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Hidden Consequences of Consumer Protection on the Financial Market: Regulation-introduced Bias*

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Abstract[1]

This paper deals with the problem of how the risk perception among retail customers is affected by the consumer protection regulation on the financial market. Through a questionnaire survey, we have measured the effect of selected consumer protection measures on banking or investment decisions taken by a young (student) population. These measures included the most common elements of financial regulation, such as bank deposit insurance, corporate bond prospectus, licenced fund management and securities broker indemnity insurance. Our results show that protective state intervention represents strong stimuli for customer decision-making with a widely misleading effect. It overshadows other factors, including individual qualification, risk-reward preference and demographic attributes, all of which were found to be insignificant. Since the surveyed measures reached a similar level of effect yet they offer different substance, this outcome has important policymaking implications.

Keywords: financial regulation, consumer behaviour, consumer protection, behavioural finance, capital market

JEL Classification: G18, G41, G53, D12, D18

Introduction

Cognitive and behavioural biases are well-known sources of deformations in consumer behaviour, especially in financial markets. As diagnosed by Thaler and Barberis (2005) and others (e.g., Oechssler et al., 2009; Massa and Simonov, 2005; or Hirshleifer, 2015), they lead to suboptimal

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decision-making on the consumers´ part, leading to their financial detriment. To illustrate the scale of the problem, it was reported by DALBAR (2021) research that in the period of 1984–2020, sub-optimal decisions costed the average equity investor almost eight percentage points of annualised returns, a staggering outcome. The legislation and regulations proposed by policymakers aim at preventing those losses as one of the primary objectives, both in continental Europe (Spindler, 2011; Lefevre and Chapman, 2017) and in the Anglo-Saxon world (Powell and Michaels, 2016). The introduced mechanisms should either prevent poor decision-making on behalf of the consumer (i.e., information disclosures, qualitative barriers of entry on the supply side), or mitigate its consequences (i.e., bank compensation funds). The effectiveness of those initiatives is disputed, with some authors arguing that the grip has tightened too much, especially after the 2009 financial crisis (Bexley, 2014), while others vouching for even more interventionary policies (Campbell et al., 2011; Akinbami, 2016; Avgouleas, 2009).

In financial investing, the "hard" factors of consumer decision-making have always been connected to the risk-return balance, as grounded by Sharpe (1964). While "riskiness" is still a central variable in the modern field of behavioural economics, there is abundant evidence on the distorted perception of risk among different groups (Gerhard and Hackethal, 2009; MacGregor et al., 1999). It is one of the prolific fields, where cognitive biases such as *loss aversion* or *endowment effect* take place, as diagnosed by Kahneman and Tversky (1979). Individual sophistication, such as financial literacy, seems like a natural recipe to reduce those biases, yet while its positive effect has been reported by some (Calvet et al., 2009; Agarwal et al., 2009), other studies disprove it Mandell (2006). Personal traits such as education, age or gender have also been reported to project a certain effect on biases´ prevalence among consumer groups (Chater et al., 2010). As Lusardi and Mitchell (2006) postulate, age in particular was found to be a strong factor of (diminishing) financial capability.

Recent literature supports significance of the risk misperception problems among consumers. Large number of empirical studies from the developed (e.g., Ainia and Lutvi, 2019; Kartini and Nahda, 2019) as well as developing markets (Lude and Prügl, 2019) points out that retail investors are susceptible to the cognitive bias mentioned before. Certain measures can diminish its negative effect, such as the presence of financial advice (Nguyen et al., 2019), yet the resulting consumer losses are still significant. Those findings do not undermine the classical risk-return models created by Markowitz (1952) and Sharpe (1964), as evinced by Burkett and Scherer´s (2020) examination of the standard deviation methods of calculation. The basic rationale of the relationship between the risk accepted for a certain reward stands; it is the perceived level of risk that is misjudged (Novianggie and Asandimitra, 2019). This lays the basic foundation for the research model and methodology we use.

While the biases and their detrimental effect on decision-making have been well described, comparatively less is known about the (de)stimulating effect of regulatory measures. Government interventions have been praised as effective, for example, in the case of U.S. retirement savings (Madrian and Shea 2001; Choi et al. 2004) or credit cards (Agarwal et al., 2015), but warnings have been raised about unfavourable trade-offs in more complicated cases, where households´ decision-making cannot be easily "nudged" (Campbell, 2016). Out-of-equilibrium markets destabilised by excessive consumer protection can not only increase prices across the board (Grubb, 2015), but can also amplify existing biases with some groups of customers (Handel, 2013; Spiegler, 2015). Specific knowledge suggests that information disclosures are a mostly effective "nudging" tool (Bar-Gill, 2012; Thaler and Sunstain, 2008), while price regulations are prone to a negative "overkill" (DellaVigna and Malmendier, 2004). There is a wide gap in between and many other regulatory measures are shrouded in uncertainty, when it comes to the effect on consumers, as shows the research on deposit insurance by Bijlsma and Van Der Wiel (2015). Do these measures suppress overconfidence, risk adversity and other biases, or rather strengthen them? This remains to be investigated.

With respect to the previous research, this paper seeks to evaluate the effect of selected consumer protection (regulatory) measures on consumer decision making in the field of investment and deposit finance. These measures included mechanisms most important in the banking field (deposit insurance) as well as on the capital markets (bond information disclosure – prospectus; securities broker bankruptcy insurance) and collective investing (fund manager regulation). In order to achieve the said objective, we have executed an experiment among the Central-Eastern European participants, usually young men and women at the beginning of their careers. Through a questionnaire survey, we first evaluated the strength of the surveyed regulatory measures (factors) impact on respondents´ decision making and then the cross-sectional (mis)perception of their effect. After a confrontation with literature expectations, our study points to several important findings that partly uproot the general perception of regulations´ effectiveness, when it comes to risk-perception bias.

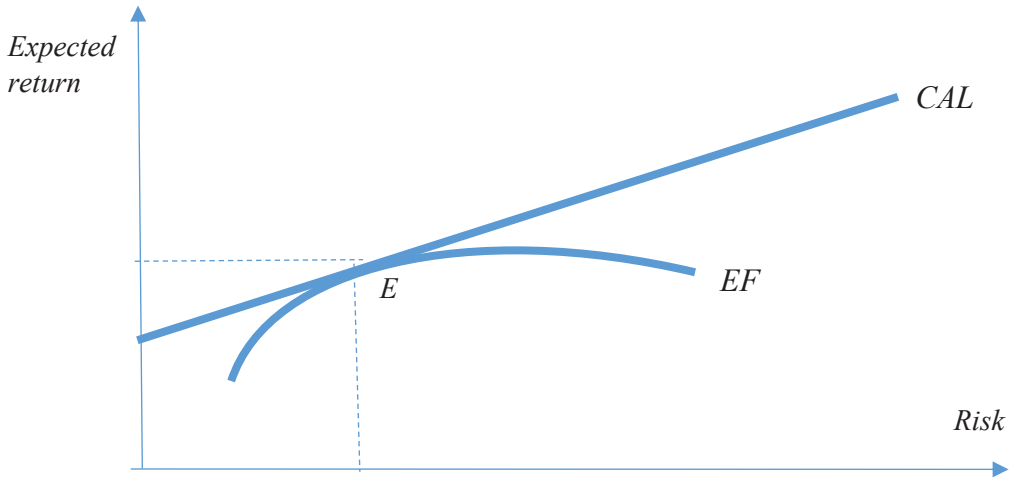
1. Model Development and Main Working Hypotheses

Our research into the potential deformation of consumer decision-making instigated by protective measures has two principal components. The first is the mechanism of the behavioural bias based on improper risk perception. The second is the assessment of misperception triggers introduced by individual regulatory measures. We disseminate theoretical background of both parts in the following chapters, leading to the subsequent outline of research assumptions and hypotheses. The undertaken model development also forms the crucial backbone of our methodology architecture, as outlined in the chapter 3.

1.1 Risk perception bias

As evinced in their review by Thaler and Barberis (2005), a notable proportion of imperfect consumer decision-making is based on a sub-optimal perception of the potential *loss* and its perceived *probability*. Misjudgement of the given investment´s riskiness is stipulated through factors such as relying too much on past successes (Biais and Weber, 2008), overconfidence (Nosić and Weber, 2010), financial literacy (Aren and Zengin, 2016) and even visual metrics and pictorials (Weber et al., 2005). The subsequent situation is a subjectively under- or over-valuated risk level associated with individual assets, resulting in a sub-optimal portfolio allocation (Hoffmann et al., 2015). We shall exhibit the potential effects on the Markowitz (1952) and Sharpe (1964) classical model of portfolio selection. The traditional equilibrium (*E*) here would be defined by the intersection of the individual capital allocation line (*CAL*) and the efficient frontier (*EF*) line (Image 1):

Image 1: Traditional portfolio selection model

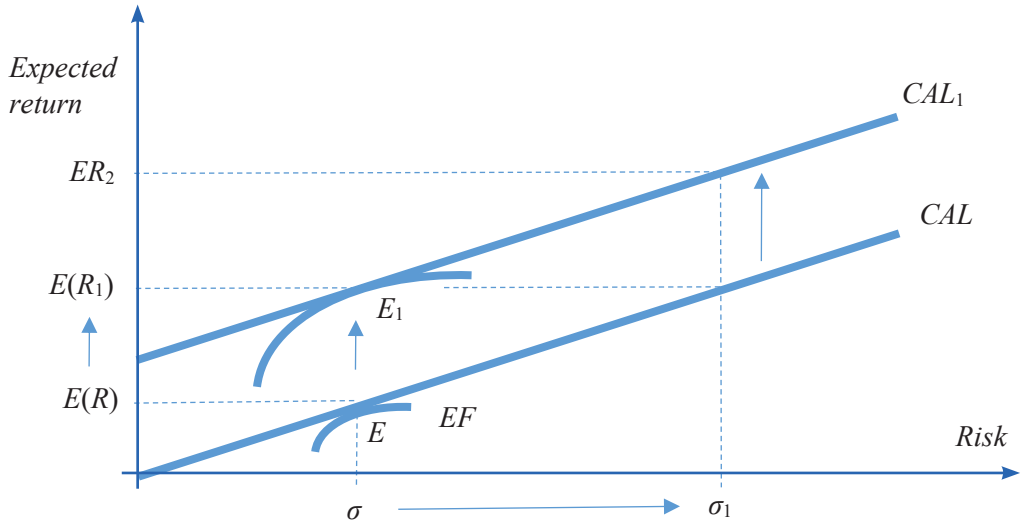


Source: Markowitz (1952), Sharpe (1964)

Our model incorporates several modifications. Firstly, we consider not only the market risk of the investment, but rather its overall risk (including default, fraud, and other similar possibilities). In this situation, there is no risk-free asset and the efficient frontier line starts to incur riskiness for every demanded non-zero return, i.e. starts from the zero intersection. Under objective risk perception, the investor would reach again equilibrium in the tangent point *E*. If the risk is underestimated, however, the *CAL* would be subjectively shifted to the new CAL_1

position, and the investor will reach subjective equilibrium at E_1. The objectively accepted risk, though, is much higher, reaching as far as R_1 level. We can easily deduce the opposite scenario for a possible risk over-valuation (Image 2).

Image 2: Modified portfolio selection model – subjective risk under-valuation



Source: authors' processing

Image 2 above illustrates clearly the side effects of the risk under- or overestimation. With the first scenario, the low-risk options are considered basically risk-free, although they are not – assuming even the most conservative example of bank deposits insurance (Helfer, 1999). Conversely, over-estimating the riskiness can extrapolate to nonzero risk being attributed to cash conserving, i.e. zero return option, when in fact even our model presumes no risk is taken. We establish those negative deviations as the **authority** (induced) **bias**. Its formal definition, exemplifying the risk under-estimation case, begins with equilibrium E_1 as defined by Markowitz (1952):

$$E(R_1) = r_F + b\sigma \tag{1}$$

The consumer here evaluates the investment´s total yield as a standard combination of the risk-free asset return (r_F) and the product of the risk premium (b) and the limited risk (σ) of the risky portfolio component. This, however, is only a purported balance. In reality, the consumer is taking a much higher risk (σ_1) than he or she perceives, reflecting his or her movement on the *EF* curve:

$$E(R_1) = r_F + b\sigma_1 \tag{2}$$

As mentioned before, the true level of the risk an investor takes on is higher by σ_{Δ} compared to the perceived one:

$$\sigma_{\Delta} = \sigma_1 - \sigma. \tag{3}$$

Finally, where the bias manifests itself is the risk premium element (b). Here the investor accepts a limited premium equal to a lower risk level (σ), while sacrificing (b_{Δ}) additional return:

$$b = \frac{E(R_1) - r_F}{\sigma} \tag{4}$$

$$b_{\Delta} = b - b(R_2) \tag{5}$$

The foundation of the whole misbalance is centred in the *perceived versus real risk level* bias of σ_{Δ}, similarly to the modelling undertaken by Burkett and Scherer´s (2020). In behavioural practice, the effect of the distortion and subsequent *EF* shift is likely neither linear, nor homogeneous. The size of risk misjudgement is determined by the intensity and direction of the biasing factor, i.e., regulatory measure in our case. This product embodies a situation, where factor influence on individual decision making is moderated by the deviation of its perceived effect from the objective one. This can vary greatly among different regulatory measures (see e.g., Sträter et al., 2008; or Boyle et al., 2015 for empirical examples). In other words, if there is a regulation which consumers take strongly into account when deciding about their savings (investments), but they judge its protective effect accurately[1], the final bias (*EF* shift determining σ_{Δ}) will be limited, and vice versa:

$$\sigma_{\Delta} = \sum_{i=1}^{n} (FS_i * FP_i) \tag{6}$$

In the above equation, σ_{Δ} stands for risk misjudgement, *FS* for factor strength an *FP* for factor´s effect misperception related to *i-th* regulation. The result of this conjunction is likely influenced by individual cognitive ability (Oechssler et al., 2009), significant effect of which on the economic behaviour has been long explored (Frederick, 2005; Benjamin et al., 2006; or Slonim et al., 2007). In return, the individual cognitive ability has been positively related to characteristics like individual education and financial experience (Cole and Shastry, 2009; Korniotis and Kumar, 2007), with personal traits like gender or age also playing their role (Chater et al., 2010). Coming out of this, we can procedurally develop the **risk biasing mechanism** as the following:

$$\sigma_{\Delta} = \sum_{i=1}^{n} (FS_i * FP_i \mid CA) \tag{7}$$

1 That is with the FP_i element close to zero.

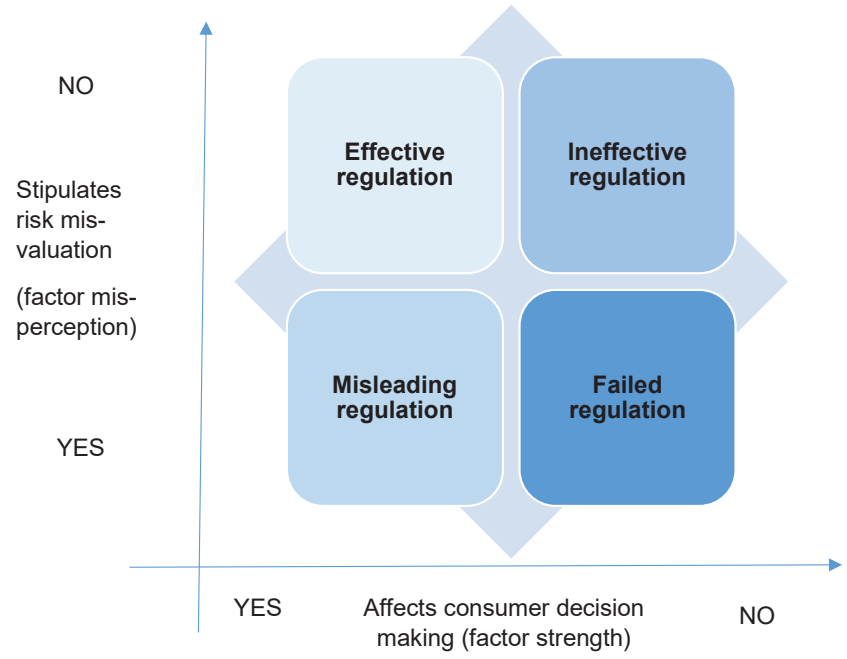
$$\sigma_{\Delta} = \sum_{i=1}^{n} (FS_i * FP_i \mid FEX, PT) \tag{8}$$

In equation (2), *CA* stands for cognitive ability. With the developed version (3), we specify cognitive ability as unification of financial education and experience (*FEX*) and personal traits (*PT*).

1.2 Working hypotheses construction

We have established the effect of risk misperception on the sub-optimal portfolio allocation, while also defining the related procedural research construction. The crucial question now is: can the consumer protection regulation act as the biasing factor? From the literature perspective, the consumer protection aims at reducing overall riskiness of the regulated assets as well as reducing misjudgement of their risk-consideration (Powell and Michaels, 2016). Yet in the introductory part, we have already compiled evidence that its nudging effect can fail under certain setup (DellaVigna and Malmendier, 2004) or it can even stipulate new biases atop of the existing ones (Handel, 2013; Spiegler, 2015). This evidence casts doubt on the positive references presented by Bar-Gill (2012) or Thaler and Sunstain (2008). On top of this schism, we can define the matrix of potential effect of individual regulatory measures, differentiating whether they tangibly reduce the overall riskiness of the investment and/or whether they induce the risk's under-valuation (Image 3):

Image 3: Possible effects of regulatory measures



Source: authors' processing

Obviously, every policy maker aims to achieve an effective regulation outcome. That is an implementing measure, which tangibly affects consumer behaviour in an intended direction, without biasing deformations. There is, however, ample evidence that connects diverse measures to the opposite side of the spectrum. In this study, we survey four regulatory measures often found as such, hence their choice:

(i) **Bank deposit insurance** usually deals with low awareness (Sträter et al., 2008; Boyle et al., 2015; Bijlsma and Van Der Wiel, 2015). Thus, it classifies as a potentially misleading regulation.

(ii) The **Bond investment regulation** is often considered as an example of failed information disclosure, on par with the controversial EU-introduced key information document (KID) brought up by the Packaged retail investment and insurance products (PRIIPS) directive (Burn, 2018). Prospectus itself, as a regulatory document, can seriously mislead investors into inherently very risky investments (La Porta et al., 2006). In certain developing markets, it can even stipulate the wrong impression that the underlying bond has been somehow "approved and certified" by the regulator (Šindelář and Erben, 2018a). This combination classifies the measure as a potentially failed regulation.

(iii) The **Fund manager regulation** reduces the overall riskiness of the investment by imposing rules of conduct but can also raise false hopes of unrealistic risk reduction (Klapper et al., 2004; Markham, 2006). Hence, it classifies as yet another potentially misleading regulation.

(ii) Finally, the **Securities broker insurance** aims at reducing the credit risk part of the capital investment with brokers, yet with the same potential cognitive deformation (Garcia and Prast, 2003). Thus, it again classifies as a potentially misleading regulation, similarly to (i).

After defining the mechanism of induced risk misperception and outlining regulatory measures as potentially biasing factors, we shall now define our hypotheses for the empirical assessment. The set of four items in total will be evaluated, for each of the factors listed in the previous chapter. While the first hypothesis reflects the theoretical discourse outlined in the introduction part, the remaining three are connected to theoretical expectations summarized during the risk perception bias overview:

H_1: The surveyed consumer protection measure (i)–(iv) is a significant factor of consumer choice.

(theoretical reference – Handel, 2013; Spiegler, 2015; Goethner et al., 2021)

H_2: The surveyed consumer protection measure (i)–(iv) significantly alters perception of risk connected to given investment options.

(theoretical reference – Campbell, 2016; Handel, 2013; Spiegler, 2015; Goethner et al., 2021; Firth, 2020)

H_3: Financial literacy (education) and experience significantly alter the size and direction of the effect induced by the surveyed consumer protection measure.
(theoretical reference – Aren and Zengin, 2016; Mandell, 2006; Kawamura et. al., 2021)

H_4: Personal traits (age, gender, nationality etc.) significantly alter the size and direction of the effect induced by the surveyed consumer protection measure.
(theoretical reference – Chater et al., 2010; Lusardi and Mitchell, 2006; Kawamura et. al., 2021)

2. Data and Methodology

Our study sample and main data-source consisted of 623 participants, whose main traits are summarized in Table 1. The survey itself was carried out in two waves, the first one (422 respondents) dealing with measurement of the factor strength component, while the second one (201 respondents) assessed the factor effect misperception.

Table 1: Survey sample basic traits

Trait (A–E)	A) Field of study	B) Year of study	C) Age	D) Nationality	E) Sex
Distribution of responses	Economics – finance oriented (199/16)	First – third year (BSc.) (221/57)	18–25 years (244/34)	Czech (294/60)	Male (185/34)
	Economics – other than finance (61/20)	Fourth – fifth year (MSc.) (141/17)	25–35 years (67/19)	Slovak and other Eastern Europe (20/4)	Female (166/41)
	Other than economics (102/39)	Fifth+ year (over graduate) (1/3)	35 years+ (50/12)	States of former Soviet Union (38/8)	Other (1)

Numbers of participants between both waves of the survey (in brackets) is divided by a slash.

Source: authors' processing

The subjects of the survey were mostly university students from Central Eastern Europe (CEE)[2] – these are people at the beginning of their careers, mostly with some level of expertise in formal economics or finance, given their field of study. It is an upcoming generation of white-collar professionals

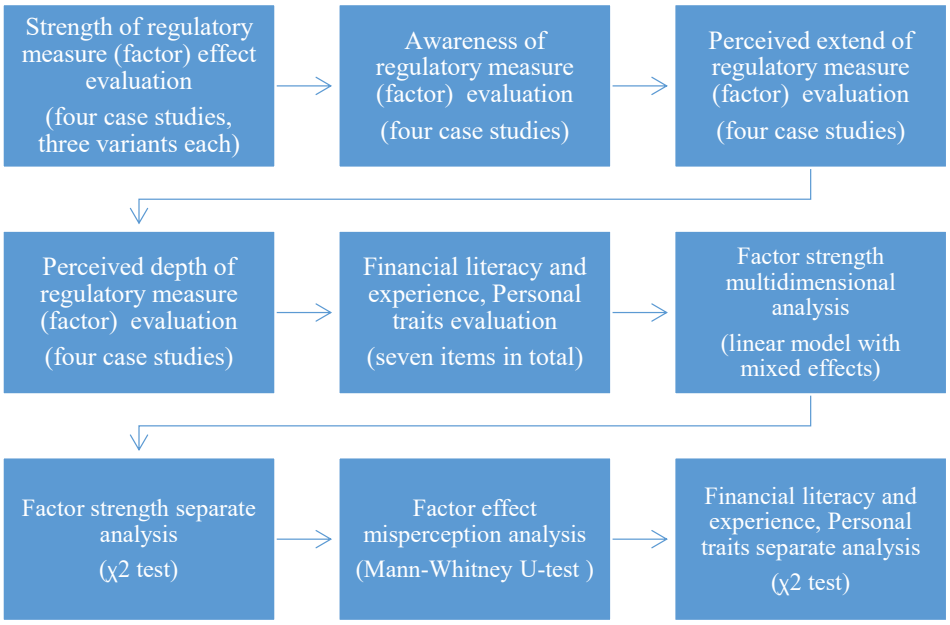
2 For the purpose of this study, CEE is composed of the following countries: Czech Republic, Slovakia, Hungary, Poland, Germany and Austria.

who are likely to form a crucial part of their countries´ economy while building their personal wealth. Informed consent was obtained from all participants in our research.

2.1 Method

Our main research method was an open experiment, carried out similarly to, for instance, Oechssler et al. (2009) through a questionnaire survey. The target audience was asked to complete an online questionnaire composed of three parts. The first part included the following four items: [1] Case study 1 (bank deposit) – testing the public deposit insurance factor; [2] Case study 2 (bond investment) – testing the bond prospectus factor; [3] Case study 3 (fund investment) – testing the investment manager regulation factor; and [4] Case study 4 (stock market investment) – testing the public broker insurance factor. A total number of nine following methodological steps are outlined by image 4:

Image 4: Experiment architecture overview



Source: authors' processing

The experimental nature of the questionnaire was based on the fact that after opting to take part in the survey, the participant was randomly redirected to one of three different versions of the case studies 1–4 (without knowing any further details of the questionnaire). In each of the case studies, he/she was presented with two different investment alternatives with one option generally less risky than the other. Each questionnaire variant fundamentally altered

the setup in those four parts, by connecting the regulatory factor to the difference between the two investment alternatives. This enabled us to judge the regulatory measure i.e. the factor strength (FS_i) component:

- Variant A: consumer protection measure [1]–[4] present with the riskier option (small bank, small cap fund, start-up bond, start-up share)
- Variant B: consumer protection measure [1]–[4] present with less-risky option (big bank, large cap fund, large corporation bond, large corporation share)
- Variant C: consumer protection measure [1]–[4] present with neither of the options (benchmark variant)

By using those different scenarios (variants) with differently risk-reward profiled choices, we were able to determine their effect dynamically. In the second (uniform) part, the individual awareness about protective measures [1]–[4] was evaluated in order to profile the perceived versus real effect on riskiness of the given investment (i.e., factor´s effect misperception, FP_i component). With each item, the respondents were asked about the following: [I] Awareness of given consumer protection measure´s existence – i.e., whether or not it is taken into account in their decision making, [II] Extent of given protection measure – i.e. whether they correctly judge the range of financial products (services) covered and not covered, [III] Depth of given protection measure – i.e., whether they correctly judge the vertical limitation of the coverage (e.g., maximum of insured deposits in given bank), [IV] Control question – in order to prevent false general awareness responses, we asked about non-existing (absurd) features of the regulation (disproving this absurd option confirms general awareness of the given measure).

The final part of the questionnaire dealt with the evaluation of the individual cognitive ability (*CA*) effect. Its principal attributes included financial education and experience (*FX* – multiple questions with points being awarded to reach an individual score) and personal traits (*PT* – field of study, year of study, age, nationality, gender), augmented by individual risk-reward preference (general). The data were collected using the Survey Monkey® platform and the full questionnaire is available in Appendix 1. Before the data extraction itself, focus group was held with total number of ten participants, successfully verifying questionnaires´ validity (face, content, criterion method) as well as reliability (test-retest method, Spearman correlation of 0.935 between repeated submissions).

Subsequently, statistical methods were employed to disseminate the results, using a two-pronged approach. Initially, a multidimensional model was constructed in order to assess the relations in a complex way. Its constitution followed similar consumer-behaviour models in the field (e.g., Koufaris, 2002; Lim et al., 2016; Chater et al., 2010) of the linear model with mixed effects as the quantification method. In the next step, separate evaluation was

carried out. For assessment of the factor strength, we used predominantly $\chi 2$ test to analyse significant differences between variants, along with logistic regression, the Fischer exact test, and the Spearman correlation coefficient test in order to evaluate effects of the given variables. In order to verify the significance of the factor effect misperception, i.e. the deviation of responses from the correct one, the Mann-Whitney U-test was our main working method. In other words, the $\chi 2$ and Mann-Whitney U-test were the methods used to confirm or disprove our set of hypotheses. Universally, p-values less than 0.05 were considered statistically significant and the analysis was conducted using the R statistical package, version 3.2.3.

3. Results

The structure of the presentation of results follows the steps described in scheme 4, namely statistical analyses outlined in the last four steps of our experiment. They process the data gathered in the first five steps through questionnaire survey.

3.1 Factor strength – multidimensional models

We start the factor strength (FS_i) results´ presentation with a multidimensional perspective, evaluating relations between variables holistically for each case study [1]–[4]. Outcomes of this estimations are summarized in table 2, denoting not only the individual factors´ effect, but also their mutual interactions:

The results indicate a dominant effect of the questionnaire variant – i.e., the consumer protection measure. That was found to be the single most significant variable in every single model. In other words, the choice of the investment option was undisputedly determined by the (non)presence of bank deposit insurance, bond investment prospectus, fund manager regulation and securities broker insurance in the respective case-study. Such an outcome confirms our H_1 working hypothesis. However, when evaluated altogether, additional variables come into play as well, most notably financial education and experience and Risk-reward preference. The age of the respondents made appearance surprisingly often, indicating direction for future exploration of the analysis. Along with nationality and the sex (gender) variable, it was often paired with the variant in an interaction element (denoted by colon), thus implying a different effect with different questionnaire variants. This supports the thesis of heterogeneous influence of those consumer traits on the final choice. In most cases, therefore, we can consider the H_3 and H_4 hypotheses confirmed as well. Overall, our multidimensional model points to a decision-making process centred strongly on the consumer protection level of investment (deposit) variants at hand, with other influences being mostly secondary.

Table 2: Multidimensional models – summary

Case study	Variable	p-value (>Chi)
Case study 1	Variant	0.0000***
Case study 1	Financial education and experience	0.0265*
Case study 1	Risk-reward preference	0.0122*
Case study 2	Variant	0.0000***
Case study 2	Risk-reward preference	0.0978
Case study 2	Sex	0.0231*
Case study 3	Variant	0.0000***
Case study 3	Financial education and experience	0.6264
Case study 3	Nationality	0.9186
Case study 3	Sex	0.6320
Case study 3	Age	0.0082**
Case study 3	Variant: Financial education and experience	0.0046**
Case study 3	Variant: Nationality	0.0132*
Case study 3	Variant: Sex	0.0257*
Case study 4	Variant	0.0000***
Case study 4	Financial education and experience	0.0139*
Case study 4	Age	0.1280
Case study 4	Variant: Age	0.0067

Source: own research

3.2 Factor strength – separate evaluation

In the next step, we shall evaluate the effect of each of the variables separately. The first batch of results is related to the most important, joint part of the survey. That is the evaluation, whether the questionnaire variant (i.e., presence of consumer protection measure) affected the respondent choice – again expressing the factor strength (FS_i) component. The outcome for the four case-studies tested is outlined in table 3:

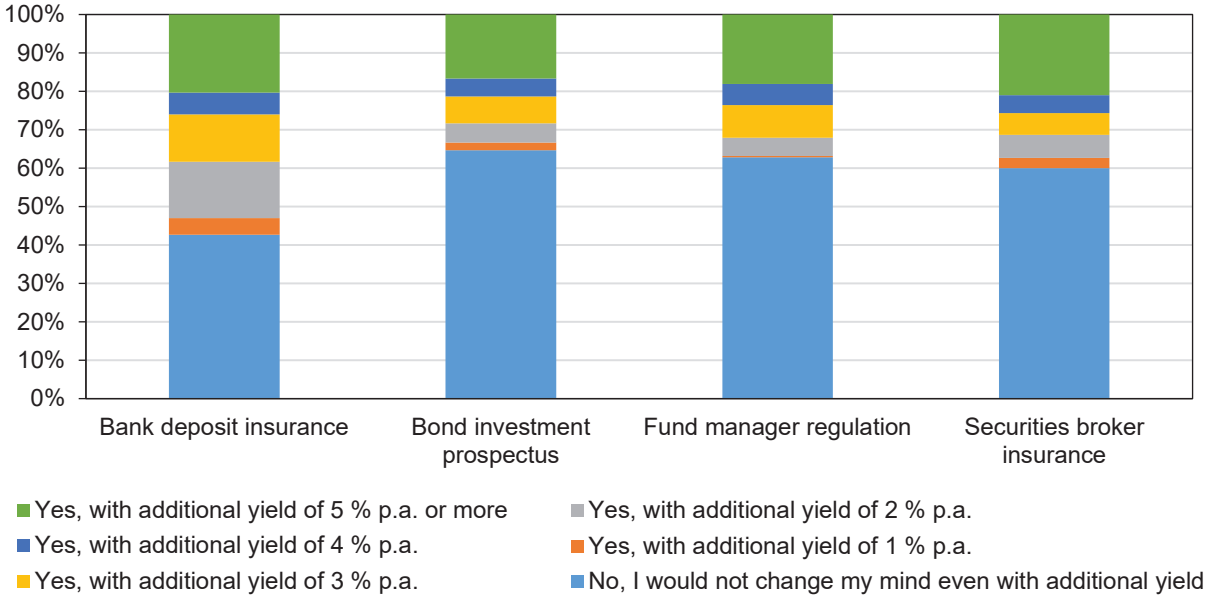
Table 3: The effect of the consumer protection measure (variant) on respondent choice

Case study	Test used	p-value	Significant differences between individual variants (post-hoc tests)
[1] Bank deposit insurance	χ2 test	0.0000***	all variants differ
[2] Bond investment prospectus	χ2 test	0.0000***	A-B and A-C differ
[3] Fund manager regulation	χ2 test	0.0000***	A-B and A-C differ
[4] Securities broker insurance	χ2 test	0.0000***	A-B and A-C differ

Source: authors' processing

As evinced by the test results, consumer protection measures introduced differently by individual variants proved to be a clearly significant factor of the respondents´ decision making (again in support of the H_1 hypothesis). Full disclosure of answers is included in Appendix 2. The questionnaire itself, however, did not end at the simple choice of a deposit or investment option. For each case study in the variants A and B, an additional question was included asking whether the participant would revert his or her choice for additional yield (return) provided. Distribution of answers is portrayed in Figure 1.

Figure 1: Change of the investment option with the possible additional yield provision



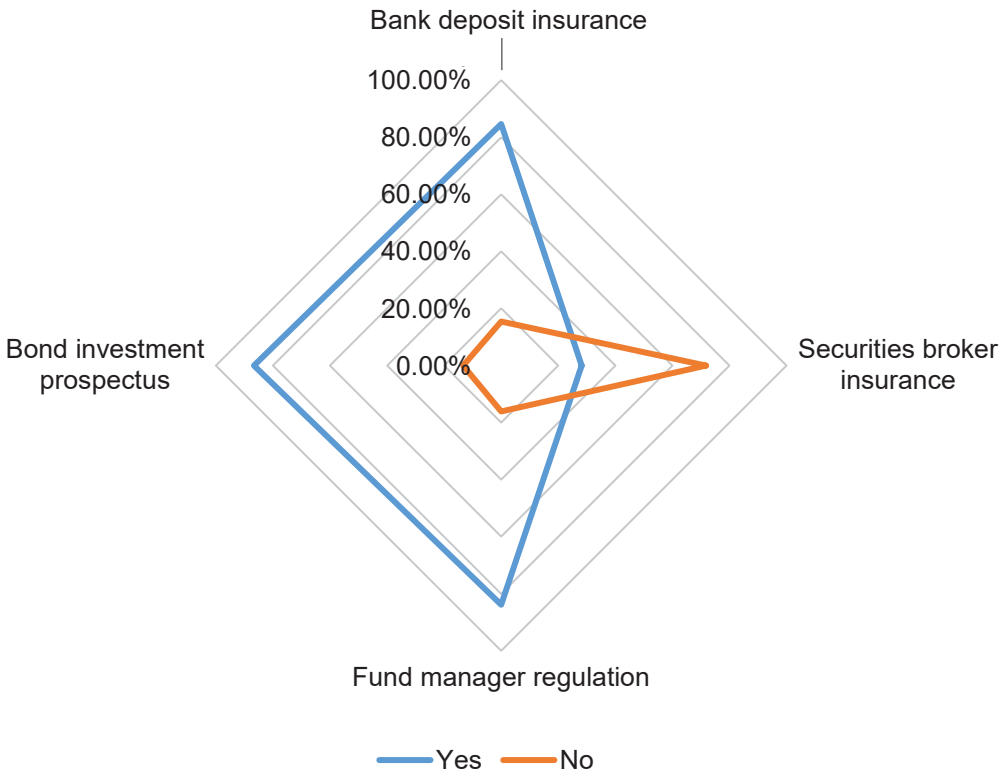
Source: authors' processing

The resulting data document stability and certainty of the consumer choice across the case studies. A substantial (and except for the case study [1] always major) part of the respondents is not willing to modify their decision with additional benefit provided, or the benefit must be unrealistically high (5% plus yield p.a.). This only underlines the strength of the effect projected by the consumer protection measures.

3.3 Factor effect misperception – separate evaluation

With the previous part, we have established the statistical significance of the factor (protective regulation) effect on the consumer decision making. Now it is time to follow our procedural model in the second part, asking how wide is the difference between the perceived and the real impact it has on the individual products and services – i.e., factor effect misperception (FP_i) component. With the first question, we asked the respondents about their general knowledge of the regulatory measure´s existence – as a proxy of it being taken into account at all. As exhibited by Figure 2, the results here largely correspond with the outcomes of the previous chapter. General awareness about consumer protection measures is almost universally high.

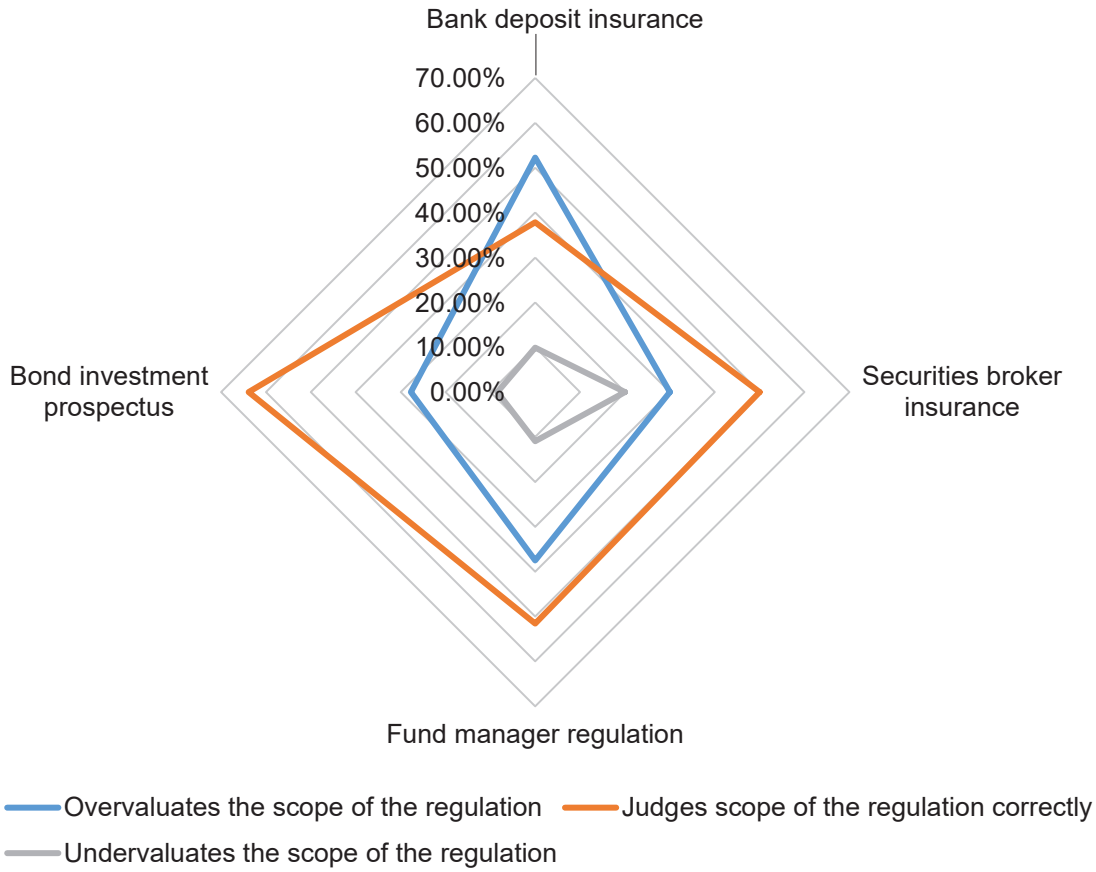
Figure 2: Awareness of the given consumer protection measure´s existence



Source: authors' processing

All of the surveyed regulatory measures (factors) are on a general level known to the target sample, with the exception of the securities broker insurance. The second attribute then deals with the scope of the regulations and its (in)correct perception[3], as displayed by Figure 3.

Figure 3: Extent of given protection measure



Source: authors' processing

With the scope attribute of awareness, the results were much closer. The notable part of the respondents over-valuated the scope of the regulation, by judging how it encompasses products and services that are in reality not included (e.g., third party funds sold by a bank not covered by bank deposit insurance). This indicates bias potential, as the proportion of the over-valuated responses was nearing a correct answer, even in the case of deposit insurance surpassing it. The under-estimation of scope was, on the other hand rather scarce. The further results are in Figure 4.

3 This and the following parts of the questionnaire were processed only to respondents positively responding about the regulation´s existence in the first question.

Figure 4: Control question

Source: authors' processing

In this final component, respondents´ awareness seems satisfactory on a general level. Deviations from the objective effect regulation (e.g., thinking there is no limit on the amount of insured deposits) are rather limited in both over and under-valuation. Finally, the control questions come into play. Here, the strong majority of the respondents claiming to be aware about the regulation´s existence responded with a correct answer, avoiding absurd responses. Thus, it confirms the survey´s construct validity – see Appendix 5 for details.

After reviewing the summary figures about the protective measures' awareness among the survey sample, we shall proceed to evaluate their statistical significance. We have tested the significance of the responses´ deviation in the scope and depth question, in relation to all four regulatory measures surveyed. The results are summarized in table 4:

Table 4: Factor effect misperception – summary

Item	Test used	p-value	Direction of the deviation
Factor 1 (bank deposit insurance) – scope	Mann-Whitney U-test	0.0000***	Respondents significantly overvalue the scope of the regulation
Factor 1 (bank deposit insurance) – depth	Mann-Whitney U-test	0.3101	No significant deviation
Factor 2 (bond investment prospectus) – scope	Mann-Whitney U-test	0.0023**	Respondents significantly overvalue the scope of the regulation
Factor 2 (bond investment prospectus) – depth	Mann-Whitney U-test	0.0354*	Respondents significantly overvalue the depth of the regulation
Factor 3 (fund manager regulation) – scope	Mann-Whitney U-test	0.0015**	Respondents significantly overvalue the scope of the regulation
Factor 3 (fund manager regulation) – depth	Mann-Whitney U-test	0.0201*	Respondents significantly overvalue the depth of the regulation
Factor 4 (sec. broker insurance) – scope	Mann-Whitney U-test	0.8016	No significant deviation
Factor 4 (sec. broker insurance) – depth	Mann-Whitney U-test	0.0726	Respondents significantly overvalue the depth of the regulation

Source: authors' processing

As evinced by the analysis outcome, consumer awareness about the scope and depth (limits) of the surveyed protective measures is significantly skewed, confirming our H_2 working hypothesis. This combined with the universally strong effect they have on the decision making, diagnosed in the previous chapter, confirms the existence of the authority bias theoretically defined by equation (6). The only two aspects that do not fall under this outcome include awareness about bank deposit insurance depth and securities broker insurance scope (with sec. broker insurance depth deviation displaying significance only on p=0.1 level). Such a finding has wide possible consequences.

3.4 Separate evaluation – additional factors

With our main research question being answered in the previous chapters is how did the personal attributes composing the cognitive ability (*CA*) aggregate fare? Were any of them similarly important on an individual basis? First, let us begin with the factor strength dimension. The complete results in this regard are summarized in Appendix 3 – out of total 84 items, only interactions near the significance interval were brought up here (Table 5).

Table 5: Effect of additional factors – factor strength

Case study vs. factor	Questionnaire variant	Adjusted p-value
Case study 1 vs. Financial education and experience	Variant A	0.0697
Case study 1 vs. Risk-reward preference	Variant B	0.0398*
Case study 4 vs. Age	Variant B	0.0699

P-values were adjusted (Holm method) in order to prevent false positives.

Source: own research

In short, none of the additional factors in the variant A of the questionnaire affected the consumer choice in a significant manner. The only close call was the financial education and experience variable with the first (banking) case study, at $p<0.1$. This puts the consumer protection measure into a unique position, and similarly so with the variant B. Here, only risk-reward preference and respondents' age were detected to provide such an effect, again in relation to the first case study. No such exception was found with the variant C; every factor was found insignificant, with a notable p-value margin.

Regarding the cognitive ability´s effect on the factor effect misperception, significant interactions are summarized in table 6.

Table 6: Effect of additional factors – factor strength

Case study vs. factor	Adjusted p-value
Factor 2 (bond investment prospectus) – scope vs. Age	0.0292*
Factor 2 (bond investment prospectus) – depth vs. Sex	0.0344*

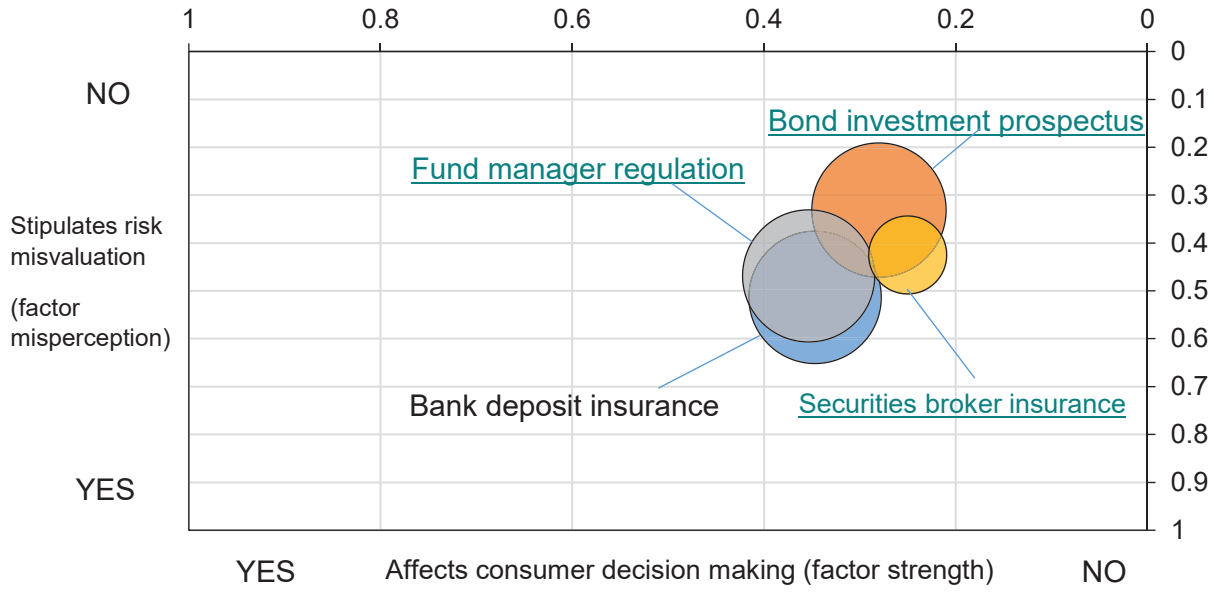
Source: authors' processing

Similarly to the previous part, individual cognitive ability measured the attributes used here has a largely insignificant role in the process of (mis)judging the regulatory measures´ protective effect. To sum this up, we can easily conclude that every personal as well as investment-preference factor was, again, easily overshadowed by the effect of the consumer protection measure. Specifically, with financial education and experience and risk-reward preference, this outcome is rather surprising. While this further supports the validity of H_1 and H_2 hypotheses, it casts serious doubts over the remaining two hypotheses, the H_3 and H_4. Overall, the results of a separate evaluation parallel broadly the earlier multidimensional ones, paving the way for joint interpretation.

3.5 Surveyed regulatory measures classification

In the final parts of the results overview, we return to the possible effects of the regulatory measures matrix outlined in scheme 3. Given the empirical data we have, how did the surveyed measures position themselves here? Image 5 brings the answer[4]:

Image 5: Regulatory measures matrix – empirical classification



Source: authors' processing

4 We used the ratio of skewed answers regarding the regulatory measure effect (both scope and depth) divided by the total number of answers in both questions to calculate the factor effect misperception ratio. Similarly, we took the difference between the number of respondents when the regulatory measure was present versus the neutral variant (C) divided by the total number of respondents in those experimental variants (A, B) to determine the ratio of the factor strength. The size of the bubbles is determined by the awareness of the given consumer protection measure´s existence.

The synthesis of the results into the final matrix, albeit simplified, presents disturbing results. All the surveyed measures are concentrated in the ineffective regulation quadrant, with all of them leaning towards a failed regulation – with the bank deposit insurance breaching the imaginary red line. Although this outcome is generalised, it indicates obvious implications for consumer protection by policy makers.

4. Discussion

Our results support the presence of risk-perception bias among the consumers in the target group, following on the related empirical studies (e.g., Ainia and Lutvi, 2019; Kartini and Nahda, 2019; Lude and Prügl, 2019). How risk is judged is an important determinant of the retail investor´s portfolio allocation, as modelled by Burkett and Scherer (2020). Our analyses also back up the presumption of the strong effect of consumer-oriented regulation on the resulting decision making, as implied by Madrian and Shea (2001); Choi et al. (2004); or Agarwal et al. (2015) studies. Every measure we have evaluated was found to be a significant factor, whose presence easily swept the respondents´ preference into generally more risky options. In this regard, we follow on a cognitive bias line constituted by Thaler and Barberis (2005) and others (e.g., Oechssler et al., 2009; Massa and Simonov, 2005; or Hirshleifer, 2015). Including the typically very conservative field of banking deposits, where it prompted the choosing a small bank with a shorter history over a more established, big one. At least with the bond prospectus case study, a proposed representative of a failed regulation, this supports the validity of our modified portfolio selection model: a situation, where the consumer is induced by risk under-estimation into a riskier choice than intended. With the remaining three supposedly misleading regulations, the outcome is less one-sided. Complementing this with the risk misperception data gained through the second part of the survey, we gain a grim picture of most consumers over-valuating the depth and scope of the investigated regulatory measures. Thus, although all the regulatory factors strength significance disproves the hypothesis of "not-easy-nudging" as proposed by Campbell (2016), when combined, it indicates that in the majority of situations, protective measures can actually deform the consumer´s choice into detrimental, more risky outcomes than intended. This finding connects with the mis-regulation warnings raised by Handel (2013) or Spiegler (2015) and, most importantly, amplifies the risk perception biases diagnosed by Thaler and Barberis (2005), Oechssler et al. (2009) and others. From the policy making perspective, this represents a fine twist of the initial aim. As summarised by the very OECD (Lefevre and Chapman, 2017), regulations often seek to compensate individual behavioural biases, while relying on the more or less binding limits to individual choice forced by the legislation. Along with philosophical questions regarding the acceptability of such a "greater good" approach, this

also brings practical consequences. If every regulatory measure helps, on one hand, to mitigate behavioural biases, while introducing new ones, this turns the current regulatory paradigm upside down. Of course, we do not deal with the financial dimension of the said biases, which will constitute an individual equation likely different for each consumer. One may argue that the material effect may be negligible in case of a rather stable and thoroughly regulated banking sector. It can have, however, fatal consequences when mistakenly relying on the bond prospectus as a credit risk mitigating signal – a problem frequently occurred in Central and Eastern Europe (Šindelář and Erben, 2018a).

Once we have established the regulatory measure as a significant and often misleading factor of consumer behaviour, what about the transformational effect of financial education and experience along with the personal traits? Simply put, the biasing input consistently overshadowed financial education and experience, as well as personal traits. Even the ex-ante determined individual risk-reward profile did not play a greater role, stressing the dominant role of the regulatory factor. The moderating effect of cognitive proxies we utilised was very limited, in contradiction with the expectations raised by Cole and Shastry (2009), Korniotis and Kumar (2005), or Chater et al. (2010). For the financial industry, such an outcome stresses the importance of operating in the regulated field, at least versus the retail clients. Interestingly enough, we have reached this outcome with a sample of young participants ("students without liabilities"), who are traditionally labelled as early adopter fancying unregulated disruptors (Ryu, 2018; Varga, 2017). One can easily extrapolate this finding into older, more conservative age groups. The regulatory context has been discussed above, yet on the individual level, the ambivalence of individual competence, investment profile and preferences sheds doubt on the whole appropriateness and suitability concept pushed by the European regulators (Spindler, 2011). In a broader empirical context, however, this outcome is not surprising, as documented by Mandell´s (2006) study on limited decisional benefits of financial literacy. Similarly blurred results were found in relation to the age effect reported by Lusardi and Mitchell (2006), albeit on a narrow data cohort.

Establishing consumer protection as a dominant behavioural (biasing) factor with cognitive proxy playing only a very limited role complements the calls for wide and intervening regulations to be put forward. These are being heard consistently since the financial crisis a decade ago (see e.g. Campbell et al., 2011; Akinbami, 2016; Avgouleas, 2009). Our study suggests that state intervention will guide the consumer choice and can mislead those, whom it seeks to protect. Especially in the case of the failed regulation, detriment to citizens´ financial utility is obvious. As evinced by the previous research in the field of investment inducements (Šindelář and Budinský, 2019) or pension products (Šindelář and Erben, 2018b), regulators often

fail to correctly diagnose the problem, yet alone affect its substance. This creates the potential for misleading, or worse, failed regulation that would lure consumers into distorted decision-making and sub-optimal portfolios. Finally, over-regulation brings higher costs for everyone involved, as pointed out by Grubb (2015). Given this and the strong effect of protective measures on consumer decision-making, they should be used sparsely and to full effect. To this end, our findings resonate with warnings voiced by Bexley (2014).

5. Conclusions and Policy Recommendations

Following the goal of the paper, we have diagnosed the surveyed regulatory measures to be a dominant factor of our respondents´ decision making, with common effect misperception indicating authority bias presence. Out of the four cases tested, there were subtle cases of ineffective and failed regulation. Factors expected by the literature to act as an effective proxy of individual cognitive ability with a moderating position were mostly found to be insignificant. These findings establish several recommendations for policy decision-makers:

(i) Every protective measure which is cast upon the consumer is likely to distort his or her choice. The deviations should be mapped in advance and evaluated as part of the regulation impact assessment (RIA). Specifically, they should be included in the cost-benefits analysis, where they are as presently often grossly missing.

(ii) Financial education and experience in the role of moderating catalysts that diminish the effect of the biasing factor are likely to assume only a minor part. This better be accounted for by the regulation concept and in consequent behavioural expectations (what consumers with different competency are likely not/to do).

(iii) Personal traits such as gender, nationality or age are presumed to have a limited effect on the possible distortion as well. The policies initiated to eliminate detrimental effects described here should therefore not be aimed at specific consumer groups, but rather at the whole population. This concerns for example financial education or information campaigns on the regulatory measures and their true scope and depth.

(iv) While regulations of the ineffective type can still achieve a neutral or even a positive primary outcome for the consumer (if the risk-reduction effect is greater than the risk-misjudgement), failed regulation represents a certain loss. To this end, no regulation at all is better than a failed one, thus not "numbing down" the consumer´s vigilance. This is especially important when symbolic new regulations are enacted (coming cryptocurrencies´ legislation is the primary candidate here).

Our research is bound by two main limitations. One relates to the geographical area we have focused our survey on, i.e., Central and East Europe. This region underwent drastic socio-economic changes in the 1990s and its people do not have many decades of experience with free yet regulated financial markets. We have mitigated this limitation by including a younger cohort of respondents, but probably not to the full extent. This is where the second point connects, to a limited age dispersion included in our study. Although this was an intentional design decision, including other age groups would further widen the provability of our results – a hypothesis that also supported by our multidimensional model results. Both those points represent natural directions for further analysis, along with its verification in the context of non-depositary (investment) finance, such as insurance and different types of credit. The verification of results through qualitative analysis is also suitable, despite their statistical verifiability. Given the problems such as over-indebtedness on developed as well as developing markets, these remain the most pressing issues.

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Appendix 1. Full questionnaire text

I) Measurement of factor strength – three variants:

VARIANT A:

1. You intend to dispose of an important part of your savings into a conservative product for the next few years. Which of the following would you rather choose?
   a) savings account with 1 % p.a. (yearly) yield in a big bank with a successful history on the market *(account is not insured as part of the state deposit insurance)*
   b) savings account with 3 % p.a. (yearly) yield in a small bank with a limited history on the market *(account is insured as part of the state deposit insurance)*

1a. Would you be willing to choose the other option than the one you did, if an additional yield was provided?

- Yes, with additional yield of 1 % p.a.
- Yes, with additional yield of 2 % p.a.
- Yes, with additional yield of 3 % p.a.
- Yes, with additional yield of 4 % p.a.
- Yes, with additional yield of 5 % p.a.
- No, I would not change my mind even with higher yield.

2. You intend to dispose of an important part of your savings into a conservative product for the next few years. Which of the following would you rather choose?
   a) corporate bond of a big company with a successful history, yielding 5 % p.a. *(without a prospectus issued by the authority)*
   b) corporate bond of a small company (start-up) with a limited history, yielding 8 % p.a. *(with a prospectus issued by the authority)*

2a. Would you be willing to choose the other option than the one you did, if an additional yield was provided?

- Yes, with additional yield of 1 % p.a.
- Yes, with additional yield of 2 % p.a.
- Yes, with additional yield of 3 % p.a.
- Yes, with additional yield of 4 % p.a.
- Yes, with additional yield of 5 % p.a.
- No, I would not change my mind even with a higher yield.

3. You intend to dispose of an important part of your savings into balanced (mixed) investment funds for a mid-term period – about 10 years. Which of the following would you rather choose?
   a) I will buy a balanced fund focusing on stocks and bonds of big companies with a successful history and an expected return of 5 % p.a. *(managed by an investment company not licensed/authorised by the authority)*
   b) I will buy a balanced fund focusing on stocks and bonds of small companies with a limited history and an expected return of 7 % p.a. *(managed by an investment company licensed/authorised by the authority)*

3a. Would you be willing to choose the other option than the one you did, if an additional yield was provided?

- Yes, with additional yield of 1 % p.a.
- Yes, with additional yield of 2 % p.a.
- Yes, with additional yield of 3 % p.a.
- Yes, with additional yield of 4 % p.a.
- Yes, with additional yield of 5 % p.a.
- No, I would not change my mind even with higher yield.

4. You intend to dispose of an important part of your savings into balanced (mixed) investment funds for a long period: 15+ years. Which of the following would you rather choose?
   a) single stock of a big company with a successful history on the market, with an expected return of 7 % p.a. *(the investment is not insured as a part of public securities-broker insurance)*
   b) single stock of a small company (start-up) with a limited history on the market, with an expected return of 9 % p.a. *(the investment is insured as a part of public securities-broker insurance)*

4a. Would you be willing to choose the other option than the one you did, if an additional yield was provided?

- Yes, with additional yield of 1 % p.a.
- Yes, with additional yield of 2 % p.a.
- Yes, with additional yield of 3 % p.a.
- Yes, with additional yield of 4 % p.a.
- Yes, with additional yield of 5 % p.a.
- No, I would not change my mind even with higher yield.

VARIANT B:

1. You intend to dispose of an important part of your savings into a conservative product for the next few years. Which of the following would you rather choose?
   a) savings account with 1 % p.a. (yearly) yield in a big bank with a successful history on the market *(account is insured as part of the state deposit insurance)*
   b) savings account with 3 % p.a. (yearly) yield in a small bank with a limited history on the market *(account is not insured as part of the state deposit insurance)*

1a. Would you be willing to choose the other option than the one you did, if an additional yield was provided?

- Yes, with additional yield of 1 % p.a.
- Yes, with additional yield of 2 % p.a.
- Yes, with additional yield of 3 % p.a.
- Yes, with additional yield of 4 % p.a.
- Yes, with additional yield of 5 % p.a.
- No, I would not change my mind even with higher yield.

2. You intend to dispose of an important part of your savings into a conservative product for the next few years. Which of the following would you rather choose?
   a) corporate bond of a big company with a successful history, yielding 5 % p.a. *(with prospectus issued by the authority)*
   b) corporate bond of a small company (start-up) with a limited history, yielding 8 % p.a. *(without prospectus issued by the authority)*

2a. Would you be willing to choose the other option than the one you did, if an additional yield was provided?

- Yes, with additional yield of 1 % p.a.
- Yes, with additional yield of 2 % p.a.
- Yes, with additional yield of 3 % p.a.
- Yes, with additional yield of 4 % p.a.
- Yes, with additional yield of 5 % p.a.
- No, I would not change my mind even with a higher yield.

3. You intend to dispose of an important part of your savings into balanced (mixed) investment funds for a mid-term period – about 10 years. Which of the following would you rather choose?
   a) I will buy balanced funds focusing on stocks and bonds of big companies with a successful history and an expected return of 5 % p.a. *(managed by investment company licensed/authorised by the authority)*
   b) I will buy balanced funds focusing on stocks and bonds of small companies with a limited history and an expected return of 7 % p.a. *(manager by investment company not licensed/authorised by the authority)*

3a. Would you be willing to choose the other option than the one you did, if an additional yield was provided?

- Yes, with additional yield of 1 % p.a.
- Yes, with additional yield of 2 % p.a.
- Yes, with additional yield of 3 % p.a.
- Yes, with additional yield of 4 % p.a.
- Yes, with additional yield of 5 % p.a.
- No, I would not change my mind even with higher yield.

4. You intend to dispose of an important part of your savings into balanced (mixed) investment funds for a long period – 15+ years. Which of the following would you rather choose?
   a) single stock of a big company with a successful history on the stock market, expected return of 7 % p.a. *(the investment is insured as a part of public securities-broker insurance)*
   b) single stock of a small company (start-up) with limited history on the stock market, expected return of 9 % p.a. *(the investment is not insured as a part of public securities-broker insurance)*

4a. Would you be willing to choose the other option than the one you did, if an additional yield was provided?

- Yes, with additional yield of 1 % p.a.
- Yes, with additional yield of 2 % p.a.
- Yes, with additional yield of 3 % p.a.
- Yes, with additional yield of 4 % p.a.
- Yes, with additional yield of 5 % p.a.
- No, I would not change my mind even with higher yield.

VARIANT C:

1. You intend to dispose of an important part of your savings into a conservative product for the next few years. Which of the following would you rather choose?
   a) savings account with 1 % p.a. (yearly) yield in a big bank with a successful history on the market
   b) savings account with 3 % p.a. (yearly) yield in a small bank with a limited history on the market

2. You intend to dispose of an important part of your savings into a conservative product for the next few years. Which of the following would you rather choose?
   a) corporate bond of big company with successful history, yielding 5 % p.a.
   b) corporate bond of small company (start-up) with limited history, yielding 8 % p.a.

3. You intend to dispose of an important part of your savings into balanced (mixed) investment funds for a mid-term period – about 10 years. Which of the following would you rather choose?
   a) I will buy balanced funds focusing on stocks and bonds of big companies with a successful history and an expected return of 5 % p.a.
   b) I will buy balanced funds focusing on stocks and bonds of small companies with a limited history and expected return of 7 % p.a.

4. You intend to dispose of an important part of your savings into balanced (mixed) investment funds for a long period – 15+ years. Which of the following would you rather choose?
   a) single stock of a big company with a successful history on the stock market, expected return of 7 % p.a.
   b) single stock of a small company (start-up) with limited history on the stock market, expected return of 9 % p.a.

II) Measurement of factor effect misperception

1. In case of your bank´s bankruptcy, are your savings insured in the EU?
   a) yes
   b) no (skips next two questions)

2. You intend to dispose of an important part of your savings into a bank. To have them insured as part of the public deposit insurance, you have to put them into:
   a) to any product offered by the bank – current account, savings account, term deposit, even mutual fund
   b) only to term deposit, current and savings account
   c) only to current account

3. If my savings are insured as part of the public deposit insurance, it means that:
   a) in case of bank bankruptcy I will get all the money back
   b) in case of bank bankruptcy I will get back money only up to 100 000 EUR (i.e. local currency equivalent)
   c) in case of bank bankruptcy I will get back money only up to 50 000 EUR (i.e. local currency equivalent)
4. For each insured deposit, the bank is required by law to offer a pre-approved consumer credit.
   a) No, public deposit insurance provides no such obligation.
   b) Yes, but only up to the amount of insured deposits.
   c) Yes, but only up to the double amount of insured deposits.
5. Can a corporate bond offer in the EU have an information sheet (i.e. prospectus) authorised by the national market supervisor (e.g. Czech National Bank in CZ)?
   a) yes
   b) no (skips next two questions)
6. You intend to dispose of an important part of your savings into a corporate bond, which has a prospectus authorised by the national market supervisor (e.g. Czech National Bank in CZ). That means the following:
   a) the authority approved business plan of the issuing company
   b) the authority approved only formal aspects of the prospectus
   c) the authority approved only name of the emission
7. The allowance of the prospectus means that:
   a) there is an administrative procedure for getting the prospectus at the authority, which also guarantees the return of the investment
   b) there is an administrative procedure for getting the prospectus at the authority, but it does not guarantee the return of the investment
   c) there is no administrative procedure for getting the prospectus at the authority, which also does not guarantee the return of the investment
8. By issuing a prospectus for the bond emission, the issuing party becomes obligated to provide the random investor with a bonus yield.
   a) No, prospectus regulation provides no such obligation
   b) Yes, for every tenth randomly selected investor
   c) Yes, for every hundredth randomly selected investor
9. When investing on the capital markets in the EU, are there investment funds operating under strict regulations, along with their managers (investment companies)?
   a) yes
   b) no (skips next two questions)

10. You intend to invest into an investment fund operated by a regulated investment company. That means the following:

    a) investments in the fund are insured as part of the securities-broker insurance
    b) investments in the fund are not insured as part of the securities-broker insurance, but are separated from the assets owned by the investment company itself
    c) investments in the fund are not insured as part of the securities-broker insurance, and are not separated from the assets owned by the investment company itself

11. The licence by the authority of the investment fund and its manager, which fall under the collective investments regulation, means the following when it comes to their code of conduct:

    a) investment company must arrange independent custodian´s supervision and fulfil other code of conduct obligations (management and control system), it must also compensate any decreases in the market value of the investments
    b) investment company must arrange independent custodian´s supervision and fulfil other code of conduct obligations (management and control system), it must not compensate any decreases in the market value of the investments
    c) investment company must not arrange independent custodian´s supervision and fulfil other code of conduct obligations (management and control system), it must not compensate any decreases in the market value of the investments

12. For every fund investment, its manager (investment company) is required to provide the investor also with a payment card, for possible remedies.

    a) No, fund management regulation provides no such obligation
    b) Yes, with a maximum remedy limit of 10 000 EUR
    c) Yes, with a maximum remedy limit of 50 000 EUR

13. Are investments through the securities broker insured as part of the public insurance in the EU?

    a) yes
    b) no (skips next two questions)

14. What kind of investments are insured as part of the public securities-broker (SB) insurance?

    a) investments to any instruments offered by the SB, including third-party mutual funds
    b) only investments to instruments executed directly by the SB
    c) no investments with the SB are insured, except from the money market instruments

15. If my investment is insured as part of the public SB insurance, it means that:
    a) in case of SB bankruptcy I will get all the money back
    b) in case of SB bankruptcy I will get back money only up to 20 000 EUR (i.e. local currency equivalent)
    c) in case of SB bankruptcy I will get back money only up to 10 000 EUR (i.e. local currency equivalent)
16. For each insured investment, the securities broker is required by law to offer a pre-approved credit margin.
    a) No, public investment insurance provides no such obligation.
    b) Yes, but only up to the amount of the insured investments.
    c) Yes, but only up to the double amount of the insured investments.

III) Respondents qualification and attributes:

5. Out of the following, which category carries the highest short-term fluctuations, i.e. volatility?

(a) Single stock or equity fund (1 point)
(b) State bond or bond fund
(c) Savings (bank) account
(d) I do not know

6. What are the main benefits of investing into collective investment schemes, i.e. investment funds?

(a) Diversification, liquidity and regulation, reducing the risks for non-professional (small) investors (1 point)
(b) The return is typically guaranteed by the investment company
(c) I do not know

7. In general, higher return (yield) means higher risk. True?

(a) Yes (1 point)
(b) No
(c) I do not know

8. Out of the following, in order to preserve the value of your investment and prevent losses (incl. inflation losses), generally the most suitable would be:

(a) Wide diversification of the portfolio (1 point)
(b) Investing only in government bonds and bond funds

(c) Investing only in equity (stock) and equity funds

(d) I do not know

9. Aside from bank and savings accounts, I have invested in the last three years into the following instruments (more options possible):

(a) Bonds or bond funds

(b) Equity (stock) or equity funds, including balanced ones

(c) Investment certificates, derivatives or similar products

(d) Individual portfolio management by a professional securities broker

(e) Did not invest into any of the above

(at least two options ticked = 1 point, less or e) option = 0 points)

10. Choose the most appropriate description of your stance towards your savings (investments):

(a) I am willing to accept no risk of losing part of my investments and want to have its nominal value guaranteed at all costs

(b) I am willing to accept a partial loss of my investments, in order to gain the possibility of higher than inflation revenue

(c) I am willing to accept a significant loss of my investment, in order to gain the possibility of a notably above-average return

11. What is your field of study at University?

(a) Economics with a focus on finance

(b) Economics with another focus (incl. law specialisations)

(c) Other than economics

12. In which year of your university studies are you currently?

(a) First year

(b) Second year

(c) Third year

(d) Fourth year

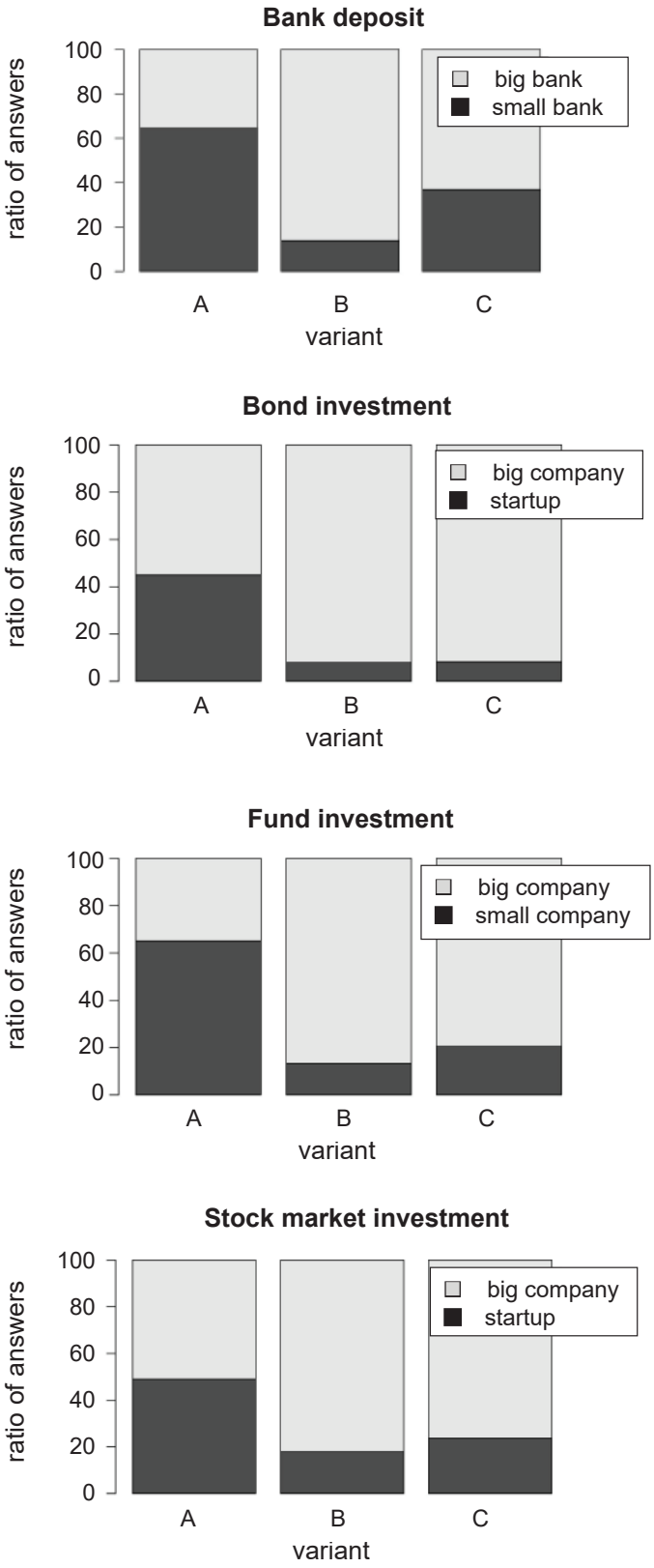
(e) Fifth year and above

13. Your age

14. Nationality

15. Gender

Appendix 2: Distribution of answers – case studies (Measurement of factor strength)



Appendix 3: Full disclosure of additional variables´ effect – measurement of factor strength

Variant A:

Case study vs. factor	Test used	Adjusted p-value
Case study no. 1 vs. Financial literacy and experience	Logistic regression	0.0697*
Case study no. 1 vs. Risk-reward preference	Spearman correl. coeff test	0.4911
Case study no. 1 vs. Field of study	χ2 test	0.4911
Case study no. 1 vs. Year of study	Logistic regression	0.4911
Case study no. 1 vs. Age	Logistic regression	0.8000
Case study no. 1 vs. Nationality	Fischer exact test	0.8000
Case study no. 1 vs. Sex	χ2 test	0.3195
Case study no. 2 vs. Financial literacy and experience	Logistic regression	0.6690
Case study no. 2 vs. Risk-reward preference	Spearman correl. coeff test	1.0000
Case study no. 2 vs. Field of study	χ2 test	1.0000
Case study no. 2 vs. Year of study	Logistic regression	1.0000
Case study no. 2 vs. Age	Logistic regression	1.0000
Case study no. 2 vs. Nationality	Fischer exact test	1.0000
Case study no. 2 vs. Sex	χ2 test	0.3512
Case study no. 3 vs. Financial literacy and experience	Logistic regression	0.4578
Case study no. 3 vs. Risk-reward preference	Spearman correl. coeff test	0.6934
Case study no. 3 vs. Field of study	χ2 test	1.0000
Case study no. 3 vs. Year of study	Logistic regression	1.0000
Case study no. 3 vs. Age	Logistic regression	0.2020
Case study no. 3 vs. Nationality	Fischer exact test	1.0000
Case study no. 3 vs. Sex	χ2 test	1.0000
Case study no. 4 vs. Financial literacy and experience	Logistic regression	0.3470
Case study no. 4 vs. Risk-reward preference	Spearman correl. coeff test	0.8550
Case study no. 4 vs. Field of study	χ2 test	0.7690
Case study no. 4 vs. Year of study	Logistic regression	1.0000
Case study no. 4 vs. Age	Logistic regression	1.0000
Case study no. 4 vs. Nationality	Fischer exact test	0.3470
Case study no. 4 vs. Sex	χ2 test	0.8550

P-values were adjusted (Holm method) in order to prevent false positives.

Variant B:

Case study vs. factor	Test used	Adjusted p-value
Case study no. 1 vs. Financial literacy and experience	Logistic regression	1.0000
Case study no. 1 vs. Risk-reward preference	Spearman correl. coeff test	0.0398**
Case study no. 1 vs. Field of study	χ2 test	1.0000
Case study no. 1 vs. Year of study	Logistic regression	1.0000
Case study no. 1 vs. Age	Logistic regression	1.0000
Case study no. 1 vs. Nationality	Fischer exact test	1.0000
Case study no. 1 vs. Sex	χ2 test	1.0000
Case study no. 2 vs. Financial literacy and experience	Logistic regression	1.0000
Case study no. 2 vs. Risk-reward preference	Spearman correl. coeff test	0.3208
Case study no. 2 vs. Field of study	χ2 test	1.0000
Case study no. 2 vs. Year of study	Logistic regression	1.0000
Case study no. 2 vs. Age	Logistic regression	1.0000
Case study no. 2 vs. Nationality	Fischer exact test	1.0000
Case study no. 2 vs. Sex	χ2 test	1.0000
Case study no. 3 vs. Financial literacy and experience	Logistic regression	1.0000
Case study no. 3 vs. Risk-reward preference	Spearman correl. coeff test	1.0000
Case study no. 3 vs. Field of study	χ2 test	1.0000
Case study no. 3 vs. Year of study	Logistic regression	1.0000
Case study no. 3 vs. Age	Logistic regression	0.5681
Case study no. 3 vs. Nationality	Fischer exact test	1.0000
Case study no. 3 vs. Sex	χ2 test	1.0000
Case study no. 4 vs. Financial literacy and experience	Logistic regression	1.0000
Case study no. 4 vs. Risk-reward preference	Spearman correl. coeff test	1.0000
Case study no. 4 vs. Field of study	χ2 test	1.0000
Case study no. 4 vs. Year of study	Logistic regression	1.0000
Case study no. 4 vs. Age	Logistic regression	0.0699
Case study no. 4 vs. Nationality	Fischer exact test	1.0000
Case study no. 4 vs. Sex	χ2 test	1.0000

P-values were adjusted (Holm method) in order to prevent false positives.

Variant C:

Case study vs. factor	Test used	Adjusted p-value
Case study no. 1 vs. Financial literacy and experience	Logistic regression	1.0000
Case study no. 1 vs. Risk-reward preference	Spearman correl. coeff test	0.9594
Case study no. 1 vs. Field of study	χ2 test	1.0000
Case study no. 1 vs. Year of study	Logistic regression	1.0000
Case study no. 1 vs. Age	Logistic regression	1.0000
Case study no. 1 vs. Nationality	Fischer exact test	1.0000
Case study no. 1 vs. Sex	χ2 test	1.0000
Case study no. 2 vs. Financial literacy and experience	Logistic regression	0.8614
Case study no. 2 vs. Risk-reward preference	Spearman correl. coeff test	1.0000
Case study no. 2 vs. Field of study	χ2 test	1.0000
Case study no. 2 vs. Year of study	Logistic regression	1.0000
Case study no. 2 vs. Age	Logistic regression	1.0000
Case study no. 2 vs. Nationality	Fischer exact test	1.0000
Case study no. 2 vs. Sex	χ2 test	1.0000
Case study no. 3 vs. Financial literacy and experience	Logistic regression	1.0000
Case study no. 3 vs. Risk-reward preference	Spearman correl. coeff test	0.6843
Case study no. 3 vs. Field of study	χ2 test	1.0000
Case study no. 3 vs. Year of study	Logistic regression	1.0000
Case study no. 3 vs. Age	Logistic regression	1.0000
Case study no. 3 vs. Nationality	Fischer exact test	0.2950
Case study no. 3 vs. Sex	χ2 test	1.0000
Case study no. 4 vs. Financial literacy and experience	Logistic regression	1.0000
Case study no. 4 vs. Risk-reward preference	Spearman correl. coeff test	1.0000
Case study no. 4 vs. Field of study	χ2 test	1.0000
Case study no. 4 vs. Year of study	Logistic regression	1.0000
Case study no. 4 vs. Age	Logistic regression	1.0000
Case study no. 4 vs. Nationality	Fischer exact test	1.0000
Case study no. 4 vs. Sex	χ2 test	1.0000

P-values were adjusted (Holm method) in order to prevent false positives.

Appendix 4: Construct validity measure – protective measures awareness