

Quaderni di finanza

Challenges in ensuring financial competencies

Essays on how to measure financial knowledge, target beneficiaries and deliver educational programmes

N. Linciano and P. Soccorso Editors



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Essays on how to measure financial knowledge, target beneficiaries and deliver educational programmes

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The present collective work was occasioned by Consob participation in the World Investor Week (WIW), a week-long, global campaign promoted by the International Organization of Securities Commissions (IOSCO) from 2-8 October 2017 to raise awareness about the importance of investor education and protection.

Following a multidisciplinary perspective, the work gathers views on how behavioural finance, neuroscience, sociology, cognitive psychology and pedagogy may contribute to improve measurement of financial knowledge, elicitation of personal attitudes, targeting audiences and delivery of educational programmes.

The aim of the work is to give food for thought with regard to methods and tools that may foster effective initiatives and coordination among the academia and the stakeholders involved in the design and delivery of educational programmes.

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Foreword by the Consob Chairman

Financial choices are among the most important decisions that we make over our lives. Still, the vast majority of Italian citizens are not knowledgeable enough to make correct choices or even to seek for a professional help. This is especially worrying in the current landscape, in which individuals are confronted with increasingly complex financial products, uncertain economic environment and declining coverage of social security and welfare schemes.

Empowering citizens in their economic decision making process is therefore of paramount importance. To this respect, financial education plays a crucial role as it may strengthen the effectiveness of traditional regulatory and supervisory tools.

Consob has long acknowledged the potential contribution of financial education to investor protection and is now actively engaged in several initiatives, undertaken also in cooperation with consumers' associations and other Authorities. Educational programmes are grounded in the insights from supervision activity and economic research, benefiting from an evidence based approach. They address both general public and targeted audiences, also with the aim of enhancing understanding of the economic context, awareness of one's own rights and responsibilities as well as preventing the risk of frauds and mis-selling.

Consob is also very committed to contribute to the forthcoming National Strategy for Financial Education, as a member of the recently established Italian National Committee, chaired by distinguished Professor Annamaria Lusardi. The Committee will make the most of the best domestic and international practices, and will grant the coordination among the relevant stakeholders needed to widen the scope of educational initiatives and to increase their effectiveness.

Cross-country evidence shows that designing and delivering effective financial education programmes requires a careful definition of contents, targets, channels and assessment tools. As recalled by the OECD, «(...) one of the main challenges facing public authorities implementing national strategies is to find ways of changing financial attitudes and behaviours of the population».

To accomplish such a task, it is crucial to delve deep into factors governing both the financial decision making process and the learning process. A multidisciplinary approach and an open cooperation among scholars and institutions may fruitfully foster the development of a new methodological setting.

The present collections of essays was occasioned by Consob participation in the World Investor Week (WIW), a week-long, global campaign promoted by the International Organization of Securities Commissions (IOSCO) to raise awareness about the role of investor education. The present work gathers the views of several researchers engaged in the field of economics, sociology, psychology and pedagogy on how to gauge financial knowledge, elicit personal attitudes, target beneficiaries and deliver educational programmes. Proper measures of financial literacy are key to set contents and targets; clinical evidence may add to the understanding of the impact of emotional status (such as financial anxiety and personal interest) on the learning process; behavioural finance and neuroscience may greatly help in the identification of effective channels and communication campaigns.

The evidence here presented is not conclusive, of course, nor it covers key topics that require further investigation. Among these, the assessment of educational initiatives is crucial, given that it provides inputs for improving actions and plans and for public accountability. Much remains to be done, also in cooperation with the academia. Still, I hope that this work will fuel a productive debate among institutions, academics and practitioners, and that the World Investor Week will contribute to raise citizens' awareness of the importance of financial education in their everyday life.

Giuseppe Vegas

Preface by the Deputy Director General

Consob engagement in financial education

Past experience and the way forward

Financial regulators, both at national and international levels, are increasingly aware that empowering citizens through financial education is relevant not only from a micro but also from a macro perspective. While correct financial planning and investment decision-making processes are key to sustainable personal finances and individual well-being, effective education policies are instrumental triggers of saving accumulation and sound participation to the financial markets, supporting a well-functioning financial system and social prosperity. This is one of the lessons learnt by the latest financial crisis.

Financial education cannot be identified only with financial knowledge, i.e., the ability of retail investors to understand technical documents, but also and above all with a conscious approach to real-life financial decisions, responsible use of disposable income available over the life-cycle and thoroughly understanding of medium and long-term personal needs.

Within this perspective, Consob has been striving to set an integrated method to financial education, which departs from the standard assumption of individuals' rationality and takes up a multidisciplinary approach drawing from the insights of Behavioural Finance, Neuro-economics, Psychology, Sociology, Pedagogy and Economic History. To this respect, ongoing cooperation with the academia is vital to keep track with the latest developments in the theoretical and applied literature.

Along this vein, Consob has set a permanent Observatory on 'The approach to finance and investments of Italian households', whose data are published on a yearly basis. It has also delved into the determinants of financial risk perception, as conveyed by information documents of financial products, and the demand for financial advice, which might drive individuals towards suitable choices. Following behavioural finance insights, cognitive biases, individual psychological traits, motivation and timing, knowledge and skills were explored among the drivers of financial choices.

Recalling the latest initiatives, in 2014 Consob, in cooperation with a number of leading consumers' associations, launched the project denominated 'Charter of the Investors' (Carta degli investitori), a comprehensive initiative including the design and the implementation of an online complaints filing system, a new

alternative dispute resolution mechanism (ADR) dedicated to investment services, and an innovative web-portal of financial education.

Consob web-portal encompasses some interactive tools: tutorials on cognitive biases and emotional carryovers, to raise investors' awareness on mental processes that can drive financial decisions; interactive tools, such as questionnaires and personalised feedback, to test one's level of financial knowledge, risk attitude and inclination towards behavioural biases, impulsivity and overconfidence; a budgeting tool, to support people in monitoring their expenses and making sustainable consumption choices. Finally, based on a learning-by-doing approach, an interactive game on investment choices and behavioural biases is going to be released.

Following its institutional remit, Consob has targeted adults and, in particular financial decision makers, to promote core financial competencies and principles underpinning a correct investment decision-making process, understanding of economic and regulatory environment, awareness of one's own rights and responsibilities. Frontal lessons addressed to representatives of consumer associations focused on information documents of financial products' and suitability questionnaires.

Consob is currently involved in the analysis of the challenges raised by digitalisation and in the development of learning tools (such as games and simulations) that can strengthen the effectiveness of educational initiatives. This goes hand in hand with the engagement to widen the audience (from adults to youth) and to refine both targeting and delivery of contents.

Reaching the targeted audiences may be very challenging without a wide cooperation among all the actors that may potentially play a role in the delivery of educational contents. As for youth, the permanent involvement of the school system is of paramount importance; as for adults, cultural and social intermediaries (e.g. foundations, universities, etc.) should be engaged; as for general public, media are the most obvious candidates.

Consob has already taken on the challenge. It has learnt from past experience and is now looking ahead at the forthcoming National Strategy for Financial Education, which will be released by the recently established Italian Committee for Financial Education and will systematically pursue the enhancement of the financial literacy of Italian citizens.

Giuseppe D'Agostino

Executive summary

The Italian legislator has recently envisaged the establishment of the National Committee for Financial Education, whose mission is to set and implement a long called national strategy. As pointed out by the OECD, which actively supports policy makers and public authorities engaged in the improvement of financial competencies, the design and the implementation of a national strategy rest on a few, fundamental steps: mapping the existing initiatives; assessing the needs of population; consulting the stakeholders; promoting national awareness and communication.¹ The roadmap of a strategy encompasses the definition of objectives and priorities, targeting of the audience, overall impact assessment, and resources. Finally, its implementation rests on well-defined delivery mechanisms and evaluation of programmes.

Each of these steps poses challenges to be addressed in order to foster successful national strategies. This collective work touches upon some of these challenges and brings forward insights of theoretical and empirical literature of multiple disciplines and multiple approaches, with the aim to stimulate the debate and provide inputs on both methodological and practical grounds.

Part I recalls the education needs of Italian households, the role of financial literacy as ascertained in the empirical literature and the precautions to be followed in gauging the level of financial education.

In details, the essay by Linciano and Soccorso reviews the evidence gathered by Consob and published on a yearly basis in the Report of investment choices of Italian households. Consistently with the evidence documented in many national and international surveys,² Consob Report confirms the low level of financial knowledge of Italian decision makers, and sheds lights on several emotional and cognitive attitudes potentially detrimental to sound financial choices. Indeed, preliminary analysis of the correlations among personal attitudes and observed behaviours claims for educational campaigns raising knowledge, awareness, and personal engagement in the full range of economic choices, spanning from financial control (i.e., planning, budgeting and saving) to financial market participation and investment choices.

1 See the 2012 High-level Principles on National Strategies for Financial Education; additional resources are the 2013 Advancing National Strategies for Financial Education and the 2015 Policy Handbook on National Strategies for Financial Education, which is a follow up of the High-level Principles.

2 See G20/OECD INFE (2017), Report on Adult Financial Literacy in G20 Countries; Intesa Sanpaolo and Centro Einaudi (different years), Indagine sul Risparmio e sulle scelte finanziarie degli italiani; OECD (2017), PISA 2015 Results (Volume IV) Students' Financial Literacy; L. Klapper, A. Lusardi and P. van Oudheusden editors (2016) Financial Literacy Around the World: Insights from the Standard & Poor's Ratings Services Global Financial Literacy Survey.

It is however necessary to delve deeper into the direct and indirect links among education and financial choices by accounting for individual traits and motivations underlying learning and empowering. Indeed, the relationship between financial education, investment choices and risk taking may not be clear-cut, since knowledge may impact on self-confidence thus triggering unintended 'second-order effects'.

Di Cagno and Panaccione review the experimental evidence generally highlighting a positive relation between literacy and stock market participation and wonder about the challenges that this relation may pose to investor protection if it is not driven by a true enhancement of competencies but rather by overconfidence. They point to unbiased professional advice and report experimental evidence on how professional advice seeking may either rise or decline with financial knowledge, depending on the effect of overconfidence and on its relationship with financial education. The authors conclude by recalling a research project, involving both Consob and the academia, dealing with the issues raised by technological developments and, in particular, by robo advice.

Reliable analyses on the impact of financial literacy rest on unbiased measures. The essay by Nicolini recalls the definitions of literacy used in the literature and compares several gauging methodologies developed so far. After exploring the technicalities underpinning a financial literacy survey, the author discusses some practical recommendations for gathering unbiased data and delivering policy makers a powerful evidence-based tool for the design of educational programmes.

Part II recalls the many factors governing financial decision-making process beyond knowledge. As it is well known, cognitive biases and emotions may severely hinder the appreciation of risk and the selection of the most suitable course of action.

Ploner reviews the seminal contributions about the most important biases in financial decision making that relate to loss aversion, such as the status quo bias and the myopic loss aversion. These in turn may prompt inertia and lower the willingness to take risk.

Beyond loss aversion, many other biases may mislead individual risk perception. Lucarelli discusses how objectively measured risk is filtered through subjective perception, which in turn may adversely affect the appreciation of the level of risk taken. This drawback may be exacerbated by unawareness of one's own risk attitude. The overall consequence is that decision makers can go through excessive risk taking relative to their risk capacity (either emotional or/and economic). Cognitive psychology, however, has shown that emotions can be deactivated through awareness. Fostering self-awareness could therefore contribute to improve individuals' mental processes and to defuse pitfalls driven by biased risk perception.

Full understanding of the individual decision making process cannot neglect financial anxiety, which has proven to be among the most relevant emotional statuses hampering individuals' financial capability. Recent studies in

neuroeconomics have begun to shed light on the neurobiological basis of anxiety in intertemporal choices, i.e., tasks requiring individuals to make decisions whose consequences are delayed in time. Saving and investment choices, for instance, have individuals experience a delay in the resolution of the uncertainty about the consequences of their own current choices. Delving deeper into the decision processes activated by intertemporal choices requires to account for subjective probabilities and subjective time. Brighetti explores these features hinging on cognitive psychology, the theory of subjective probability and the conceptual framework of false belief in clinical psychology. The author discusses how anxiety is related to anticipatory representations of possible future events and how uncertainty disrupts the so called Episodic Future Thinking (EFT), an imagery-based cognitive process allowing to imagine or simulate experiences that might occur in one's personal future and to work out preparatory behaviour.

Part III highlights how behaviours can systematically differ across individuals depending on personal traits and gender. People are different and may react differently to the same information as well as achieve the same goals following different routes. This circumstance weakens the effectiveness of one-size-fit-all financial education initiatives and claims for a careful, evidence-based targeting of the audiences.

Cervellati draws on the theories of financial personalities showing that individuals (and their mental processes) can be categorised into psychological types, each characterised by a specified set of personal traits, cognitive biases, emotional carryovers, and motivations. Taking into account personality types may contribute to improve segmentation of beneficiaries, identification of the weaknesses to be addressed and 'personalisation' of communication (which the author calls for, at least with reference to the four main temperaments discussed in the literature).

Gender differences in financial choices may be significant along several dimensions, ranging from knowledge, financial background, interest in financial matters, and self-confidence, as documented also by Consob Report on the investment choices of Italian households. Rinaldi recalls the theoretical advances in sociological literature that explain gender gaps in terms of differences in inclination towards money, socialisation patterns and mathematical skills. The author pleads for the development of an interdisciplinary, complete model, building on the existent literature and evidence, in order to support policy makers in the implementation of gender-sensitive educational programmes.

How can we empower financial decision makers? Which channels can be used to deliver educational programmes? Who should be involved in the implementation of long-term initiatives? These issues are debated in Part IV.

Viale, in an interesting thought-provoking essay, challenges the behavioural literature looking at financial education as a de-biasing tool. He argues that, in the complex and uncertain environment in which individuals are called to make financial decisions, heuristics (i.e., the simple rules of thumb that behavioural economics labels as errors and irrationalities) are indeed an adaptive toolbox enabling people to solve

problems. Financial education should hence depart from standard training to inform individuals about the use of heuristics, according to a Bounded Rational Adaptive Nudge approach. Exercises and practices based also on psychological strategies, and unbiased communication should be employed to strengthen the learning process.

Evidence on financial behaviour and decision-making process questions the channels traditionally used to deliver financial education and asks for a deep reconsideration of both communication strategies and educational tools.

Martelli argues that neuroscience may be of great help in improving teaching methods, traditionally backed by seminars, books, specialized magazines, online personal finance software, etc.. Neuroscience is unravelling how our brain works and learns, while educational neuroscience is uncovering the relationship among the subject taught, the brain networks involved and emotions. These advances provide grounds for the implementation of the so called experiential learning, which strengthens the learning achievements by allowing individuals to directly experience a specific situation (both in terms of contents and context) and to reflect on that situation. Games, simulations, and role plays are some tools that may foster experiential learning.

How communication can best be structured to reach out the target audience of an educational programme is discussed by Alemanni with specific reference to retirement choices. By drawing on the insights of behavioural finance, the author underlines that simplicity, reference to real and practical events, emotional connections, and proper goal framing are key to engage people in virtuous conducts. Moreover, to account for heterogeneity across individuals, communication cannot apply a one-size-fit-all approach, but needs to be attuned to the profile of the targeted audience. Once again, psychological and behavioural studies may provide important clues for the design of salient communication strategies, tailored to the characteristics of a specified target.

Beyond the issues reviewed so far, financial education may be challenged by difficulties in reaching out the targeted beneficiaries, such as youth and adults. The suitable involvement of key stakeholders has to be considered.

As for youth, the educational system has obviously a leading role. As claimed by OECD (2012), *«including financial education in the official school curriculum is considered one of the most efficient ways to reach a whole generation on a broad scale. (...) Yet the successful integration of financial education in school curricula proves to be challenging in many respects owing to a vast range of constraints. These include: lack of resources and time; already packed curricula; insufficient expertise and know how; lack of quality materials; the variety of stakeholders involved; and the lack of strong and sustainable political willingness, commitment and overall accountability»*.³ These constraints can be addressed only through a strong coordination among Government, public authorities and schools,

3 See, among the others, OECD/INFE (2012) Guidelines for Financial Education in Schools.

which the launch of a national strategy for financial education can suitably accomplish.

Agrusti, Ferri and Giannotti draw from the preliminary results of a field survey on a financial education class to elaborate on some principles that should inform the involvement of schools in financial education strategies. The authors suggest teachers should be committed to long-term educational strategies. Teachers should also be trained so as to engage students and to prevent biases that might be prompted by financial education, such as overconfidence. Finally, a multidisciplinary approach and reliance on interactive tools could significantly benefit the effectiveness of teaching strategies and increase students learning.

Involving adults in educational programmes is even more challenging than involving young people, because of their time constraints, reluctance to deal with financial matters, etc.. If programmes are not compulsory, moreover, self-selection may weaken the effectiveness of the initiatives, given that only the most motivated individuals may enroll. Steering adults towards suitable financial decisions may therefore require the engagement of the actors of the financial system. Cruciani and Rigoni show that trust may be a channel of information delivery from advisors to clients that may raise competencies and reinforce trust, provided that such delivery is unbiased and goes beyond formal compliance. Fostering trust in advisors promote delegation by investors, who may benefit from unbiased advice. These findings suggest a further topic to be investigated, i.e., how financial education and trust associate, and possibly a further channel through which education may impact on individuals' choices.

The present collective work confirms that financial education is paramount to the empowerment of individuals. In order to be effective, however, education programmes should not only deliver technical contents but also foster awareness and engagement. Accounting for individuals' heterogeneity and behavioral biases is key to the design of effective communication strategies. Leveraging on individuals' learning processes and on emotional triggers is key to the development of interactive and experiential learning tools. Combining multidisciplinary approaches in an integrated methodological setting, therefore, seems to be a promising, essential avenue to be explored.

Nadia Linciano and Paola Soccorso

Education needs and the role of financial literacy

Financial knowledge, attitudes and behaviours of Italian investors

Nadia Linciano and Paola Soccorso

- 1 Introduction
- 2 Financial knowledge
- 3 Personal traits and inclination towards behavioural biases
- 4 Financial control
- 5 Investment decision process

Decision making in investments and savings

Some experimental evidence on the role of financial literacy

Daniela Teresa Di Cagno and Luca Panaccione

- 1 Introduction
- 2 The role of financial literacy: evidence from the experimental research
- 3 The impact of financial education programmes
- 4 Concluding remarks and future work

The assessment methodologies of financial literacy

Gianni Nicolini

- 1 Introduction
- 2 Financial literacy: definition and key elements
- 3 The assessment of financial literacy: evidence from previous studies
- 4 Measuring financial literacy: technicalities and practical recommendations
- 5 Conclusions

Financial knowledge, attitudes and behaviours of Italian investors

N. Linciano^(*) and P. Soccorso^(**)

1 Introduction

Many national and international surveys (Consob, different years; Klapper, Lusardi and van Oudheusden editors, 2016; OECD, 2017) have long documented that financial knowledge and competencies of Italian households are far from being satisfactory even at a basic level. Consob has delved further into this topic by gathering evidence on the multifaceted drivers of individuals' financial decision making, i.e., experience, behavioural biases and socio-demographic characteristics.

The present note draws from Consob annual Reports on investment choices of Italian households (Report henceforth), referring to a representative sample of Italian retail financial decision makers, and from the insights gained from related empirical research undertaken by Consob also in cooperation with the academia.

Both Reports and research are aimed at supporting Consob engagement in investor educational initiatives, through a deep understanding not only of educational needs but also of personal traits, emotional statuses and cognitive biases that may impact on personal inclination towards financial matters and, specifically, on personal motivation and interest.

The note is organised as follows. Section 2 recalls the evidence on financial knowledge and some personal traits of a representative sample of Italian financial decision makers. Section 3 goes through financial control capabilities, encompassing planning, budgeting and saving. Section 4 focuses on retail investors' attitudes towards the investment decision making process and concludes.

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2 Financial knowledge

Consob Reports are based on the Multifinanziaria Retail Market Survey, gathering data from a sample of 2,500 Italian households, and on the Observatory on 'The approach to finance and investment of Italian households', collecting data from about 1,000 households. Both Surveys, conducted by GfK Eurisko, are representative of the same population of Italian retail financial decision makers, defined as the primary family income earner, and aged between 18 and 74. At the end of 2016, about 45% of respondents report to be investors.

The 2017 Report confirms that the level of financial knowledge of Italian households is largely inadequate to the complexity of the economic choices they are called to make. The proportion of respondents failing to answer basic questions (i.e., inflation, risk-return trade-off, simple interest and diversification) ranges between 47% and 67% and rises further when understanding of financial risk dimensions (i.e., market, credit and liquidity risks) is tested. Acquaintance with financial notions is positively associated with education and residence in northern and central regions. No gender-gap has been detected, although differences across men and women are recorded with respect to self-confidence and inclination towards financial matters, as it will be detailed in the following.

Attitudes and behaviours may be driven not only by actual knowledge but also by perceived competencies. This is the case of financial advice seeking, as shown by a strand of the empirical literature (evidence from the Italian market is discussed in Gentile et al., 2016). Accounting for perceived knowledge may therefore enhance the understanding of observed choices. As shown by the 2017 Report, a proportion of respondents overvalues their competencies when self-rating their financial understanding of the notions recalled above (i.e., inflation, risk-return trade-off, etc.). Depending on the notion considered, inconsistencies between self-assessed and actual knowledge ranges from 32% to 41% of the sample, generally accounting for individuals prone to an 'upward mismatch', i.e., reporting to have understood the selected financial notions while being unable to define them. In particular, 36% of respondents state to know what the market risk is but fail in defining it correctly; this percentage declines to 28% and 27% as for liquidity risk and credit risk respectively. Propensity towards upward mismatch is more likely among men, middle-aged groups and better educated. Notably, upward mismatch is also more frequent among financially knowledgeable individuals. This evidence claims for educational initiatives attuned so as to de-activate unmotivated self-confidence.

Given the low levels of financial knowledge, not surprisingly assessing the risk of a financial product is a challenge for more than 30% of the Italian decision makers. Indeed, more than 60% of the sample report to be acquainted only with deposits, government and bank bonds, i.e., with those instruments that have long been the most widespread in the domestic context, whereas 15% of the investors are not familiar with any instrument. The 'upward mismatch' between self-assessed familiarity with a specified product and one's ability to rate its riskiness surprisingly records its highest level for liquidity, followed by bond funds and Italian bank bonds.

3 Personal traits and inclination towards behavioural biases

It is well known that financial behaviour may be affected by emotional statuses and cognitive biases. Consob 2017 Report focuses first of all on optimism, financial anxiety and interest in financial matters among the factors that may shape individuals' decision making process. Data show that roughly one-third of interviewees may be regarded as optimist on the basis of the reported positive expectations about their future and the economic landscape. As for financial anxiety, engagement with one's personal finances triggers feelings of anxiousness in about 50% of the cases, as measured by the overall individuals' attitude towards selected financial tasks (e.g., tracking one's bank account) and financial problem solving (e.g. bailing oneself out distress). This emotional status is associated with poorer financial behaviour, as detailed in the following Sections. However, financial apprehension seems to be less frequent among respondents reporting a higher score in financial knowledge (as well as among individuals with a bachelor degree and younger and older age groups), thus suggesting that financial education might successfully mitigate it.

Effectiveness of financial education is undoubtedly grounded in personal motivation, which in turn may be triggered by personal interest and/or the need to implement a specific course of actions (e.g., controlling household expenses). Consob Report gauges interest in financial matters as a combination of individuals' disposition towards different levels of cognitive and emotional involvement (i.e., whether financial learning is thought as arousing, interesting, useful or boring). Learning about financial matters is deemed to be interesting by half of the interviewees, with the proportion of respondents expressing positive states rising when learning is referred to a specific competence, such as the capability to invest on one's own. According to Consob Report, personal interest turns out to be the main driver underpinning individual background in financial matters, especially for investors, male, more educated, younger and wealthier individuals. Experience in household budgeting is more frequently reported as a basis of one's financial knowledge among women, residents in the Centre of Italy, middle-aged and individuals falling in low/medium wealth groups. Not surprisingly, individual financial background benefits of a wider set of inputs when financial knowledge (both actual and perceived) and interest in financial matters are high, while anxiety seems to work the other way round. These findings claim for educational contents to be matched with the actual needs of the recipients, which in turn goes hand in hand with a proper segmentation of the potential beneficiaries. Moreover, interest in financial issues rises with financial knowledge (as well as with formal education, wealth and for middle-aged respondents). This suggest that properly designed programmes may trigger a virtuous self-reinforcing circle between interest in financial matters and financial education.

Consob Reports also gather evidence on individuals' inclination towards cognitive biases. The 2015 Report surveys the disposition effect, i.e., the tendency to sell too quickly financial assets that have gained value (winners) and hold too long

financial assets that have lost value (losers). This attitude is exhibited by 37% of Italian investors, who might in principle experience severe losses, either giving up to potential gains, in the case of winners, or postponing actual and increasing losses, in the case of losers (Consob, 2015).

Financial decision making may also be driven by mental accounting. People may split their money into separate accounts according to a number of subjective criteria (like the source of the money and the purpose of each account), and may hold both a safe investment portfolio and a speculative portfolio in order to protect safe investments from the potential negative returns of the speculative investments. Consob Report detects such an attitude in 23% of the interviewees, while only 6% are inclined towards a portfolio management approach (Consob, 2016)

Poor outcomes of financial choices may result from under-diversification, which in turn may be related to low knowledge as well as cognitive biases. Indeed, portfolio diversification is correctly understood only by 6% of respondents, while the remaining reveal either misunderstanding of risk/return relationship or attitudes potentially ascribable to a number of biases. In general, propensity towards under-diversification is more frequently detected among less educated and less wealthy individuals; also gender differences do sometimes play a role. Although misunderstandings of diversification are more frequently detected among low-literate respondents, financial knowledge is not always associated to the correct attitude (Consob, 2016).

Moreover, the vast majority of Italian decision makers are loss averse (consistently with their strong preference for risk free/capital guaranteed investment options), which in turn may prompt biases such as the so called status quo and myopic loss aversion (as discussed in the essay by Ploner).

The Report also brings forward evidence about instability of individuals' preferences both over time (so called dynamic inconsistency) and across different frames of the same situations (so called framing effect). Almost 35% of interviewees exhibit time inconsistency and are therefore potentially prone to present bias and procrastination. Moreover, about one-third of the Italian financial decision makers prefer certainty when the choice set is positively framed and uncertainty when the choice set is negatively framed (or vice versa), thus showing an inclination to reverse risk preferences depending on the frame (so called framing effect). This is in line with the evidence from the Italian market documented in Gentile et al. (2015), which shows that risk perception and risk preferences are context-dependent and mainly determined by the way financial information is disclosed.

Framing effects raise concerns for investor protection, given that financial information is among the main tools meant to empower individuals, reduce informational asymmetries and mitigate miss-selling risks. It is even more alarming the individuals' willingness to invest even when they don't understand financial information (as reported by 27% of the 2017 sample). This inclination is more frequent among women, financially anxious and less literate respondents.

4 Financial control

Financial control can be defined as the individual's capability to work out her own financial plan and to keep track of her own finances. These actions go hand in hand with a correct decision making process, as it will be extensively recalled in Section 5. Financial control also underpins consumption and saving behaviours, by this affecting individuals' well-being.

Financial planning is not widespread, as it is reported by nearly one-fourth of the sample. Almost all the interviewees having either a short-term or a long-term plan review their progress, mainly on a biannual or a yearly basis. Having a financial plan is positively associated with formal education, income and wealth as well as financial knowledge (both actual and perceived) and interest in financial matters.

The 2017 Report highlights that more than half of respondents have a budget, although only 15% always stuck to it. Tracking spending involves more than 60% of the sample, but only one-fifth of interviewees relies on written records. Meeting the budget (either completely or partially) and properly tracking expenses (i.e., taking notes of them) are more likely among women, individuals with higher formal education and younger people. Budgeting and monitoring are positively correlated with financial knowledge (both actual and perceived) and interest in financial matters, whereas the opposite holds with respect to financial anxiety.

Financial control is an important input of a wide range of individuals' abilities and economic choices.

First, it enhances the capacity to gauge the resources that can be deployed to maintain a given living standard and, by this way, financial resilience with respect to changes in income. At the end of 2016, 30% of respondents report a deterioration in their income, mainly on a temporary basis (18%). It is remarkable, however, that almost 30% of the households are not able to assess their ability to cope with the downturn, while slightly more than 25% declare that a one-third drop in their disposable income would trigger an immediate downward adjustment in their living standards. Notably, the proportion of interviewees not having a perception of their financial resilience declines with formal education, financial knowledge and engagement in financial planning.

Secondly, financial planning may trigger a proper debt management process. This is not irrelevant in the Italian framework, given that almost 40% of households carry debt, either mortgages (25%) and/or consumer credit for consumer good purchase and daily expenses, mainly to banks or other financial institutions.

Finally, financial control is key to saving. According to our evidence, among respondents reporting to save (61%), almost two-thirds do it on a regular basis and mainly on their own. Not surprisingly, the proportion of savers rises with the degree of financial control as captured by budgeting, tracking expenses and having a financial plan, as well as with education, income, wealth and financial education. Major deterrents to saving are a tight budget and debt service, whereas among personal traits, financial anxiety and lack of interest in financial matters show a

significant negative correlation. Precautionary motive is the main reason particularly among less educated, less literate and less wealthy individuals, while specific goals are reported to trigger saving only by 32% of respondents.

5 Investment decision process

The Report also gathers data on Italian households' investment behaviour and the related decision making process. Indeed, the quality of investment choices rests not only on knowledge but also on the understanding and the implementation of a correct decision process, both in its ex-ante and ex-post dimensions.

According to our data, Italian investors keep being unaware of the building blocks of an investment decision that must be reviewed before investing, that is the identification of objectives, holding period, one's own risk tolerance, one's own risk capacity, etc.. Indeed, about 40% of the interviewees do not consider any of those, while three-quarters of the remaining respondents refer only to one item (mainly the holding period).

Moreover, only one-fourth of the interviewees ask for professional help (either financial advice or portfolio management), while more than half make investment decisions with the support of family, friends and colleagues (so called informal advice).

Investors relying on a financial intermediary are not totally aware of the extent to which the quality of the recommendations they receive depends also on the quality of the information they provide. Indeed, the percentage of respondents inclined to give complete and true information to the advisor or the portfolio manager is never higher than 36%, whereas 14% states that no detail needs to be disclosed.

To ensure a thorough comprehension of the investment decision making process, educational initiatives should also focus on all the dimensions of financial choices, spanning from the identification of sustainable objectives to the management of the relationship with a financial advisor.

* * * * *

The evidence recalled so far identifies some of the educational needs of the Italian financial decision makers. Although further investigation is needed to gain a deeper understanding of the mental processes underpinning observed behaviours, data point to the necessity to design educational campaigns touching knowledge, personal attitudes and cognitive biases as well as leveraging interest and personal motivation. In addition, technological developments have to be accounted for in order to timely detect new challenges that may be raised by the so called FinTech phenomenon as well as new opportunities that may be exploited in the delivery of educational contents and in the communication addressing the targeted audiences (OECD, 2017).

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Decision making in investments and savings

Some experimental evidence on the role of financial literacy

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1 Introduction

Despite the increasing availability of financial products addressed to retail investors, Italian decision makers remain more oriented towards liquid products, such as deposits and saving-accounts. Moreover, recent financial crises lessened participation in financial markets by making investors more reluctant to engage in risky investment activities.

Growing complexity of financial landscape requires people to learn how to manage their personal finances, plan how much to save and invest according to their needs. Unsuitable financial decision making process may indeed contribute to make individual financial provision insufficient to face the declining coverage of the welfare state.

Consequently the focus of the economic research has recently shifted from the study of optimal saving decisions of rational households to the analysis of the limitation hampering households' decision making process. Several scholars, professionals and also authorities highlighted the need of raising people knowledge of basic financial notions and their capability to choose financial products most suitable to them.

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2 The role of financial literacy: evidence from the experimental research

A growing strand of the literature has recently paid attention to individuals' financial literacy and, in particular, to the assessment of retail investors' actual knowledge. Moreover a number of authors have explored the effectiveness of several educational programmes aimed at improving individuals' investment decision making process, as well as raising awareness of their competencies and their willingness to invest. In addition, the relationship between financial education and financial advice has been investigated, in order to assess whether they can be regarded as complements or substitutes.

Experimental research (both in the field and in the lab) has contributed with a number of studies focusing on different aspects and effects of financial literacy. Although not providing a complete overview of the experimental literature on the topic, the present note reports some results that may add to the understanding of some important issues raised in the current debate.

2.1 Financial literacy and participation in financial markets

By using data from the 2005 De Nederlandsche Bank's Household Survey (DHS),¹ van Rooij et al. (2011) investigate the impact of financial literacy on financial decision making. To this end, they examine, among other things, whether literacy influences the sources of information consulted by households when taking financial decisions. Furthermore, they analyse whether financial literacy affects participation in the stock market.

As for the first issue, the authors find that respondents with low basic literacy are more likely to rely on informal sources of information, such as family, friends, and acquaintances. Conversely, the proportion of households relying on newspapers, financial magazines, guides and books, and financial information on the Internet gets larger as the level of basic literacy increases. Moreover, households who rank high in financial literacy are more likely to rely on professional financial advisors. These effects persist, and are actually stronger, when considering advanced levels of financial literacy.

As for the second issue, the authors find that stock ownership is strongly correlated with literacy, and this effect holds even when considering only basic literacy, such as simple knowledge and numeracy. Indeed, the authors find that who scores high on basic literacy is much more likely to participate in the stock market.

1 The DHS is an annual household survey covering information about demographic and economic characteristics and focusing on wealth and saving data. The panel is run by CentERdata, a survey research institute at Tilburg University that specializes in Internet surveys. The data set is representative of the Dutch population, and it contains over 2000 households. Survey participants are interviewed via the Internet.

The relationship becomes much stronger when considering advanced literacy. Overall, the authors conclude that the lack of literacy could obstacle households' participation in the stock market.

Klapper et al. (2013) use a panel survey of financial literacy administered to a nationally representative sample of over 1,000 Russian individuals during 2008 and 2009. They show that financial literacy is positively related to participation in formal financial markets and negatively related to borrowing via informal sources. Furthermore, more financially literate individuals are more likely to report greater levels of unspent income and less likely to report high levels of spending and experience a negative income shock. Finally, after controlling for household characteristics, the relationship between financial literacy and the level of unspent income is higher during the financial crisis. To sum up, the results of the authors suggest that greater financial literacy can help individuals facing unexpected macroeconomic and income shocks.

2.2 Financial literacy and financial advice seeking

Kramer (2016) investigates the demand for financial advice in Netherlands by using two data sources. One is based on the 2005 Dutch DNB Household Survey (DHS);² the second is based on a 2011 survey of a randomly selected, representative sample of retail investors at one of the largest Dutch banks.³ The author uses both measured and self-assessed financial literacy. The main finding is that individuals who are more self-confident in their financial literacy seek out less advice: the most confident households demand advice roughly half as much as the least confident and this effect is more pronounced among wealthier households. The author therefore concludes that advice and self-assessed financial literacy are substitutes. On the other hand, the author finds that there is no relationship between measured financial literacy and financial advice seeking. Therefore, caution should be taken in using measures of objective financial literacy to capture the relationship between financial literacy and financial advice seeking.

Calcagno and Monticone (2015) analyse the effect of financial literacy on investors' willingness to delegate their portfolio decision and on demand for financial advice by relying a theoretical model and an empirical analysis based on the 2007 Unicredit Customers' Survey (UCS).⁴ The authors use measured financial literacy and self-assessed financial knowledge. Their results show that «*concerning stock market*

2 In 2005, a special financial literacy module completed by 1508 households was added to the survey (van Rooji et al., 2011).

3 For this second survey, 467 investors filled in the survey.

4 The Unicredit Customers' Survey (UCS) is a representative sample of the customers of the Unicredit group. Eligible interviewees are account holders with at least 10.000 euro in the bank at the end of 2006. The sample selected for the analysis includes only the account holders who report that Unicredit is their main or only bank.

participation, investors with higher financial literacy and higher wealth are more likely to invest in risky assets; investors with higher financial literacy are more likely to consult financial advisors than investors with a low degree of financial literacy (conditional on investing in risky assets) and investors with higher financial literacy are less likely to delegate their portfolio choice (conditional on investing in risky assets)». Wealth does not appear to affect the probability of consulting the advisor.

Guiso and Viviano (2015) consider a dataset combining data from a survey conducted by one Italian bank on its clients with the bank's administrative data on the asset holdings and transactions of those clients. The survey is conducted on a sample of around 1,600 clients, interviewed in the summer of 2007, sampled from the population of 1.3 million customers with at least 10,000 euros of financial assets at the bank. The authors find that *«along the dimensions considered – selling stocks when the market is high rather than when it is low (ability to time the market), rebalancing according to a CAPM prescription (ability to manage one's investment) and avoiding distorted advice (ability to detect potential conflicts of interest) – financially literate investors do better than those with lower levels of literacy»*. However differences between the two groups are economically small, while in both groups the fraction of investors choosing the dominated alternative is large. Both features suggest that gains from increasing financial literacy may be modest.

3 The impact of financial education programmes

Understanding the factors triggering individuals' interest in financial education and developing methodologies to assess the impact of financial education initiatives are key to the design of effective programmes.

As for the first issue, Meier and Sprenger (2013) run a field study implemented with the city of Boston and a large credit counselling firm. During the period January to April 2007 the credit counselling firm offered a short credit counselling session to around 870 individuals waiting for tax filing assistance in a city-coordinated Volunteer Income Tax Assistance (VITA) site. The counselling session included an overview of the individual's credit report, with their credit score, along with useful, generally unknown credit information. The results of the study show that individual time preferences are highly correlated with their willingness to participate in the educational sessions: in particular more patient individuals are more likely to take up the credit counselling programme. These results are robust to controls for socio-demographic characteristics including gender, race, age and, critically, income and education. The authors additionally show that more patient individuals have higher financial knowledge prior to the field study.⁵ The finding that financial

⁵ Controlling for this prior financial knowledge and proxies for financial experience and credit constraints, more patient individuals remain more likely to take up the counseling programme.

information acquisition is positively correlated with time preferences helps to explain why some individuals remain financially illiterate despite the apparent benefits of financial knowledge. Acquiring financial information may not be attractive to some groups of individuals, very impatient subjects being one critical subgroup. This evidence is a key insight to policy makers as to what type of consumers can be reached through voluntary educational programmes and how to increase attractiveness of such programmes.

As for the assessment of financial education programmes, on the lab side Becchetti et al. (2013) and Luehrmann (2015) use an experimental identification strategy to assess the effects of financial education programmes on high-school students. While the former does not find any statistically significant effect of the treatment, the latter finds that short training sessions have a positive impact on awareness and general financial attitudes, such as interest in the topic and propensity to save. More interestingly, Brugiavini et al. (2015) provide both field and lab evidence from a sample of undergraduate students showing that a small scale training has a significant effect on self-assessed rather than actual financial knowledge. Also Di Girolamo et al. (2016) stress the role of beliefs generated by financial education in investment decision making. Campioni et al. (2017) run an experimental study in which before taking their financial decision participants were informed about their absolute and relative level of financial literacy objectively measured through an incentivized pre-test. The authors study, in particular, whether revealing information about other participants' average level of financial literacy affects coordination in a multiple equilibria withdrawal game. Overall, their results show that revealing information on the financial literacy of other participants whose decisions are related via strategic interactions affects the outcome of these strategic interactions. Therefore revealing this type of information may reduce financial instability in strategic interactions, especially when large groups are involved.

4 Concluding remarks and future work

Overall experimental analyses are nearly unanimous in confirming that financial literacy programmes are effective in reducing the investors' reluctance to risk taking. Anyway, caution is needed in the interpretation of empirical evidence, since a positive correlation between literacy and risk taking doesn't necessarily imply a causal relationship. Moreover, increased participation in financial markets may be critical if it is driven mainly by self-assessed rather than actual literacy, thus resulting in a higher number of inexperienced investors taking risk. This brings us back to the debate about the substitutability versus complementarity between financial literacy and financial advice. Are more trained investors able to better benefit from professional advice that they understand and correctly process? To this respect

experimental findings are not conclusive: in particular, Hung and Yoong (2010) provide evidence that advice is demanded mainly by the least financially literate, whereas Lusardi and Mitchell (2011), van Rooij et al. (2011) and Collins (2012) provide evidence that more financially literate individuals are more likely to use formal sources such as newspapers, financial advisors and the Internet.

In any case the use of 'formal' sources is not a guarantee of sound financial decisions: *«in addition to potential conflict of interest between advisor and investor, investors might follow unscrupulous financial gurus or use unreliable Internet advisory website and the financial press. However, these sources are still more likely to provide valuable information than non-professional sources, such as friends, neighbours and relatives ... or through the social interaction with peers»* (Calcagno and Monticone, 2015).

Technological developments raise further issues on the investor protection grounds. The provision of robo advice may exacerbate the mistakes made by illiterate investors in risk perception and risk taking. One may wonder whether the willingness to follow the professional recommendation and hence the level of trust in the advisor vary across physical and digital advisors. Are investors willing to invest different amount of money depending on the type of advisor? Does attitude towards risk change? Which role play financial and digital literacy?

To shed some light on these issues the Luiss Cesare Lab researchers, in cooperation with the University of Genoa and Consob are implementing an experimental setting where either a computerized algorithm or a human consultant provide the same investment advice to a potential investor, who is then called to make his/her investment decision. The study aims to evaluate whether and to what extent individuals' investment choices differ in a digital environment with respect to the physical channel and which issues need to be considered to ensure investor protection.

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The assessment methodologies of financial literacy

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1 Introduction

The growing attention to financial literacy by Governments, financial authorities, regulators, and international organizations stresses the need of reliable and effective measures of financial knowledge, skills and attitudes of financial consumers.

This paper reviews the most popular methodologies adopted to measure financial literacy in order to identify the issues to be addressed when setting a financial literacy survey and using survey data.

To start with, the definition of financial literacy is assessed, as it is pivotal in measurement of financial knowledge and financial literacy (Section 2). Section 3 reviews different methodologies that can be used to gauge financial literacy, while the last paragraph concludes with some technical recommendations.

2 Financial literacy: definition and key elements

There are many definitions of financial literacy that have been developed over time. A first definition dates back to 1992 and explains financial literacy as *«the ability to make informed judgement and to make effective decisions regarding the use and management of money»* (Noctor, Stoney and Straddling, 1992). The characterisation of financial literacy as a personal skill can be found also in later studies, where it is *«the ability to read, analyse, manage and communicate about the personal financial conditions that affect material well-being»* (Vitt et al., 2000) or *«the ability to interpret, communicate, compute, develop independent judgement, and take*

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actions resulting from those processes in order to thrive in our complex financial world» (Danes and Habermann, 2007).

Further developments of the academic literature have increasingly highlighted that the ability to apply financial skills in order to make (effective) financial decisions is the final stage of a learning process prompted by the acquisition of basic financial knowledge. The leading role of financial knowledge is underlined in Kim (2001), defining financial literacy as *«a basic knowledge that people need in order to survive in a modern society»*.

The need to develop a clear and comprehensive definition of financial literacy has become more and more evident as people in all developed countries are increasingly called to make financial decisions on their own, while lacking the necessary competencies: think of saving for retirement in an institutional framework no longer based only on public pension schemes, or of investment decisions involving several, complex financial products.

The US Financial Literacy and Education Council (US FLEC, 2006) defined financial literacy as *«the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being»*. This description distinguishes between financial knowledge and financial abilities (as the ability to apply knowledge) that is also a key element to the definition provided by Huston (2010), underlining that *«Financial literacy consists of both knowledge and application (ability) of human capital specific to personal finance»*. The same approach based on the combination of financial knowledge and financial abilities is proposed by Remund (2010) who states that *«Financial literacy is a measure of the degree to which key financial concepts (knowledge) and possesses the ability and confidence to manage personal finances through appropriate, short-term decision making and sound, long-range financial planning, while mindful of life events and changing economic conditions»*.

The OECD (2015) has recently widened the basic components of financial literacy from financial knowledge to financial skills, by characterising financial literacy as *«the combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial well-being»*.

The evolution of the concept of financial literacy has not affected the basic assumption that financial knowledge represents a fundamental pillar of the financial literacy construct. Without knowledge and understanding of basic financial principles and basic financial products, the development of any financial ability or skill is not possible, and even the chance to make confident financial decision is unrealistic. Hence, financial knowledge can be considered as key to the assessment of financial literacy.

Financial literacy and financial behaviours

The relevance of financial literacy studies and the attention paid to the measurement of financial literacy by public entities (Governments, regulators, supervisory authorities, etc.) is founded on the assumption that financial literacy is a key driver of financial behaviours. The empirical evidence shows that people with low financial literacy are more prone to make bad financial decisions (e.g. to be victim of financial frauds) or to make financial decisions without a full understanding of their possible consequences (e.g., underestimate investment risk, do not save for retirement when the legal and financial framework makes a private pension scheme desirable, etc.). This urges policy makers to identify the categories more at risk – by assessing the financial literacy of the whole population or of specific targets – and to promote financial education. If a comprehensive review of the studies that confirm the positive role of financial literacy on consumer financial behaviour goes beyond the aim of this work, there are some relevant papers that deserve to be mentioned. Results from previous studies show how people with more financial literacy tend: to be less likely to go bankrupt (Thorne and Porter, 2007); to be less likely to be overindebted (Lusardi and Tufano, 2009); to participate more in stock markets (van Rooij, Lusardi and Alessie, 2011; Arrondel, Debbich and Savignac, 2012); to be financially prepared for retirement (Lusardi and Mitchell, 2006, 2008, Almenberg and Save-Söderberg, 2011).

3 The assessment of financial literacy: evidence from previous studies

Every study on the role of financial literacy in financial behaviours has to deal with the assessment of financial literacy. To this end, two different approaches can be used.

A first approach is based on the analysis of general financial principles. The most common topics are: inflation and the money illusion, the compound interest effect, and the diversification of risk. The rationale behind this approach is that the above mentioned basic concepts are useful to investigate several financial behaviours. For instance, inflation is a relevant topic to both investors and borrowers. At the same time, areas like money management are related with the value of money over time. Similarly, the compound interest effect impacts on the return of long-term investment and the cost of a mortgage. The assessment of financial literacy through the analysis of broad and general concepts is recommended when the objective is to measure financial behaviours (e.g. total amount of savings, stock market participation, etc.). The chance to use the same item (e.g. knowledge of inflation) to evaluate several financial behaviours is an incentive to rely on the elicitation of knowledge of basic principles instead of more detailed contents. This approach is particularly suitable when any previous evidence on the financial literacy of a population or a certain group (e.g. students, adults, workers, etc.) is available and the research is devoted to test the relationship between financial literacy and financial behaviour in an explorative vein. This approach has been used by several studies, including Chen and Volpe (2002) and the NEFE – National Endowment for Financial

Education (2006) in the US, the FSA (2006) in the UK, and the ANZ (2008) in Australia.

An alternative approach gauges financial literacy by referring to specific topics, provided that *«financial literacy should be tested against individuals' needs and circumstances, not against all available financial products and services since consumers will never need or use most of these products and services»* (Worthington, 2006). This method is based on the assumption that individuals financial literacy should not be measured in 'a linear sense', but rather with respect to the set of knowledge that is necessary to deal with specific financial needs. In this perspective financial literacy becomes a multidimensional construct, with an individual being knowledgeable in certain domains (e.g., investing) while showing a deep lack of knowledge in others (e.g., borrowing). However, lack of knowledge in a specific area is not considered a critical gap if the individual is not called to make financial decisions in that area.

Studies based on this second approach do not rely anymore on general principles items (e.g., inflation, interest rates, etc.), but gather information on specific items related to a specific domain of knowledge. Therefore, contributions on investors' behaviours collect data through questionnaires posing questions closely related with investment knowledge (NASD, 2003; Muller and Weber, 2010), while investigations on the role of financial literacy in borrowing decisions relied on questions about loans and their facilities (Lusardi and Tufano, 2009; Jones, 2005).

Regardless of the items used (general principles vs. specific knowledge), gauging financial literacy requires to choose how to aggregate items. The standard procedure is to check if an individual is able to correctly answer to a multiple choice question, being multiple choice questions themselves a standard in financial literacy studies. Answers are then dichotomized, being equal to 1 if they are correct and 0 otherwise. Dichotomized answers may be aggregated into a single measure according to several methods.

A first method is to sum the correct answers to a set of multiple choice questions. This yields a financial literacy score ranging from zero (all wrong answers) to 'n' (all right answers) where 'n' is the number of items. This method is quite common in financial literacy studies (Moore, 2003; Agnew and Szykman, 2005; Robb and Sharpe, 2009; Gerardi et al., 2010), probably because it is quite objective and easy to understand.

A second option is to draw a distinction between individuals that answered all questions correctly and the others. Respondents failing a single question are considered as financially illiterate. Although this criterion can sound too tough, it makes sense when the difficulty of the questions is so low – as they refer to very basic concepts – to make the assessment of financial knowledge closer to the screening of financial illiteracy rather than to a proof of financial literacy. Indeed, correct answers to easy questions do not grant that respondents are financially literate, while failing a single question is enough to identify the individual as low literate. This criterion can be applied when the aim of the survey is to identify the

sub-groups of the population that are more vulnerable to financial mistakes, due to their poor knowledge, rather than to assess financial literacy of the whole population (among the studies relying on this methodology, see Lusardi and Mitchell, 2011, and Almenberg and Save-Söderberg, 2011).

A third option is to use each item separately as a self-standing measure of financial literacy. Separate consideration of the items is justifiable when they refer to different topics, e.g. three items concerning respectively investment, mortgages, and insurance. In this case, it's better to use each item as a self-standing gauge of financial competence.

Other studies take into account the difficulty of each question (Lusardi, Mitchell and Curto, 2012). This methodology tries to differentiate the informative power of each item by departing from the hypothesis that questions are equally difficult. Answers, either correct or wrong, are hence weighted by the degree of complexity: a correct answer to a difficult question weighs more than a correct answer to an easy question. In order to apply this methodology, a scale of weights and difficulty need to be set. The difficulty of each item can be either defined a priori, on the basis of the judgement of evaluators or external experts, or attributed through a technical comparison among the levels of financial knowledge and skills required to answer to different questions, or estimated on the basis of the number of respondents that were able to answer a specific question correctly.

The use of different methodologies is partially driven by the number and quality of the available items and by the need to choose the measure that best fits with the aim of the study.¹ Researches devoted to providing a big picture on the level of competencies of a large population will probably pay more attention to the knowledge of basic financial concepts, while studies oriented to investigate the financial behaviour of a specific target will pay more attention to the number of items and their difficulties, and will aggregate the available data after testing several options. Therefore, gauging financial literacy should be approached more as a tailor-made rather than as a one-size-fits-all process. Accordingly, researchers called to deal with the assessment of financial literacy should be aware that measurement mistakes can affect the reliability of the analysis. The relationship between financial literacy and financial behaviours (e.g., risk attitude, portfolio diversification, etc.) and the effectiveness of financial education programmes are only two examples that stress the need to pay attention to the design of financial literacy measurement.

4 Measuring financial literacy: technicalities and practical recommendations

The assessment of financial literacy requires to take into account several dimensions. It has been already stressed how financial knowledge represents only the

¹ Financial literacy questions are not always part of a questionnaire specifically set to assess financial literacy or other consumer financial behaviours, but are frequently added to a broader survey, which reduces the number of available items.

first element of financial literacy. Individuals could be financially knowledgeable but unable to apply their knowledge when making a financial decision or they could lack confidence in being responsible for their financial choices. At the same time it has been noted that lack of financial knowledge denies any chance to be financially literate because people that ignore basic financial principles, the functioning of financial products and of financial markets cannot be aware of the possible consequences of their financial decisions in term of risk taken, performance and adequacy to their financial needs.

The central role of financial knowledge in the assessment of financial literacy requires to keep in mind some tips when planning a financial literacy survey.

Difficulty of the questions

In order to summarize different items in a single score or in a standard scale, questions on different topics should have the same (or comparable) level of difficulty. A difficult question about a topic (e.g., stock markets) and an easy question about another (e.g., money management) may bias the measurement if the two questions are equally weighted.

This consideration does not imply that all the questions should be on the same level of complexity. Gauging financial literacy on a certain topic almost always requires the use of more than one item, and when more than one item is available it is recommended to include questions of different difficulty levels. What may bias the measurement is surveying knowledge on different topics by using a different number of items characterised on average by a different level of difficulty (e.g., questions on stock markets more difficult than questions on money management).

Number of options

In case of multiple-choice questions, each question should have the same number of options. The use of questions with different number of options may introduce a different level of difficulty, because reading and remembering several options require more attention by the respondent than reading two options. In the meanwhile it cannot be ignored that some respondents could simply try to guess when they do not know the right answer. A true/false question or – generally speaking – a question with only two options offers the respondent a 50% chance to randomly pick the right answer, thus providing a stronger incentive to guess compared to the case of questions with three or four options.² Differences in the level of complexity of the questions should therefore be ascribable to contents rather than to technicalities like the number of answer choices.

² In case three options are available the chance to select the correct answer is only 1 out of 3 (probability of 33.33%). If four options are available the chance drop to 1 out of 4 (probability of 25%).

Use of jargon

If the question does not aim to assess the respondent's understanding of specific words or expressions typically used in finance (e.g., 'leverage', 'rating', etc.), the use of jargon should be avoided. The respondent might know the concept needed to give the right answers, while not being aware of the meaning of some words that are pivotal to fully understand the question. If this were the case, only respondents knowledgeable of both the jargon and the topic would provide the right answer, while respondents only knowing the jargon but not the concept underpinning the question and respondents only knowing the topic but not the jargon would fail to answer the question correctly. A respondent that realises to be close to the answer, because he/she knows the topic, but is not sure about the meaning of some technical words, can be more prone to guess compared to a completely illiterate one. Keeping in mind that any guessing behaviour represents a potential issue for the assessment of financial literacy, the use of jargon to increase the difficulty of a question should be avoided.

'Do not know' and 'Prefer not to say' options

The assessment of financial literacy for research purposes is not a test and respondents should be reminded about that. It follows that individuals that are not knowledgeable about a question should not select any of the available options. As it was mentioned above, any guessing behaviour raises the chance that a lucky answer is accounted for as an indicator of financial knowledge. At the same time a blank answer cannot be considered by definition an evidence that the respondent does not know the answer. The chance that the respondent unintentionally skipped the question or that the subject of the question is a sensitive topic that the respondent does not want to discuss³ are two examples that highlight the need to include additional choices among the answers. In order to distinguish intentionally avoided answers from the 'Do not know' answers, it is advisable to add a 'Prefer not to say' option.

The inclusion of the 'Do not know' choice provides an additional information about the respondent's financial literacy, because it can be used as a proxy of his/her self-confidence. Most of the cases, individuals admitting not to be knowledgeable about finance and selecting the 'Do not know' option may be regarded as individuals feeling so under-confident to prefer not even trying to answer.

Topic of the questions and respondents' educational needs

How an item of a questionnaire works in assessing the financial literacy of an individual depends on the respondent's educational needs. Measures of financial

3 For instance, individuals that have been victim of financial frauds could be reluctant to answer questions about financial frauds. Similarly, investors that suffered huge losses from trading a specific financial products could have a negative feeling with the topic, deciding to not answer the question.

literacy should take into account the financial decisions that an individual has to make, given that he/she could not be skilled on a certain topic just because he/she is not active in that financial area (e.g., knowledge of loans for wealthy individuals that do not need to borrow). Hence, a specific item should be included in a questionnaire only after checking its relevance for the targeted respondents.

Do not overestimate the explanatory power of an item (part 1)

Under certain conditions, an item may not be used in a financial literacy measure even though it gauges the financial knowledge required to make a given financial decision. Items referring to basic financial principles (e.g., diversification of investment portfolios) cannot discriminate enough among financially literate individuals able to make a financial decision (e.g., assess an investment asset) and the others. Items related to basic notions can be included in a financial literacy scale only together with items assessing more advanced knowledge. Gauging financial literacy only through items based on basic financial concepts may hamper the detection of a relationship between financial literacy and a specific financial behaviour or may lead to underestimate the explanatory power of financial literacy.

Do not overestimate the explanatory power of an item (part 2)

The explanatory power of a financial literacy measure depends on the informative power of the underlying items. The use of multiple items increases the effectiveness of financial literacy measures in explaining financial behaviours with respect to measures based on a single item. When only one item is available, the researcher should keep in mind that its informative power is limited, given that respondents can be categorized only in two extreme classes, i.e., on the basis of a simple dichotomous scale. In other words, individuals will be considered as fully knowledgeable if able to answer correctly and will be treated as completely illiterate if they fail the single question.

5 Conclusions

A financial literacy survey is a powerful research tool in consumer finance. A reliable methodology to assess financial literacy is necessary to test its influence on consumer financial behaviours and to measure the quality and the effectiveness of financial education programmes. The aim of this work was to stress the need to carefully design the measurement of financial literacy, in order to avoid technical biases during data collection. A biased sample or an unbalanced questionnaire can lead to biased research outputs, which in turn are useless and/or detrimental on policy grounds.

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Gauging the drivers of financial choices

Loss aversion and inertia in financial decision making

Matteo Ploner

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- 2 Loss aversion
- 3 Inertia in financial decision making
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A little insight on the maze of risk

Caterina Lucarelli

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Financial risk as anxious feeling and uncertainty driven by episodic future thinking (EFT)

Gianni Brighetti

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Loss aversion and inertia in financial decision making

M. Ploner^(*)

*A win doesn't feel as good as a loss feels bad,
and the good feeling doesn't last as long as the bad.
Not even close.*

(Andre Agassi)

1 Introduction

The opening quote, taken from the autobiography of tennis legend Andre Agassi (2010), well captures the essence of *loss aversion*. The concept of loss aversion was introduced by Kahneman and Tversky in their pioneering work about prospect theory (1979) and refers to the higher emotional value associated to losses than to gains of the same size (*«losses loom larger than gains»*). This asymmetry in evaluation plays a fundamental role in risk attitudes (Köbberling and Wakker, 2005) and may lead individuals to turn down profitable opportunities in uncertain environments for the fear of potential losses, even when the expected returns of the venture are largely positive. Here we focus on inertia in decision making that originates from loss aversion. We first provide a brief introduction to the concept of loss aversion and then illustrate how this relates to inertia in decision making.

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2 Loss aversion

Loss aversion is one of the key components of prospect theory, a well-known behavioural theory developed by Tversky and Kahneman (1992). According to this theory, the value of an outcome is assessed as a change relative to a reference point. Accordingly, the value of an outcome x is given by the following value function

$$V(x) = \begin{cases} v(x) & \text{if } x \geq 0 \text{ (gain)} \\ \lambda v(-x) & \text{if } x < 0 \text{ (loss)} \end{cases}$$

where the coefficient $\lambda > 1$ captures the psychological trait of loss aversion, implemented as a penalty assigned to bad outcomes relative to good outcomes.¹

As an example of the working of loss aversion in decision making under risk, let us consider the decision task of Table 1.² The two investments, A and B, differ in the payoffs associated with the Good and the Bad course of the economy. Investment A has a lower expected return but is less risky than Investment B. Furthermore, the losses in investment A are smaller than in Investment B.

Table 1 – Prospects

Investment A			Investment B		
event	probability	payoff	event	probability	payoff
G	50%	+\$34	G	50%	+\$42
B	50%	-\$2	B	50%	-\$6

The expected payoff of Investment A is \$16, while the expected payoff of investment B is \$18. To keep it simple, assume that the value attached to the outcomes is $v(x) = x$. Thus, an individual adopting the prospective value function $V(x)$, but not displaying loss aversion ($\lambda = 1$), should always rationally prefer the Investment B to the Investment A. However, when an individual displays loss aversion, the ordering of the two investments may change. Assuming that $\lambda = 2.5$, the perceived value of the investment becomes \$14.50 and \$13.50, respectively for Investment A and B. Thus, when an individual displays loss aversion Investment A is preferred to Investment B.

The relevance of loss aversion for decision making under risk has been highlighted by several studies, adopting different empirical approaches. The experimental study of Abdellaoui et al. (2008) presents an efficient elicitation method to measure loss aversion and shows robust evidence of this pattern: 76.6% of the subjects in the experiment are classified as loss averse and the median estimated

¹ Several empirical studies provide empirical estimates of the magnitude of λ . As an example, Tversky and Kahneman (1992) report an estimate of $\lambda = 2.25$.

² The two prospects are an excerpt of the experimental protocol proposed by Eckel and Grossman (2008) to estimate risk and loss aversion, in simple gambling tasks.

coefficient of loss aversion λ is equal to 2.61. The empirical study by Genesove and Mayer (2001) investigates the behaviour of homeowners who face a nominal loss relative to the purchasing price of the estate. In line with loss aversion, homeowners experiencing a nominal loss set prices higher and spend longer time trying to find a matching offer than those not experiencing a loss. Tom et al. (2007) rely on neuro-imaging techniques to identify patterns in neural activity when individuals are choosing in simple 50/50 chance lotteries. In line with loss aversion, the authors identify a decrease in neural activity in the presence of losses stronger than the increase in neural activity observed in the presence of gains.

3 Inertia in financial decision making

As highlighted by Kahneman et al. (1991), loss aversion is the main source of inertia in decision making. In the following, we focus on two main types of inertia related to loss aversion biases, that have direct implications for economic and financial decision making: inertia in revising choices and inertia in exploring profitable investment opportunities. The former relates to the *status quo bias*, i.e., the tendency that individuals display to preserve the current state of affairs instead of undertaking new opportunities. The latter relates to *myopic loss aversion*, i.e., a disposition that leads to an overly negative evaluation of risky investments.

3.1 Status quo bias

Individuals seem to be highly conservative when asked to revise their economic and financial plans. In the behavioural literature, the strong anchoring to the current state has been labelled status quo bias and loss aversion represents the leading explanation for this bias. In the prospect theory, changes relative to the current state may potentially lead to losses or gains. Given the stronger psychological impact of losses relative to gains, individuals may prefer to preserve the status quo rather than to undertake new opportunities.

In an experimental test of the status quo bias, Samuelson and Zeckhauser (1988) show that presenting an investment opportunity as the *status quo*, i.e., as if the choice was already implemented and could be effortlessly modified, increases the likelihood that the option is selected relative to a condition in which the option is not selected and must be implemented. The experimental evidence of Samuelson and Zeckhauser highlights the importance of defaults in decision making. In our context, a default is a choice that is automatically implemented when the decision maker does not actively intervene in the course of actions (Johnson et al., 2002). The status quo bias is a leading explanation for the strong attraction for the default option displayed by decision makers, i.e., default effects.

Default effects seem to affect choices in several economic domains.³ Of particular interest here is the contribution of Madrian and Shea (2001) about the impact of defaults in retirement saving decisions. The authors observe the saving behaviour of employees in a US firm before and after a change in the procedure adopted to enrol in the 401(k) saving plan. Before the change, the workers were required to actively state their subscription of the plan (opt-in), while after the change the workers were automatically enrolled and asked, if they wanted, to exit the plan (opt-out). The authors observe that after the change, the subscription rate dramatically increases from 49% to 86%. In addition to this, the default contribution rate and the investment profile chosen by the employer has a strong influence on the final decision of the workers. Choi et al. (2004) further elaborate on this and show that low default contribution rates and conservative allocation profile may reduce total savings. Thus, defaults seem to be a powerful tool to influence saving behaviour, but their use should be carefully considered to avoid unintended consequences.

3.2 Myopic loss aversion

In financial markets, investors ask a premium in term of expected returns to hold risky financial assets. The higher the risk of the asset and the higher the risk aversion of the investors, the higher the premium asked to hold the asset. The contribution of Mehra and Prescott (2003), however, points out an anomaly in the magnitude of the risk premium of stocks. Over long time horizons, stocks largely outperform bonds and carry moderate risk. Given this, the return differential between stocks and bonds implies an exaggerated degree of risk aversion on the side of stock owners.⁴ This anomaly is known in the literature as equity premium puzzle.

Benartzi and Thaler (1995) put forward a behavioural explanation for the equity premium, under the label of *myopic loss aversion*. The explanation combines insights from two behavioural biases, mental accounting and loss aversion. The latter has been already presented above and refers to the asymmetry in the evaluation of gains and losses. Mental accounting (Thaler, 1985) refers to how the aggregation process of one's own resources affects the way the resources are employed and evaluated. Here we focus on the intertemporal aggregation individuals adopt to evaluate a stochastic asset. Specifically, when evaluating their investment individuals may adopt either a myopic perspective (narrow bracketing), so that they perceive each realization of the stochastic process in isolation, or a broader view, so that realizations over distinct time periods are aggregated.

According to Benartzi and Thaler (1995), the joint effect of loss aversion and mental accounting may explain the abnormal premium associated with stocks. Intuitively, stocks are quite volatile and may register several negative and positive

3 As an example, Della Vigna and Malmendier (2006) investigate the role of defaults in consumption decisions and Johnson and Goldstein (2003) consider the implications of defaults for health-related issues.

4 Mankiw and Zeldes (1991) further elaborate on the evidence presented by Mehra and Prescott (1985) and show that the coefficient of risk aversion required to explain the differential in returns between bonds and stocks is about 26 times the coefficient generally assumed in economic models.

deviations from a given reference point, like the entry price. Due to loss aversion, losses have a much stronger impact than gains on the perception of the investment. When losses and gains are evaluated in isolation, a long series of substantial gains may not be sufficient to 'compensate' a shorter series of moderate losses. Thus, investors may form a negative perception of an investment that, in nominal terms, delivers positive outcomes.

As an illustrative example, take the price pattern of a fictional Stock XYZ reported in Table 2. The entry price of the stock at period 0 is equal to 100 and then changes over the four periods as illustrated in the table.

Table 2 – Price of Stock XYZ

Period	0	1	2	3	4
Price	100	120	110	105	110
$P_t - P_{t-1}$		+20	-10	-5	+5

The change in price from period 0 to period 4 is equal to +10, with a positive return of 10%.

Now, assume that the investors evaluate the investment using the prospective value $V(x)$ outlined above, with $v(x) = x$. A standard investor who does not display loss aversion ($\lambda = 1$) will positively evaluate the investment in Stock XYZ. Obviously, the same conclusion would have been reached if the investor had taken into account each period in isolation. However, for an investor characterized by loss aversion the adoption of a narrow or a broad perspective may have strong implications in terms of the perceived value of the investment. When a broad perspective is adopted, the investor registers a gain of +10 and the perceived value of the investment is the same as for the investor displaying no loss aversion. However, when each period is evaluated in isolation, the net perceived value of the investment is equal to $V = +20 - \lambda 10 - \lambda 5 + 5$. This implies that as long as $\lambda > 1.67$, the net perceived value of the investment is negative. The example illustrates how the combination of loss aversion and myopic evaluations may hamper investment in stocks and foster allocation to safer investments, like bonds.

4 Conclusions

The strong aversion to losses displayed by humans may foster inertia in decision making and lead to detrimental consequences for portfolio management. In this short essay, we considered two main sources of inertia related to loss aversion, the status quo bias and the myopic loss aversion. The former leads to a lack of exploration in terms of new opportunities for investment and the latter leads to conservative portfolio allocation strategies that heavily penalize investment in risky but profitable securities.

The behavioural literature has identified a few potential interventions aimed at preventing the detrimental consequences of biases related to loss aversion. As an example, Madrian and Shea (2001) show the advantages of opt-out over opt-in schemes in terms of participation rates in saving programmes. Thaler and Benartzi (2004) illustrate the working of SMaRT, a pension saving programme that exploits defaults and the status quo bias to increase saving contributions. Because of inertia, individuals remain in the programme and tend to save more than those who do not subscribe it. Concerning the resistance to invest in stocks over long time horizons, a possible behavioural intervention may be to encourage the investors to embrace a broader perspective in evaluating their investments. Experimental studies provide support to this intuition (e.g., Thaler et al., 1997; Fellner and Sutter, 2009).

In light of what presented above, promoting awareness of behavioural biases that lead to inertia and offering investment programmes that take into account these biases may represent a useful solution to improve investors' decisions. Financial education may foster self-awareness and this may open new opportunities for private intermediaries offering products that help retail investors reach their goals and overcome behavioural biases that trigger inertia in investment decisions.

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A little insight on the maze of risk

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*The mathematical concept of probability
arose from the endeavour to render objective, as far as possible,
the subjective expectation of a single event.*

(Wolfgang Pauli, *Probability and Physics*, 1952)

1 Introduction

Human decision making frequently consists of choices made under uncertainty. Some uncertain situations are unavoidable, because they are indissolubly linked to human nature. Others are driven by human behaviour.

Uncertainty is analytically related to the concept of probability. When uncertainty refers to the probabilities of possible outcomes, it is usually defined as «*ambiguity*» (not-measurable uncertainty). *Ambiguity* prevails when the decision maker ignores the statistical frequencies of events relevant to the decision or when a priori calculations are impossible (Knight, 1921). When the outcome is uncertain, but associated probabilities can be known and measured, we use to talk about «*risk*».

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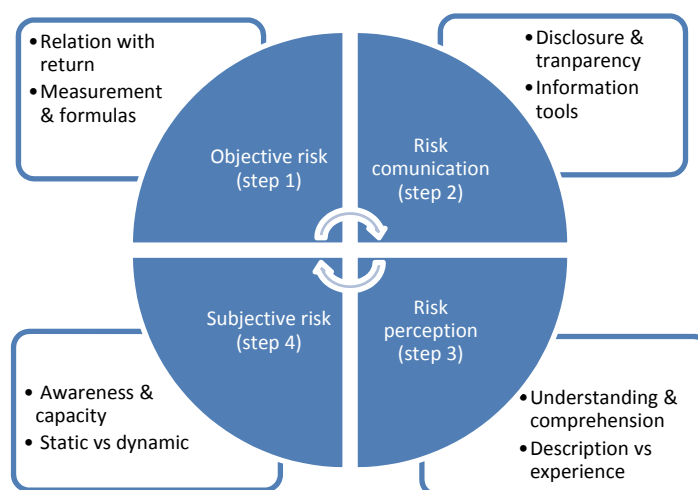
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In this paper, I focus on decision making under risk. According to an epistemological approach, decision making under risk needs to simultaneously consider the objective side of the risk (i.e., risk driven by the intrinsic characteristics of the choice), and the subjective side of the risk (i.e., risk as perceived by the decision maker; Figure1).¹

The latter implies a further preliminary statement: behaviour under risk is domain-specific. In other words, individuals may accept or refuse to take risk depending on the reference domain (e.g., health, driving, career, leisure time, safety or finance; Nicholson et al., 2005).

Figure 1 – An epistemological design for risk analysis in finance



Source: author's elaboration.

Finance is the specific domain in which risk ordinarily drives the production of financial products on the offer side and decisions on the buying side. Therefore, this domain represents a natural realm for testing the epistemologic design of the risk analysis shown in Figure 1. This short note offers food for thought on the main drawbacks that can be experienced in the investment decision process, having assumed the above mentioned objective-subjective risk dialectic.

2 A theoretical path in the objective-subjective risk dialectic

Higher riskiness of a financial product is justified by the expectation of higher returns, since the classical positive risk-return relationship is generally beyond dispute: any acceptable bargain implies that the higher the risk, the higher the expected return.

¹ This statement is coherent with developments of human knowledge of Nature, since the early 20th-century subatomic physics and revelations of quantum mechanics.

In a practical sense, financial risk is related to the probability of losses, but it may be modelled through various *formulas*, capturing many different dimensions: variability around average returns, losses that may happen under certain conditions, the maximum loss that is likely to occur, lower than expected returns or lower than a targeted benchmark returns, and so on.

Financial regulation requires objective risk of financial products to be disclosed to the benefit of potential investors, according to a precise *risk communication*. Disclosure and transparency of financial products are conceived to deliver the risk/return profile of financial products to investors. Regulators definitely recommend investors to read and analyse information documents (IFF Research and YouGov, 2009; ESAs JC, 2015).

The desirable path should coherently be as follows: the objective risk-return profile (step1) should be disclosed (step2) and perfectly understood by decision makers (step 3), who should be completely aware of the risk they are taking. Furthermore, the risk taken should be suitable to decision maker's subjective risk attitude (the risk they *want* to take), and consistent with his/her risk capacity (the risk they *can* take), in a static equilibrium (step 4).

Nonetheless, whatever the domain considered, understanding of risk disclosure may be affected by individual's pitfall in risk perception (Ragnar, 2010).

3 The real path in the objective-subjective risk dialectic: some drawbacks

Human behaviour is not predictable and systematically deviates from the desirable path mentioned above. Each single step of the objective-subjective risk path (objective-risk => risk-communication => risk-perception => subjective-risk) unfolds the presence of drawbacks caused by human complexity. Moreover, over last forty years multidisciplinary empirical evidence has disappointed the hypothesis that the desirable path always ends up to the desired static equilibrium.

Given the positive risk-return relationship, higher risk-taking is generally justified by higher expected returns (step 1). Nonetheless, through a range of clinical and physiological studies, Loewenstein et al. (2001) provide evidence that emotional reactions to risky situations often diverge from cognitive assessment of risk and coined the 'risk-as-feelings' hypothesis. Such expression recalls the role of emotions in risky decision making. As a way of example, risk taking may be guided by seeking for excitement, thrill or pleasure, thus making questionable the axiom of the positive risk-return relationship. Not surprisingly, this awareness brings back to the original thought of Jeremy Bentham (1789), the founder of utilitarianism, who described utility as the sum of all pleasures, well-being and happiness resulting from an action minus the suffering and pain of anyone involved in that action. Given the impossibility of measuring 'happiness', later studies simplified utility theories, leading

to the assumption that decision making is driven by optimization of a monetary outcome (ease proxy of happiness). When technology allowed somehow to 'measure' the emotions experienced during the decision making process, empirical evidence uncovered rationality underneath apparently irrational choices, because individuals aim to maximize their own *subjective value* of reward (Lucarelli et al., 2015).

To the purpose of this note let us assume that the positive risk-return relationship on monetary values still holds, and let us move to the issue of risk communication (step 2). Disclosure should refer to expected returns and probability of loss, but several studies indicate that effectiveness of disclosure depends on the way information is given. On one hand, properly designed information tools, such as graphs (Desanctis and Jarvenpaa, 1989) or visual priming techniques (Wang et al., 2010), can increase the effectiveness of disclosure. On the other, specific presentation formats and ways of communicating risk may increase risk taking of investors, such as the graphical display of distributions, as shown by Benartzi and Thaler (1999) and Beshears et al. (2011), or the disclosure formats combined in a «risk tool», as shown by Kaufmann et al. (2013). Graphs may enjoy the status of being 'worth a thousand words', but this is true only if graphical tools are employed for transparent risk communications (Kurz-Milcke et al., 2008). Weber et al. (2005) revealed that returns presented through a distribution graph, rather than a bar graph, lead to greater estimates of asset risk, because the density function format makes the end-points (extreme values) perceptually more salient, thus inducing an anchoring effect that eventually intensifies the perceived risk. In line with this argument, an attention effect is strongly relevant when a decision maker goes through documents, such as the information sheets disclosing information on financial products: as it is known since the original pieces of work by Barber and Odean (Barber et al., 2005; Barber and Odean, 2008), investors' attention is grabbed by 'glittering pieces' of information. Moreover, as know from other disciplines defining the complexity within a 'person-task interaction' (Campbell, 1988), the information processing leading to decisions is a function of complexity (Payne, 1976). Coherently, Gentile et al. (2015) found empirical evidence of the impact of complexity on perceived risk, i.e., the higher the perceived complexity of information disclosed the higher the perceived risk of the financial product.

Let us turn to risk perception (step 3). *«Why is it that the public can read and write but only a few understand statistical information? Why are elementary distinctions, such as that between absolute and relative risks, not better known? In the absence of statistical literacy, key democratic ideals, such as informed consent and shared decision making in health care, will remain science fiction.»* Even if the authors of this sentence (Kurz-Milcke et al., 2008, p.18) refer to a different domain, i.e., perception of information disclosed to prevent diseases such as cancer, any risk communication programme should be concerned about what is perceived by the individuals targeted by the programme itself. Whatever risk is disclosed, people need to understand it. From the empirical evidence gathered in Gentile et al. (2015), simplification may not be sufficient to ensure correct risk perception and unbiased

investment choices. Investors' heterogeneity – in terms of socio-demographic features, financial literacy, personal traits or inclination towards behavioural biases – questions the existence of the 'optimal' disclosure, according to a 'one-size-fits-all' approach able to ensure comprehension of financial products and unbiased risk perception. These doubts confirm what is already known in the literature: *«the utility of a particular type of information cannot be effectively evaluated apart from the users of that information»* (Dermer, 1973, p. 518). Providing more than one representation of the same risk/return characteristics of a financial product may be a virtuous solution, as suggested by some scholars (Diacon and Hasseldine, 2007). The strong influence of framing, anchoring and attention effect indicates that risk perception may also be directed. In extreme cases, disclosed information can be manipulated in order to influence the level of risk perceived.

How do people learn about risk? The decision making literature distinguishes between two fundamentally different ways: *description* versus *experience* (see, among others, Hertwig et al., 2004). In the first case, risk is described in a summary form, e.g., through historical returns reported in factsheets and probabilities explicitly stated and associated to outcomes. In the second case, learning about risk comes from sampling possible outcomes and, consequently, the underlying probabilities are judged or inferred from observed experience. However, perception of *rare events* is subject to two cognitive processes, *overestimation* and *overweighting*, which impact on people's choices (Hertwig and Erev, 2009). A striking consequence is that a description *or, alternatively*, an experience learning process differently affect individuals' willingness to take risk: when decisions are made after learning about risk from a description, people overweigh the probability of rare events, as described by the prospect theory (Kahneman and Tversky, 1979), and are less willing to take risk. Conversely, when decisions are made on the base of an experiential learning of risk, people underestimate the probability of rare events and become more willing to take risk (Hertwig et al., 2004; Kaufman et al., 2012).

This evidence questions individuals' awareness of their own risk attitude (step 4). How reliable is inferring individual willingness to take risk from the observed investment choices? Are individuals able to self-define their personal risk attitude? Is this attitude mediated by the awareness of personal or family risk capacity? Is risk aversion/propensity stable over time or is it driven by internal and external conditions?

As far as the first two questions are concerned, evidence has been gathered through a psycho-physiological task research, conducted on a group of adults among the largest ever studied before, that introduced measurement of emotional arousal during the decision making process (Lucarelli et al., 2015). This laboratory setting resembles experiential learning of risk, because interviewees were asked to make investment choices within a portfolio frame. Lucarelli et al. (2016) uncovered that interviewees' behaviours are classifiable as risk-seeking if observed through the exterior phenomenology of the monetary pay-off of their investments, as it is

expected from such kind of risk learning processes (Hertwig et al., 2004; Kaufman et al., 2012). Nevertheless, the same individuals are discovered to be risk-averse when values of their choices are balanced with their emotional experiences. This result holds if risk is thought to be mentally projected by individuals within a standard deviation formula. For any level of education, it is impracticable to obtain a reliable response about *which is the formula* individuals *mentally apply* to represent risk. Lucarelli et al. (2016) compared the descriptive efficacy of standard deviation of outcomes, value at risk at 95% confidence level, conditional value at risk at 95%, and maximum drawdown. According to the authors, only standard deviation works, showing a list of behaviours in decision making statistically different from the remaining risk formulas.

The same laboratory setting has been exploited to understand if individuals are able to self-define their personal risk attitude. Lucarelli et al. (2015) compared the risk attitude classification resulting from a traditional risk tolerance questionnaire to evidence drawn from a psycho-physiological task. They found that people tend to misclassify their true risk tolerance, and frequently define themselves as risk averter while their emotional experience drive them to behave as risk lover, and vice versa. Fortunately, it seems that the presence of external constraints related to dependent family members, income level and wealth conditions makes emotional risk attitude converge towards actual individual risk capacity (Lucarelli and Brighetti, 2010).

Up to this point, if external conditions may work in mediating the emotional risk attitude with some degree of efficacy, is the emotional risk attitude stable over time? In other words, is a personal condition of risk aversion maintained every day, long life long? Unfortunately, the answer is no. As an example, Lerner and Keltner (2001) find that fear and anger differently affect risk preferences: fearful people tend to show risk-averse behaviours, whereas angry people, similarly to happy people, tend to make risk-seeking choices.

Also the decision making context may influence the content of the decision itself. Kirchler et al. (2017) find that time pressure increases risk aversion for gains and risk taking for losses compared to time delay, implying that time pressure increases the reflection effect of prospect theory. There is also asymmetry between gains and losses: results for gains are weaker and less robust than the results for losses and no significant difference between time pressure and time delay is uncovered for loss aversion.

Finally, even receiving incentives affects willingness to assume risk. As an example, in the laboratory tasks run in Kirchler et al. (2016) both rankings and tournament incentives increase risk-taking among underperforming professional fund managers, while students, under the same laboratory conditions, do not adapt their risky behaviours, being not used to such form of competition.

4 Knowledge of risk is a labyrinth: so what?

This note shows that individuals may be frequently unaware of their risk aversion/propensity by their nature. Even worse, they may tend to make a risky choice while being (subjectively) convinced of making a prudent choice. Risk perception may even be misled by the financial information they (do not?) comprehend.

Therefore, as Han, Lerner, and Keltner (2007) point out, sound research on human risky behaviours could benefit consumers (investors) by increasing their consciousness of the emotional component of their decision making under risk, with a challenge of 'awareness of unawareness' (Ma and Schiffer, 2017). Such consciousness should be one of the pillars grounding production, distribution and regulation of financial products as well as financial education programmes.

At the margin, it is worthy to mention that an easy device to cope with pitfalls of individual perception and decision making is the 'mediation' of subjectivity: decisions definitively improve when *sharing* personal perceptions and emotions *with others*. An arguable mediation should involve financial professionals (financial advisors, private bankers, or whoever is in charge of selling/distributing financial products) who should support their customers in disentangling essential information from the bulk delivered to them, and could finally act in favour of their debiasing (Kahneman and Riepe, 1998; Linciano, 2010).

That being said, as I come to the end, awareness of the objective-subjective risk dialectic should steadily represent one of the educational goals of programmes addressed to enhance financial literacy of investors.

The obvious final question is: shouldn't it be useful to include this educational goal also in training programmes addressed to professionals, supporting/advising retail customers, in order to make them aware of the weaknesses of the human decision making process?

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Financial risk as anxious feeling and uncertainty driven by episodic future thinking (EFT)

G. Brighetti(*)

This note on decision making under risk and uncertainty hinges on some principles of cognitive psychology (with particular reference to the psychological concept of time), the theory of subjective probability and the conceptual framework of false belief in clinical psychology. The constraint binding these three domains of knowledge, i.e., the *ligands* determining a sort of docking, is the socio-political situation in which individuals make choices, and depends on a non-linear interaction of events.

1 Economic mindset and probability theories

I would like to begin by recalling some themes of the broad debate that still involves the proponents of the neoclassical and behavioural economic theories (the latter including prospect theory, hyperbolic discounting and social preference utility functions), defined by Bert and Gigerenzer (2010) as *«almost surely wrong as descriptions of true psychological processes»*.

Berg and Gigerenzer (2010), in their criticism at those divergent theories, cite a seminal work of Allais (1953) summarizing the constituents of any realistic theory of choices involving risk in four points:

- 1) the distinction between monetary and psychological values;
- 2) the distortion of objective probabilities and the appearance of subjective probabilities;
- 3) the mathematical expectation of psychological values (the mean of the probability distribution of psychological values);
- 4) the dispersion (variance) as well as general properties of the probability distribution of psychological values (Allais, 1953, p. 504).

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Referring also to previous empirical-experimental data (Gigerenzer, 2008), Gigerenzer and Brighton (2009) contrast the heuristic reasoning with the formal logic and argument that heuristics are efficient cognitive processes, with these words:

«Heuristics are efficient cognitive processes that ignore information. In contrast to the widely held view that less processing reduces accuracy, the study of heuristics shows that less information, computation, and time can in fact improve accuracy.

Homo heuristicus has a biased mind and ignores part of the available information, yet a biased mind can handle uncertainty more efficiently and robustly than an unbiased mind relying on more resource-intensive and general-purpose processing strategies.

By the end of the 20th century, the use of heuristics became associated with shoddy mental software, generating three widespread misconceptions:

- 1. Heuristics are always second-best.*
- 2. We use heuristics only because of our cognitive limitations.*
- 3. More information, more computation, and more time would always be better.»*

(Gigerenzer and Brighton, 2009; p. 109)

Also by using these interesting statements, I would like to turn the attention to the concept of subjective probabilities, which has originated by the thought of the great mathematician Bruno De Finetti (De Finetti, 1930; De Finetti, 1933).

The De Finetti theory of 'subjective probability' provoked a harsh controversy among mathematicians who faced the problem of calculating the probability in objective terms, being the probability of an event objective when it is real, measurable and observable by all individuals in the same way. According to De Finetti, the probability poses serious problems of measurement, which considerably differs among individuals depending on their beliefs. In De Finetti's opinion the 'truth' of a statement can be understood in two ways: either in the objective sense, as conformity to an external reality conceived as independent of us, or in a subjective sense, as in accordance with our opinions, impressions, sensations.

The distinction between objective and subjective considers as an example the tables of truth of formal logic, for which the semantic and referential value of the propositions is indifferent, provided they obey formal rules.

So, if Socrates is a man and men are deadly, then Socrates is deadly, but if Socrates is a tree and the trees are snakes, then Socrates is a snake. So good, it all makes perfect sense!

De Finetti also says: *«Of many assertions, or propositions, we often do not know whether they are 'true' or 'false' (e.g., for almost everything about future events), but only if they are more or less probable. Here too there are two alternatives: to conceive such a probability assessment as having an objective sense, or as having*

merely a subjective sense. It is almost always sought, even with great efforts, to persuade itself for the existence of an objective meaning, however, all these efforts have always been unsatisfactory, so is true that no definition or conception of probability has ever been able to impose itself or assert itself.»

And finally: *«The probability calculation is the logic of the probable. As the formal logic teaches to deduce the truth or falsehood of certain consequences from the truth or falsehood of certain premises, so the probability calculation teaches to deduce the greater or lesser likelihood of certain consequences from the greater or lesser likelihood of certain premises. For those who attribute an objective meaning to the probability, the probability calculation should have an objective meaning, and its theorems expressing properties that in the field of the real are satisfied. But it is useless to make such assumptions. Just limit yourself to the subjective conception, i.e. consider the probability as a degree of confidence heard by a given individual in the coming of a given event, and it can be shown that the known theorems of probability calculation are necessary conditions and sufficient because the opinions of a given individual are not inherently contradictory and incoherent.»* (p. 261).

If we adopt an objective conception of truth, logic appears as a property of the real world, as a sort of external law that objectively regulates truth or falsehood of certain propositions. If limited to the subjective aspect, logic only worries about mental processes, and only teaches whether thought is coherent with itself. This second meaning is more general and wider than the other, because it is independent of any particular clarification of the value to be given to the concept of 'true' or 'false' (De Finetti, 1930; p. 261). This complex reasoning can certainly lead to an extreme form of subjectivism. However, I would like to lower it in the mental processes of the layman, whose empirical experience and trials of causality hinge on few poor cases of the everyday life, the memory of private defeats and of betrayed hopes, prejudices and superstitions slowly fostering what a great and almost forgotten Italian psychologist, Bruno Bozzi, had brilliantly defined *«naïve physics»* in the field of perception (Bozzi, 1999).

One may object: it is not economics, it is about another field, another knowledge, poor methodology. This is true, but how much realism in the phenomenology of seeing through the senses!

This last argumentation is not too distant from the economic field if we consider the words of Thaler (1991), cited in Berg and Gigerenzer (2010), stating that the major contribution of behavioural economics has been the discovery of a collection of 'illusions' completely analogous to optical illusions. Thaler interprets these 'illusions' as an unambiguously wrong escape from the 'rational' or correct decision making. We could however take the liberty of thinking that if human choices often violate the axioms of rationality, this does not necessarily imply any criticism of the axioms of rational choices on normative grounds, but rather that for so many ordinary people it is so simple to behave according to different alternative models. As Thaler writes, referring to Müller-Lyer illusion: *«It goes without saying that the existence of an optical illusion that causes us to see one of two equal lines as longer*

than the other should not reduce the value we place on accurate measurement. On the contrary, illusions demonstrate the need for rulers!»

According to the psychology of Gestalt (and extending the analogy also to the economic field), rulers in visual perception cannot produce any type of metrics. They only depend on the phenomenological method. This means that the judgement and the consequent decisions and actions prompted by a stimulus are driven by the perceived choice and, as in the case of ambiguous figures, can continuously alternate as in the behaviour of a magnetic dipole.

I would like to dwell on a sentence of the broad quotation reported above, affirming *«the probability as a degree of confidence heard by a given individual in the fulfilment of a given event»*. This touches a field that borders between cognitive psychology and philosophy. Although it is agreed that building of trust must primarily be based on knowledge, information, assessment of circumstances and on reliability of the iteration of past events, this fails to prove even a small part of the many resounding assessment errors that each of us makes in real life.

Moving from trivial considerations of developmental psychology, will it be *the time* conceived as 'mental time travel', from adolescence dreams and hopes, to a rapidly more reflective adulthood, to an old age sadly conscious in the end? Will it be the 'mental time travel' that is lacking in the construction of those that Allais (1953) defined *«Properties of the form of the probability distribution of psychological value»*?

The time has come for addressing precisely the temporal dimension from a psychological point of view.

2 On subjective time

As pointed out by Nyberg et al. (2010), humans and maybe some animal species spend a large part of their waking time thinking about events occurred in the past and imagining what might happen in the future. These thoughts, involving individuals as observers or participants in the events, define what cognitive scientists metaphorically call 'mental time travel'.

In recent years, this state of mind has been studied through neuroimaging techniques, by asking to the experimental subjects to remember truly occurring autobiographical events and later to imagine similar events that could happen in the future. The results highlight that widely distributed networks of cerebral connections activate with a similar intensity when thinking of past and future.

In the context of the mental time travel, an issue is the nature of the time in which the metaphorical travel takes place, i.e., what is and what characteristics has that 'time' in which remembering the past and imagining the future are placed in a present that is so realistic to activate emotions and physical reactions, despite the awareness of its lack of any basis in reality. Tulving (1985), forcing the laws of classical physics and perhaps even common sense, called it *«subjective time»*. It appears clear that if we introduce such a significant space of subjectivity in the

temporal dimension, any decision we make or we wanted to make would be strongly influenced not only by our emotions and dreams but even by our possible assessment of the event horizon. Let us think about what would be of our projects, career, consumption, lifestyles in this subjective perspective. Many of us could argue that such an evaluation of future time should call for strong corrective and remedial realism, so fashionable in the 'realism philosophy' in recent years, although others could reasonably exclaim: let us at least dream!

This means, as an example, that the metric appreciation of future and precisely measurable rotations and revolution of our planet would become a subjective function of our expectations, hopes and dreams. In this perspective, dangerously lysergic, in case of investment or retirement choices we would see significantly reduced the possibility of forecasting future outcomes.

In that interpretative key, Tulving (2002) has defined 'chronesthesia' the ability, acquired by human species over the evolution, to be constantly aware of past and future. Tulving (2002) also argues that over time humans have discovered that remembering past events helped them develop adaptive behaviours in the future, e.g. telling friends from enemies or useful from useless tools. If we adopt this functional view, the relationship between retrospective memory and prospective memory appears to be devoid of problematic consequences for human behaviour. However, once again the theme of temporal subjectivity creates some embarrassment, as Szpunar (2011) points out with a really *tranchant* argument. The author states that the time to which we refer in psychology is not the clock and the calendar time, defined by the physical sciences that govern most of our everyday life affairs, since *past* and *future*, necessarily punctuated with reference to a sentient observer, do not exist in physical reality but are products of the human mind.

Facing our projections on future with the idea of not being able to count on a measure or any tool other than a product of our mind appears quite disturbing.

The neuroimaging studies by Nyberg et al. (2010), D'Argembeau and Van der Linden (2006) and Suddendorf and Corballis (2007) support the idea that the 'mental time travel' corresponds to a neurocognitive function, allowing humans to go back to the past, by re-living it with a strong effect of realism, and to project themselves into the future in order to pre-live events that have not happened yet. From the physiological point of view it has been shown that *travels* in the past and in the future share similar phenomenological features and activate the same cerebral areas (see Okuda Fujii, Ohtake et al., 2003, using the Positron emission tomography or PET).

As argued by Lhumann et al. (2008), economists have long speculated that intertemporal preferences (e.g., preferences between immediate and future consumption in saving and investment choices) are partly determined by people's «*power to imagine*» and willingness to keep up the necessary effort to imagine. Furthermore, it has been suggested that the vividness of such imagination (or the lack thereof) should explain variability in intertemporal preferences across both individuals and situations (Loewenstein, 1987).

Lhumann et al. (2008) analyse intertemporal choices by investigating preferences for identical probabilistic monetary rewards that were presented either with or without temporal delays until uncertainty resolution. The authors detect individual differences in delay sensitivity in a functional neuroimaging task. These differences amount to a variability greater than 20% and are robust to a series of controls.

Namboodiri et al. (2014) is one of the most interesting contributions investigating the relationship between behaviour and intertemporal delay. The authors argue that none of the existing theories link the intertemporal decision making process to time perception within a single framework, thus remaining unable to systematically explain the breadth of data on intertemporal choices. Namboodiri et al. (2014) refer to a reasoning already mentioned above: representations of temporal delays are needed when attributing values to rewards delayed in time. Representations of time are subjective, as it is known that time perception varies within and across individuals, and that errors increase with the interval being represented.

Although not reaching the ambitious aim of building a convincing and complete general theory of intertemporal decision making and time perception, Namboodiri et al. (2014) have the merit of providing an algorithmic treatment of the problem that delivers good predictions in experimental tests.

3 Episodic prospection, decision making, uncertainty/anxiety

After the above speculations on some assumptions on individuals' ability to evaluate probability and perceive time, we need to find a link with the psychological constructs of anxiety and uncertainty.

As emphasised by Asp et al. (2013), uncertainty is a broad construct. In the domain of decision making, for example, uncertainty can be divided into distinct dimensions including sensory uncertainty, state uncertainty, rule uncertainty and outcome uncertainty.

Uncertainty better captures subjective aspects of one's internal state, and thus appears more frequently in the literature on human anxiety disorders. The primary component of uncertainty is inextricably linked to the phenomenological experience of anxiety arising from unpredictable future events. Uncertainty makes it difficult to prepare properly for future events: one must strike a balance between preparatory actions that are more efficient (but potentially inadequate) and those that are more effective (but potentially unnecessary). Anxiety and clinical anxiety disorders are associated with disruptions to a number of processes of preparatory behaviour in the face of unpredictable threat.

Uncertainty about a possible future threat disrupts our ability to avoid it or to mitigate its negative impact, thus resulting in anxiety.

An interesting recent work by Grupe and Nitschke (2013) emphasises that *«anticipatory processes serve an adaptive function when executed at a level commensurate with the likelihood and severity of threat, but can be maladaptive when conducted excessively»*. The authors also add that information about probability, timing, and nature of a future negative event is rarely available owing to the inherent uncertainty of the future, despite being able to promote more efficient allocation of resources.

However, it is precisely the human ability to estimate the probability of future event that I tried to question through the numerous researches cited above.

If we acknowledge subjective probability and subjective time, then the assessment of the danger and risk of future events becomes a variable largely linked to individual personality, and it is easy to conclude that the more the environment in which we live is perceived as insecure the more the level of uncertainty will play a fundamental role.

Although past experiences can work as alerts in imagining possible future events, what will be the actions of a personality with obsessive tendencies, in the face of a future that reserves unforeseeable uncertainties? What levels of confidence can one have, what levels of probability can one assume, if these estimates are based essentially on one's own fears? Fears that are very much justified by almost daily events.

If the obsessive personality, leaving out personal events, observes the past and recent history or chronicle, what guarantees can it have that its prospective memory can be worth a cent?

It will be said, of course, that a good level of expertise on probability calculation could help people predict future events. Nonetheless, the obsessive will always wonder why experienced (in probability calculation) people have so often failed their predictions, with an even more damaging conclusion that they could have been risk lovers or they could have behaved opportunistically.

The reasonable criticism that Asp et al. (2013) make to the statement of Kahneman (2011) *«Right now, there is a killer directly behind you»* is based on the implausibility of the assertion cited in the absence of context data. Is this criticism true even today and is it true for all subjects, for any personality type (either more or less anxious or more or less obsessive)?

Anxiety is related to anticipatory representations of possible (that is, uncertain) future events. It certainly cannot be argued that the majority of people live in a permanent anxious state, but it cannot be denied that hope and trust in the future are not closely linked to a personal assessment based on information, being almost always prompted by beliefs little based on reasoning.

As Gilbert showed (1991), the understanding of an event or others' actions is first of all an immediate belief in what is being said, before any reflection or reasoning, and only a secondary psychological act can produce disbelief or doubt.

Our daily life is largely made of predictions about our future. Only in an optimistic and uninformed vision, predictions may be based on unrealistic dreams and be as such rather dangerous.

To resolve for uncertainty, it is needed systematic, competent and above all simple information on features of the economic landscape that closely concern the layman, because they relate for example to the purchase of a house, the forecast of future personal and family needs, safe saving plans.

As we have tried to demonstrate, uncertainty, subjective assessment of probabilities, projection of self in a dreamed future time are very widespread and this certainly does not help a rigorous reasoning. It could be argued that uncertainty and probability are the rules governing the world we live in, but these considerations lead to a form of fatalistic resignation that does not properly represent an incentive to invest in one's own future.

After this picture, certainly not consolatory, it can still be hoped that a more stable commitment in the search for knowledge and a restructuring of our false beliefs represent the safest vaccine against the risk of reckless decisions.

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Targeting beneficiaries

One size does not fit all

The importance of investors' personality in financial education

Enrico Maria Cervellati

- 1 Introduction
- 2 Theories of personalities
- 3 Personality and financial decisions
- 4 Personality and behavioural issues
- 5 Effective communication strategies with distinct personality temperaments
- 6 Conclusions

Gender differences in financial literacy in Italy

Exploratory explanations

Emanuela E. Rinaldi

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One size does not fit all

The importance of investors' personality in financial education

E.M. Cervellati^(*)

1 Introduction

Academic studies and educational publications propose the 'right' way of managing money, often referring to the traditional finance paradigm of the rational, omniscient, maximizing agent. Studies in the behavioural finance literature have shown that real people are neither fully rational nor omniscient. Furthermore, individuals are not always maximizing agents. With regard to financial planning, behavioural studies have also highlighted that real people lack self-control, do not have a long-time perspective, discount the future in a hyperbolic way, have limited forecasting abilities, etc.. In a few words, people are horrible at planning. Financial knowledge is a key factor in both money management and financial planning and some scholars advocate that without proper knowledge people are not able to correctly manage their money and plan ahead. Given the low level of financial literacy around the world, financial education programmes have been put in place. However, to be effective, financial education must consider behavioural insights. In particular, it has to consider recent advances in behavioural finance, what has been called 'behavioural finance 2.0' or 'behavioural finance in action', trying to provide solutions to the emotional and cognitive errors to which investors are prone. While this 'new' approach is still developing, an even 'newer' one has appeared at least in embryonic form, which I call 'behavioural finance 3.0' or 'personalized behavioural finance', linking behavioural finance with theories of personalities.

Demographic variables have often been used in papers dealing with financial literacy, and more in general with decision making behaviour, to understand differences in goal attainments. However, this approach does not consider behavioural differences among individuals. Psychographics, quantifying psychological attributes, is important in understanding individual decision making since it considers

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people's beliefs, lifestyle, personality, and values that often influence their needs and preferences more than objective traits or demographic characteristics do. Modern personality theories have been used for more than 50 years to explain personal diversity and for profiling purposes, but they proved to be also useful to better understand financial behaviours and decisions.

Considering investors personality is relevant not only on academic grounds but also in real life. Financial advisors know that understanding their clients is vital to their profession, and new financial regulation (e.g., MiFiD II) is going in this direction (Cruciani, 2017). If policy makers, regulators, educators and financial advisors lack knowledge about how individuals make decisions, any action aimed at supporting investors in understanding financial information and making sound choices may result ineffective. Self-awareness will also help investors to reach their goals through a personalized strategy.

This note aims to clarify why considering financial personalities is essential to improve financial literacy, but also to encourage academics, educators, financial advisors, policy makers and regulators to opt for an interdisciplinary approach for effective financial education programmes. This note is organized as follows. Section 1 briefly describes the main theories of personalities. Section 2 summarizes the main evidence that relate personalities with financial issues. Section 3 links these theories to behavioural finance. Section 4 presents some strategies for communicating effectively with distinct personality temperaments. Section 5 concludes.

2 Theories of personalities

Personality theories date back more than 2,000 years. 'Humoralism', first proposed by Hippocrates and then adopted by Ancient Greek and Roman physicians and philosophers, explained the working of the human body as resulting from four distinct bodily fluids known as humours; excess or deficiency of any of them could influence health and temperament. Hippocratic medicine was the most widespread view of the human body among European physicians until the advent of modern medicine in the nineteenth century. While it has not been used in medicine since then, humoralism has influenced philosophers and psychologists who have identified four patterns of human behaviour, known as 'temperaments'.

Dr. David Keirsey is considered the father of modern temperament theory (Keirsey & Bates, 1984), and his approach is used extensively both by private and public institutions for profiling purposes. Keirsey claims that temperament determines people behaviour, according to four main categories: Artisan, Guardian, Idealist, and Rational. Guardians are the 'preserving' temperament: they are considered the cornerstone of society, serving and preserving social institutions. They are cautious, dependable, dutiful, and judicious; they take care of their businesses, families, and communities. Artisans are the 'doing' temperament, because they need action. They tend to excel in arts, but also in athletic, business, industry, military, and politics; they enjoy freedom and have a spontaneous temperament. Idealists have an inspiring

temperament, focused on personal growth and development not only of themselves, but also of the others. They usually work with people, in education or counselling, in social services or personnel work. Rationals have a theoretical nature; they are sceptical, understanding and problem-solving temperament.

The Big-Five theory (McCrae and Costa, 1992) states that there are five main personality traits, namely Openness to new experiences (O), Conscientiousness (C), Extraversion (E), Agreeableness (A), Neuroticism (N). This theory claims that individual personality is the result of combinations of these traits, measured with scores ranging from low to high. When the score is high, the trait is relevant in the personality, while when it is low, it is not present or the opposite trait is present. For example, individuals scoring low in Extraversion are considered introvert. Individuals scoring high in Openness to new experiences are creative, curious, imaginative, original, and sophisticated. Conscientious people are diligent, organized, responsible, thorough, and like self-control. Extraverts are active, enthusiastic, lively, optimistic, outgoing, sociable, talkative. Agreeable people are characterized by high levels of altruism, empathy, and trust; they are friendly, generous, helpful, sympathetic, soft-hearted, trusting, and warm. Neuroticism refers to emotional (in)stability: neurotic people are moody, nervous, prone to anxiety and stress, worrying.

Jung's theory of psychological types (Jung, 1923) was further studied and applied by Katharine Briggs and her daughter Isabel Briggs Myers (Myers, 1980). In 1944, they developed the Myers-Briggs Type Indicator (MBTI) with the aim of better understanding human behaviours and helping people appreciate themselves and the others. MBTI has been validated during decades and it has been used not only for profiling purposes, but also to study the relation between personality types and differences in behaviours and decision making among people. MBTI identifies four pairs of preference alternatives: extraversion/introversion, sensing/intuitive, thinking/feeling, judging/perceiving. Jung's theory suggests that each individual is predisposed to use prevalently and to strengthen one out of the two preferences of each pair. The preferences extraversion/introversion describes the way individuals interact with others. Extraverts seek relationships with other people and learn by talking, i.e., they better understand things – even their own thoughts – by talking, rather than listening or reading. They like to be part of a group and look for the group's approval. Instead, introverts take their time to reflect before speaking and are often wary to share personal information with others. The sensing/intuitive couple is related to how people gather information. Sensing people use their senses, focus on the present, and have concrete ideas. Intuitive people, instead, gather information using sensations and inspiration, looking for the big picture. The thinking/feeling preferences describe how people make decisions. People with a thinking preference like logic, numbers and figures, i.e., a scientific approach. They prefer to be right rather than be liked, because they value objectivity. People with a feeling preference, instead, consider the feelings of others when they make decisions, thinking at the potential impact on them. They prefer harmony over objectivity and may give up self-comfort to accommodate others. The couple judging/perceiving is related to lifestyle orientations. Judging persons are decisive, well organized, like to plan ahead and to follow a plan. Those with a perceiving preference are instead adaptable and

spontaneous. They like to keep options open, instead of planning, and they often work last-minute to meet deadlines.

These four couples of preferences mix into sixteen personality types, forming a sort of 'type table'. People want to be treated in accordance with their personality type. Therefore, understanding psychological types allow to work more effectively with individuals, depending on their personal decision making style. It is not necessary to know people preference, it is enough to watch for behaviour cues.

The above-mentioned three theories of personality are linked to each other. Keirsey's temperament theory contains four of the Big Five factors and is related to the MBTI. Guardians are high on Conscientiousness and low on Openness, thus they are Sensing and Judging. Artisans are low on Openness and low on Conscientiousness, thus they are Sensing and Perceiving. Idealists are high on Openness and high on Agreeableness, thus they are Intuitive and Feeling. Rationals are high on Openness and low on Agreeableness, thus they are Intuitive and Thinking. Moreover, high Agreeableness in the Big Five corresponds to the Feeling preference in the Myers-Briggs model and low Agreeableness to Thinking; high Conscientiousness to Judging, low Conscientiousness to Perceiving; high Openness to Intuiting, low Openness to Sensing. Extraversion and Introversion are identical in the Big-Five and Myers-Briggs models, while the Myers-Briggs model does not include Neuroticism.

3 Personality and financial decisions

Financial personality has implications for financial behaviour (McKenna et al., 2003). Extraverts are willing and ready to talk to financial advisors – and more in general to counsellors – about their needs and wants. They do not like written material, they prefer to talk and often they hear what they want to hear. However, they are open to change a financial plan, following someone else advice. On the contrary, introverts prefer written material and want the time to read it and reflect on it in order to contribute to the advisors' proposals. Sensing people like to deal with facts and want information presented in a linear way. Intuitives, instead, prefer to see the big picture. They are open to new possibilities and are not afraid of change. They like to think about the future, planning for their needs, but they are not interested in the details of the plan. People characterized by Thinking preference are the closest to the ideal of *homo oeconomicus*: they manage their money in a rational, impersonal way. People with Feeling preference, instead, select alternatives in a personal way, and may be interested in socially responsible investments. Individuals with Judging preferences like planning, while those with Perceiving preferences like a wide range of information and ideas, prefer to remain open to many alternatives, are spontaneous, and do not like plans.

Given these relationships between psychological preferences and financial decisions, it is also easy to classify the four main personality temperaments on the basis of their attitudes and behaviours.

Guardians want to preserve their wealth and look for security. They manage money conservatively to provide themselves and their families a solid financial base. They like self-control and rules like frugal spending, minimizing debt, preparing for the future by saving money. Guardians tend to rely on past experiences in making decisions. Uncertainty or unanticipated changes stress them, so they like plans and procedures, because these give them the feeling that they have everything under control. They like defining financial goals and setting up a method to achieve them, and they have the self-discipline and self-control needed to respect the plan. Since they do not tolerate volatility, they are very risk-averse, they prefer low-risk investments that provide stable and secure returns.

Artisans, instead, do not like to plan, their focus is on the short term and look for immediate results of their investments, i.e., they prefer instant rather than delayed gratification. They are bold, impulsive, opportunistic, and tend to take risk. Even if they have a high-risk tolerance, they are typically overconfident, underestimating risks and overestimating their ability to bear them. They love the thrill of speculation and gambling in financial markets. They are flexible enough to accept losses, more than any other temperament. It is difficult to advise them because they are not goal-oriented and do not want to be restricted in a financial plan. Rather, they trust their instinct and do not want to miss out opportunities to make money soon.

Idealists are not interested in the accumulation of money, as they consider it as a tool to achieve their life goals. They usually do not follow markets and dealing with financial issues may even stress them. While they understand the importance of investing, they often do not have personal ideas regarding investments, so they tend to follow the suggestions provided by other people they trust, such as financial advisors, but also friends or colleagues. Thus, Idealists, more than other temperaments, tend to rely on informal rather than professional advice. They are not interested in financial details, while they look for the underlying motives and goals of their investments. They care about others; thus, they are usually interested in the impact of their investments on the society and the environment. They pay particular attention to maintain integrity and investment that are in line with their ethics, ideals and values. Thus, they may be particularly interested in social responsible investments, but also – especially High Net Worth Individuals – in philanthropy.

Rationals are the most analytical of the four temperaments. They are comfortable with complexity, and like it, so they often look for complex, innovative, unusual approaches to investment. This tendency may resolve into a weakness because overly complex investment strategy may lead them to a 'decision-paralysis'. Furthermore, since they often prefer 'thinking' rather than 'doing', Rationals may sometimes achieve very little because they eventually do not act, but keep waiting to gather additional information. They are independent thinkers, and often they are sceptical with regard to conventional wisdom. They will take advice only from someone that they think has (demonstrated) greater expertise than themselves. They typically have low anxiety in financial matters, as investing to them is just another process to be understood, mastered or even controlled. For these reason, even if they

are more rational than others, they are also more prone to what the behavioural finance literature call 'illusion of knowledge' and 'illusion of control'.

Given the differences among personality temperaments, there is no 'best practice' that will work for all of them. Not only the same investment or financial planning strategy could be difficult to implement for some of the temperaments, but it would not yield the same emotional or psychological satisfaction for the distinct personalities, even if it worked financially. It is then vital for those involved in financial education (advisors, educators, policy makers, regulators) to propose strategies that work from a financial point of view and also make sense for the different temperaments. It is therefore essential to communicate in distinct ways to the different temperaments to motivate them to change their behaviours.

Only in recent years economists and psychologists have started analysing how personality affects economic and financial decisions. Ware (2001) claims that there is no best personality type for money management, but that each person has to understand her own strengths and weaknesses and compensate accordingly. Statman and Wood (2004) find that personality affects preferences: Guardians respect tradition, Artisans prefer spontaneity over discipline, Idealists are caring and compassionate, Rationals are overconfident about their knowledge and skills.

Other studies investigated the predictive power of personality in explaining life outcomes related to health, professional achievements and economic performances. An advantage of considering personality traits is that they tend to remain stable during the life time. Fung and Durand (2014) review studies analysing the link between personality traits and financial decision making, focusing on risk-taking behaviour and overconfidence. They show that Neurotic people tend to be more risk averse and more loss averse. Extraverts tend to be more overconfident. The authors offer another important insight: personality traits are reflected in individual behaviours, but they are not entirely unconscious. Individuals may learn to understand their personality and how it affects their behaviours, and eventually how to modify them or how to reduce negative effects. This evidence has also clear implications for policy makers and educators. Designing financial education programmes tailored to different personalities may not only be effective, but also helpful to mitigate negative effects of temperaments.

4 Personality and behavioural issues

Pan and Statman (2013) analyse the relationships between personality and risk tolerance as well as behavioural inclinations, i.e., attitude towards attribution of success to either luck or skill, life-satisfaction, maximization, overconfidence, regret aversion, and trust. Using a survey of over 2,500 individuals, the authors find that risk tolerance varies depending on personality factors, even after controlling for age and gender. Extraversion and Openness are positively associated with risk tolerance, contrary to Conscientiousness, while Agreeableness is not related to risk attitude. Overconfident individuals are high in Extraversion, but low in Agreeableness. High

scores in Openness and Agreeableness and low scores in Conscientiousness significantly explain the propensity to attribute success to luck. Conscientious individuals exhibit the inclination to attribute success to skills and are prone to regret (a feature also explained by low Extraversion). Life-satisfaction is high among extraverts, but low among people with high levels of Openness. High propensity for maximization is positively correlated with Extraversion and Conscientiousness, being negatively correlated with Openness and Agreeableness. Propensity for trust is high among people with high levels of Agreeableness, Extraversion, and Openness, and low among high conscientious individuals, who are always on guard. Some personality factors are correlated: Conscientiousness is negatively associated with the other factors. Some gender differences are also detected, as women turn out to be more agreeable, conscientious and extravert than men. Interestingly, extraversion declines with age, Openness and Agreeableness increase with age, while Conscientiousness is constant across age groups.

Combining Keirsey's temperaments with Big Five personalities also brings forward interesting evidence. For instance, Guardians result the less risk tolerant among the four personalities, while Rationals and Artisans are very tolerant. However, extraverts are generally more risk tolerant than introverts. This evidence holds not only for Guardians but also for Artisans and Idealists. In the same vein, even though overconfidence does not significantly vary across the four temperaments, Extraverts tend to be more overconfident than Introverts.¹

Moving to financial choices, personality traits may make some financial products more attractive than others to specific types of investors. Motivational theory by Lopes (1987) claims that people are driven by two main objectives: security (downside protection) and potential (upside), on one side, and aspirations, on the other side.² People inclined by personality to look for security will tend to opt for investment portfolios protecting their wealth, even though offering low returns. Those inclined by personality to favour upside potential will instead choose portfolios offering chances for great returns.

Financial personality may differ from the general individual personality, even though they are often aligned. Pompian (2012) merged together Keirsey's personality theory with behavioural finance studies, developing what he calls Behavioural Investor Types (BITs), i.e., Preserver, Follower, Independent, and Accumulator. The BIT classification links temperaments to the typical cognitive biases more frequently exhibited by individuals. Although temperaments and BITs do not overlap, since BITs reflect the 'financial' personality and the associated behavioural biases while

1 Moreover, Guardians have a high propensity for maximization, contrary to Idealists. Regret aversion does not vary significantly across the four temperaments, but introverts have a higher propensity for regret than extraverts. Guardians have a low propensity to attribute success to luck over skill, contrary to Idealists. Introverted Idealists have a higher propensity to attribute success to luck rather than skill than extraverted ones. However, this is not true for extraverted and introverted Guardians. Guardians have a low propensity for trust, that instead is high among Idealists. More in general, extraverts tend to be more trusting than introverts. Guardians and Artisans enjoy high levels of life-satisfaction, while Idealists and Rational suffer relatively low levels of life-satisfaction. Extraverts tend to enjoy higher levels of life-satisfaction than introverts.

2 That is why it is also known as SP/A theory, where S stands for Security, P for Potential, and A for Aspirations.

temperaments refer to the 'general' personality, some intersections can be found. Guardians are often Preservers, because their main goal is to preserve their wealth; Idealists tend to be Followers since they follow others' advices, not being interested in financial matters; Rationals are generally Independents because they have independent opinions; Artisans are typically Accumulators since they are mainly interested in accruing capital.

Pompian (2012) claims that people may be initially classified into active and passive investors. Passive investors include the Preservers and the Followers BITs, characterized respectively by low and medium risk tolerance. They either accept or decline the advisor's suggestions (Preservers may discuss or disagree with the professional but usually do not propose their own ideas). The active BITs are instead the Independents and the Accumulators, showing, respectively, a medium-high and a high risk tolerance. Independents, typically Rationals, tend to intervene in the investment process bringing forward their own ideas. Accumulators, often Artisans, are urged to act, not only to talk.

The main point of the type classification is that each BIT is more prone to commit certain cognitive errors than others do. On the other hand, emotional errors are more instable than cognitive mistakes and may affect all BITs.

It is also important to distinguish the typical nature of the biases affecting each BIT, that is emotional for Preservers and Accumulators and cognitive for Followers and Independents. Preservers, as Guardians, are not only risk averse but also more loss averse than other BITs.³ Moreover, Guardians are characterized by low Openness to new experiences. Preservers not do like to change, they get stressed when they have to decide, and may feel overwhelmed by information. When they don't know what to do, they simply stick to the status quo. Preservers are also characterised by anchoring since they tend to refer to the past more than to the future. Given that they feel the burden of making a decision, they often rely on mental accounting because using distinct accounts allows to lower the complexity of choices.

Followers' biases are instead mainly cognitive, because they are typically Idealists, and they do not care much about money matters. Thus, they do not have their own ideas with regards to investments and they tend to follow the suggestions of others, and to rely on recent news. They are subject to framing effects – i.e., the way in which information is presented deeply affects their choices – more than other BITs. They tend to think in hindsight, and they may even feel strongly the pain of regret.

Independents are usually Rationals, thus their biases are predominantly cognitive. They are less emotional than other people, but they believe so strongly in their point of view that they tend to be too conservative, and to be fooled by

3 Kahneman and Tversky (1979) showed that a loss weights about twice as much as a gain of the same magnitude. This holds on average: evidence shows that for Preservers this figure is much higher, whereas Accumulators are quite flexible and are better at dealing with losses.

representativeness if it confirms their opinions. They attribute to themselves the merits of good investment decisions, while they blame others for errors.

Accumulators are the most aggressive BIT in term of risk tolerance. They are typically overconfident in their knowledge and skills – like Independent – but they act on it, taking excessive risks. Their biases are mainly emotional in nature. They choose investments that are similar to the way they live, e.g., lottery-like stocks that promise high returns in the short term. They lack self-control and focus on the short run consumption. Their overconfidence is often due to illusion of control. They are used to have control over decisions in their lives or professions, but they don't understand that they cannot control financial markets.

The BIT framework shows not only that different personalities are associated with distinct behaviours, as the temperament theory suggests, but also that different *financial* personalities of investors are characterised by some typical biases. This is useful to advisors and educators engaged in debiasing investors.

The BIT classification also highlights that different BITs perceive the same financial products in distinct ways. For example, some mutual funds pay periodic amounts of money. These 'checks' are perceived as dividends or coupons. Due to 'hedonic editing', a particular framing effect, individuals' risk tolerance increases when the outcome of an investment may be decomposed in two parts, one certain (the dividend, the coupon, or the 'check' from the mutual fund) and one uncertain (the capital gain or loss). Preservers, very loss averse and apprehensive in financial decisions, will like this kind of mutual funds because the periodic 'checks' will enter in their 'current income' mental account, allowing them to better tolerate risk. On the contrary, Independent will think that paying 'checks' just means 'decumulating' the invested wealth.

5 Effective communication strategies with distinct personality temperaments

Using financial personality allows not only to better profiling investors but also to develop effective communication with people showing different temperaments. McKenna et al. (2003) suggest some strategies, built on interviews they collected with people classified according to the Keirsey's four personality temperaments. Guardians have Sensing and Judging preferences and value credentials. Authority is relevant to them: therefore, both advisors and educators need to take on the role of an authority to be trusted and respected. Because Guardians like to belong to groups they empathize with, they value as an example to follow the experiences and the anecdotes of people who are similar to them in terms of age, income, and stage of life. Guardians want to do what is right to them, according to the norms they respect and the values they believe in. Communication must be accurate, direct, and clear, based on facts and figures. Guardians need time to process information, but they will follow a plan in a timely and responsible way once they have chosen it.

With respect to Guardians, Artisans are somehow at the other end of the spectrum of personalities. They want to use their money, not manage it. They don't like and don't want to plan, but they have to be sure that their current needs are covered. To achieve long-term goals, they may need nudges and strategies such as automatic contributions to retirement accounts. In this way, they may focus on the short term, as they like, still being sure to achieve their future goals. To communicate effectively with Artisans, simplicity is the key, as well as respect for their lifestyle. Imposing 'what is right' in general may not work, because it may not be right for Artisans.

Since Idealists are not interested in accumulating money but rather want their investments to be meaningful for themselves and others, they need to understand who their financial plans will benefit and how they will impact on the environment and the society as a whole. Idealists' attitude towards money can result in a poor financial preparation for the future, an inclination that deserves attention. Effective communication with Idealists skips the details, since they want to hear about their dreams and visions.

Rationals are good in planning, but they are more interested in thinking about their investments, not just in defining goals. They look for expert financial advisors to challenge their own ideas. They do not necessarily implement recommendations because they want to keep for themselves the final decision. Even if they are not expert in financial issues, they are often experts in other fields and want to be treated with respect: therefore, using an informal way to communicate with them may be self-defeating. Rationals look for intellectually challenging plans and like complexity. Effective communication relies on tables, graphs, equations, which they look for, given their quantitative skills.

6 Conclusions

Academic research and educational material provide strategies to invest in the 'right' way that often require planning for the future, keeping a long-time perspective, abstaining from trying to time the market, using the science of finance, controlling emotions, diversification, etc.. For some people, it is hard to follow these prescriptions. People are different, and they behave differently. Considering investors' personalities is thus vital to understand why they may follow alternative routes to achieve the same goals. This is important not only for regulators, or for financial advisors striving to improve the relationship with their clients, but also for everybody truly interested in helping people understand financial matters. Financial information has to be presented in *their* 'right' way, i.e., it needs to be personalized, at least on the basis of the four main temperaments or BITs. To be effective, financial education must consider and exploit the behavioural strengths, and work out solutions to overcome the weaknesses of each temperament. The real challenge is thus identifying different strategies suitable to different personality types, especially those that are not in line with the 'ideal' model, because one size does not fit all.

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Gender differences in financial literacy in Italy

Exploratory explanations

E.E. Rinaldi^(*)

1 Introduction

One of the most striking result of the OCSE-PISA financial literacy surveys was the significant gender difference in financial literacy found among Italian students, with boys being more financial literate than girls. Unique to Italy, this result was previously shown in both the surveys run in 2012 (OCSE, 2014a and 2014b) and 2015 (PISA, 2017), even after controlling for students' mathematic literacy together with reading literacy. Higher performances of men in financial literacy tests, compared to women's, have also been found among Italian adults (The European House Ambrosetti, 2008, Lusardi and Mitchell, 2011, Consorzio Pattichiari, 2014), though not among children (Sartori and Ongari, 1999) nor preadolescents (Rinaldi and Todesco, 2012). The study of gender differences in financial literacy (and, more broadly, in financial socialization patterns) is considered as very relevant nowadays for various reasons. Firstly because, as shown by various research carried out in Western countries, the recent financial downturn has strongly affected women, increasing their chance of running into poverty, especially for women who are single-parents, divorced, widowed and/or elderly. Secondly because, despite increasing their level of education and presence in the workplace, women still have lower earnings and levels of pension benefit. How can we explain this gender difference which seems only to widen from adolescence to adulthood? In this paper we will try to answer this question, though shortly, by drawing on relevant literature from psychological and sociological theories.

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2 Materialism

According to surveys run in Italy on children (Sartori and Ongari, 1999; Rinaldi and Giromini, 2002), preadolescents (Junior Achievement, 2011) and teenagers (Dosso and Rosci, 2000; Dei, 2006), boys assign more importance to money as a means for achieving happiness and success, than girls (we could call this tendency, though not fully properly, as 'materialism'). Furthermore, boys associate money to more positive concepts (such as respect, power, prestige, job-satisfaction), than negative or ambivalent ones (greediness, cupidity, selfishness; Prince, 1993; Zelizer, 1994; Deutsch, Roksa and Meeske, 2003), while girls display a more mixed attitude about it. Since money is a more relevant and positive matter for boys than for girls, it is reasonable to expect that boys are also more inclined to invest time and effort in order to increase their knowledge of the financial domain, supporting a higher financial literacy.

Materialism and choice of higher education

The different meaning that boys and girls attribute to money during preadolescence could also affect their choices for higher education and adult working career. As regards educational choices, for example, Italy has long shown gender segregation in technical/scientific fields and, though to a much lesser extent, in economic disciplines, where males are more likely to enrol and graduate than females (Triventi, 2010). These fields are among those which provide a greater probability of earning higher average monthly salaries (ISTAT, 2010). Therefore, as higher levels of income are correlated (though not directly) with higher financial literacy, this could be another way in which financial socialization patterns differentiate boys and girls just after college.

Materialism and relevance of the right to receive money

Research into social construction of gender identity carried among preadolescents in Italy (Besozzi, 2003) has documented that boys are more willing than girls to 'require' their entitlement to have money from their parents: when ranking the characteristics of good parents boys assign 'giving children the possibility to have money' as of greater importance than girls do. Furthermore, studies show that boys receive higher amounts of pocket money than girls in Italian families (i.e., Ciccotti and Sabbadini, 2007; Ruspini, 2008; 2012). Part of these findings may be due to the fact that, as indicated by Williams (2001), girls are more affected than boys by the 'commodification anxiety', i.e., the fear of a world sullied by commodification of intimate relationships where money pervades even family relationships and the 'economy of care'. Thus, girls may tend to attach less importance to money and to the right to receive it, reducing their chances of learning how to manage and use it. As they expect not to be the breadwinner in the family, they may also give less importance to the acquisition of independent money income during their life (see for example Pahl, 1989; Rinaldi, 2007; Facchini, 2008).

3 Socialization patterns: different norms, expectation and values

Research has suggested that the gender gap in financial literacy arises from different sets of practices and expectations (for sons and daughters) that parents display towards children, which cause girls to develop distinct fears, preferences, and confidence in financial matters (i.e., Prince, 1993; Rabow and Newcomb, 1992; Zelizer, 1994; see also the review by Bertrand, 2011). In other words, as maintained by the framework offered by the cultural perspective on sociology of money (Baker and Jimerson, 1992), symbolic meanings, preferences and attitudes that boys and girls associate to money, while growing up, may play a significant role in its use and the type of knowledge they acquire on financial matters. Taking a social constructivist perspective, as pointed by Danes and Haberman (2007), it is possible to suppose that women tend to have a harder time successfully managing money because they face financial difficulties that either are not experienced as such by men or are not experienced to the same degree (Anthes and Most, 2000; Chen and Volpe, 1998). Participants in a women-and-money incubator sponsored by the National Endowment for Financial Education and the American Association for Retired Persons, cited by Danes and Haberman (2007), identified social money messages that are targeted at impressionable girls starting at very early ages and continued throughout life. Examples of such socially prevalent messages include that women do not deserve to have financial well-being, that girls are trained to be financially dependent and to seek safety and security rather than become risk-takers, and that if a woman is financially competent, she will end up alone (Anthes and Most, 2000). It is therefore highly probable that different role expectations lead to different status beliefs and behaviors. According to status characteristics theory (Berger, Cohen & Zelditch, 1972) the rules for the gender system are encoded in widely shared gender stereotypes, that contain status beliefs at their core. Therefore, these beliefs constitute the cultural framework used by actors, even at an early stage of their life, to perceive and enact gender differences and inequalities. For example, if girls expect to earn less than men, they may be less willing to negotiate a higher salary at job interviews or, again, chose less remunerative jobs. A recent survey on 1.200 primary school children, for example, has found that even when they are 8-9-10 years old, boys are significantly more willing to do a high-paid job as adults than girls (Rinaldi, 2017). Different financial socialization patterns may therefore shape different levels of materialism and interest in financial knowledge.

Lower self-confidence in the financial domain

Several studies have also found that boys have higher self-confidence in managing money than girls. These findings may reflect a status belief, in accordance again with status characteristics theory (Berger, Fisek, Norman & Zelditch, 1977; Ridgeway, 2001; Ridgeway, et al., 2009). According to this theory, gender inequalities are also due to status beliefs, i.e., *«widely held cultural beliefs that link greater social significance and general competence, as well as specific positive and negative skills,*

with one category of a social distinction (e.g., men) compared to another (e.g., women)» (Ridgeway, 2001, p. 638). In this line of reasoning, girls could feel less self-confident in money knowledge (and management) than boys, since their evaluation is affected by a status belief. This could explain why the number of women answering 'do not know' in financial literacy tests is significantly higher than men's, even when they know the correct answer (see also Bucher-Koenen et al., 2016). The literature finds that both men and women are often overconfident, with men being more overconfident in their success in uncertain situations than women (like in financial decisions; see review in Croson and Gneezy, 2009).

Boys have more and earlier work experiences

Chen and Volpe (2002) underline that in the United States college students who have less work experience are more likely to be less knowledgeable in financial matters. One hypothesis could be that work activities (amount of hours, type and age at first job) may have a significant impact on financial literacy. Since in Italy there is strong evidence that more boys have early work experience than girls (ISTAT, 2002; Finocchietti, 2004; Dei, 2006; IRES, 2008), it can be supposed that higher male financial literacy develops in adolescence and gets reinforced during adulthood by following gender differences in the 'year of first work experiences' as well as the hours dedicated to it. This topic is worth of further exploration through the analysis of cross-national datasets (like the OECD-PISA financial literacy one), so as to highlight not only gender but also cultural differences in the socialization to and for work patterns.

4 Mathematical literacy

For a complete picture of possible factors explaining differences among male and female subjects in financial literacy test, we finally examine the issue of mathematical literacy. Gender differences in the Science Technology Engineering and Mathematics (STEM) subjects are widespread in many OECD countries, Italy included, and mathematics is the only subject where girls typically tend to underperform compared to their male counterparts (Contini, Di Tommaso and Mendolia, 2017). As mathematical and financial literacy (fin-lit) are significantly linked, one could argue that the fin-lit gender gap may be explained by the one in maths, which could be due to biological as well as socio-economic and cultural factors. However, using the recent OCSE-PISA data (PISA, 2017), after controlling for maths literacy together with reading literacy and basic socio-economic variables, the financial literacy gender gap still persists, with boys performing better than girls. The mathematical factor, therefore, cannot explain the fin-literacy gender difference, at least in Italy among 15 year old students. Hence, we suggest that the influence of socio and cultural dimensions needs further investigation.

5 Conclusions

In this short essay, we have tried to highlight some of the possible explanations which underlie the gender-financial literacy gap. Needless to say, these should be combined and tested, not only with experimental but also with real-life data, as highlighted by several authors (e.g., Bernard, 2011). We are open to collaborate using an interdisciplinary perspective to create a more complete model and, of course, to receive further advice and suggestions on better understanding these explanations. As women nowadays tend to experience more financial difficulties, to live longer, and accumulate higher health care costs than men, we believe that increasing women's financial literacy must be at the top of the political agenda, so as to develop gender-sensitive policies and educational programs, which can help reduce the financial gender gap for future generations.

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Delivering educational programmes

How to decide in the large world of finance

The bounded rational adaptive nudges

Riccardo Viale

- 1 Is Behavioural Economics a genuine descriptive enterprise?
- 2 Rationality in a 'Large World'
- 3 Bounded Rational Adaptive Nudges (BRAN) to empower the financial decision making

Improving financial literacy through neuroscience and experiential learning

Understanding how the brain works and how we learn to deliver more effective solutions

Duccio Martelli

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From nudging to engaging in pension

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Debiasing financial education

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Trust and financial literacy

Substitutes or complements?

Caterina Cruciani and Ugo Rigoni

How to decide in the large world of finance

The bounded rational adaptive nudges

R. Viale^(*)

1 Is Behavioural Economics a genuine descriptive enterprise?

Behavioural economists who decades ago defined their critical contribution to the neoclassical mainstream a purely descriptive enterprise (Thaler, 1991) now advocate using behavioural concepts for prescriptive policy purposes as in the Nudge theory (Thaler and Sunstein, 2008). This evolution is not justified because: the descriptive behavioural enterprise seems not to fulfil the realist desiderata of a true empirical endeavour to substitute the as-if approach of neoclassical economics; the prescriptive behavioural enterprise is biased by the conventionalist nature of the descriptive side and often it is not capable of truly offering prescriptions that increase the well-being of the citizens.

When Herbert Simon began his attempt to change empirically the economics, his methodological and epistemological coordinates were realist (Simon, Egidi, Viale, and Marris, 1992; Simon, 2009). His main critical target was the instrumentalist *as-if* approach of Milton Friedman (1953). A descriptive enterprise in economics had to overcome the unbounded rationality assumptions of neoclassical economics as unbounded self-interest, unbounded willpower and unbounded computational capacity. The behavioural economics programme initiated by Simon had the goal of replacing these a-priori assumptions with more realistic ones. How much psychological realism has been brought into economics by behavioural economists? Unfortunately very little, because there are barriers to psychological realism that are common to neoclassical economics and that are the son of the shared reliance on Friedman's *as-if* principle (Berg and Gigerenzer, 2010). All relevant

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behavioural theories suffer of the same shortcomings of neoclassical economics: assuming that risky choice always emerges from a process of weighting and averaging all relevant pieces of information; the decision maker knows the objectively feasible action set; the decision maker knows the list of outcomes associated with lotteries or the probabilities of the known outcomes (Berg and Gigerenzer, 2010). The shift from neoclassical economics to behavioural economics and in particular, after the impact of Allais Paradox, from *expected utility theory* to *prospect theory*, appeared to be based on the introduction of more transformations with additional parameters to square the basic operation of probability-weighted averaging with observed choices over lotteries (Berg and Gigerenzer, 2010).

Weighting-and-adding objective function is used *as-if* it were a model of mind. But it's not. It is a fictional mind, a valid instrument to make a posteriori inferences through the introduction of suitable parameters in order to reach a better R-squared.

The same methodological model is observed in many other behavioural theories (Berg and Gigerenzer, 2010). For example the Fehr and Schmidt *social preference model* (1999) recognizes the insight that people care about others' payoffs. Therefore they modify the utility function with addition of at least two additional free parameters. People are assumed not to maximize a utility function depending only on their own payoffs but a behavioural or other-gathering utility function. To do it, decision maker assigns benefits and costs to each element of the choice space based on weighted sum of the intrinsic benefits of its own payoffs together with the psychic benefits of being ahead of others and psychic costs of falling behind others. The decision maker will select the action with the largest utility score based on weighted summation. Another *as-if* model is the Laibson's *model of impulsiveness in consumption*, a psychological bias that over-weights the present over the future (Laibson, 1997). He puts more weight on the present by reducing weight on all future acts of consumption. In other words he reduces the weight of all terms in the weighted sum of utilities except for the term representing utility of current consumption. The unrealistic pretension is evident: the decision maker after an exhaustive search of all possible acts of consumption computes the weighted sum of utility terms for each act and chooses the one with highest weighted utility score. The deviation between the value that recovers the neoclassical version and the new parameter that reduces the weight on the future is considered empirical confirmation of the model (Berg and Gigerenzer, 2010).

The instrumentalist methodology of behavioural economics uses the addition and managing of free parameters to improve the realism of the models. In so doing it improves the within-sample fit and improves the R-squared. Most of the philosophers of science both in the realist tradition (e.g., Hacking, 1983) and in the antirealist tradition (e.g., van Fraassen, 1980) agrees on the empirical adequacy by successful prediction, particularly of novel facts, as the first principle in deciding between competing hypotheses (Viale, 2013). A large number of free parameters

allows the model to fit many sets of data without proving to generate successful out-of-sample prediction. On the contrary the most challenging test of a theory is in prediction using a single set of fixed parameters. Something that few models of behavioural economics dare to do.

2 Rationality in a ‘Large World’

The real life problems are inside a complex environment. They are typically ill-defined problems. The goals are not definite; what counts as an alternative and how many alternatives there are is unknown; it's unclear what the consequences might be and how to estimate their probabilities and utilities (Viale, forthcoming). This environment might be called also as Large World (Savage, 1954) and it is characterized by uncertainty. Small Worlds instead are in principle predictable and without surprises and they are characterized by the knowledge of all relevant variables, their consequences and probabilities. The conditions of small worlds are the requirements of Neoclassical Rationality as Simon stressed in his Noble Lecture (1979, p. 500). In these worlds the problems may be well-defined but they can be also computationally intractable. As it is well known, an example of a computational tractable problem is the dice game or the roulette game. Instead well-defined problem as chess game is computationally intractable. In any case the real world is most of the time large and these conditions of knowledge are rarely met. Since they are rarely met, the normative rational requirements of neoclassical economics are unjustified and the application of their theories can lead easily to a disaster (Stiglitz, 2010). Unfortunately behavioural economics, whereas criticizing the descriptive side of neoclassical economics without really proposing an alternative realist model of decision making, retains the normative one. In fact the heuristic and biases programme is developed to cope with what is called human irrational behaviour, characterized by biases and formal errors caused by psychological mechanisms as the heuristics. Thaler (1991, p. 138) is very clear on this point:

«A demonstration that human choices often violate the axioms of rationality does not necessarily imply any criticism of the axioms of rational choice as a normative idea. Rather, the research is simply intended to show that for descriptive purposes, alternative models are sometimes necessary.»

In a large world the axioms of rationality can't be applied. Therefore they can't be considered feasible normative canons of rationality. Moreover as Jonathan Cohen (1981) properly writes in his seminal article:

«However, nothing in the existing literature on cognitive reasoning, or in any possible future results of human experimental enquiry could have bleak implications for human rationality, in the sense of implications that establish a faulty competence.» (p. 152)

Consequently is the label of irrational behaviour attributed to biases and errors justified? In a large world rationality must be judged in relation to the proper adaptation of the choices and problem solutions to a given environment. Rationality can't be formal but only *ecological*. Counterintuitively the formal rationality should be considered pathological because it doesn't supply canons or reasoning to properly adapt the behaviour to the environment. On the contrary libertarian paternalists¹ believe that people suffer from systematic reasoning errors due to their cognitive limitation in achieving the normative standard of formal rationality. And they claim that these errors imply serious costs for human well-being. Actually there are no data that prove that this is the case. For example a systematic review of hundreds of framing studies could not find a single one showing that framing effects imply real costs in terms of health or wealth (Arkes, Gigerenzer, and Hertwig, 2015).

3 Bounded Rational Adaptive Nudges (BRAN) to empower the financial decision making

We live in a large world where the canons of neoclassical rationality are unjustified both descriptively and normatively. Therefore the reasoning errors, fallacies and biases that libertarian paternalism is engaged to overcome most of the times are not irrationalities. Moreover the decision making models that behavioural economists have introduced most of the times are as-if instrumentalist tool to fit observed choice data. Adding parameters and transformations to ensure that a weighting-and-adding objective function could fit observed choice data is not a realist process model of decision making as one would expect in the bounded rationality tradition.

What kind of features a cognitive inspired policy making theory ought to have? What kind of nudges are feasible in order to help the citizens to fulfil their own well-being?

The proposal of a Bounded Rational Adaptive Nudge (BRAN)² has the following features.

Since we live in a large world characterized ontologically by complexity, recursivity and non-linearity and epistemically by uncertainty, the rationality of choices should be judged by their adaptivity and problem solving ability. In fact bounded rationality is not confined only to the constraints of computational power of human mind. As in the scissors metaphor of Simon (1990), rationality should be judged by the matching or mismatching of the relation mind-environment or in other words choice-task structure.

1 Libertarian paternalism is the ethical and political tenet of the Nudge theory. It has a dual valence. As *paternalism*, it aims to make up for citizens' irrational and self-harming tendencies by 'gently nudging them' to decide rationally for their own good. In its *libertarian* form it aims to give the last word to the outcome of the conscious and deliberative processes of the individual citizen who can always choose to resist the *nudge*.

2 BRAN has a double meaning as an acronym but also as something that symbolizes simplicity and frugality.

What kind of reasoning processes are able to match the environmental tasks and solve the problems? This is an empirical question that has been faced some years ago by some cognitive scientists, as Herbert Simon, Vernon Smith, Richard Selten and in particular more directly Gerd Gigerenzer and the Abc group (Gigerenzer, Todd, and the Abc Group, 1999). The adaptive toolbox of formalized heuristics is the result of these empirical investigation. In a number of problems simple heuristics were more accurate than standard statistical methods that have the same or more information. The results became known as 'less-is-more effect'. There is a point where more is not better, but harmful. There is an inverse-U-shaped relation between level of accuracy and amount of information, computation, or time (Gigerenzer and Gassmaier, 2011, p. 453). For example *«starting in the late 1990s it was shown for the first time that relying on one good reason (and ignoring the rest) can lead to higher predictive accuracy than achieved by a linear multiple regression»* (Gigerenzer and Gassmaier, 2011, p. 453). Herbert Simon himself spoke, in his appraisal to the volume of Gigerenzer, Todd and the Abc group (1999), of a *«revolution in cognitive science, striking a great blow for sanity in the approach to human rationality»*. The tool box is composed by many heuristics that have been tested successfully against statistical algorithms of rationality not in the easy task of fitting closed sample of data but in the much harder task of prediction. They have proved to be both a better description of decision making and a better prescription on how to decide. Obviously the adaptive success of any given heuristic depends on particular given environment. In which environments will a given heuristic succeed, and in which will it fail? Todd et al. (2011) have identified a number of environmental structure variables:

- 1) Uncertainty: how well a criterion can be predicted;
- 2) Redundancy: the correlation between cues;
- 3) Sample size: number of observations (relative to number of cues);
- 4) Variability in weights: the distribution of the cue weights.

How do we assess the adaptive success in ecological rationality? Gigerenzer and Gassmaier (2011, p. 457) write:

«The study of ecological rationality results in comparative statement of the kind 'strategy X is more accurate (frugal, fast) than Y in environment E'...»

What kind of implications to policy making come from ecological rationality? Is it possible an ecological rationality inspired libertarian paternalism and a bounded rational adaptive nudge? What kind of implications for policy initiatives addressed to financial behaviour and financial education?

Following the distinction of Hedonic, Cognitive and Educational libertarian paternalisms³ I can exclude the first because of the unjustified attribution of the label libertarian.⁴ A real libertarian paternalism is aimed to supply the cognitive tools to the people to process better the information and to improve their deliberate problem solving in the large world. In other words to increase their ecological rationality. Therefore the only justified libertarian paternalisms seem to be the cognitive and the educational ones (Viale, 2016).

What characterized better the BRAN approach is the *design of environments of choice* that increase the correct utilization of the tool box of heuristics together with a proper education on what and when utilize them.⁵ How is it possible to design ecology rational environment?

The following two points will deal with the cognitive side of libertarian paternalism, whereas the third will deal with the educational side.

First, ecology rational environment can be designed by considering that the mind's statistical reasoning processes evolved to operate on natural frequencies and that Bayesian computations are simpler to perform with natural frequencies than with probabilities. It is well known that if information is presented as the outcome of learning from experience, known as natural frequencies, and not as conditional probabilities, the proportion of people reasoning by Bayes' rule increases a lot (Gigerenzer and Hoffrage, 1995). Statistics expressed in terms of natural frequencies improve Bayesian inferences in finance as in many other kind of topics (Gigerenzer and Hoffrage, 1995; Hoffrage, Lindsey, Hertwig, and Gigerenzer, 2000). Therefore a BRAN inspired architecture of choice should change information formats in probabilistic reasoning dealing with financial problems from probabilities to natural frequencies. The importance of nudging people to reason correctly in statistical tasks through the natural frequency format is crucial in many environments (Gigerenzer, 2014). In particular the frequency format improves the statistical and the Bayesian reasoning in many financial and medical judgements to correctly predict, for example, the probability of a disease according to a prior probability and new evidence (returned, for example, by a test with some false positives), or the probability of a fall in a Stock Exchange index according to a prior probability and

3 See Viale (2016; forthcoming). At the furthest point downstream of the decision making we have the choice architecture of a state of well-being. This set of interventions, mainly based on default states and that exploit automatic decision making, could be called *Hedonic Libertarian Paternalism*. Further upstream, there are nudges designed to reinforce the capacity for reasoning and judgement, thereby leading to the choice of what solution to adopt. In this case, we can talk of *Cognitive Libertarian Paternalism*. Lastly, upstream we have the most important paternalistic intervention that a government can make to improve the decision making processes of its citizens: we can call this *Educational Libertarian Paternalism*, namely the attempt to give 'a good fishing rod to anyone who wants to go fishing'.

4 Among the other things, even the explanation given to the default effects by people's inertia seem empirically not well grounded. For example, experiments by McKenzie, Liersch, and Finkelstein (2006) indicate that people accept the default not for inertia but because interpret it as a recommendation by policy maker.

5 A similar position is hold by Hertwig and Grune-Yanoff (in press) with the concept of *boosting*.

new evidence (the bankruptcy of a big global bank). The same argument can be applied to many public policies with dramatic future implications for the human life as financial defaults, natural disasters, terrorist attacks, micro criminalities, epidemic, but also more quiet social phenomena where people has prior probability and some new evidence, as the choice of a bank in relation of various rankings or the choice of the faculty for the sons in relation to labour market or the choice of a hospital for a surgical operation in relation to the success rate of similar medical institutions.

This topic is related to another important component of cognitive libertarian paternalism: how to increase the *knowledge of feedback* from our choices. One of the reason to increase the feedbacks is not only that we can learn from our errors. It is also that we can improve inductively our theories of the world. That is, we can improve our prediction on future states of the world, for example our future choice of an investment or of a party or of a school. In the experiments on Bayesian learning people learn probabilities from experience and are subsequently tested as to whether they make judgements consistent with Bayes' rule. Many times the tests are successful. Therefore many cognitive scientists conclude that people's judgements are largely consistent with it (Chater and Oaksford, eds., 2008; Gigerenzer, 2015). This kind of test are the cognitive justification for an ecological rational role of the nudges that manage to increase the knowledge of the feedback from people choices.

It also seems possible to design ecologically sound *mapping of the choice into future welfare*. For example, when an individual has to make a choice of different mortgages or credit agreements it is possible to simulate future simple environments with few cues in frequency formats (for example the monthly rate) and ask him to imagine to be in that situation. In this case the attempt is to create a situational rationality dimension and to trigger embodied cognition aspects of the choice. This situation would allow him to understand better the future effects of his choice trying to make converge subjective present utility with future utility. In other word this architecture of choice should foster people's competence to vary their sense of psychological connectedness, that is their sense of connection with their future self. In the context of saving, this could mean that the more aware someone is of being the future recipient of today's savings, the more prepared that person will be to save for retirement (Hertwig and Grune-Yanoff, forthcoming). In some experiments (Hershfield et al., 2011) participants who interacted with their virtual future selves, and presumably overcame disconnectedness, were more likely to accept later monetary rewards over immediate ones.

Second, ecology rational environment can rely on the design of an environment that nudges the utilization of a proper suitable heuristic. For example, the environment can exploit the so called *social intelligence* by relying on heuristics designed for social information. *Imitate-the-successful* heuristic, for instance, speeds up learning of cue orders and can find orders that excel take-the-best's validity orders (Hertwig and Herzog, 2009). Other heuristics include *imitation heuristics*, *tit-for-tat*, the *social-circle heuristic*, and *averaging the judgements of the others to exploit the «wisdom of crowds»* (Gigerenzer and Gassmaier, 2011).

Simplifying and structuring complex choices are also good challenges for BRAN heuristic choice. Beyond the valid proposals of Thaler and Sunstein (2008) exemplified by the example of paint store, there can be also a BRAN way to structure the complexity, for example trying to select environments that present high redundancy and variability in weights of their structure. High *redundancy* means structure where cues are highly connected (for example the market value of a business). High *variability* means structure where there is great difference in weight between some cues and the others (for example the weight of TAEG⁶ compared to other information in the choice of a credit contract). In this structure when there is also high uncertainty it is likely that *one-reason decision making* as *take-the-best heuristic* is able to allow successful inferences that can be superior than those based on algorithms as classification and regression tree or conjoint analysis. In most of the choice linked to one's well-being, as finance, education, health, food, consumption goods, housing, and so on, one has to search for more than one cue. In these cases also one may follow a sequential heuristic that is based on one-reason decision making. An example is *elimination by aspects lexicographic heuristics* to nudge proper choices in large world. How? Structuring for example with a proper software the information given to the families, by *fast-and-frugal trees* in which is incorporated the lexicographic logic. Let's do the example of the choice of a school: the first question might be: 'In your opinion what is the most important feature of the schools in your town ('a bank in your quarter')?'. The answer might be 'To be among the best five in the ranking in the quality of teaching' ('To be among the 5 biggest national banks'). Here is the first selection of five. Then the second question might be: 'Among these five schools what is the preferred aspect for choosing one of them?' ('Among these five banks what is the preferred aspect for choosing one of them?'). The answer might be 'The cost must be no more than 15 thousand dollars' ('The banking costs to open and to manage an account should be the lowest'). Here is the second selection of two schools A and B ('of two banks A and B'). The third question might be: 'Between A and B what is the best feature to choose one of them?'. The answer might be 'The closeness to family house'. Here is the final choice of A if it is closer than the other. Otherwise there might be another question asking another comparative feature. This is the typical non-compensatory strategy for choosing in an ecological rational way. In this strategy people order the cues relying on recall from mental sample. A person doesn't need to learn cue orders individually but instead can learn from others, as through teaching and imitation (Gigerenzer and Gassmaier, 2011). This is an example of BRAN nudges.

Lastly, ecology rational environment can be pursued by fostering a BRAN inspired educational libertarian paternalism about financial behaviour and education, which should strengthen the competence in risk literacy, uncertainty management and managing motivations and cognitive control.

6 TAEG is the Tasso Annuo Effettivo Globale (Global Effective Annual Rate).

- 1) The first competence is about understanding statistical information. These competencies can be achieved through (Hertwig and Grune-Yanoff, forthcoming):
 - a. graphical representations (Lusardi et al., 2014; Spiegelhalter et al., 2011);
 - b. experience-based representations as opposed to description-based representations (Hogarth & Soyer, 2015);
 - c. representations that avoid biasing framing effects relying, for example, on absolute instead of relative frequencies (Spiegelhalter et al., 2011);
 - d. learning how to transform opaque representation (e.g., single-event probabilities) into transparent ones (e.g., frequency-based representations) (Seldmeier & Gigerenzer, 2001).

- 2) When people have no access to actuarial information they should make decisions under uncertainty, with no explicit risk information available. This is the case of most decisions in the world of finance. The competence for uncertainty management foster procedural rules for making good financial decisions, predictions and assessments under uncertain conditions with the help of simple rules of collective intelligence (Hertwig and Grune-Yanoff, forthcoming); fast and frugal trees; simple heuristics; rule of thumb and procedural routines. For example Drexler et al. (2014) found that providing micro-entrepreneurs with training in basic accounting heuristics and procedural routines significantly improved their financial practices and outcomes. The impact of the 'rule of thumb' training was significantly larger than that of standard accounting training.

- 3) People often lack self-control and have weak attention during financial decision making. The results are often suboptimal. A BRAN educational libertarian paternalism may foster the competence to autonomously adjust one's motivation, and cognitive control in decision making (Hertwig and Grune-Yanoff, forthcoming) through growth-mindset or sense-of-purpose exercises (Paunesku et al., 2015; Rattan et al., 2015); attention state training (Tang, Tang, and Posner, 2013); psychological connectedness training (Hershfield et al., 2011); reward bundling exercises (Ainslie, 2012); the strategic uses of automatic processes and harnessing simple implementation intentions (Gollwitzer, 1999); training in precommitment strategies and self-control strategies (Fishbach & Shen, 2014).

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Improving financial literacy through neuroscience and experiential learning

Understanding how the brain works and how we learn to deliver more effective solutions

D. Martelli(*)

1 Introduction to educational neuroscience

Over the last few years the field of research of educational neuroscience (or neuroeducation) has rapidly evolved, due to the availability of non-invasive methodologies, such as electroencephalography (EEG) and functional magnetic resonance (fMRI), which allow to study the relationships existing between the nervous system and the way subjects learn. Particular attention is usually devoted to the brain networks that are activated while individuals perform particular tasks. The potential of combining different methodologies from several disciplines (pedagogy and neuroscience in the first place) makes educational neuroscience a particularly relevant field of study, as also shown by the OECD (among the others, OECD, 2007). In particular, the most relevant factors raising the interest of scholars and institutions in this discipline are three: 1) the possibility of scientifically verifying the validity of 'neuro-myths' related to learning (i.e., is it true that people use on average only 10% of their brain or that men and women reason differently?), 2) a greater understanding of the underlying dynamics of learning different subjects (e.g., mathematics, music, ...), and finally 3) the ability to improve traditional teaching methods.

Though today we are able to analyse the brain as it has never happened in the past, its functioning, and in particular the role played by the two hemispheres (left and right), has been studied since antiquity. Hippocrates, for example, already spoke of duality of the brain. In this paper it is not possible to give an exhaustive

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description of the structure and functioning of each individual part of the brain (those interested can refer to a neurophysiology textbook). Nonetheless we can recall some basic facts. It is ascertained that the left cerebral hemisphere controls the right side of the body, while the right part of the brain adjusts the left half of the body. In addition, the two hemispheres have a prevalence in performing certain functions rather than others: analytical thinking, for example, appears to be concentrated in the left hemisphere, while the emotional and artistic components are mainly carried out by the right cerebral hemisphere. It is always the right hemisphere that also plays a crucial role in interpreting the context in which a certain situation occurs. However, as the individual functions (except for rare exceptions) are never carried out by individual parts of the brain, but by a network of these, the two hemispheres are closely linked by a multitude of fibers that allow to transfer information from one part of our brain to the other. That is why lesions of these fibers can impair the proper functioning of the brain. It is therefore not fully correct to state that people with high verbal skills are dominated by their left hemisphere, while more artistic and emotional subjects are controlled by the right side of their brain. Language, for example, is a typical example of the joint work of the two hemispheres: during a conversation, indeed, the left side produces the speech, while the right hemisphere allows the subject to understand the context and therefore the true meaning of the words. As Byrnes and Fox (1998; p.310) state, *«nearly any task requires the participation of both hemispheres, but the hemispheres seem to process certain types of information more efficiently than others»*.

However, not all information is perceived in the same way. There are several factors that influence this filtering process. Perceived importance or inputs which are novel or different from what the subject expects tend to attract her attention. Stimuli that are more intense (e.g., louder, brighter, or more pronounced) get more attention as well. The movement also helps to capture the attention of individuals. Finally, the motivation to learn and especially the reward associated with learning are factors that facilitate the acquisition of new information. Our brain is in fact predisposed to experience pleasant states and seems to have a complex system to process rewards: many brain structures are supposed to be implicated in that process, including the hypothalamus, the prefrontal cortex and the amygdala. The expectation that one can receive a reward can trigger this complex network of pleasure, which starts producing a neurotransmitter, called dopamine. Dopamine is thus produced both due to an anticipation of a reward and following the experience of a pleasure. However, the brain easily gets used to similar pleasant states generated by the same stimulus, so having rewards already received in the past can no longer create new states of pleasure. In order to perceive a sensation as pleasant, rewards should be always increasing. The typical example is a child who after a good action is happy to receive a candy. She will then be spurred to make further good actions in order to receive the expected reward, i.e., the candy. At a certain point, however, only one candy is no longer enough to spur the child to perform further good actions, as the pleasure of such reward is no longer perceived as it was in the past. The child will then start asking for two, then three, then four candies, and so on, to feel an incentive for making new good actions.

Although the mechanisms outlined above work mainly in an unconscious way, these same principles can be used to capture the attention of people as well. Unfortunately the new information individuals receive can be forgotten even in a few seconds, unless it is considered so important to be transferred from the short-term memory, where the information is firstly processed and stored, to the long-term memory, in order to be used at a later stage.

2 Experiential learning

As seen in the previous paragraph, the content of a message is mainly processed in the left cerebral hemisphere, while the right side of the brain is devoted to the analysis of the context. Too often, unfortunately, financial education initiatives are only focused on the content of the message, giving little attention to the context in which the information is presented. Excessive focus on the content may produce learning that is not strictly related to events impacting the lives of the subjects. If so, the educational initiative is ultimately ineffective for the participants. Recent neuroscientific studies suggest that, in order to make learning more effective, and thus to allow to build and strengthen the neural connections between the two hemispheres, educators should incorporate the context into their speeches and presentations. Besides, the moods and emotions that participants experience during learning, as well as their expectation for a reward, are all a prerequisite for an effective learning. Among all possible forms of learning, experiential learning is maybe the most valuable tool. It allows participants not only to directly experience a specific situation (both in terms of contents and context) but also to feel specific emotions related to that situation.

Since the late 1960s, the Cone of Experience originally developed by Edgar Dale has been a useful point of reference for assessing the effectiveness of educational initiatives, depending on the information recalled within a few weeks after the experience. In particular, Dale (1969) showed how the recall of a message declines differently depending on the participant's engagement. If the stimulus is only verbal, for example, subjects tend to recall only about 20% of the original message heard. The retention rate increases to about 50% of what the subjects saw, if the stimulus was visual. More information (on average 70% of what individuals heard) is, however, recalled if subjects were actively involved in the learning process (for instance by participating in a topic discussion), while the impact is even highest (about 90%) if the subject directly experienced a certain situation. A famous quote by Albert Einstein related to experiential learning is the following: «*The only source of knowledge is experience*». Learning from experience is one of the most natural and important ways of learning that we all have. Every day we tend to learn from experience, since this form of learning requires neither important skills nor technological resources. In most situations, however, effective learning requires a moment of reflection, both autonomously and with the support of other people (e.g., a parent, a teacher, a coach, ...). Although this approach based on experience may seem simple, in practice it is rather complex. In particular, it suffers of two main

limits: 1) experienced people usually have a higher average age and 2) individuals are inclined to be influenced by the status quo. Unfortunately, those who have never experienced a certain situation may not be aware of the dangers that specific behaviours might cause (e.g., the phenomenon of aquaplaning while driving a car on a wet road, or financial losses when inappropriate investments are made). The importance of learning from experience would seem to be particularly useful in finance, where 'lessons' (such as periods of crisis and market collapses) tend to be learned by various generations, as they approach the world of investments. Unfortunately, as the market history teaches, investors need to learn the negative impacts of their behaviour on their own skin, although the evidence suggesting more performing behaviours is available to everyone (both in literature and by analyzing the behaviour of investors who have financial success). This behaviour is due to the fact that indirect learning (such as looking at others' behaviours or reading books) has a much less intense impact and therefore is not able to significantly affect the behaviour of a subject. This holds also for professional investors. An interesting work by Greenwood and Nagel (2008) compares the behaviours of experienced and inexperienced fund managers during the burst of the dot-com bubble. Their results are in line with adaptive learning models; in particular, inexperienced fund managers tend to follow the trend, hoping to learn and predict future market performances, just using the few available market data they see, since they do not have any experience of similar situations. As fund managers improve their decisions experiencing different market situations, so people tend to learn how to solve complex decision problems mainly through a *learning-by-doing* process. It is important to highlight that experience is subjective: two individuals can participate in the same event (e.g., watching a movie), but they can have completely different experiences (e.g., one person liked the movie, the other did not). Besides, every time we recall a specific experience, our feelings and sensations may change, due to the plasticity of our brain and the new situations experienced meanwhile. A particularly pleasant (or painful) situation experienced in the past now may no longer be perceived as such. Experience and learning are therefore two strictly related and almost inseparable concepts. Many authors also agree that experience is the basis of any form of learning, although some of our behaviours are innate (e.g., sucking). Also at the brain level many of our biological functions are inherited although some abilities can grow and develop as a result of each subject's experience. A classic example is the development of the hippocampus, an area related to position and orientation, among taxi drivers in New York.

It should be emphasized that experience itself is not a sufficient condition for learning. Many subjects experience similar situations a large number of times, without unfortunately learning anything from bad past behaviours. Knowledge therefore results from the combination of acquisition and transformation of experience. When we talk about experiential learning we thus refer to the process by which knowledge is created through the transformation of experience (Kolb, 1984). As mentioned earlier, subjects do not learn directly from their experience, but from the reflection they make on their experience, trying to figure out what happened, how it happened and why. Without this reflection, experience is not fully perceived

by the brain, which associates it to other background stimuli that needed to be discarded due to its limited cognitive abilities. To define this situation, Senge (1993) uses the term «*illusion of learning from experience*». While acknowledging the importance of learning from direct experience, he doubts its effectiveness when subjects cannot observe the consequences of their actions. This happens, for example, when feedbacks are distant in time or space (i.e., feedbacks are far in the future or the output of a decision depends on variables the subject cannot control). According to Senge, we all have a 'horizon of learning', a temporal or spatial perimeter within which we can assess the effectiveness of our decisions. In line with Senge, Kanheman (2013) also states that keeping a good behaviour sometimes requires an external help, especially in all those situations where it is easy to fall into temptation. A typical example is the difficulty of starting a diet and respecting it for all the period suggested. In fact, benefits are far in the future and uncertain (if the diet is not accompanied by regular physical activity, results are usually lower than expected), while costs (such as turning down a slice of cake) are borne today. The temptation to interrupt a diet is therefore very high. It happens the same in finance. Let us think about insurance: the cost of the insurance policy (the premium) is paid today, while the benefits (the refunds) are uncertain. As in the previous case, individuals are tempted to avoid paying for insurance policies. This is one of the reasons why people tend to be underinsured in practice. Always according to Kanheman, other situations in which we need help occur when several factors play a crucial role and the relationships between these factors are difficult to understand. Financial markets are a typical example of a complex system difficult to understand. We also need help when the frequency of a particular decision is very limited: despite 'practice makes perfect' also in finance, there are situations in which we make specific decisions only one or a few times in our lifetime (e.g., asking for a mortgage or choosing an investment for our pension). Finally, we need an external support when the feedback to our decisions is absent. As Sange also points out, when our decisions fall outside a certain horizon, people are unable to learn from direct experience.

Everyone is different from the others also due to genetic or behavioural traits, situations experienced and so on. As seen before, no one sees events in the same way as others do. All learning experiences are therefore personal and unique to each individual. Every experience is filtered by the subject's past, by her emotions and mood. Everyone then (consciously or unconsciously) focuses her attention on what she considers important to her. The learning process can thus be summarized in five main steps:

1. the presence of a stimulus (which can be internal or external);
2. the reception of the stimulus by one or more senses (consciously or unconsciously);
3. the filtering of the stimulus (depending on previous knowledge and experience, emotions, context, etc.);
4. the interpretation of the stimulus;
5. the response to the stimulus (which can be behavioural, cognitive and affective).

Not all experiences, however, have a positive (or neutral) effect on learning; some experiences may have a detrimental effect. This latter effect may depend on personal past experiences, expectations of others (e.g., family, society, etc.), inadequate preparation, hostile environment or mental closure to experience. In addition, we are usually mistaken in situations we are not familiar with: that's why we prefer to stay in our comfort zone. Likely, not everyone behaves in the same way: the founder of the famous brand of vacuum cleaner, Dyson, for example, produced over 5,100 prototypes before arriving on the market with the definitive first model. Everyone has thus the possibility to learn from her own mistakes, but not all of us do it. There are, in practice, three main types of people who react differently to their mistakes:

- a. those who make a mistake once and learn from it, so not to make any further similar mistake in the future;
- b. those who make a mistake once and are so traumatized that they don't want to make similar decisions anymore;
- c. those who make the same mistake over and over again and never learn from their experience.

It is also possible to classify investors using the above three categories. The first group is usually represented by successful investors (e.g., institutional investors): they make bad decisions, but they are able to learn from their mistakes and correct their behaviour accordingly. The second and the third categories are mainly represented by retail investors. People belonging to the second category decide to enter the market, often at its top, herding other investors, and after the first market downturn they are so traumatized that they want to leave the market and never invest again. As time passes, this extremely negative perception fades away, so that these individuals are ready to invest again and make the same mistakes. The third group of investors is finally represented by those ones who systematically make mistakes while investing, without learning from them. Actually, most of the times they are even convinced of being successful investors. External advisors are thus required for these kind of investors.

3 Future applications to improve financial literacy

As seen previously, experiential learning is perhaps the best way to acquire new information, since the subject is directly involved in a situation or in solving a problem. There are several types of experiential learning (such as games, simulations, role plays, etc.). In the financial sector, simulations are today one of the most used tools to increase investors' knowledge. Simulations are now recognized as effective teaching methodologies, thanks to individuals' active participation in the learning process. The use of simulation is increasingly widespread, mainly due to the continuing reduction of its implementing costs. However, working out an effective simulation requires some attention. For instance, a well-structured simulation should satisfy the following features:

- 1) *Careful choice of the topic to be simulated.* Some topics can be better simulated than others. They share some common characteristics, such as the possibility to see the situation through the eyes of others and to carry out more tasks simultaneously under pressure.
- 2) *Simulations do not necessarily have to be an exact replica of reality.* The presence of too many details and variables may sometimes overload the participants' brains of information, thus distracting their attention from the core objective of the simulation.
- 3) *Make participants responsible of their actions.* It should be avoided that external events may have a meaningful effect on the final outputs of the simulation (e.g., giving too much weight to pure luck).
- 4) *Develop an appropriate performance appraisal model.* Scores calculated according to quantitative models are usually the most used in simulations; however, more qualitative models should be used to assess attitudes of participants when simulations are related to personal characteristics (e.g., ethics, cultural aspects, team spirit, etc.).

The potential effectiveness of these learning methodologies is also acknowledged by the participants, who generally give enthusiastic comments about their participation in a simulation. Some competitions are also under the focus of the media, as they are used as a benchmark for evaluating the goodness of different universities (Wall Street Journal, 2017) or of different investment styles.

Unfortunately, simulations of investment choices currently available on the market are not always effective learning tools (Martelli, 2013). In particular, many simulations do not ask participants an enrolment fee at the beginning of the competition, but they offer rewards at the end. Participants may therefore be led to adopt opportunistic behaviours (i.e., to choose highly speculative investments in the hope of winning the competition and receiving the reward), which might not have put in practice otherwise. Hence, the simulation is not only ineffective, but also dangerous, since it may bias participants behaviours.

Finally, neuroscientific techniques have also made possible to rank ways of communicating (e.g., brochures, videos, etc.) according to their effectiveness (see Martelli and Pavone, *forthcoming*). Combining these findings with the evidence on the learning process (and in particular on the factors leading the human brain to retain the information received) and with a more extensive use of experiential learning deserves a special attention, given that it may greatly benefit the effectiveness of financial education programmes (for further details, see Martelli, *forthcoming*).

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From nudging to engaging in pension

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1 Introduction

A common topic in behavioural economics has been increasing participation in retirement savings plan. One of the major reasons why individuals do not reach their savings goals is lack of planning. We humans are cognitively lazy. If making a change requires thought and effort, our default is to do nothing unless there is a pressing reason to act.

Perhaps the biggest bottleneck in solving the retirement savings problem is the need of recognition – the fact that people seem to believe that retirement is still some time away and that it is too early to start thinking about it. People's involvement might be low because most of them simply do not have the knowledge and the capacity to interpret the information on private pension plans received by employers and governments. They do not know how to appropriately evaluate and balance these choices, and make a decision based on weighing of the alternatives. When a default option is set (e.g., knowing the pension plan most people choose or employees' committee most frequently suggest), people may use it to make a quick decision and put the issue aside (even when this pension plan is not best suited for them). When people are confronted with a large number of options, the more options they are given, the less likely they are to be engaged in the choice task (Iyengar, et al, 2004; Iyengar & Lepper, 2000), especially when they see alternatives as relatively similar among them and are not able to understand why they differ.

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All these cognitive difficulties appear difficult to overtake and more and more public policy is embracing the philosophy of nudging people into pension plans. In this short note, while we agree on the role that nudges can play to people's future financial wellness, we put forward the idea that behavioural and communication disciplines have lot more to teach on how to make retirement saving decision savvy and engaging.

2 The pros and cons of nudging in retirement saving

Nudging has recently received a lot of attention with its promises of a cheap, discrete, unrestricted alternative to rules, warnings, restrictions and other negative courses of action. A number of governments around the world have formed nudge units, i.e., teams of behavioural science experts tasked with designing behavioural interventions, that have the potential to encourage desirable behaviour without restricting choice, testing those interventions rapidly and inexpensively, and then widely implementing the strategies that prove most effective. The United Kingdom established a nudge unit in 2010 and was soon followed by other countries, including Australia, Germany, The Netherlands, and Singapore, as well as the United States, where an Executive Order issued in September 2015 directed federal agencies to incorporate behavioural science into their programmes (Obama, 2015).

Nudging claims to be able to change people's behaviour simply by changing their surroundings. Research in behavioural economics has shown that changes in the environment disproportionately influence behaviour. Rather than placing restrictions or changing economic incentives, nudges affect choices by changing the way options are presented in the environment. While a significant change in economic outcome or incentives is not a nudge, a nudge may serve to highlight an economic incentive.

Perhaps the best-known nudges for savings in workplace retirement accounts enrol employees automatically, use automatic escalation to increase their contribution rates (the worker sets aside a bigger percentage of his/her salary with each raise up to a pre-set limit) and often employ auto-allocation features (most typically into a target-date fund). Workers have the option of opting out of the plan, changing their allocations and adjusting their contributions, but many simply don't. Automatic enrolment is effective because people exhibit inertia, which favours sticking to defaults; because people infer that policymakers are recommending the default option; and because defaults become reference points, which makes deviations from the default feel like losses, which loom larger than gains (Johnson & Goldstein, 2003).

The most definitive study of automatic enrolment in savings plans used data from Denmark, where Chetty et al. (2014) found out that changing the fraction of an individual's salary automatically directed to a retirement account can generate savings changes of several percentage points of annual salary at essentially zero cost if the infrastructure for payroll deduction into a retirement account already exists.

Nudges have two major appeals. First, they preserve autonomy because they make some actions easier to select without restricting the choice set (Sunstein, 2012; Sunstein, 2014). Second, nudges reduce errors and biases by encouraging people to make better decisions 'as judged by themselves' (Thaler & Sunstein, 2008, p. 5). That is, nudges help people do what they would have done anyway if they had put more time and energy into their choices. However, too much nudging can have unintended consequences and even lead to backlash from those who should benefit from it.

Besides advantages, default option policies carry diverse and severe limitations, especially in some settings. First and foremost, because opt-out policies yield decisions through the inaction of the decision maker, they are less likely to engender the kind of committed follow-up that is often useful when it comes to implementing the decision. This effect may go beyond pure self-selection; the act of affirmatively making a decision may well increase a decision maker's satisfaction (Botti and McGill, 2006) and commitment (Cioffi and Garner, 1996) above and beyond what the same decision maker would exhibit if the decision were passive. Second, opt-out 'choices' in many situations are less likely to reflect decision makers' true preferences than will more active choices (Payne, et al., 1993). Opt-out is likely to be effective in situations in which there is a single optimal course of action, that most people don't take, and that policy-makers are able to identify and favour by making it the default. However, when different options are best for different people, or when policy-makers cannot be relied upon to make the best option the default, then opt-out will be much less beneficial and even potentially destructive. For example, there is growing evidence that the shared optimum inherent in an automatic 401 (k) enrolment plan may be inappropriate (Carroll et al., 2009) or unsustainable (Lusardi and Mitchell, 2007) for some people. Finally, default policies can be counterproductive if those who implement them view them as a substitute for other, more substantive, interventions, such as educational programmes that give people the information they need to make an informed choice. Some employers who adopt automatic enrolment, for example, may believe they no longer have to deliver investor education to employees. Unavailability of financial seminars may lower employee motivation to learn about how their earnings are distributed and whether they have taken advantages of other benefits offered by employers. Workers who invest in a 401(k) without lifting a finger are unlikely to spend much time looking into whether they're saving enough, or even too much. A default option can be considered an implicit advice (McKenzie et al., 2006) and lacking adequate awareness employees may be upset with their employer or the system in general during market downturns.

A final remark on nudging is aimed at raising a methodological point on the assessment of costs and benefits. Past studies on nudges, including those disseminated by existing nudge units, have typically measured only the extent to which an intended behaviour was changed (if at all). To be fully informative, future policy-oriented behavioural science research should measure the impact per dollar spent on behavioural interventions in comparison with more traditional interventions.

In the absence of such calculations, policymakers lack the evidence needed to design optimal policies and to decide on the appropriate allocation of resources across behaviourally informed and traditional interventions.

3 From nudging to engaging: how to ‘nudge’ towards active awareness in pension decision

In many countries changes in legislation might play a key role in making people save more for retirement. However, the frequency and nature of communication will become increasingly important. It is fundamental to create a more robust saving culture and push individuals to take personal responsibility for long term saving. Eventually, failing to engage people might undermine the impact of automatic enrolment.

When defined benefit pensions were standard, engagement was not so critical. Effective communication was about informing and, perhaps, encouraging appreciation of the value of the benefit. So, employees were generally the passive recipients of facts about their scheme. Now pension provision through defined contribution arrangements is very much the norm and engagement from employees is needed if this form of saving is to produce a satisfactory outcome for both employees and employers. Traditional communication and educational strategies appear ill suited to engage people with the subject of pensions, commonly perceived as a complicated, difficult and quite frankly dull issue. Drawing from the hindsight of behavioural studies and the development of FinTech, retirement saving communication and experience can be fully reengineered to make it ‘actively engaging’.

Industries such as banking have increased consumer engagement by piloting various new FinTech projects – using technology to increase the ease and efficiency of managing finances. The pensions industry has been relatively slow to embrace FinTech, to the detriment of both providers and members. Admittedly, pension is not the easiest market in which to introduce technological change. In the UK, difficulties in matching FinTech and pensions have been overtaken by few start-ups, such as PensionBee, which provide an online pension plan to combine a customer’s existing pensions into a single pot that is then manageable via mobile app. These plans are intended to be quick to set up and painless to operate. Customers simply give a few details online and from there the company will automatically track down their old pensions. Customers have access to an online pension dashboard where they can monitor their new pension and make one-off or regular contributions into their plan. These companies’ mission is to remove all the mystery surrounding pensions by eradicating jargon and taking an upfront approach to fees.

The big achievement of these new players has been to make retirement saving decision a simpler and friendlier experience. If individuals are to be encouraged to prioritise long-term saving then it is key to explain benefits in straightforward language so they can clearly see the upside. Behavioural science

shows that it is important to highlight the benefits of saving in ways that are easy to grasp, so it is recommended to use simple monies rather than complex equations and percentages. In the same vein a research by Standard Life (2015) found that when awareness of tax relief for pensions was low, messages such as 'the Government contributes 20p to your pension for every pound you put' were very effective in engaging people. Similarly, to tackle the affordability objection, the FT (2016) presented the problem as follows: *«A pension, I said, is a bit like a supermarket 'meal deal' that you might buy for your lunch. There are three components. There's the money you put in (the sandwich) which gets topped up with money your employer puts in (the drink) and money from tax relief (the crisps or carrot sticks). So you might have to pay for the sandwich now, but you're effectively getting the other two elements thrown in»*. This type of communication campaign has several major advantages. It is simple and it deals with real, practical event. If we ask anyone what is engaging in the others, he/she is likely to say something along the lines of humour, intelligence, enthusiasm and empathy. Any effective pension communication should score high against these criteria.

To engage individuals, communication needs to make emotional connections with the lives they lead and incisively overtake some stereotypes regarding 'old people'. A recent report by The Economist (2017) on the 'new old' highlight that: *«ageing populations could be a boon rather than a curse. But for that to happen, a lot needs to change first»*. Many of those older people today are not in fact 'old' in the sense of being worn out, sick and inactive. Today's 65-year-olds are in much better shape than their grandparents were at the same age. In most EU countries healthy life expectancy from age 50 is growing faster than life expectancy itself, suggesting that the period of diminished vigour and ill health towards the end of life is being compressed. Yet in most countries the retirement age has barely shifted over the past century. In spite of these trends, in retirement saving communication there is still the perception that pensioners will 'spend all their days gardening', while most people, as said, might have more exiting dreams in mind for their later healthy years. So, by using terms like 'pension', we are reinforcing stereotypes and inertia and so failing to engage people. 'Retirement income' or 'wage after work' are terms to explore to bring closer engagement as well as using images of people as they are today (young and at work).

To be effective, the delivery of information needs to be targeted, relevant and contextualised at the point of delivery to ensure that the audience is only receiving content that affects it. A one-size-fits-all approach must be fully abandoned. When dealing with retirement savings, perceptions and behaviours may be affected by the time lapse to retirement, thus suggesting that communication needs to differ across younger and older workers. Using temporal construal theory, Liberman and Trope (1998) and Trope and Liberman (2003) suggest that individuals tend to view things differently based on whether they think an event will happen in the near or distant future: individuals farther away from an event prefer to think about the event in general (abstract) terms rather than considering the details of the event, but if an event will occur in the near future, people think more concretely, focusing on the specific steps needed to achieve the desired outcome. Testing this

theory relative to long term retirement saving planning, Montgomery et al. (2017) found that younger people respond better to abstract versus concrete advertisements. Younger workers think about retirement in a very simplistic manner, considering only the big picture without regard to the amount of money they should be saving now in order to achieve their desired distant goals.

Effective communication should draw also on goal framing. That is, should a goal be presented as a distant goal of how much to save for retirement, or should the goal be more proximal as a milestone to achieve over shorter time period? This might be relevant for motivational and cognitive effects of planning. When the goal is framed as a distant objective, younger workers who have only recently started saving for retirement might perceive themselves to be off target because the amount of money they actually have saved is a small portion of what they need in retirement. On the contrary, when presenting younger workers with a milestone goal not so far in the distant future, the dollar amount of the goal would be substantially less than the final amount of savings needed at retirement. As a result, younger workers may perceive themselves to be in better goal standing, and, as a result, may be more motivated to save in order to achieve the closer, smaller goal. Ulkūmen and Cheema (2011) found that when thinking more abstractly, consumers are more successful at achieving savings goals when the goal is framed as a specific dollar amount (vs. a non-specific savings goal) because considered more important. However, when thinking more concretely, consumers were less successful when the goal was framed as a specific dollar amount because it was viewed as more difficult. Although not focused on age or retirement, these findings suggest that for younger workers, for whom retirement is in a distant future, setting a specific milestone savings goal (e.g., save a particular amount from each paycheck) might be more successful at encouraging them to save than providing a general, long-term goal (e.g., amount needed in total for retirement). Similar conclusion is drawn by Montgomery et al. (2017) who find that relative to younger workers the effectiveness of advertisement encouraging saving is dependent on the concreteness of the message, as well as on whether the goal is framed as long-term or short-term.

Traditional retirement saving communication falls short also in terms of message contents in other matters as well. The pensions industry has spent the last 25 years trying to educate people so that they 'get' pensions and that hasn't worked because it focused on inputs (contributions and investments) rather than outputs (a target income in retirement). Pension plan members want help in the following topics:

- 1) establishing a target income in retirement ('what do I need?');
- 2) knowing where they are against that target;
- 3) and what to do about it if it looks like they might miss it.

This requires an 'outcome' focussed approach to communication. It should be less about the attributes of the pension plan and more about what the plan can do for someone. So, to engage, we need to link pensions and objectives that are important to people over their lives.

But we know that words alone are not the most effective way of communicating. Research suggests that over 80% of human learning occurs visually and we know that visual elements also affect us emotionally. Images should have meaning and not just be part of a 'design style'. In this vein, gamification as well might represent an effective and innovative way to engage in retirement saving, particularly younger generation. The principle of gamification recognizes that people are more apt to change their behaviours when they are engaged in fun, achievement-oriented tasks with established rewards for positive action. As a strategy, gamification has been used for some time in healthcare – and it's proven effective in that realm. By using gamification, individuals can understand the ramifications of their choices, visualize the future in new ways, and understand the various scenarios that result from engagement in retirement planning. In short, gamification can help inform and engage, ultimately raising participation and performance. It combines feedback, friends and fun, to make tasks more compelling and rewarding for users.

Gamification appears effective in engaging especially when the 'game' pits players against each other and players perceive to be part of a community. This makes sense for several behavioural reasons and social norms in particular (Cialdini and Trost, 1998).

Apart from gamification, there are many well documented examples showing that disclosure of social norms – what 'most people' do or believe – can positively influence behaviours ranging from anti-social drinking to tax compliance, to keeping appointments at the doctors surgery, etc.. Most people, despite feeling strongly about being an individual (hence the increased focus on personalisation), like to know that their behaviour doesn't fall outside social norms. Indeed, as social animals, we are conventional and heavily swayed by others in our actions and opinions, piggybacking on the information of others, and typically seeking approval for what we do. A 'making it social' communication strategy suggests that by publicising favourable statistics showing that most people in a relevant cohort have started thinking about retirement or, even better, have started saving and disclosing the amounts involved, again if favourable, would encourage others in that cohort to do similarly. This is particularly true where the power of social networks can be harnessed. Reassuring people that their behaviour fits with social norms reinforces that behaviour. By contrast, highlighting lack of saving as a socio-economic widespread problem compounds the problem because people accept their sub optimal behaviours as being the social norm.

For many individuals, the financial decisions related to retirement may lead to increased anxiety as retirement approaches, suggesting that different tactics may increase the ability of communication to improve financial decision making. Nest (2014) emphasises how communication need to reassure, not just inform. In general framing is a topic largely investigated in behavioural studies. In presenting retirement educational materials, the message can be organized so as to make savers aware of potential negative outcomes of poor financial decisions, thereby encouraging them to make better retirement choices (e.g., 'If you do not save today, this could happen to you'), or to present them with the potential positive benefits of effectively saving for

retirement (e.g., 'If you do save today, you could do this'). While the use of negative framing (relative to positive framing) in communication with individuals has been shown to increase preventive health behaviours and also influence investment decisions (Agnew et al., 2008), past research has highlighted that the effectiveness of negative messages is dependent on many factors (e.g., amount of negative information, feelings of accountability, etc.; Keller and Block, 1996; Passyn and Sujun, 2006).

Specifically, perception and feelings towards pension as a concept may impact on the decision maker's attitude towards the task. The affect as information hypothesis (Clore et al., 1994; Schwarz and Clore, 1983) suggests that judgments are influenced by positive and negative feelings towards the decision target (other people, places, objects, as well as words, memories, etc.). Positive or negative emotions towards the decision task might directly affect the decision process. Negative emotions towards pension and retirement might be a result of unpleasant thoughts and negative images of the future raised at the time of pension decisions, such as financial dependence, ill health, death, aging, or disabilities (Weber, 2004). Such thoughts may be psychologically threatening and provoke 'retirement anxiety' (e.g., Hayslip et al., 1997), which may not be restricted to older adults. Interestingly, Hayslip et al. (1997) have found that younger adults showed even greater anxiety about retirement than older adults. Indeed, the results of Neukam and Hershey (2003) suggest that people who experience retirement anxiety are less likely to plan and save for the future. In summary, positive and negative perceptions of pension as a concept are likely to guide emotional reactions toward the decision task at the time of the choice and therefore are expected to influence the motivation to invest in the decision process. Low motivation to invest in the decision process may lead to insufficient search for information, set on a default option, or other shortcuts that may lead to a decision that departs from the decision maker's best interest. Motivation and framing in pension saving are central in a recent neuroscientific study commissioned by Standard life (2013). The experiment was aimed at investigating the psychology of saving and emotion: 36 people were submitted to a laboratory experiment utilizing neuroimaging technology EGG (electroencephalography) to measure the brain's response to information about saving. Participants each saw one negative, one neutral and one positive intervention. For half the participants the interventions did not include a call to action message, while the other half received the call to action. The most effective intervention proved to be presenting information in a positive tone, highlighting opportunities for a pleasant retirement, as opposed to the threat of an unpleasant one or no content at all. The positive intervention with call to action used the least effortful attention and elicited the highest level of motivation.

The impact of framing is not limited to the accumulation stage as consumers' choices about decumulation are materially affected by the way the relevant information is presented to them. These findings highlighted by FCA (2014) are consistent with the results from Brown et al. (2008), who ran a similar

experiment on consumers in the US. Framing annuity choice as an investment appears to bias individuals against annuities. Currently, consumers are provided with the value of their pot continually during accrual and at the point of retirement. This creates an investment frame through which annuities can be monitored. While there are very good reasons why consumers should be given this information, this frame does appear to trigger aversion to annuities. Such a finding means that it is vital that people get the right information and help at the time of retirement to ensure they make the best decision they can about their retirement income. Further, consumers seem to associate the term 'annuity' with poor value products. The use of this term reduces the number of individuals who choose the annuity, even though they appear to value the underlying characteristics of the annuity itself.

4 Few final remarks

Responsible financial habits are important for economic welfare, yet it remains unclear whether they can be effectively taught. Financial education is not a silver bullet, but it can be an effective tool when delivered at the right time, to the right audience, through the right channels, and in combination with other interventions.

In this note we discussed this new wave of research that has identified many effective avenues for delivering financial communication and education to engage people. The storytelling is now more defined; however we need to improve the means to deliver it. The spread of mobile phones has opened up a vast new world of possibilities for digital delivery of contents that can enhance households' financial capability. Entertainment media offer a unique and cost effective channel to reach millions of viewers with financial education messages that resonate. Financial capability is a serious matter, but communicating and teaching financial concepts can be 'pop' and 'fun'.

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Debiasing financial education

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1 Introduction

The assumption of investors' rationality – which underpins, e.g., the Efficient Markets Hypothesis (EMH) – has been increasingly challenged, while most finance courses and manuals keep hinging on it. Many studies uncovered empirical evidence of various and significant cognitive biases leading investors to behave inconsistently with rational choices.

This led to a polarization of the debate, as shown also by the somewhat schizophrenic award of the Nobel prize in economics to both Eugene Fama – the architect of the EMH – and Robert Shiller – the best-known author in behavioural finance.

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For a concise review of cognitive biases, it is useful to refer to Kahneman (2011), highlighting that humans choose by using two different systems: System 1 – a fast, intuitive and easy reaction – or System 2 – a slow and deliberate reaction that requires effort. System 1 choices are frequently 'irrational' while System 2 choices are typically 'rational'. The most important cognitive biases identified by Kahneman (2011) include: overconfidence; anchoring; availability; substitution; framing; sunk-cost. Overconfidence is probably the most significant of the cognitive biases. It consists in a 'pervasive optimistic bias' whereby individuals tend to overestimate benefits and underestimate costs, leading them to undertake overly risky projects. According to Kahneman, agents don't realize the complexity of situations and end up basing their choices on too limited sets of parameters.

The anchoring effect refers to the fact that, when making our choices, individuals tend to be influenced by the reference point they are given. An example is 'charm pricing' whereby price setters tend to post prices ending in 9 or 99 – i.e., the distance we perceive between a 9.99 euro price and a 10.00 euro price is much bigger than the one between €10.00 and €10.01.

As to the availability bias, Kahneman writes that *«people tend to assess the relative importance of issues by the ease with which they are retrieved from memory – and this is largely determined by the extent of coverage in the media»*.

In turn, the substitution bias derives from individuals' reluctance to use System 2 when faced with a complex problem, which is instead assigned to System 1. Against a difficult problem, decision makers frequently use a simpler question ('heuristic question', e.g.: 'What is my mood right now?') instead of the true question ('target question', e.g.: 'How happy are you with your life these days?').

The framing bias highlights that we tend to choose differently depending on whether the problem is framed positively or negatively. An example, from De Martino et al. (2006), is a gambling task. Having an initial endowment (e.g., \$50), participants were then asked to choose between a sure amount and a gamble. The gamble was represented graphically using a pie chart that showed the chances of winning and losing as portions of the pie. The sure option was framed in one of two ways (e.g., keep \$20 or lose \$30 of the initial endowment). Although the two formulations are obviously equivalent, the sure option was chosen more often when it was framed positively (with the word 'keep') than when it was framed negatively (with the word 'lose').

Finally, the sunk-cost bias is the tendency to let current decisions be affected by costs of past decisions that cannot be recovered anyhow. For example, Hammond et al. (1998) argue that this bias *«shows up with disturbing regularity in banking, where it can have particularly dire consequences. When a borrower's business runs into trouble, a lender will often advance additional funds in hopes of providing the business with some breathing room to recover. If the business does have a good chance of coming back, that's a wise investment. Otherwise, it's just throwing good money after bad»*.

Obviously, cognitive biases may lead investors to suboptimal outcomes (e.g., Subrahmanyam, 2008; Stango and Zinman, 2009). Financial education may contribute to debias individuals (e.g., Lusardi, 2011), and even though some scholars doubt about its efficacy and/or cost effectiveness (e.g., Willis, 2008; Bertrand and Morse, 2011; Hastings et al. 2013), it still remains a tool to mitigate the negative effects of cognitive biases on investors (e.g., Lusardi and Mitchell, 2014).

Nonetheless financial education does not necessarily wipe out individual's attitudes towards cognitive biases, since a financial education programme may itself be prone to cognitive biases. Hence, an appropriate context, interaction among teachers and students, and suitable tools are required in order to strengthen the nexus knowledge/competencies/behaviours while trying to mitigate the impact of cognitive biases throughout the financial education process. This issue is the main focus of our paper, which is organised as follows. Section 2 discusses the role of teachers in financial education. In turn, Section 3 reports evidence from a field survey on a financial education class. Section 4 concludes calling for further research on cognitive biases in financial education programmes and for regulators' and policy makers' engagement in designing truly effective financial education strategies (henceforth, debiased financial education).

2 Teachers' role in financial education

In the last two decades, large scale assessment studies (LSA), such as OECD PISA or IEA TIMSS, have had several influences on educational policies of the participating countries. This is due not only to the extensive information they provide on the delivery of education at national level but also to the intrinsic impact of assessment in itself. Generally, running an assessment implies the selection of contents and skills that are deemed worthy to be ensured, and setting suitable targets and preferred scenarios at the end or at crucial stages of the learning process.

Responding to the global concerns on the low level of financial literacy, particularly of young people, the international experts leading LSA together with the participating countries' representatives defined the assessment framework (OECD, 2016), i.e., the top priorities in young people knowledge needs in order to face financial decisions and be effective consumers of financial services. Thus, as a result of concurrent factors, financial literacy is now worldwide recognised as an essential, transversal life skill and several countries are implementing national strategies to enhance financial education (OECD, 2017).

Recommendations and principles for financial education descending from these assessments (OECD/INFE, 2012), though, rarely refer to teachers and educators. The few references available suggest a possible lack of knowledge and self-confidence by educators on these novel, highly specialised topics:

«For those programmes which favour use of classrooms, proper education and competence of the educators should be promoted. In this respect, the development of programmes to 'train the trainers' and the provision of specific information material and tools for these trainers should be encouraged.» (OECD 2005).

In the last decade, countries integrated financial education in their curricula in various ways, both as a stand-alone often optional subject (as in the United States) or, more frequently, as a subject included in Mathematics and other subjects, e.g., Economics, Politics, History, Social Sciences (OECD 2014). Irrespective of a cross-curricular or a single-subject approach, the idea was to provide concrete pedagogical tools to teachers. In Italy, a deep-rooted study, carried out by the Bank of Italy, included the provision of lectures to teachers and ready-made teaching materials (Romagnoli and Trifilidis, 2013). Teachers' expertise and knowledge of the school context were deemed crucial to develop suitable additional resources for pupils:

«Teachers' pedagogical expertise and close relations with their pupils make them the ideal channel for delivering financial knowledge. While the Memorandum provides some guidance for teaching, in terms of number of classroom hours and practical examples tailored to children, teachers can convey the concepts in the way they deem most appropriate, so that their teaching reflects their heterogeneous background, which ranges from arts to science. In addition, teachers are required to conduct the program mainly during regular school hours and they need to develop suitable resources for their pupils based on the material the Bank of Italy offers them.» (Romagnoli and Trifilidis, 2013, p. 10)

This idea is in line with the evidence gathered in meta-analyses of factors affecting students' achievement, which emphasised the importance of the student – teacher relationship in students' engagement (Hattie, 2009). Expert teachers have a more in-depth understanding of the learning processes underpinning the achievement of a set of specific outcomes, they recognize possible obstacles to learning and are able to adapt the subject outline and the level of difficulty to students' needs (Hattie, 2012).

In Italy, a recent report monitoring the educational initiatives undertaken over the three-year period 2012–2014 shows that the involvement of teachers is still modest (lower than 10%), even when learning programmes are specifically directed to students and carried out at school (Bank of Italy et al., 2017, p. 39). Although the recent establishment of the Italian National Committee for Financial Education (Law no. 15 – 17 February 2017) and the launch of a national strategy will probably foster financial education at school, explicit early and direct involvement of expert teachers would greatly benefit the effectiveness of the forthcoming national strategy itself (OECD/INFE, 2013). This would probably foster long-term initiatives, and widen the scope of their implementation in terms of both contents and audience.

3 Tentative suggestions from a field survey on a financial education class

The debate about the design of an appropriate learning framework for financial education at school is wide (Banca d'Italia, 2017; Farsagli, Filotto, Tracì, 2016; OECD/INFE, 2013 and 2015). The financial education of younger generations has become more and more relevant for many reasons such as the increasingly complexity of financial instruments, the possibility to access to financial services at ever earlier ages and the need to strengthen a sound financial culture and to disseminate new habits (OECD/INFE, 2013; OECD, 2017).

In order to best attune financial education at schools to students' attitude and needs it is crucial to resort, *inter alia*, to field studies. In the following, we report the preliminary evidence drawn from a financial education project developed by LUMSA University in Rome, in 2017. Secondary school students attended a 20 hour course on the risk-return trade-off and ethical financing and investing. The course consisted of traditional, experts-led classes on theoretical contents and practical exercises, with university professors' and professionals' engagement during the lessons, based also on teachers' contribution to the design of the project. Exercises included a role play, implemented in cooperation with Banca Etica, having students acting either as bankers or investors, and teamwork on specific projects that applied the notions taught in the theoretical lessons and were presented at the end of the course. After attending the classes, students were administered an evaluation questionnaire that, in spite of the low number of observations, may still provide some qualitative insights on how to deliver financial education at school.

Participants reported to be interested in financial education and stressed the importance for the educational projects to rely on interaction among classmates and experts, to cover both theory and practice, and to use tools such as games (OECD/INFE, 2015). Many students emphasized the importance of being instructed on theoretical aspects, confirming the complexity of the subject and their very low levels of knowledge (OECD/INFE, 2015b).

Students declared to have benefited from the project to the extent that they regarded it useful for their personal and professional life. This judgement may signal an overestimation of the effects of their learning experience, which in turn may fuel overconfidence: the classes might not have filled their knowledge gaps nor significantly raised their competencies, given also their limited length. The attitude towards overconfidence is more frequent among low financially educated individuals (Gentile, Linciano, Soccorso, 2016), which might also be the case of our students, exhibiting lack of basic financial knowledge.

Students attending the LUMSA educational programme reported to be interested in participating to other learning experiences on these topics, implicitly recognising that financial literacy is an essential life skill. This supports the idea that students' potential demand must be fostered and financial education may induce a virtuous learning cycle by arousing personal interest in financial matters and by this increasing demand for educational initiatives.

On the basis of the preliminary evidence reviewed so far, we can sketch some tentative conclusions on how effectiveness of financial education at school can be improved. First, institutions should plan long-term initiatives, which is best accomplished by engaging experts and/or the educational system through the inclusion of financial education in school curricula, carefully monitoring all the critical and structural aspects of such a choice. This measure should also go hand in hand with teachers' training covering also the biases that may hamper education.

Second, educators should properly stress the relevance and the usefulness of the subject taught in everyday life as well as its complexity, also in order to discourage overconfident attitudes.

Finally, trained teachers should be prompted to use interactive education tools and a multidisciplinary approach.

4 Conclusions

In this note, we first outlined the best-known cognitive biases and how they negatively impinge on financial behaviour. Next, we reported how the mainstream approach to correct those biases relies on financial education. However, the process of financial education is not a black box and may itself be subject to cognitive biases. Thus, we reported evidence from a field survey on a financial education class held in LUMSA University. Although the limited number of participants did not allow a fully-fledged quantitative analysis, our anecdotal evidence may be useful to policy makers engaged in the definition of financial education initiatives.

Investigating how cognitive biases may hamper financial education deserves special attention and calls for further investigation and research. On policy grounds, regulators aiming to make financial education truly effective at overcoming knowledge and cognitive gaps should also worry about debiasing the financial education process. This might require multiple actions such as: 1) engaging teachers in educational projects and providing them ready-made technical material; 2) prompting a stronger interaction among teachers and students to enhance students' trust and engagement; 3) breeding a multidisciplinary approach to financial education to stress how financial decisions affect so many different aspects of everyday life; 4) planning long-term initiatives, such as delivering projects with experts' engagement and/or financial education through school curricula, managing all related critical factors.

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Trust and financial literacy

Substitutes or complements?

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The global financial turmoil and the European sovereign debt crisis dramatically affected the way in which the general public understands the role of financial markets and the responsibilities of financial institutions. Despite the fact that some of the negative effects of the crisis have already started to fade away, it is important to acknowledge that the crisis showed that both investors and financial institutions need to scale up their game to effectively participate and prosper in modern financial markets. Understanding the reasons for the financial crisis requires addressing the limits of current financial education and awareness of key financial topics and the limits of formal regulation of financial institutions.

More importantly, the crisis contributed to foster a *«trust crisis»* (Guiso, 2010) that may undermine a key asset in financial markets – the unregulated, informal bond of trust linking investors and institutions. This short article argues that addressing the trust crisis is a way to deal with the limits of investors' knowledge and financial education and the complexity of the environment in which financial institutions operate.

Post-crisis financial markets need to be characterised by better rules and more efficient players. How can the relationship between investors and financial intermediaries be improved through policy interventions? Judging from the recent evolution in financial regulations (e.g., the upcoming entry into force of the European MiFID II package), transparency and information delivery have become key to investor protection and more effective financial planning. These keywords paint a novel landscape for financial intermediaries, whose strengths and weaknesses need to be fully understood and addressed in order for the plan to succeed.

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On one side, the focus on information transmission is grounded in the hypothesis that better information should lead to better decision making. Even setting aside the bulk of empirical evidence showing that individuals are able to process only a limited amount of information and are prone to several, well-documented biases even when offered objective information, the faith in the role of information delivery in improving financial decision has already been empirically challenged by a different but related strand of literature.

Indeed, the idea that skill transfer may affect financial market participation is not a new one and has been thoroughly explored in the financial literacy research. Financial literacy can be defined as the ability to understand and use key financial concepts regarding investment and saving in everyday life. Several authors have investigated how financial literacy can act as a facilitator for stock market participation (Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2011; van Rooij, Lusardi, and Alessie, 2011). More literate individuals are more likely to invest in the stock market and to select riskier assets with higher expected returns, as well as voluntarily engage in retirement plans. Despite its crucial role, the level of financial literacy in the average western population tends to be rather low (Lusardi and Mitchell, 2014).

Given its importance in fostering stock market participation, retirement planning and the use of financial tools to hedge against future uncertainties, financial education programmes represent a viable policy intervention to improve financial literacy, especially among the lower-income fringes of the population.

Unfortunately, the effectiveness of these programmes is difficult to prove, as there may be self-selection issues amongst participants (when they are not compulsory, only the most motivated may decide to enrol), which are impossible to rule out in the absence of a control group. Collins et al. (2010) show that such concerns have characterized many financial education programmes. The authors also point out the timing of the evaluations: many programmes are evaluated too soon after their completion and tend to rely only on self-assessment. In their meta study Fernandes et al. (2014) show that financial education seems to decay already 20 months after the exposure to financial education programmes, with almost negligible effects on actual financial behaviour, especially among low-income groups. Miller et al. (2015) underlines the difficulties in the assessment of educational interventions, but provides preliminary support to their positive impact on at least some areas of financial concern, such as savings and record keeping.

Empirical evidence suggests that educational programmes may not target the population groups that would need it the most (as they may be unable to understand the importance to participate or are too busy to join in a voluntary initiative) or may only produce temporary effects.

If transfer of information contents by itself may be ineffective and cumbersome, financial intermediaries could play the role of financial educators and find ways to steer a correct information processing and a correct decision making process. Unfortunately, again empirical evidence suggests that seeking for

professional financial advice is most frequent among financially literate individuals, i.e., advice and literacy are complements rather than substitutes (Calcagno and Monticone, 2015; Collins, 2012; Debbich, 2015). This article suggests that trust is another key feature in financial services provision and should be considered a powerful complement to information delivery and the general goal of increasing investors' competencies.

Trust can be defined as the lubricant of economic activities. Several studies have shown that generalized trust (i.e., trust towards others in general) is a significant determinant of economic growth (Knack and Keefer, 1997). Trust plays a significant role also in financial market participation (Guiso, Sapienza, and Zingales, 2008), while trust in financial advisors may increase the level of delegation and yield positive results to both clients and professionals (Gennaioli et al., 2015). In particular, the 'money doctors' model proposed by Gennaioli and colleagues shows that trust in a financial advisor translates into increased market participation by reducing clients' perceived risk aversion. Trust needs not necessarily be well-placed: as shown by empirical evidence, advisors pursue higher commissions and exploit trust by engaging their clients in riskier investments that investors would not have chosen on their own (Mullainathan et al., 2012). However, this behaviour not only generates higher commissions to advisors but also leads to higher expected outcomes and higher participation to clients, especially when they are so risk averse that they would not have entered financial markets on their own.

Recent empirical analysis shows that the 'money doctors' model bears significant empirical implications in times when trust is put most to the test. Dorn and Weber (2017) address how a sample of German investors reacted to the 2008 financial crisis, by distinguishing among fully managed, partially managed and individually managed accounts. Just as predicted in the money doctor model, trust is crucial for some investors to engage in the stock market, but it also carries a disastrous potential for backfiring when challenged. In fact, fully managed accounts are significantly much more likely to sell off all positions (suggesting trust was determinant in deciding to invest in the first place) and not reengage in the stock market after the crisis (showing that trust is difficult to rebuild once lost). In a way, trust in a financial expert is able to induce participation in the stock market, but delegation is vulnerable not only to observable financial results but also to shocks to trust. Provided that advisors act in the best interest of their clients, understanding the determinants of trust in advisors and detecting the types of clients more likely to trust them may contribute to increase market participation throughout alternative strategies based on increased delegation rather than on the mere transferring of skills from advisors to clients. The complementarity between financial education and trust develops its potential precisely in the figure of the financial intermediary – the financial advisor – who should act as a facilitator of information collection and processing as a way to build back trust. In other words, the delivery of information alone cannot effectively reduce the competence gap between the client and the advisor, but can foster a trusting environment where delegation can take place again. Financial intermediaries need to continue being the better informed part in the relationship with clients, but their willingness to disclose, explain and share

information (regardless of the effectiveness of these actions) may be a viable avenue to testify of their trustworthiness and re-establish a climate of mutual trust.

The features of the relationship between clients and their advisors should be further investigated. Recent empirical research on a large sample of Italian professional financial advisors has shown that advisors' trustworthiness is linked to a series of non-material factors that characterize the relationship they have with their clients (Cruciani et al., forthcoming). Once the relationship with the client stabilizes over time, professional success and absolute results lose importance compared to relational features (such as the frequency of meetings) and the ability to provide emotional support to the client. Interestingly, the tendency of some advisors to publish short articles on personal websites significantly explains the trust they receive once the relationship is stabilized. This implies that unsolicited and publicly available testimonies of competence and willingness to disclose contribute to promote a climate of trust, where a client knows that potential queries will be addressed professionally, even if he never puts any forward. This evidence supports the idea that trust is a key element in financial market participation and that rebuilding it should be the main goal of financial institutions. In order to preserve the positive effects of trust on financial market participation, an increased focus on information delivery and transparency need not make more impersonal the advisor-client relationship, where individuals are only a passive receivers of the information flow.

By assuming that a complementarity may exist between information and trust, financial intermediaries may find a way to rebuild their perceived professionalism and a positive climate for delegation.

The trust crisis generated by the recent financial turmoil still lingers and scholars and practitioners have an important task ahead of them. The effects of new regulation, such as MiFID II in Europe, on financial market participation should be carefully monitored. Trust encompasses an element of risk, as if the risk of being exploited did not exist, trust would not be necessary in the first place. Reducing the riskiness of delegation to an intermediary is necessary to govern financial advisory markets. However, if implemented simply in the direction of making the client-advisor relationship more impersonal and codified, it may crowd out the very incentive to trust, which for some is even a crucial driver of participation in financial markets.

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