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Aging Society and Attitude to Risk

Summary: The objective of this study fills a gap in the Hungarian academic literature: its goal, on the one hand, is to systematise the research trends of decision-making and risk preferences at older ages according to the various methodological approaches, including researches based on experiment, questionnaire or wealth portfolio holding, and, on the other hand, to identify the impacts between age and financial literacy. The international academic literature shows that the researches on attitude to risk at older ages reached different conclusions depending on the research method used. In an experimental environment embedded in a play situation older people are rather risk-seeking, whereas in case of learning leading to a risky choice they are risk-averse. Based on the conclusion drawn from questionnaire surveys and portfolio selection methods, willingness to take risks decreases in older cohorts. The risk preferences dynamically changing with age highlight a new dimension of investment decisions. The research of the relationships between the investment experience accumulated with increasing age – which raises risk tolerance – and the cognitive abilities deteriorating as the end of the life-cycle approaches highlights several contradictions in the international literature.[1]

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The elderly's wealth holding is disproportionately high in developed societies, which may carry an increased risk of sub-optimal financial decisions. It is thought-provoking that according to the OECD research (2017) on financial literacy, analyses according to age, especially old age, are not given sufficient attention in the attitude researches concerning financial knowledge, financial behaviour and long-term financial planning in aging societies. The relevance of the topic is shown by the fact that based on the statistics of the ICI Research Perspective (2019) Generation X and the Baby Boomers have the highest ownership ratio in the market for investment funds in the USA. The generational turnover poses a challenge to the financial markets due to the transformation of risk preferences, whether it comes to generation-specific allocation of resources between the different investment forms corresponding to different risk levels, or the management of older people's wealth within the family, or capital market pricing effects. The aging population and the high leverage ratio present serious systematic risks in the financial markets. Due to the aging population risk-averse behaviour is increasing in the world, which affects saving and investment behaviour – at the level of

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both volume and investment strategy – and in the broader context capital accumulation, the supply of savings and even the capital flow between the countries.

The pension and health insurance measures related to the aging population have an impact on aggregated employment, investment, wages and interest rates at the macroeconomic level (Conesa, Kehoe, 2018). The tendency of increasing capital intensity, higher wages, lower returns on capital emerges due to the aging society; the latter is caused by the fact that the elderly are supported by public and private transfers rather than financial assets, and in case of open economies aging may lead to increased flows of capital and labour (Lee, 2016).

According to the statistics of the Hungarian Central Statistical Office, currently almost one fifth of the total population is over 65 years of age. The OECD study (2019) suggests that people over 65 years of age in Hungary usually do not work, the expenditure spent on the pension system in our country is relatively low when compared to the other countries (15.4 percent) and wage inequality leads to pension inequality. The financial behavior and the expected financial decisions of the elderly substantiate the relevance of the topic in Hungary, too. In the Hungarian academic literature, the risk considerations of the aging society primarily manifest themselves in the testing of the hypothesis of capital market shrinking-wealth after the global economic crisis (Mosolygó, 2009), the effects on the PAYE system (Mosolygó, 2010), the longevity risk burdening the pension system (Májer-Kovács, 2011) and its economic effects (Botos-Botos, 2009). The examination of the age-correlations of the changes in risk attitude may represent a further dimension of the financial vulnerability research conducted among the Hungarian population (Németh et al., 2020). The review of the international researches on risk preferences relating to aging represents added value in the Hungarian academic literature; we intend the theme proposal to be an opening chord for our currently ongoing researches.

ATTITUDE TO RISK AT OLDER AGES

The empirical researches reached numerous contradictory findings in terms of the relationship between age and risk preferences. Risk aversion increases with age (e.g., Morin, Suarez, 1983; Grable, Lytton, 1999; Hallahan et al., 2004; Yao et al., 2011; Sahm, 2012). According to some other studies, however, risk aversion decreases with age (Haliassos, Bertaut, 1995; Bertaut, 1998; Grable, 2000; Guiso et al., 1996; Zhong, Xiao, 1995). Based on the latest research findings it seems that risk aversion increases with age both in the United States and internationally (Mata et al., 2016).

The stability of the preferences over the life-cycle is lesser known. Giving up the concept of stable preferences profoundly weakens any decision-making model and leads to a circular argumentation, except for the dynamic context of the systematic (functional) relationship between actions and preferences (Sunde, Dohmen, 2016). On the basis of the birth cohorts the individual risk preferences systematically differ from each other because of the macroeconomic (Malmendier, Nagel, 2011) and institutional (Cameron et al., 2013) context which the different cohorts grew up in. According to others, however, neither the cohort effect nor selective mortality explains the lower willingness to take risks at older ages; instead, it can be directly linked to health shocks and other life events such as retirement, widowhood or marital changes – the latter play an important role especially in the evolution of women's attitude to risk (Banks et al., 2019).

Age affects prioritising certainty; it was

observed that older adults prefer certain gains, and avoid more sure losses than younger adults (Mather et al., 2012). In relation to the goals over the lifespan, younger adults rather have a growth orientation in their goals, while older adults are characterised by an orientation towards maintenance and loss prevention (Ebner et al., 2006).

In terms of financial decisions the elderly are particularly likely to make mistakes. Compared to the younger and older people, middle-aged adults make financial mistakes such as the misestimation of the property value or payment of excessive interest or charges more rarely (Agarwal et al., 2009). According to the authors, losses due to financial mistakes form a U-shaped age-related curve, on which the minimum appears at the age of 53, therefore, individuals make their most conscious financial decisions at this age.

Lower cognitive abilities – which were measured with IQ tests – are coupled with greater risk aversion and more manifest impatience (Dohmen et al., 2007). The deterioration in cognitive abilities has specific effects on the individual's well-being and decision-making. There is a negative relationship between the pace of retirement and the reduction of cognitive functions, but no unambiguous causal relationship was found (Coe et al., 2009). The persons who are not aware of the slight deterioration of their cognitive condition are more exposed to financial vulnerability (Okonkwo et al., 2008). Sophisticated financial decisions relate more to perceived than actual financial knowledge (Banniert, Neubert, 2016). Risk perception is more influenced by the individual's level of financial literacy (Aren, Zengin, 2016).

Sociological and psychological researches – due to their nature complementing the economic aspects – highlight valuable correlations, some of which are useful to include in the line of reasoning in order to ensure that the economic relevance of these can substantiated in the future with further researches. The childhood socio-economic status affects financial risk-taking at older ages, including the ownership of stocks and investment funds, while it does not influence the ownership of less risky assets (Christelis et al., 2011).

Hivest (2015) emphasises that the majority of the researches focuses on the negative impacts of decision-making at older ages while understanding risk processing, and a minor percentage of them addresses the positive impacts arising from age-related wisdom. An example of the latter is that the elderly are less susceptible to non-relevant, diversionary options while making decisions. Decoy effect is a phenomenon when an irrelevant option is integrated into a decision-making process, as a result of which the choice will turn around and the decision-maker will prefer the option with lower utility. The decisions of the elderly are usually not influenced by the presence of a decoy (Kim, Hasher, 2005). The elderly are more resistant to excessive spending and effort (Tentori et al., 2001) if the decoy is above the threshold level of the individual's financial/mental/physical budget. Another example is sunk cost fallacy, which means that the decision-maker – instead of cutting off his/her losses – chooses to continue to invest in the field where he/she had previous investments. The resistance of older adults to the effect relating to sunk cost was substantiated by several researches (Strough et al., 2008; Strough et al., 2011a; Strough et al., 2011b). The elderly are just as adaptive as young people when they need to change their information searching strategy (Hess et al., 2013; Mata et al., 2007).

Concerning the role of non-cognitive abilities played in the attitude to financial risk, researches demonstrated that the locus of control – i.e. the extent to which the

individual believes that the life events are the consequences of his/her own actions – is in a positive relationship with attitude to risk in case of older adults (Kesavayuth et al., 2018).

An important element of the financial decision-making process is risk perception, which is influenced by many factors, including demography (Garling et al., 2009; Slovic, 1999). Researchers have been long interested in the complexity of the relationships between risk perception, attitude to risk, intent to invest and the actual financial investment. Older adults have greater difficulty managing complex decision-making situations than young people (Keane, Thorp, 2016), while for example choices about pension savings and health insurance are just like that.

Over the last decades the research of risk perception mostly focused on capital loss, returns below the expectations, economic uncertainty, perceived knowledge deficit and the sense of lack of control. As can be seen form the list, not only quantitative but also qualitative aspects need to be taken into account when analysing risk perception. The financial risk perception of individual investors not only depends on the quantitative aspects of the investment form, which include volatility and loss probability, but also on the qualitative aspects of the investment situation, associated with anxiety and transparency (Sachse et al., 2012).

In the academic literature on decision-making and risk attitude at older ages the method of estimation of risk aversion – measured based on laboratory experiments, questionnaire surveys, portfolio holding – the country or time of sampling greatly influences the research findings obtained, their comparability and relevance. Deviations are caused, for example, by the inconsistent age classification of older investors, and there is no concensus either about the age above which the investors are considered elderly. The separation of the effects of age, cohort and period (e.g. experiencing various circumstances or a financial crisis) presents a well-known methodological difficulty relating to identification. In case of the age effect, firstly, the effect related to aging must be separated, which relates to the shortening of the investment time horizon and the depreciation of human capital. The cohort effect refers to the socio-economic environment characterising the given generation, which does not change with age; finally, the calendar time effect or period effect, which refers to the social and economic environment that the individuals of different ages equally experience at the given time. The often contradictory research findings can be attributed to the problems listed above.

Experimental approach

The risk profiles identified in the experimental context often differ from the findings of the approaches based on questionnaire or wealth portfolio. *Sproten* et al. (2010) designed their experiment in a way that in the course of a card game younger and older players made decisions in risky and ambiguous conditions. The players, having full information, knew the exact probability of gain and loss in the risky conditions, whereas they did not in the ambiguous conditions. In case of the risky conditions, the behaviour of older and young adults did not differ, but under the ambiguous conditions, older people were less ambiguity-averse than younger people.

Older people seem to be risk-seeking when it comes to card game gambling or games based on financial investment strategies, while they are much more risk-averse when faced with risks assumed through physical tasks (Mata et al., 2011). Elders are more risk-seeking in the loss zone and more risk-averse in the gain zone. What is more, they

are the least consistent in the application of strategies; they lost most of their income in the experiment compared to all the other groups (Tymula et al., 2013). When the parameters of the return distribution have to be learned from experience, older investors show a different and sub-optimal choice behaviour compared to younger adults (Mohr, Heekeren, 2012). According to the authors, if learning leads to a more risky choice, then older adults show a much more risk-averse behavour than younger adults; in contrast, if learning leads to risk-averse behaviour, then older adults made a riskier decision than younger adults. In the decision situation relating to the use of an ATM in the street older adults showed a stronger emotional response than younger adults to the audio and written reports relating to the decision; they also showed more willingness to reconsider their decisions (Rolison et al., 2017).

The findings of the experimental approaches clearly show the extent to which the risk preferences of the elderly are influenced by the context of the decision or a dynamic change in it. The questionnaires related to attitude to risk and the wealth portfolio analyses are less able to capture these dimensions of risk behaviour.

Questionnaire survey on attitude to risk

There is a negative relationship between age and willingness to take risks (Dohmen et al., 2011). The relationship between self-reported willingness to take financial risks and age is also negative according to a study using a data set from the 'Survey of Health, Ageing, and Retirement in Europe – SHARE', including a sample of individuals aged 50 to 90 covering 11 countries (Bonsang és Dohmen, 2012).

The study of the characteristics of risk preferences varying in the course of the lifespan was long missing from the academic literature. *Shurer* (2015) examined risk preferences according to the age of individuals. Risk tolerance dropped by 0.5 SD across all socioeconomic groups from late adolescence up to age 45, from which age risk tolerance continues to drop for the most disadvantaged and stabilises for all other groups. (Shurer, 2015). According to other research findings, however, willingness to take risks decreases linearly in the course of the lifespan until the age of 65 years, after which period the curve becomes flat (Dohmen et al., 2015). In the view of the authors, men are more risk-seeking than women at all ages.

The interpretation of the measure of self-reported willingness to take risks as the predictor of the choice between certain payment and playing the lottery has behavioural validity (Dohmen et al., 2011). On this basis, the authors confirm an age pattern according to which older age groups show a systematically lower willingness to take risks, regardless of whether they are women or men.

Bonsang and Dohmen (2015) link the decrease in willingness to take risks with the decline in cognitive skills. They measured cognitive skills with tests of episodic memory, verbal fluency task, and arithmetical tests based on calculations from real life situations. The authors substantiated the pronounced decline in cognitive skills with age; furthermore, in their opinion 70 percent of age-related change in risk attitude can be attributed to cognitive aging.

Risk attitude estimated based on wealth portfolio allocation

The methods based on wealth portfolio allocation are suitable to quantify actually made financial decisions which reflect an ex post situation as well as the related risk

characteristics; in this regard they differ from the experimental and questionnaire-based approach. By applying the two methods for measuring risk-taking simultaneously – that is, based on portfolio allocation of wealth and survey concerning willingness to take risks – it was demonstrated that taking risks decreases in function age, which confirms conventional wisdom (Jianakoplos, Bernasek, 2006). Age as a factor can be linked to shortening investment time horizon and lower cognitive skills, which result more and more in a short-sighted behaviour and risk aversion (Dohmen et al., 2010). As time passes older people have a lower probability of recovering from investment losses due to decreasing life expectancy and deteriorating cognitive skills, which supposes that they have a lower tolerance for financial risks.

At older ages lower level of cognitive skills can reduce the individual's ability to control his/her own emotional reactions in case of losses. The latter may lead to enhanced preferences for safety following capital market downturns, which may cause reallocations away from the stocks and an underperforming portfolio in the long term. Based on the panel data of the 'Health and Retirement Study' researchers compared 2006 and 2008 in terms of return adjusted asset allocation, and they found that the cognitive abilities are in a negative relationship with allocations away from stock; in other words, retirees with lower cognitive skills are more exposed to mistakes arising from market timing (Browning, Finke, 2014).

In the context of age and tolerance for financial risks it was observed by examining the data sets of almost half a million clients who contacted their financial advisor that risk tolerance decreases with age rather at a decelerating speed (Brooks et al., 2018). According to the authors the ability to tolerate loss, the decreasing investment time horizon and the pension effects have more explanatory power than age; however, the researchers were not able to prove that the older investors' declining cognitive abilities are coupled with a lower willingness to take risks.

The portfolio decisions of older investors reflect greater knowledge about investing; however, the more their investment abilities deteriorate with age, the more quantifiable the unpleasant financial effects of cognitive aging become (Korniotis, Kumar, 2009). The authors found that older adults achieved a 3–5 percent lower return than young adults, which they associated with their strategy based on risk-averting choices. In case of a two-person household a lot more risky assets were included in the portfolios where the risk-tolerant spouse had more bargaining power in deciding when to retire, where to buy real estate or how much they should spend when making major purchases (Yilmaze, Lich, 2015). The bargaining power was also influenced by the individual's level of income.

Each generation socialises into an intrinsic demographic, political, social and economic environment in the course of their lifetime. The different experiences across the generations also define how risk perception and investment strategy differ across investors of different ages. Willingness to take risks shows a positive relationship with GDP fluctuation (Bucciol, Miniaci, 2013). When examining the cohort of those born between 1931 and 1947 *Sahm* (2012) found a moderate decline in risk attitude in function of age. Those who have experienced low stock-market returns throughout their lives show lower willingness to take financial risks and are more pessimistic in terms of their future returns (Malmendier, Nagel, 2011). It is understandable that the cohorts who have experienced the Great Depression are less willing to take risks in the rest of their lives (Malmendier, Nagel, 2011).

Researchers observed risk aversion at advanced age varying with the level of the

stock market index (Blanchett et al., 2018). The authors demonstrated that older investors are more risk-averse than younger cohorts, even if the S&P 500 Index level, account balance, income, savings percentage, equity percentage and allocation fund percentage are taken into account. The researchers emphasise that risk preferences are influenced by the level of the S&P 500 Index but only in case of older adults. According to the authors the S&P 500 Index – i.e. the growth of wealth – increases the uncertainty of consumption for older investors; therefore, disutility decreases due to the diminishing marginal utility of wealth. Thus, the more the S&P 500 Index increases (decreases), the more the risk aversion of older adults decreases (increases). Therefore, conservative portfolio allocation can be the optimal investment strategy for older investors susceptible to risk aversion. If the investors' risk preferences are used at the time of their measurement when the portfolios of older clients are designed , then it is likely that the financial advisors will offer less risky portfolios to older investors after a stock market decline; and riskier ones when the capital markets are booming. Target-date funds and life-cycle funds provide an opportunity to reduce the losses arising from a bad market timing, which may result from changes in risk preferences.

In the analysis of a three-period model economy including overlapping generations, where risk aversion increases in time from young through middle-aged to old people, the risk premium of the share of equity increases and the risk-free interest rate decreases (DaSilva and Giannikos, 2007). By employing the same model it can be observed that holding cash as part of the portfolio follows a 'U-shaped' pattern over the life-cycle, whereas stock holding suggests a humped-shaped pattern, while there is also continuous consumption smoothing (Chambers, Schlagenhauf, 2003).

If we incorporate the inheritance function into the analysis framework, further intergenerational correlations are revealed. The inheritance function is defined by the following: (1) a weighting factor which describes how important the inheritance is for the individual compared to his/her one-period utility function, (2) the amount of the financial wealth and real estate accumulated over the life-cycle, and (3) the exponent defining the concave and convex nature of the inheritance function. The authors also set up the utility function for the good and poor health condition of the individual. If the parameters of the inheritance function are risk-neutral and the parameters of the utility function are risk-averse, then the phenomenon of 'risky shift' emerges, which means that the individuals hold a greater part of their portfolio in risky instruments at middle and old age (Feinstein, 2006).

OLD AGE AND FINANCIAL SECURITY

The aging society causes concern about the financial security of the households concerned all around the world. The macroeconomic indicators relating to old age include the share of the population over 60 years of age, life expectancy, GDP per capita, Human Development Index, i.e. HDI, as a comprehensive quality of life index. By examining these it can be demonstrated that aging has a negative effect on all the indicators measuring the financial security of households: ownership of account, general savings behaviour, targeted savings for old age, savings for unexpected events and emergency savings (Lyons et al., 2018). According to the authors, women are less educated and the poor sections of society are particularly vulnerable in emerging countries: the use of technology has, in contrast, a positive effect on

financial security through financial inclusion in developed countries.

One of the pillars of financial security at older ages is the so-called health-wealth nexus. Health shocks increase risk aversion (Decker, Scmidtz, 2016). Poor health has a negative effect on wealth through 'asset cost', such as out of pocket health care expenses not covered by insurance and indirect costs such as lost earnings, non-health-related expenses – for example using a cleaning service, organising shopping – or changes in lifestyle (Poterba et al., 2017). Low income decreases the financial assets available upon retirement, and lead to a low social security and pension annuity, which prevent the development of the assets after retirement.

THE DECLINE OF FINANCIAL LITERACY IN THE AGING SOCIETY

In case of middle and older generations financial literacy is determined by the educational attainment, the cognitive skills, coursework in economics or finance and the income level (Shimizutani, Yamada, 2019). According to the authors, individuals with higher financial literacy are more likely to invest in stocks or securities in their household assets allocation. In case of older people there is a connection between higher financial literacy and more diversified, complex portfolios (Koh et al., 2018).

Mental abilities and risk preferences are transformed with age, which may lead to sub-optimal financial decisions. The cognitive changes associated with aging present a theme for the financial service providers, as well, which requires more attention in the next decades. The flaws of memory – such transience, absent-mindedness, blocking, misattribution, suggestibility, biases and being persuaded – may influence financial memory, and this raises ethical problems in the area of financial consultancy (Klement, 2009). The decline in mental faculties is accompanied by the deterioration of financial literacy, although cannot be associated with a drop in confidence in managing one's own finances (Gamble et al., 2015). Financial literacy decreases anxieties about life at older ages, regardless of gender, age, educational attainment, marital status, investments, coverage by social security, homeownership, living with children and physical exercise (Kadoya, Khan, 2016).

Among gender, age, investment experience and financial literacy the latter was found to be relevant in the explanation of financial risk perception (Sachse et al., 2012). As people grow older they are more likely to accumulate investment experience, which may have a positive effect on risk tolerance; however, advanced age goes hand in hand with the deterioration of the cognitive condition, which causes concern about the extent to which the elderly are able to appropriately assess and manage risks. This tendency may contribute to the fact that their risk exposure is rather reduced.

Financial literacy starts to deteriorate after the age of 60, while the confidence of older people in their own financial literacy remains unchanged (Finke et al., 2016). They think that the decline in both the so-call fluid (e.g. remembering words) and crystallized intelligence (e.g. word definition) contribute to the deterioration of financial literacy scores.

Based on the Health and Retirement Survey, *Angrisani and Lee* (2019) examined cognitive decline and household financial decisions in case of older American couples. Their results suggest that differences in the level of cognitive abilities play a major role in determining who the financial decision-maker is in the household, while changes in the cognitive abilities only marginally modify such choice. Following declines in the cognitive test

scores of the household members, the authors observed reductions in wealth among older households. Wealth reductions are less sizeable among households with pension/annuity income and receiving help with finances from their children.

It is a paradox in the savings of households that many of them rely solely on bank deposits and do not have stock market investments, or contractual pre-savings or pension products in their portfolios. The factors describing the absence of participation in the stock market – such as stock purchase expenses, liquidity needs, life-cycle motives, negative experiences during the financial crisis – do not explain why bank deposit holding is so high in households (Meyll et al., 2018).

Older Americans are more likely to file for bankruptcy based on data from the Consumer Bankruptcy Project; there was a two-fold increase in the number of older people aged 65 and over among those filing for bankruptcy, and an almost five-fold increase in the percentage of such cases in the older population (Thorne et al., 2018). According to the authors, the magnitude of growth in older Americans in bankruptcy is so large that the generally increasing trend of the aging U.S. population can only marginally explain the phenomenon.

A French study suggests that several reasons explain why half of the individuals do not prepare for old age: low income, high expenses of preparation, intensive risk and time preferences, selfishness, low subjective probability of becoming disabled and short life expectancy (Apouey, 2017). According to the author, women prepare more for old age in terms of housing, social life and health care, but there is no difference between men and women in terms of financial preparation (savings and insurance).

CONCLUSIONS

Cognitive changes at older ages are coupled with the transformation of risk preferences, which has numerous aspects in connection with the age-related use of financial services on both the demand and the supply side. The separation of the aging effect, the cohort effect and the period effect helps us to identify the factors of risk perception. Not only the financially quantifiable factors have an effect on the risk perception of older people, but also the qualitative elements (anxiety, transparency). Apart from the experimental approach of risk attitude, the findings of international researches indicate that risk aversion concerning financial decisions increases in older cohorts, which unambiguously manifests itself during the portfolio assessments reflecting the investment decisions which were actually made. Risk tolerance decreases as people grow older. The deterioration processes of financial literacy in parallel with the decline in mental faculties, as well as the aggregated effects of the related sub-optimal financial decisions present a serious risk for the aging society. Understanding the relationship between cognitive health, financial decision situations and financial responsibility and identifying the financial consequences of aging in general opens numerous research opportunities in the Hungarian academic literature, too. It is an unanswered and particularly interesting question whether the researches carried out in Hungary with different methods – based on experiments, questionnaires or wealth portfolio holding – will lead to results strengthening each other or, on the contrary, they will indicate dissonances in terms of risk perception and the actual and declared willingness to take risks.

Note

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