the developed countries, the coefficient indicates that individuals in better health are more likely to invest in the stock market (e.g. a higher value for the health variable corresponds to worse health conditions), while for less developed countries individuals with poor health are more likely to aggressively invest. For the developed countries' result, we obtained a consistent estimate with the previous results from the literature, where individuals that were found to be in poor health condition were less risk tolerant, which is also the case for aging that reduces the risk tolerance (Banks et al., 2020). The positive impact of decaying health on investment risk for the less developed countries is not expected and may be attributable to limited access to healthcare services in such countries that may restrain them from accessing check-ups regularly. Previous studies from the health literature indicated that individuals with lower socio-economic status are less likely to participate in cancer screening and prevention activities (Akinyemiju, 2012). Furthermore, country-specific cultural factors and institutional features were identified in the literature for the European elderly regarding risk attitudes, especially for the reactions in the context of health deterioration (Banks et al., 2020).

For the developed group of countries, age has a negative and statistically significant influence on investment riskiness, which is in line with the fact that elderly investors are more risk-averse or happier with lower returns, while better education is associated with taking more financial risks in terms of investment decisions, as well as being a man (Becker et al., 2015; Merkle et al., 2015; Rieger et al., 2015). Age squared indicates a non-linear and statistically significant relationship between aggressive investors and age in developed countries. For the developed group of countries, individuals with a higher trust score are more likely to invest in risky assets, consistent with the results of Georgarakos and Pasini (2011).

The financial variables for the first-stage logit model are all statistically significant for the developed group of countries. A positive and statistically significant relationship emerges between financial stability (as proxied by the variable ease of making ends meet) and risky asset allocation. More specifically, individuals who report fewer financial difficulties are more likely to invest in riskier assets. As for the savings accounts enlarged, a negative relationship was identified with the response variable for the first stage regression. Households with higher incomes are more likely to invest in riskier assets, while a negative relationship is identified between aggressive investing and not having another partner in the household. More importantly, the IV is statistically significant in the first-stage logit regression, suggesting that individuals with a higher financial risk aversion are less likely to assume financial risks.

We examine life satisfaction in the second stage ordered logit regression, where the direction of the relationships between the predictors and the response variables is the same for both groups of countries, except for the fitted values for aggressive investors after accounting for the endogeneity in the first stage. More specifically, aggressive investors are more satisfied with their lives as compared to conservative investors from the less developed group of countries, at the 1% threshold, while controlling for socio-demographic variables and addressing endogeneity concerns in the first stage regression. For developed countries, aggressive investing behavior is not statistically significant as a predictor for life satisfaction among elderly investors.

As a robustness test, we report the results after considering another measure for the response variable by including future expectations of individuals as the response variable, to analyze the impact of portfolio choices not only on the present life satisfaction of elderly investors but also on the outlook. Table 3 presents the results of the robustness analysis. We apply the same two-stage methodology of ordered logit and logit regressions for each group of countries. For the first stage of logit regressions, where the aggressive investor is the response variable, the results are identical to those from Table 2.

The prominent result of the second stage ordered logit regressions is that elderly individuals with an aggressive investment profile are more optimistic regarding the future than the other investors from our

Table 3. Explaining the future looks good—two-stage ordered logit and logit regressions.

Variables	Less developed	Developed
Dependent variable: future looks good (second-stage regression)		
Aggressive investor	0.42*** (0.07)	0.06*** (0.02)
Health	0.69*** (0.02)	−0.81*** (0.02)
Age	0.06*** (0.01)	0.20*** (0.01)
Age square	−0.0006*** (0.0001)	−0.001*** (0.0001)
Education	−0.08*** (0.03)	0.01 (0.01)
Trust	0.12*** (0.06)	0.16*** (0.007)
Savings accounts enlarged	0.38*** (0.09)	0.05 (0.06)
Making ends meet	0.30*** (0.02)	0.60*** (0.02)
Man	−0.20** (0.04)	−0.09** (0.03)
Household income (log)	0.06*** (0.01)	0.05*** (0.01)
Household partner	−0.10*** (0.01)	−0.15*** (0.01)
Dependent variable: aggressive investor (first-stage regression)		
Health	0.16*** (0.05)	−0.17*** (0.03)
Age	0.0003 (0.07)	−0.06* (0.03)
Age square	−0.0001 (0.0002)	0.0006*** (0.0002)
Education	0.38*** (0.05)	0.09*** (0.02)
Trust	−0.02 (0.02)	0.09*** (0.01)
Savings accounts enlarged	−0.94*** (0.14)	−0.38*** (0.09)
Making ends meet	0.28*** (0.06)	0.38*** (0.04)
Man	0.49*** (0.11)	0.26*** (0.06)
Financial risk aversion	−0.36*** (0.08)	−1.30*** (0.06)
Household income (log)	0.01 (0.05)	0.09*** (0.02)
Household partner	0.0008 (0.06)	−0.20*** (0.03)

Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

classification, indicating a positive and statistically significant relationship for both country groups, after controlling for standard socio-demographic variables. The coefficient is higher for elderly individuals from less developed countries than for those situated in developed countries. For the rest of the predictors, the direction and statistical significance of the relationships between them and the response variable are maintained with the results obtained in Table 2, apart from the education variable for developed countries.

We have conducted a mediation analysis using the framework established by Baron and Kenny (1986), to examine whether the link between aggressive investing and life satisfaction is mediated by the perceived life meaning for the less developed European countries. Life meaning stands as a proxy for the non-monetary benefits of investing, as hypothesized by H_4. We have used a series of random-effects ordered logistic regression.

The results of the mediation analysis are depicted in Table 4. Firstly, we investigate the total effect of the independent variable, aggressive investing on the dependent variable, life satisfaction. Our results indicate a positive and statistically significant association between the two variables, suggesting that individuals who adopt a more aggressive investment behavior report a slightly higher level of life satisfaction while controlling for other factors that may influence the relationship.

Secondly, we examine whether aggressive investing, the independent variable is associated with life meaning, the proposed mediator. Our analysis indicated a positive and statistically significant relationship, suggesting that aggressive investors tend to perceive their lives as meaningful. This result confirms our hypothesis that aggressive investing behavior contains non-monetary benefits, such as a sense of meaning and psychological engagement.

Thirdly, we include both aggressive investing and life meaning in the model predicting life satisfaction. Our results show that life meaning is a strong positive predictor of life satisfaction at the 1% threshold, while the coefficient for aggressive investing was reduced and became non-significant. The pattern obtained in this last step of regression analysis indicates that the impact of aggressive investing on life satisfaction is fully mediated by life meaning, for the less-developed group of European countries, as hypothesized (H_4). This finding is aligned with recent research that emphasizes the role of a sense of purpose in life and social participation as significant predictors of life satisfaction for the elderly (Pynnönen et al., 2024). On a similar note, another recent study identified that life meaning and social participation have a positive association with the quality of spiritual living of the elderly (Wang et al., 2024). These findings align with our mediation analysis, which supports our result that aggressive investing may improve life satisfaction by providing a greater sense of purpose in less developed countries.

Table 4. Mediation analysis of life meaning in the relationship between aggressive investing and life satisfaction.

Regression I: Independent variable predicting the dependent variable: Life satisfaction	Coef.	St. Err.	t-value	*p*-value	[95% conf	Interval]	Sig
Aggressive investor	.08	.042	1.93	.054	−.001	.162	*
Health	−.764	.026	−28.93	0	−.816	−.713	***
Age	.125	.026	4.89	0	.075	.176	***
Age square	−.001	0	−3.81	0	−.001	0	***
Education	−.038	.016	−2.46	.014	−.069	−.008	**
Trust	.169	.01	16.87	0	.149	.189	***
Making ends meet	.63	.028	22.16	0	.574	.686	***
Risk	−.031	.029	−1.05	.293	−.088	.026	
Man	−.134	.043	−3.13	.002	−.219	−.05	***
Savings accounts enlarged	−.252	.057	−4.44	0	−.364	−.141	***
Household income (log)	.093	.018	5.07	0	.057	.129	***
Household partner	−.342	.025	−13.94	0	−.39	−.294	***
Regression II: Independent variable predicting the mediator: Life has meaning	Coef.	St. Err.	t-value	*p*-value	[95% conf	Interval]	Sig
Aggressive investor	.148	.059	2.50	.012	.032	.264	**
Health	−.582	.034	−17.00	0	−.649	−.515	***
Age	.176	.035	5.07	0	.108	.244	***
Age square	−.001	0	−5.46	0	−.002	−.001	***
Education	.1	.022	4.60	0	.057	.142	***
Trust	.127	.013	9.63	0	.101	.152	***
Making ends meet	.237	.035	6.77	0	.169	.306	***
Risk	−.013	.041	−0.31	.756	−.093	.067	
Man	−.198	.06	−3.29	.001	−.317	−.08	***
Savings accounts enlarged	−.085	.078	−1.08	.279	−.238	.069	
Household income (log)	.088	.026	3.39	.001	.037	.139	***
Household partner	−.316	.033	−9.50	0	−.382	−.251	***
Regression III: The mediator influencing the dependent variable: Life satisfaction	Coef.	St. Err.	t-value	*p*-value	[95% conf	Interval]	Sig
Aggressive investor	.059	.041	1.45	.147	−.021	.138	
Life has meaning	.946	.037	25.44	0	.873	1.019	***
Health	−.672	.025	−27.01	0	−.721	−.623	***
Age	.089	.025	3.56	0	.04	.138	***
Age square	0	0	−2.33	.02	−.001	0	**
Education	−.053	.015	−3.49	0	−.082	−.023	***
Trust	.147	.01	15.26	0	.129	.166	***
Making ends meet	.591	.027	21.52	0	.537	.645	***
Risk	−.026	.028	−0.93	.351	−.082	.029	
Man	−.1	.042	−2.40	.016	−.181	−.018	**
Savings accounts enlarged	−.241	.055	−4.36	0	−.349	−.133	***
Household income (log)	.082	.018	4.58	0	.047	.117	***
Household partner	−.287	.024	−12.20	0	−.333	−.241	***

***$p < .01$; **$p < .05$; *$p < .1$.

Our extensive margin analysis compares investors to non-investors, which reveals major differences across the two categories of countries and supports H_5, namely that the elderly individuals from less developed countries that invest report a higher life satisfaction than non-investors, at the 1% threshold. The results of the extensive margin analysis are reported in Table 5. These results suggest that participation in financial markets improves well-being when controlling for other potential factors that could influence the relationship, such as health, income, or other socio-demographic variables.

5. Discussions

We investigated the impact of portfolio riskiness on present life satisfaction and the future positive expectations for elderly investors while accounting for endogeneity with an instrumental variable and controlling for socio-demographic factors. We have divided the sample into less developed countries and developed countries consisting of European countries and Israel, to examine if the impact of aggressive investing is different across them, considering that the well-being of retirees varies based on the institutional support for active aging.

Our empirical evidence strongly supports H_1, indicating a significant positive association between aggressive investing and life satisfaction among elderly investors in less developed countries. This aligns with our expectation that aggressive investing may provide non-monetary benefits that may, in turn, provide the elderly investors a life purpose and positive views about the future, given the non-monetary

Table 5. Life satisfaction: investors vs. non-investors (extensive margin).

Variables	Less developed	Developed
Dependent variable: life satisfaction (second-stage regression)		
Investor dummy	.057*** (.017)	−.016 (.035)
Health	.667*** (.013)	.848*** (.029)
Age	.034*** (.013)	.133*** (.027)
Age square	0*** (0)	−.001*** (0)
Education	−.065*** (.009)	.035 (.023)
Trust	.142*** (.005)	.103*** (.01)
Savings accounts enlarged	−.21*** (.051)	.193 (.128)
Making ends meet	.624*** (.02)	.657*** (.04)
Man	−.126*** (.023)	−.162*** (.054)
Household income (log)	.097*** (.011)	.068*** (.021)
Household partner	.498*** (.024)	.422*** (.053)
Dependent variable: investor dummy (first-stage regression)		
Health	.243*** (.019)	.149*** (.047)
Age	.071*** (.022)	.066 (.055)
Age square	0*** (0)	−.001 (0)
Education	.192*** (.015)	.374*** (.039)
Trust	.034*** (.008)	−.025 (.02)
Savings accounts enlarged	1.458*** (.073)	2.25*** (.179)
Making ends meet	.83*** (.027)	.715*** (.065)
Man	.236*** (.039)	.466*** (.097)
Financial risk aversion	−1.071*** (.035)	−1.34*** (.092)
Household income (log)	.291*** (.017)	.161*** (.041)
Household partner	.124*** (.042)	.367*** (.102)

Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

benefits to investing that were previously identified in the literature, such as self-attribution (Daniel et al., 1998; Gervais & Odean, 2001), entertainment (Dorn & Sengmueller, 2009) and gambling thrills (Kumar, 2009). The weaker social safety nets and limited access to active aging in less developed countries may amplify the psychological benefits of participation in the equity markets, as investing replaces the dynamism lost by leaving the labor market. This result resonates with Self-Determination Theory, where intrinsic motivation is fostered by autonomy and competence (Ryan & Deci, 2000). From the financial perspective, the stronger effect of aggressive investing on life satisfaction may reflect the higher marginal utility of wealth gains, considering that the baseline level of wealth is lower in less developed countries than in developed countries and that even small returns may improve the living standard.

Our analysis was based on the conjecture that such non-monetary benefits may be more pronounced for the elderly, given that elderly adults may have a less dynamic lifestyle as opposed to younger adults due to health challenges, a low-income replacement rate, lack of social engagement and learning, as well as lack of purpose by not working anymore. However, other individuals may consider the retirement phase to be fulfilling since they have the free time to spend with family, and friends, to pursue hobbies, or to travel. Contrary to popular belief, higher life satisfaction was registered for elderly individuals, which gave the name to this concept the 'paradox of well-being', which can be explained by the fact that individuals with better health and more satisfied with their lives stay in a survey for a longer period, therefore biasing the results for panel interviews (Hudomiet et al., 2021).

Contrary to H_2, aggressive investing did not significantly predict life satisfaction in developed countries. Our results provide empirical evidence in favor of hypothesis H_1, that aggressive investing may influence life satisfaction and a positive outlook for elderly investors in less developed countries, therefore marking differences across the impact of investing on life satisfaction across the two country groups. Firstly, aggressive investment has a different impact between the developed and less developed countries on life satisfaction as a response variable. The relationship between aggressive investing and life satisfaction is positive and statistically significant for less developed countries, while for the developed countries it lacks statistical significance. The divergence could be potentially attributable to the institutional and socio-economic that distinguish developed countries from less developed ones: higher baseline wealth, robust social security systems and institutional frameworks that support active aging, and more alternatives for purposeful engagement, that may reduce the relative importance of investing as source of fulfillment. The different impacts across the two groups of countries can be attributed to the following potential factors.

Firstly, financial literacy can have a certain role, as financial literacy levels tend to be lower in less developed countries (Batsaikhan & Demertzis, 2018). This may lead to individuals viewing aggressive investments as a viable path to financial success in less developed countries and may enhance the perceived benefits of aggressive investing on life satisfaction, even though the financial market participation is lower in less developed countries. Financial literacy correlates positively with the propensity to own equities in developed markets (Van Rooij et al., 2011). In contrast, fewer studies were focused on emerging markets rather than developed markets (Sivaramakrishnan et al., 2017).

Secondly, as expected, the less developed countries face economic and social concerns, such as higher levels of poverty and social inequality, and given these conditions, individuals may be prone to aggressively invest in them to escape these burdens. The aggressive investment strategies could generate massive potential returns that could be recognized as a route to economic opportunity, as an escape from poverty restrictions.

Thirdly, aggressive investing might have a more pronounced impact on wealth accumulation in less developed countries, which could lead to higher life satisfaction, considering the lower baseline level of wealth and higher poverty rates. Financial gains from aggressive investing may be more impactful in less developed countries, compared to developed countries, where there are more sources of income available and broader investment options.

Fourthly, differences in active aging due to the institutional frameworks might explain why aggressive investing affects life satisfaction differently across countries. In developed countries, retirees often can remain active and socially engaged, while less developed countries might lack such policies, prompting retirees to seek purpose and fulfillment through other activities, such as investing in equities. For instance, developed European nations such as Sweden, Denmark, United Kingdom, Finland, Netherlands, and Ireland come at the top of the Active Ageing Index, based on the results of a survey, while Greece and many of the Central European countries are situated at the bottom of the list regarding active aging (Zaidi et al., 2017). For instance, in developed countries, there are projects such as the Multi-Generational Houses from Germany that promote social inclusion and aim to reduce loneliness among the elderly population, or the National Pensioners' Organization in Sweden that promotes volunteerism. Such initiatives may be limited in countries with a low Active Ageing Index.

In summary, we have discussed potential factors that could shape how the life satisfaction of elderly investors is influenced by aggressive investing in different countries, including factors such as financial literacy, economic conditions, baseline wealth, and opportunities for active aging.

Our empirical evidence robustly supports H_3, namely that financial risk aversion negatively predicted aggressive portfolio choices across both country groups. Our findings align with the Modern Portfolio Theory, where risk-averse individuals prioritize portfolio allocations towards safer assets (Roman & Mitra, 2009). The link between stated risk preferences and actual investment behavior was suggested by empirical work (Xia, 2011).

The stronger negative association in developed countries between financial risk aversion and portfolio riskiness may depict a higher level of financial sophistication, indicating that the risk assumed by investors in their portfolios is more accurately aligned with personal risk tolerance. Contrastingly, the lower financial literacy from the less developed countries may weaken the link between financial risk aversion and portfolio riskiness, through mechanisms such as overconfidence of limited access to diversified instruments.

Our mediation analysis using Baron and Kenny's (1986) framework supports H_4, namely that non-monetary benefits (i.e. providing a life purpose) mediate the positive relationship between aggressive investing and life satisfaction in less developed countries. Future research could explore other unmeasured mediators and benefits from the investing activity, such as social recognition from investing success or the cognitive stimulation of investing and managing portfolios and could further capture the psychological pathways that link life satisfaction to aggressive investing. The mediation analysis underscores the psychological benefits of the investing activity in less developed countries, by enhancing the sense of life meaning, beyond the financial implications. The extensive margin analysis conducted to analyze the difference in life satisfaction among elderly individuals who invest and non-investors indicates higher life satisfaction for investors in less developed countries, supporting H_5. This result aligns with the hypothesis of the non-monetary benefits of investing, especially in countries with limited retirement

support schemes, as opposed to developing countries where there is no significant difference between investors and non-investors.

The empirical results advocate for policies that aim to improve the life satisfaction of the European elderly population by ensuring active aging and financial engagement. Financial literacy programs targeted toward elderly individuals can contribute to the mitigation of investment risks, while still maintaining the non-monetary benefits of the investing activity such as life purpose, especially in countries with a weaker institutional support scheme for the elderly. Similarly, active aging initiatives such as lifelong learning or volunteering roles may provide a life purpose for elderly individuals, while still contributing to society.

Our study contributes to theoretical and practical literature. From a theoretical point of view, we shift the focus from the stated financial risk preferences to actual portfolio behavior as a predictor of life satisfaction among elderly investors, offering new insights regarding the mechanisms of non-monetary benefits through which aggressive investing influences life satisfaction. We have obtained empirical evidence by the mediation analysis that life meaning serves as a channel through which aggressive investing influences well-being. Furthermore, we have conducted an intensive margin analysis to compare aggressive investors to conservative investors, and an extensive margin analysis to compare investors to non-investors. Practically, the results suggest that investment engagement in risky assets provides non-monetary benefits in less developed European countries, which highlights the need for targeted policies to promote active aging, as an aim to provide a life purpose for the elderly in countries with a weaker institutional system.

Conclusions

Our study investigates how aggressive investment portfolios impact life among elderly investors, using waves 4-8 of the SHARE database, for developed and less developed countries. A two-stage regression methodology was employed to address the endogeneity of aggressive investment. Results indicate that aggressive investing is a significant predictor of life satisfaction in less developed countries. A robustness test revealed a positive, significant relationship between aggressive investing and future expectations in both groups, with a stronger effect in less developed countries. Policy recommendations are provided to increase the life satisfaction of elderly investors. Our results indicate that life meaning could mediate the relationship between aggressive investing and life satisfaction, namely that aggressive investing provides a purpose for elderly people, which may in turn influence life satisfaction, as indicated by a mediation analysis.

We acknowledge several limitations. Firstly, the classification of countries into two groups could be improved by including multidimensional economic indicators beyond GDP per capita, such as the development of the financial sector, pension sustainability, and economic inequality. Secondly, the elderly were treated as a homogeneous group and certain differences exist between countries regarding the retirement age and life expectancy. Lastly, a limited dynamic was present in our longitudinal database for key variables such as life satisfaction and the interest for financial assets was low in a few countries, which reduced the sample size.

Future research could expand on how active investing in equities is influencing life satisfaction for elderly investors, as the active nature of investing may provide non-monetary benefits. Increasing the sample size, adding more waves, and dividing the population into subgroups based on life expectancy and retirement age could also explain the interlink between aggressive investing and life satisfaction.

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Author contributions

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About the authors

Adrian-Gabriel Enescu is an Assistant Professor and PhD student at the Department of Finance, Accounting and Economic Theory, Transilvania University of Brasov, Romania. His research interests include behavioral finance, financial well-being, investment behavior among the elderly, and applied econometrics.

Monica Răileanu Szeles is a Professor at the Department of Finance, Accounting and Economic Theory, Transilvania University of Brasov, and a researcher at the Institute for Economic Forecasting, Romanian Academy. Her main research interests include applied econometrics, income inequality, and social policy evaluation.

Data availability statement

Data supporting the conclusions of this study are available from the corresponding author, upon reasonable request. The SHARE database waves 4, 5, 6, 7 and 8 can be retrieved on the official website of the project funded by the European Union (https://share-eric.eu/).

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