ISSN 2508-3155 eISSN 2508-464X

The International Review of Financial Consumers

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Vol. 7, No. 1, 2022

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The International Review of Financial Consumers, Volume.7 Issue.1(April, 2022), 1-18 pISSN 2508-3155 eISSN 2508-464X
https://doi.org/10.36544/irfc.2022.7-1.1
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The International Review of Financial Consumers

www.eirfc.com

Microfinance Effects on Borrowers' Poverty: A Case Study on BRAC

Muhammad Ziaulhaq Mamun† · Mohammad Aslam*

A B S T R A C T

Many parts of the world have been suffering with poverty and some are in extreme form. Microfinance is addressed as an instrument for accelerating financial access to the poor for alleviating their poverty as mentioned in the foremost sustainable development goal. This effort has been operationalized in Bangladesh through BRAC - a prime operator for poverty alleviation. BRAC is presently serving a large number of marginal poor below the poverty level globally. At the onset, governments and donor backed microfinance programs presumed a positive welfare effect on poverty. However, mixed effects are visible in empirical studies. This paper is designed to assess the microfinance effect on BRAC borrowers' poverty at business, household, individual, and security levels. The effect is measured by regressing microfinance on borrowers' poverty using the Household Economic Portfolio Model (HEPM). The results show that microfinance has a significant positive effect on reducing BRAC borrowers' poverty in each of the levels reflected by sixteen different items. Hence, this microfinance program appears to be effective as a development tool to alleviate poverty.

Keywords: BRAC, Borrowers, HEPM Model, Household, Individual, Microfinance, Poverty, Security

Ⅰ. Background

Around the globe, poverty is a severe issue. The parts in the world with extreme prevailing poverty may endanger the rich blessed countries. Sometimes, it may induce unlawful activities leading to violence in its worst form. Being born as a poor is not a crime and it is not in their hand to control most of the time, even though they have been reprimanded for this granted crime they did not commit. Nearly half of the population of the globe (exceeding about three billion) have been living by earning lesser than U.S. $2.50 per day. Of them about 1.3 billion people live in extreme poverty level expending not as much as $1.25 per day. More saddening is that about one billion children across the globe have been plunged in poverty and around 22,000 children die a day because of poverty (UNICEF). These alarming issues are very much related with poverty at grass root level. To solve this poverty for humankind, microfinance might be very effective instrument (Yunus 2007). At sub-national levels supported by international development agencies, microfinance is frequently found to have a positive effect on poverty reduction based on relatively small sample studies (Roth et al. 2016).

The microfinance effort has been regarded as a momentous change in development technique. At the point when the concept matured during the eighties, it was viewed as a trustworthy answer for solving poverty and when it shows due consideration for the welfare of women's

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lives, the engaging quality of the concept is significantly more reformist. Development agencies along with governments begin to apply this model after proper acknowledgement of the microfinance idea during the mid-seventies (Goldstein 2011). However, it is contended that different strategies like the delivery of rudimentary facilities and infrastructures might be more successful to reduce poverty than microfinance. It sabotages the wide range of various strategies of the spectrum by giving focus just on microfinance (Bateman & Chang 2012). Ongoing researches have highlighted the disappointment of microfinance services as a method for development due to high interest rates, alternative use, over indebtedness, etc. (Chhorn 2020).

Microfinance has a portfolio of $ 124 billion with 140 million borrowers across the world. India is the highest followed by Bangladesh, Vietnam, Mexico, Philippines, and other countries by the number of borrowers in 2018. Bangladesh is the pioneer in conceptualizing and applying microfinance ideas. Today over 31 million borrowers (including BRAC) are being served with a loan portfolio of about U.S. $8.0 billion in Bangladesh. Here, modern microfinance has expanded its scope far beyond household activities and self-employment through diversifying borrowers' economic activities. They recognize the heterogeneity among the poor and carefully target and develop customized financial services that best meet their varying needs.

BRAC is a leading provider of financial services for the poor, operating in seven countries including Bangladesh, Pakistan, Tanzania, Uganda, Sierra Leone, Liberia, and Myanmar. BRAC's microfinance activities work through a unique 'credit-plus' approach, addressing the specific needs of various target populations such as rural women, youth and adolescents, landless poor, marginal farmers, migrant workers, urban poor, and small entrepreneurs. BRAC's microfinance members also have access to and benefit from their other development interventions. BRAC's microfinance clients use financial services for a range of reasons, from funding various income-generating activities, to investing in small assets, ensuring stable cash flows for consumption, building up resilience against financial shocks, to simply saving for the future. BRAC has a total enrolment of about 4.19 million borrowers with 279,175 village organization. Its loan portfolio is shown in Table 1.

A rising pattern of microfinance directing a small amount of fund to the people living beneath the poverty line has been watched dominantly for the last few decades.

Table 1. BRAC portfolio

Particulars	Quantity
Village Organization (VO)	279,175 organizations
VO Members	5.84 million members
Total Borrowers	4.19 million borrowers
Dabi Borrowers	3.72 million borrowers
Progoti Borrowers	254, 330 borrowers
Cumulative Disbursement	$ 8175 million
Outstanding Loan	$ 706 million
Repayment Rate	98.76 percent

Still, the appraisals of these sorts of creativities are missing in the existing literatures (Mokhtar 2011). The usefulness of microfinance in decreasing poverty significantly and expanding the welfare of households stays an open question and current literature gives various outcomes (Chhorn 2020). This research has been centered to complement the existing literature by exploring the effect of microfinance on BRAC borrowers' poverty at business, household, individual, and security level. The rest the paper will be offered with an overview of microfinance supportive, adverse and indifferent effect on borrowers' poverty including the theoretical framework. Thereafter, it presents the methodology, result, and discussion followed by conclusions and recommendations.

Ⅱ. Literature Review

A. Microfinance and Poverty

Microfinance has been expected to produce favorable longstanding effects on productivity (Chowdhury 2009). It assumes to be a powerful development strategy to break the vicious cycle of poverty. It begins with the aptitude to lift mass people out of poverty, to empower women, to help those on the edge of society. Yunus (1987) noted that credit is a fundamental human right. This right may be exercised through the operation of microfinance. Microfinance can make this dream come true. Poverty will one day be found only in a museum (Yunus 2007). Microfinance has been envisioned to diminish poverty, encourage job creation, produce earning capability and in the long run help poor people all over the world.

Otherwise, these needy individuals need to take borrowings from neighbor, relatives, friends, or even from local informal money lenders (often quoted loan shark for their extreme terms and conditions) related with very high rate and unfavorable treatment. This sort of informal and casual loan frequently produces serious adverse consequences. But there are mixed research findings in this respect.

A lot of studies have been conducted over the years examining microfinance impact and they produce mixed results (Cautero 2019, Duvendack et al. 2011, Khandker et al. 1998, Roodman & Morduch 2014). Microfinance has not been the silver bullet as it was once considered. Some researchers have revealed that many borrowers consume their loans to cover short term crises rather than address long term development and end up with over-indebtedness. Some found microfinance loans expensive and incur high interest to meet the necessary operating costs of fund providers. It is rarely sustainable among the poor at modest interest rates and very rarely reaches the poorest. It also encourages economic inefficiency. Less consumption demand and unhealthy competition make business catastrophe in poor communities. As a consequence, the majority of new businesses fail within a short time. Many microfinance programs abuse to some extent rather than empower poor people. The collection policy is sometimes heavy-handed which makes some extortion to borrowers' lives. Besides, there is a long-standing issue with exploitive interest rates and many poor are trapped in deepening cycles of poverty and debt as a consequence.

B. Supportive Views

The concept of micro-finance helps marginal poor to fulfill their aspiration which are at the bottom of the ladder. A well-noted empirical work in Bangladesh by Roodman and Morduch (2014) noticed positive effects of microcredit on households. In order to determine microfinance effect Pitt and Khandker (1998) apply a quasi-experimental design. They concluded that, especially in the case of lending to women, microfinance increased household spending. Khandker (2005) argued that microfinance benefited highly poor people much better than relatively poor people through applying panel data analysis. In Bangladesh, numerous researchers have explored the impact of microfinance in their respective studies. As an instance, exploring eighteen hundred borrowers in eighty-six villages, Khandker (1998) showed positive changes in various variables such as income, consumption, expenditure, savings, wealth accumulation, employment generation, etc. He also enumerated that about five percent of the borrowers annually get out of poverty by their individual communities.

Some other researchers like Hashemi, et al. (1996) and Husain (1998) observed a similar form of positive effect on borrowers in Bangladesh attributable to microfinance. Many of these scholars claimed that microfinance supported people below the poverty line with comparatively decent lives and brought them at least to poverty reduction, or even out of poverty. The supply or lending side of the system is under the jurisdiction of microfinance. It provides the poor with small credits to start income-generating activities that help them accumulate resources along with increasing standards of living (Littlefield et al. 2003). Milton Friedman, recipient of the Nobel Prize in Economics in 1976, cited "The poor remain poor not because they are lazy but because they do not have access to money" (Smith & Thurman 2007).

C. Adverse Views

Contradictory effects of microfinance have created enduring doubt of the development strategy. Morduch (1999) along with Pitt and Khandker (1998) found no effect on the amount of borrowers' spending using simple predictors. However, they observed that microfinance decreased consumption uncertainty. Different researchers were of the opinion that microfinance did not succeed for its intended purpose but rather, it failed to accomplish its goal in different aspects (Duvendack et al. 2011, Hickel 2015). All these researchers argued that microfinance often produced more suffering and borrowers ended up with worse results. A significant explanation was that, instead of engaging in revenue-generating programs, often borrowers diverted their loans to pay for their basic consumption. This diversion of the loan caused a stalemate in the generation of their income. Therefore, they sunk themselves into further debt as a consequence.

In South Africa, 94 percent of all microfinance credits had been redirected from the planned purpose of alleviating poverty to some other purpose (TRT.World 2017). This generated the condition where borrowers had not been

interested in income generation with their initial loan. As a result, to pay off the current debt obligation and so forth, they again needed another debt. With more loans, this plunged them deeper down and made the situation worse, and, in some cases borrowers committed suicide (Taylor 2011). Even a significant claim was that the microfinance net effect against poverty in the developing world had been observed to be nearly zero (Hickel, 2015). Bateman's (2010) controversial and provocative analysis revealed that microfinance did not really work for its intended purpose, rather it created hype on half-truths, and it worked for those people promoting and working for microfinance. In addition, it demonstrated that it really created an important blockade to sustainable socio-economic development. Hulme (2000) noted that microfinance did not even scratch the surface of poverty outside Bangladesh.

D. Mixed Views

In different periods and locations around the globe, microfinance effect assessments have been reported with different findings. A number of research outcomes triggered a stalemate situation and suggested further researches to determine microfinance effect. They showed poor linkages between microfinance and poverty alleviation when systematic or repeated exercises had been performed (Roodman & Morduch 2014). Microfinance when used properly, however, could act as an effective tool to alleviate poverty for poor people usually unserved or underserved for financial services (Cautero 2019). Over the past few decades, policymakers and donors had supported it as a responsibility, both economically and even politically. While there were several cases of positive outcomes of microfinance, there were also negative reports for borrowers with loans which made their welfare much worse.

In recent years, finding out microfinance effect for poverty alleviation had been most important arguable subject (Duvendack et al. 2011). Poverty mitigation might undercut the microfinance key goal, however, social promotion, emancipation and inclusion could be extended as the domino effect and microfinance needed to be continued instead of tenacious difficulties and mismanagement (Milana & Ashta, 2012). Bhuiya et al. (2016) studied borrowers wellbeing through household income and consumption in their econometric analysis and indicated that increase in the duration of microfinance borrowing was associated with an increase of income and consumption. Pitt et al. (2006) pointed out that effects of microfinance differ significantly for borrowers of different gender and noted that women were performing much better than men.

Rahman et al. (2015) found microfinance has increased income, general expenditures, and savings and also confirmed that relatively high-income borrowers experienced more benefits and women gained greater access to decision-making. Woller and Parsons (2002) concluded favorable community economic impact through associating microfinance with regional income multipliers. Roodman and Morduch (2014) showed that microfinance decreased poverty with the hope of possibility which was not confirmed through randomized controlled trials. After dropping outliers, even the original results on poverty alleviation did not appear. Microfinance might have positive effect for its well design and target to subset of poor people but not for all and it needed to be complemented rather than replaced with other development tools (Sinclair, 2012). However, many researchers conclude that there is a significant positive effect for some few development indicators, whereas, it is not true for other development indicators.

Through providing small loans to borrowers, De Mel et al. (2008) measured the increase in profits arising from this exogenous shock to capital stock and found the average real return to capital substantially higher than the market interest rate. Ghalib et al. (2015) revealed that microfinance had positive effect on the borrowers' households for indicators such as healthcare, clothing, water supply, house quality etc. Imai et al. (2010) examined whether household access to microfinance reduced poverty and found significant positive effect of productive loans on multidimensional welfare indicator despite some limitations arising from potential unobservable important determinants of access to microfinance institutions. Mukherjee (2015) examined whether the government subsidized microfinance program has been able to expand physical, economic, political and socio-cultural spaces across castes, creeds and beliefs and found success in effecting upon physical, economic and political components of empowerment, but has failed to expand socio-cultural spaces.

Despite the latest crisis within the microfinance industry, it continued to expand as a key development tool. Van et al. (2012) considered financial outcomes (e.g., income, savings, expenditure and assets), as well as, non-financial outcomes (e.g., health, nutrition, food security,

education, child labor, women's empowerment, housing, job creation, and social cohesion) and they found indifferent effect showing that microfinance does harm, as well as good, to the livelihoods of the poor. Some researchers did not agree for the same indicators rather put positive effect on some other indicators (McIntosh et al. 2011). Further, Lascelles and Mendelson (2012) observed that because of inadequate proof for positive effect, micro-finance may be losing credibility.

Ⅲ. Microfinance Theory, Models and Variables

A. Microfinance Theory

The theories behind microfinance tell us how it is effective in the application toward borrowers. These theories were quoted by Osmani and Mahmud (2015) in three systematic ways. These are (i) theories relating to incentives (moral hazard), (ii) theories relating to screening (adverse selection) and (iii) theories relating to contract (contract enforcement). Moral hazard has been tackled though group-lending approach used in microfinance to oblige the borrowers putting relatively higher degree of effort for the fruitful result. It makes the borrowers morally responsible through behaving in desirable way by selecting the suitable schemes. The microfinance as a loan market may operate in odd or unusual ways when the data is asymmetrical between lenders and borrowers.

Adverse selection is presumed as a market disappointment for selecting wrong type of borrowers. This has been tackled through joint liability lending to prevent adverse selection, which leads to better credit market efficiency. Contract enforcement issue arises when borrowers have made the target returns but do not want to repay back the loan. The revenue generating activities supported by microfinance go well but there is no formal contract between lenders and borrowers which can make them bound to pay back. Since collateral is absent, there is not much in the lenders hand to do anything legitimately for execution. This issue has been tackled thorough threatening borrowers with no further credit in future. The borrowers might be induced to consider the future availability of loans as the lenders are capable of making the threat credible. When a borrower is concerned with microfinance, all these theories are believed to be in operation. The implementation of these theories in the field, whether they work or not for poverty alleviation, is worth exploring.

B. Micro-finance Model in the Study and Variables

In this study, Household Economic Portfolio Model (HEPM) is used to overcome shortcomings in microfinance effect evaluation. The main function of the HEPM model is to get rid of overestimating one particular indicator of borrowers' welfare. The HEPM evaluates microfinance effect through three levels: (i) business, (ii) household and (iii) individual (Chen and Dunn 1996). The household resource components include human household resources (i.e., time, labour, and skills), physical household resources (i.e., land, construction, tools & equipment, and raw materials) and financial household resources (i.e., cash and cash equivalents). In microfinance effect assessment, fungibility produces more challenges than other concerns. This is far more significant than endogeneity and selection bias. Nonetheless, fungibility can be resolved through the HEPM model by assessing the impact of microenterprise services (Khalily 2004).

For the individual member of the corresponding household, all the above listed resources can belong either individually or collectively. The resource can be obtained from either an informal entity or a formal institution or even from the network existing in the society. There should be some household activities consisted of production, consumption and investment, after receiving loan from microfinance institution. Production household activities includes income generating, household maintenance and outdoor activities. Consumption household activities include basic amenities together with ceremonies and amusements, and investment household activities include real property, productive assets, physical storage of wealth, human resource development through education and training. The revenue generated from these activities would flow into domestic belongings. The HEPM system becomes operational by considering all perspectives of the borrower's domestic activities (Figure 1). Since all components have been interrelated with each other, HEPM recommends that microfinance effect assessment should be carried out on all of them simultaneously. Therefore,

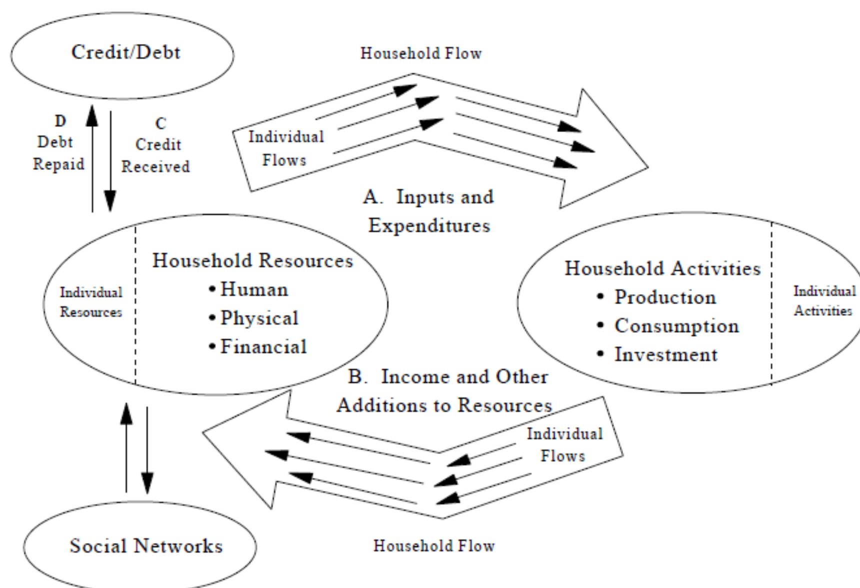

Figure 1. Household Economic Portfolio Model (Chen and Dunn 1996)

effect assessment has been studied at microenterprise level, household level and individual level as well.

Poverty, the dependent variable in this study, is characterized by different poverty variables in conjunction with Household Economic Portfolio Model. Poverty is measured in relative terms rather than in absolute terms. For instance, business revenue has been considered as the poverty variable in the business level effect measurement of microfinance. After at least one year of microfinance intervention, we measure whether a participant borrower's opinion about business revenue increased or not compared to non-participant borrowers. If a participant borrower agrees there is more business revenue increment compared to a non-participant borrower, she is better off towards poverty alleviation. An opinion can be formed that microfinance has a positive effect on poverty holding other things constant.

In line with the aforesaid HEPM, we add one more level for the effect assessment with microfinance intervention. This is the security level, which is further split into borrowers' social security, financial security, food security, and health security. Finally, this study intends to measure borrowers' poverty for microfinance intervention and we also intend to measure this type of effect assessment quantitatively.

Ⅳ. Study Method

In this study, microfinance is taken as an explanatory (independent) categorical variable that takes two levels: (i) a treatment group with microfinance intervention, and (ii) a control group without microfinance intervention. Loan is given to participant borrowers (treatment group) by their concerned microfinance institute (BRAC), for producing revenue-generating activities. This treatment group comprises of those poor people who are successful with their loan application through fulfilling all the criteria set by the BRAC. Conversely, loan is not given to non-participant borrowers (control group) by the respective microfinance institute (BRAC) for creating revenue-generating activities. This control group comprises of either those poor individuals with failed loan application for not satisfying all the conditions set by BRAC, or those individuals who want loans but are unable to go further for their respective obligations.

An experimental treatment group (participant borrowers) has been compared with a control group (non-participant borrowers) in this study. To overcome the selection bias for this study, due effort has been given so that all the respondents are comparable on the same socio-economic background. After one-year of microfinance inter-

vention, the participant borrowers are compared with non-participant borrowers regarding their business activities, household conditions, personal affairs and security issues. Both the groups have been asked, after one year they receive microfinance loan or otherwise operating without such loan, whether their respective positions in *business*, *household*, *individual* and *security* level have any effect. In the survey questionnaire, the borrowers are asked to give their agreement in a five point Likert scale (1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly agree) that microfinance creates an effect on the items under business, household, individual and security level selected for this study (Appendix 1).

This study used the exploratory concept (opposing to confirmatory concept) to measure microfinance effect on borrowers' poverty represented by multidimensional items. This method explores whether multifaceted poverty items prove valuable for covering the research question asked. Exploratory analysis used to this data set assists to comprehend the relationship to condense a wide number of items to one poverty construct. However, we used some prior knowledge through HEPM that helped to choose items for poverty construct. To find out whether there is a significant effect of microfinance on borrowers' poverty (construct or latent variable), the study took four items for each aforesaid level (business, household, individual and security) to operationalize the HEPM framework as follows:

1) Business level: Business Revenue, Fixed Asset, Current Asset, Employment
2) Household level: Household Income, Immovable Property, Movable Property, Expenditure
3) Individual level: Control, Honor, Capacity, Confidence
4) Security level: Social, Financial, Food, Health

To be definite, multivariate measurement involves using multiple items to build a construct. Using multiple items to quantify poverty construct is more likely to represent all the diverse features within the concept with precision (Appendix 2). Nevertheless, even using multiple items may also retain some degree of error. Under the backdrop of aforesaid literatures, the following hypothesis has been developed for microfinance causal impact on borrowers' poverty.

H_o: Microfinance causes significant positive impact on borrowers' poverty at business, household, individual and security level.

Structural Equation Modeling (SEM), used in the study, helps us to overcome many limitations and shortcomings and enables us to incorporate unobservable variables measured indirectly by indicator variables. It also assists incorporating error in observed variables (Chin 1998). Between Covariance-Based SEM (CB-SEM) and Partial Least Squares SEM (PLS-SEM), this study applied PLS-SEM to explore the relationship between microfinance and poverty. This helps through focus on explaining the variance when examining the model. Furthermore, the PLS model provides much more stable results than the OLS model (Farahani et al. 2010). PLS-SEM initially focuses on the measurement model, and later on the structural model. *Measurement model* brings empirical measures of the relationships between indicators and constructs by evaluating the reliability and validity of the construct measures. *Structural model* brings the same among constructs. These measures enable us to compare microfinance theory with reality. Alternatively, it would tell how well microfinance theory fits into the studied area. This study used reference values cited by Ramayah et al. (2018) for both the measurement model and structural model for significance (Appendix 3).

The survey for this study was conducted during the year 2019 (through questionnaire survey). Sample size was determined using G*Power, which predicted 365 respondents for this research. However, to be on a safer side, the studied sample size is 400. Aided by the interviewer with the questionnaire, borrowers' responses were collected mostly at the time of their weekly meetings. Also, borrowers were intercepted at their business, household, training, meetings of their convenience and accessibility. In each of the four greater divisions of Bangladesh (Rajshahi, Dhaka, Khulna and Chittagong), four zones were randomly selected. From each of the zones 25 respondents were chosen at random, making total respondents equal to 400. Interviewer aided face to face questionnaire surveys were conducted with both groups of the participant and non-participant borrower respondents (Table 2).

Table 2. Details of sample distribution

Divisions	Total number of Zones	Number of randomly chosen zones	Sample from each zone	Total sample from each division
Dhaka	13	4	25	100
Rajshahi	11	4	25	100
Chittagong	7	4	25	100
Khulna	9	4	25	100

V. Results and Discussion

This section discusses microfinance impact on borrowers' poverty at four levels: business (business revenue, fixed asset, current asset and employment), household (household income, immovable property, movable property and expenditure), individual (control, honor, capacity and confidence) and security (social, financial, food and health). All the calculations are done using Smart PLS. Regression analysis has been performed using partial least square (PLS) with reflective measurement model (RMM) taking microfinance as an independent variable and poverty as dependent variable. Poverty is measured through four latent variables reflected by four items at business, household, individual and security levels. Analysis regarding measurement model and structural model are detailed below.

A. Measurement Model

Mentioning reference values for PLS-SEM modelling (Appendix 3), it is noted that Composite Reliability (CR) (between 0.70 ~ 0.90) confirms satisfactory internal consistency (Table 3). Also values of Factors Loadings (FLs) (> 0.40) and Average Variance Extracted (AVEs) (> 0.50)

Table 3. Measurement model

Construct	Items	Internal consistency	Convergent validity		Discriminant validity
		Composite reliability (CR)	Factor loading (FL)	Average variance extracted (AVE)	Heterotrait-Monotrait ratio (HTMT)
Microfinance		1.000	1.000	1.000	0.807
Business Level	Business revenue	0.764	-	0.624	-
	Fixed asset		-		
	Current asset		0.662		
	Employment		0.899		
Household Level	Household income	0.740	-	0.588	0.984
	Immovable property		-		
	Movable property		0.791		
	Expenditure		0.742		
Individual Level	Control	0.754	-	0.606	0.780
	Honour		-		
	Capacity		0.801		
	Confidence		0.755		
Security Level	Social	0.752	-	0.504	0.863
	Financial		0.620		
	Food		0.763		
	Health		0.739		

confirms convergent validity. Fornell-Larcker Criterion, Cross Loadings and Heterotrait - Monotrait Ratio (HTMT) have also met the threshold levels confirming discriminant validity. Considering the PLS output results and HEPM, the study excluded business revenue and fixed asset at business level, household income and immovable property at household level, control and honour at individual level, and social security at security level (Figure 2). Items with weaker outer loadings are sometimes retained on the basis of their contribution to content validity (Hair et al. 2016). This HEPM has been applied by Dunn and Arbuckle (2001) to evaluate microfinance impact assessment. It deals with poverty as a content through different aspects at the business, household, individual, and security level and suggests to explore these items for avoiding fungibility.

B. Structural Model

The structural model statistics for testing the hypothesis are detailed in Table 4. The estimated path coefficients of microfinance on poverty at business (0.551), household (0.376), individual (0.409) and security (0.726) level are found statistically significant ($p<0.000$). These path coefficients can be interpreted just as the beta coefficient like the estimated change in the dependent variable for a unit change in the independent variable. This means participant borrowers are estimated to be 0.551, 0.376, 0.409 and 0.726 times better off in poverty at business, household, individual and security level respectively compared to non-participant borrowers. The coefficient of determination (R^2) of microfinance on poverty at business (0.303), household (0.142), individual (0.168) and security (0.527) level can be considered weak to moderate. Corresponding f^2 (0.435, 0.165, 0.201 and 1.115 respectively) indicate that microfinance has small to medium effect in producing the R^2 for poverty. Besides, the predictive relevance of the model has been examined by checking the Q^2 values (0.179, 0.079, 0.097 & 0.253 > 0), indicates that the model has sufficient predictive relevance.

Considering both measurement and structural models, it can be concluded that microfinance has a significant positive impact on BRAC borrowers' poverty level. This

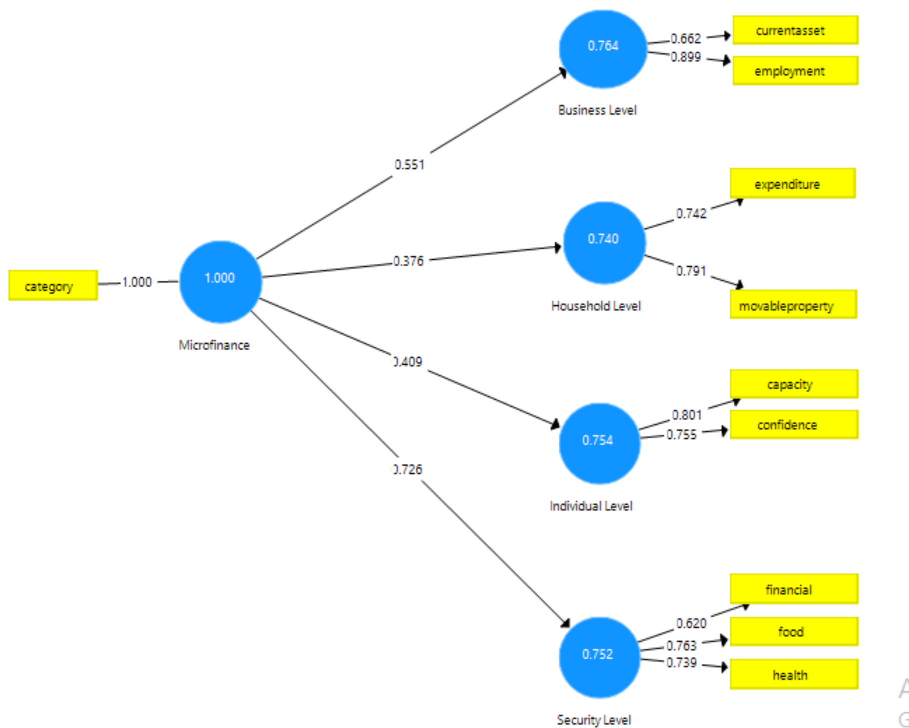

Figure 2. Causal Relationship between Poverty and Four Latent Variables

Table 4. Structural model

Hypothesis (H1)	Relationship	Std. Beta	Std. Dev.	T-value	Decision	R^2	f^2	Q^2
MF causes significant impact on borrowers' poverty at four different levels	Microfinance→ Business Level	0.551	0.024	22.844***	Supported	0.303	0.435	0.179
	Microfinance→ Household Level	0.376	0.030	12.664***	Supported	0.142	0.165	0.079
	Microfinance→ Individual Level	0.409	0.030	13.795***	Supported	0.168	0.201	0.097
	Microfinance→ Security Level	0.726	0.015	48.047***	Supported	0.527	1.115	0.253

Note: *** $p < 0.01$

finding is consistent with a number of studies (Khandker 1998, Mamun 2017). They found positive evidence for microfinance by different variables like income, consumption, expenditure, savings, employment, etc. Khandker (1998) also concluded that about five percent of the borrowers got rid of poverty by their respective categories per year. Similarly, positive impact on borrowers' poverty was found for microfinance intervention (Hashemi et al. 1996; Husain 1998).

Ⅵ. Summary, Conclusions and Recommendations

This work has been structured to complement the existing literature by exploring the effect of microfinance on BRAC borrowers' poverty at business, household, individual, and security level. In this study, Household Economic Portfolio Model (HEPM) is used to overcome shortcomings in microfinance effect evaluation, mainly to get rid of overestimating one particular indicator of borrowers' welfare. Using multiple items to quantify poverty is more likely to represent all the diverse features within the concept with precision. The items included in business level are business revenue, fixed asset, current asset & employment; in household level are household income, immovable property, movable property & expenditure; in individual level are control, honor, capacity and confidence and in security level are social, financial, food and health security.

Microfinance is taken in two forms: (i) a treatment group with microfinance intervention, and (ii) a control group without microfinance intervention. Loan is given to participant borrowers by their concerned microfinance institute (BRAC), for producing revenue-generating activities. This study used the exploratory concept to measure microfinance effect on borrowers' poverty represented by multidimensional items. This method explores whether multifaceted poverty items prove valuable for the microfinance they have taken. Under the backdrop of literatures, the study hypothesized that microfinance causes significant positive impact on borrowers' poverty at different levels. The interviewer aided questionnaire survey for this study was conducted during 2019 on 400 microfinance borrowers, mostly at the time of their weekly meetings. Borrowers were also intercepted at their business, household, training, meetings of their convenience and accessibility. The respondents were chosen from all the greater four divisions of Bangladesh.

Partial Least Squares Structural Equation Modeling (PLS-SEM), used in the study, helps to overcome many limitations and shortcomings and enables to incorporate unobservable variables measured indirectly by indicator variables to explore the relationship between microfinance and poverty. This focuses on explaining the variance when examining the model. PLS-SEM initially focuses on the *measurement model* and later on the *structural model*. *Measurement model* brings empirical measures of the relationships between indicators and constructs by evaluating the reliability and validity of the construct measures; *Structural model* brings the same among constructs. These measures enable us to compare microfinance theory with reality. Considering the PLS output results and HEPM Model to evaluate microfinance impact assessment on poverty as a content, the study excluded business revenue and fixed asset at business level, household income and immovable property at household level, control and honor at individual level, and social security at security level.

The structural model for testing the hypothesis showed that the estimated path coefficients of microfinance on poverty levels are found statistically significant. The model has sufficient predictive relevance. Considering both

measurement and structural models, it can be concluded that microfinance has a significant positive impact on BRAC borrowers' poverty level.

Everybody should be given an opportunity to become a successful entrepreneur as this study finds that microfinance has a significant positive impact on borrowers' poverty at different levels. BRAC gives the small value of assets in the form of microfinance loans and some training to operate those assets. After providing money and technology, we find these poor people end up with more assets and more earning from those assets. It ultimately increases their consumption and positive outlook for lives. This is a good argument that microfinance may work to a certain extent.

The problem of microfinance includes financing tiny enterprises and they do not make much money and are usually without paid staff and with few operating assets. It is not impossible to have a self-sustaining big business with microfinance but there are few examples and special cases. Although microfinance is important in helping the poor survive, it would not be wise to rely on it for a mass exit from poverty. As a solution for global poverty, microfinance gives hope for poverty elimination by providing financial services to the poor. It gains the attention of most international development organizations, governments, the United Nations, and the World Bank devoting huge resources to promoting it. Sometimes, it has been treated as a political means to appeal to supporters, especially non-poor people. However, microfinance is also subject to corruption and abuse. A series of catastrophes sparked the crash of microfinance in India and other parts of the world and the dark side of microfinance was uncovered. Policymakers need to support the industry by creating funds, formulating rules, and making regulations for both borrowers and industry. Microfinance seems favorable for both governments and for the welfare of their respective people

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Received/ 2022. 05. 20
Revised/ 2022. 06. 18
Accepted/ 2022. 06. 09

Microfinance Effect on Borrowers' Poverty: A Case Study of BRAC

This survey is designed to find out whether microfinance is working for poverty alleviation. The information provided will be completely confidential and will be used exclusively for academic purpose. This will not be associated with your normal activity of life or create problem in any way. This survey will ask several questions about yourself and your family together with microfinance impact on your business, household, individual and security level at different perspectives. Your cooperation in this regard will be appreciated.

I. Please tick the right Identification (Borrower Category)

A. Participant Borrower (With Microfinance) b. Non-Participant Borrower (Without Microfinance)

II. Please give your agreement in a scale of 1 (Strongly disagree) to 5 (Strongly Agree) to the following statements.

Appendix 1. Survey questionnaire

Variables of different levels	Strongly agree (5)	Agree (4)	Indifferent (3)	Disagree (2)	Strongly disagree (1)(5)
A. Business level					
Your business revenue has been increased.					
Your business fixed asset has been increased.					
Your business current asset has been increased.					
Your business has created employment.					
B. Household level					
Your household income has been increased.					
Your household immovable property has been increased.					
Your household movable property has been increased.					
Your expenditure on basic amenities has been increased.					
C. Individual level					
Your control has been increased.					
Your honor has been increased.					
Your capacity has been increased.					
Your confidence has been increased.					
D. Security level					
Your social security has been increased.					
Your financial security has been increased.					
Your food security has been increased.					
Your health security has been increased.					

Thank you for your cooperation!

Appendix 2. Constructs and items development for causal impact

Construct/Type	Variable	Conceptual definition	Operational definition	Measurement Item	Technique of development	Literature support
Microfinance Borrowers (Explanatory Variable) /Reflective	Microfinance Category: 1. Treatment /Participant borrowers or 2. Control/ Non-participant borrowers	Microfinance presents small magnitude of financial services primarily micro-credit designed for borrowers living below poverty line (Robinson 2001).	Microfinance refers to small magnitude of microcredit designed for borrowers living below poverty line and beyond banking services (Mermod 2013). Participant borrowers mean who have taken microfinance based on their portfolio and completed at least one year, otherwise, non-Participant.	Category: Microfinance Institutes (In this case BRAC) give small loans to participant borrowers for alleviating poverty through revenue generating activities.	Adapted from Mosley (1997), Armendáriz & Morduch (2010).	(Robinson 2001), (Mermod 2013)
Poverty (Dependent Variable) /Reflective	Borrowers' Poverty measured by the following four (4) items.	Poverty is a state or condition in which a person or community lacks resources essential for minimum life standard and living below national poverty line (J. Chen, 2019). Hagenaars and De Vos (1988) defined poverty as a feeling that people do not have enough to get along.	Poverty is measured in relative term (Change in borrowers' poverty position) rather than in absolute term (Mokhtar, 2011). It is done by different poverty variables (e.g. business revenue, fixed assets, etc. of participant and non-participant borrowers through five point Likert scale (Likert, 1974).	Items are developed from different poverty variables (e.g. business revenue, fixed assets, etc.) at business, household, individual and security level with in line with HEPM Model (M. Chen & Dunn, 1996).		(J. Chen, 2019), Hagenaars & De Vos (1988)
	A. Business Level	Borrowers' poverty need to be measured at their business, household, individual and security level in line with HEPM Model (M. Chen & Dunn, 1996)	Microfinance made positive impact on the microenterprise revenue and employment (Dunn & Arbuckle, 2001a). The profitability and growth of business are correlated with the growth of its fixed assets and employment.(Hossain & Diaz, 1997; Islam, 2007)	1. Business Revenue: How much you agree that your business revenue has been increased.	Adapted from Mokhtar (2011)	Dunn & Arbuckle (2001a).
				2 Fixed Asset: How much you agree that your fixed asset has been increased.	Adapted from Mokhtar (2011)	Hossain & Diaz (1997), Islam (2007)
				3. Current Asset: How much you agree that your current asset has been increased.	Self - Developed	Hossain & Diaz (1997), Islam (2007).
				4. Employment: How much you agree that your employment has been increased.	Adapted from Mokhtar (2011)	Dunn & Arbuckle (2001a).

Appendix 2. Continued

Construct/Type	Variable	Conceptual definition	Operational definition	Measurement Item	Technique of development	Literature support
Poverty (Dependent Variable) /Reflective	B. Household Level	Borrowers' poverty need to be measured at their business, household, individual and security level in line with HEPM Model (M. Chen & Dunn, 1996)	Microfinance increased house quality, number of appliance, household land, firming land and number of livestock as well (Coleman, 2002; Dunn & Arbuckle, 2001a; Khandker, Samad, & Khan, 1998; Nader, 2008). The household income also raised the borrower's expenditure (Khandker, 2005; Zaman, 1999).	1. Household Income: How much you agree that your household income has been increased.	Adapted from Mokhtar (2011)	(Coleman, 2002; Dunn & Arbuckle, 2001a; Khandker et al., 1998; Nader, 2008).
				2. Immovable Property: How much you agree that your immovable property has been increased.	Self -Developed	-
				3. Movable Property: How much you agree that your movable property has been increased.	Self - Developed	-
				4. Expenditure: How much you agree that your expenditure has been increased.	Adapted from Mokhtar (2011)	(Khandker, 2005; Zaman, 1999)
	C. Individual Level	Borrowers' poverty need to be measured at their business, household, individual and security level in line with HEPM Model (M. Chen & Dunn, 1996).	Revenue generated from the business made the borrowers contributing to the household. This caused rise in borrower's self-esteem (Woller & Parsons, 2002). The growth in the business increased the borrower's effectiveness in coping with unfavorable shocks (M. Chen & Dunn, 1996; Dunn & Arbuckle, 2001b).	1. Control: How much you agree that your control over the situation has been increased.	Adapted from et al. (2011)	Chen & Dunn (1996), Dunn & Arbuckle (2001b)
				2. Honour: How much you agree that your honor has been increased.	Adapted from Mokhtar (2011)	Woller & Parsons (2002)
				3. Capacity: How much you agree that your capacity has been increased.	Self - Developed	Chen & Dunn (1996), Dunn & Arbuckle (2001b)
				4. Confidence: How much you agree that your confidence has been increased.	Adapted from Mokhtar (2011)	M. Chen & Dunn (1996), Dunn & Arbuckle (2001b)

Appendix 2. Continued

Construct/Type	Variable	Conceptual definition	Operational definition	Measurement Item	Technique of development	Literature support
Poverty (Dependent Variable) /Reflective	D. Security Level	Borrowers' poverty need to be measured at their business, household, individual and security level in line with HEPM Model (M. Chen & Dunn, 1996).	Microfinance impact indicators include improvements in health, nutrition, education, food security, quality of housing, infant mortality, gender disparities and women empowerment, self-esteem and respect (Epstein & Crane, 2005; Kabeer, 2005).	1. Social: How much you agree that your social security has been increased.	Self - Developed	Reddy & Manak (2005)
				2. Financial: How much you agree that your financial security has been increased.	Adapted from Al Mamun et al. (2011)	Al Mamun et al., (2011)
				3. Food: How much you agree that your food security has been increased.	Self - Developed	Epstein & Crane, (2005) (Kabeer, 2005)
				4. Health: How much you agree that your health security has been increased.	Self - Developed	Epstein & Crane (2005), Kabeer (2005)

Appendix 3. Some reference value for PLS-SEM modeling

1. Measurement Model

Assessment	Name of Index	Definition	Reference Value
Internal Consistency	Composite Reliability (CR)	It measures items within the construct have similar range and meaning	CR > 0.7-0.9 Satisfactory (Hair et al. 2016)
Convergent Validity	Factor Loadings (FL)	It denotes the proportion of indicators variance that is explained by the latent variable.	FL > 0.40 Adequate (Hulland 1999)
	Average Variance Extracted (AVE)	It is the grand mean value of the squared loadings of all indicators associated with the constructs.	AVE > 0.50 Adequate (Hair et al. 2016)
Discriminant Validity	Heterotrait-Monotrait Ratio (HTMT)	It refers to the ratio of correlation within the constructs to the correlation between the constructs	HTMT Ratio < 0.90 Conservative (Gold et al. 2001)

2. Structural Model

Assessment	Name of Index	Definition	Reference Value
Lateral Collinearity	Variance Inflator Factor (VIF)	It deals with the collinearity problem.	VIF > 0.50 (Hair et al. 2016)
Path Coefficient	Path Coefficient	It is the beta coefficient.	$P < 0.05$ ($\alpha = 5\%$)
Co-efficient of Determination	R^2	It measures model's predictive accuracy.	R^2>0.67, 0.33, 0.19; high, moderate, week respectively (Chin et al. 2003)
Effect Size to R^2	f^2	It assesses how strongly one exogenous construct contributes to explain endogenous construct in terms of R^2	$f^2 > 0.35$, 0.15, 0.02; high, moderate, week respectively (Cohen 1988)
Predictive Relevance	Q^2	It indicates whether exogenous constructs have predictive relevance for endogenous constructs.	$Q^2 > 0$ (Hair et al. 2016)

The International Review of Financial Consumers, Volume.7 Issue.1(April, 2022), 19-32 pISSN 2508-3155 eISSN 2508-464X
https://doi.org/10.36544/irfc.2022.7-1.2
ⓒ 2022 International Academy of Financial Consumers

The International Review of Financial Consumers

www.eirfc.com

Financial Literacy in the US: A Robustness Check of the Lusardi-Mitchell Questions*

Gianni Nicolini† · Robin Henager**

A B S T R A C T

This study tested the reliability of financial literacy measures used in previous studies based on a set of items referred to as the "Lusardi-Mitchell questions". Using a sample of 514 American adults that completed a questionnaire with fifty financial literacy items, the authors compared (1) the results from a set of multivariate regression analyses that used the Lusardi-Mitchell questions to investigate the explanatory power of financial literacy on different financial behaviors, with (2) results that used alternative financial literacy measures that differ by the topic of the items or the number of the items. Doing so the paper investigate the chance that a scale based on a small number of items could not provide a precise measure of people financial literacy, due to a lack of information. Results suggest that the Lusardi-Mitchell questions provide a measure of financial literacy that is close to the results obtained using more sophisticated measures. In addition, the results supported the hypothesis that the financial literacy positively affects different financial behaviors.

Keywords: Financial Literacy, Lusardi-Mitchell, Financial Education

Ⅰ. Introduction

Several studies on financial literacy published in the last 15 years, and the development of national strategies to improve financial literacy in a growing number of countries, are evidence of the interest that financial literacy receives from both researchers and policy makers (Huston 2010, Atkinson and Messy 2012, OECD 2017, OECD 2020). The question whether a higher level of financial literacy is associated with improved financial decisions is the main hypothesis that supports this research interest. The validity of this assumption is pivotal for the promoter of financial education curricula too. The purpose of any financial education initiative is to increase the financial literacy of individuals and is motivated by the assumption that increasing financial literacy can improve the financial behaviors of individuals. This general assumption is present in studies that address quite different financial behaviors, including borrowing decisions, investment decisions, retirement planning, saving, money management, and other financial issues. Most of the cases rely on measures

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* **Acknowledgement**
This study is the results of a research program funded by the Fulbright program (Bureau of Educational and Cultural Affairs, United States Department of State with the cooperation of the Institute of International Education). The authors want to thank the Fulbright program and its staff for all the support received, especially during the COVID-19 pandemic, which represents much of the relevant part of the research collection and writing. The authors thank all the participants involved in the study, and guarantee that all of them were fairly treated according to the standards of the Institutional Review Board (IRB) for Research with Human Subjects of Whitworth University (Spokane, WA USA) where the research was administrated. No conflicts of interest exist for the authors and any other subject involved in the research.

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of financial literacy based on a few items that address basic financial principles like inflation, or compound interest (Hira and Loibl 2005; Atkinson and Kempson 2008; Lusardi and Tufano 2009; Lusardi and Mitchell 2011; Brown and Graf 2013). This happens quite frequently with the use of public data, where financial literacy items are added from previous waves of the same survey. The risk in assessing financial literacy by a few items based on basic financial principles can be to highlight those who struggle the most in dealing with financial issues and that are not able to correctly answer even a simple question. This type of measure will not highlight differences between other groups which could differ a lot in terms of knowledge, skills, and attitudes. The weakness of a limited financial literacy measure could be the reason some studies on financial literacy have not found a correlation with financial behaviors or explained only a small role of financial literacy in the decision-making processes of households. This may be because the assessment of financial literacy failed to properly measure the construct, while the availability of more items may find a correlation between financial literacy and financial behaviors (Nicolini, 2019a, 2019b).

These issues are important to consider, because the presence of a correlation between financial literacy and financial behaviors may not create a strong enough argument to promote and invest in financial education. If financial literacy is correlated with the quality of financial decisions, then researchers need to carefully examine the magnitude of that correlation and consider the chance that other variables could be more relevant than financial literacy. From a more technical point of view, this means that a variable used to assess financial literacy could be statistically significant, but not determinant, in explaining financial behaviors (e.g., value of a coefficient close to zero, odds close to one, etc.), or the marginal effect of financial literacy could be overwhelmed by other factors (e.g. other variables perhaps more relevant than financial literacy). In both cases, the perceived risk of investing in financial literacy may not be rewarded with the anticipated outcome. The development of different measures of financial literacy can help to understand, in more detail, the correlation between financial literacy and financial behaviors (Ranyard et al. 2019, Houts and Knoll 2020). A different measure of financial literacy can show a correlation when it was not found before, or it can show a bigger correlation where financial literacy was a statistically significant variable, but it was not a key variable.

This study aimed to compare financial literacy measures widely used in previous studies - based on a few items and usually referred as the "Lusardi-Mitchell questions" - with different financial literacy measures developed from a broader set of items. In that manner, we can test if the small number of items is a limitation or not, and we can check possible alternative set of items and their explanatory power of an individual’s financial literacy. Testing these financial literacy measures on several financial behaviors we can even test how much financial literacy improves financial behaviors referring to different financial decisions contexts.

Ⅱ. Literature Review

The hypothesis that financial literacy can help explain financial behaviors and that an improvement in financial literacy can improve the quality of financial decisions of individuals has been tested in several studies. For instance, Moore (2003) analyzed how financial literacy affects the use of payday loans and the cash advance on credit cards, using a sample of over 1,400 residents in Washington State. The study found that lower financial literacy was associated with an increased attitude to use payday loans and to withdraw cash on credit cards. Robb (2011) used the information from a sample of American college students (1,354 obs.), collected in 2007, to examine how well financial literacy explains the use of credit cards by college students. Results suggest that students with higher scores on a measure of financial literacy were more likely to engage in more responsible credit card use. The relationship between financial literacy and the use of credit cards in the US has been studied also by Allgood and Walstad (2011) where the authors used the 2009 NFCS (National Financial Capability Study). Results from the analysis, based on the self-perception of financial literacy of the more than 28,000 American adults, showed that financial literacy helps to explain the use of credit cards. Mottola (2013) used the same database (NFCS 2009) looking at the same financial behaviors for credit cards, using objective measures of financial literacy. Results supported the hypothesis that a lack of financial literacy is positively related to costly credit card

behaviors. Evidence of the explanatory power of financial literacy on the use of credit has been found also by Disney and Gatherhood (2013) and by Lusardi and Tufano (2009). The first authors analyzed a sample of 3,041 residents in the UK and concluded that financial literacy is on average lower among those who participate in the consumer credit markets, compared with those who do not. Lusardi and Tufano analyzed the role of financial literacy on over-indebtedness and the use of high-cost borrowing vehicles in the US (e.g., auto title loans, student loans, payday loans, etc.). Once again, the results supported the hypothesis that a connection between financial literacy and financial behaviors exists. In their conclusions, the authors stress "*as much as one-third of the charges and fees paid by less knowledgeable individuals can be attributed to ignorance*". Meanwhile, a low level of financial literacy increases the chance that people feel they carry too much debt. Regarding borrowing and over-indebtedness, Gerardi et al. (2010) studied a sample of American borrowers in 2008 and found a strong association between (low) financial literacy and mortgage delinquency. More recently, Clark et al. (2021) have found that people with high financial literacy were more able to deal with the shocks due to the Covid-19 pandemic, and Klapper and Lusardi (2019) have found how relatively low financial literacy levels exacerbate consumer and financial market risks as increasingly complex financial instruments enter the market.

A. Financial Literacy and Saving and Investment Behaviors

Other studies have analyzed the connection between financial literacy and saving and investment behaviors. Kimball and Shymway (2007) analyzed data from a sample of 500 American adults and found that financial literacy is related to stock market participation. Those who are more financially literate seem to be, not only more prone to invest in stocks, but also more likely to invest in international assets, and to hold a diversified portfolio. Yoong (2011) studied the relationship between stock market participation and financial literacy as well. Using a sample of 533 American adults (40+ years old) from the 2007 American Life Panel (ALP survey), the author highlighted how ignorance about stock market investments significantly reduced the propensity to hold stocks. Specifically, a decrease of one standard deviation above the mean level of financial literacy resulted in a decrease in stock market participation of 10%. The positive role of financial literacy on stock market participation was confirmed also by Almenberg and Dreber (2015) - in a study with data from Sweden - and by Van Rooij et al. (2011) - in a study on stock market participation in the Netherlands. Van Rooij et al. found that the lack of financial literacy was statistically relevant in explaining the lack of stock market participation. Regarding financial literacy and investment decisions, Muller and Weber (2010) used a sample of 3,228 German adults to test the hypothesis that, between investors, the more financially literate tend to rely more on passive mutual funds than low literate people. Results confirmed once more the correlation between financial literacy and financial behaviors. In addition, Arrondel et al. (2012) have shown - using data from France - how financial literacy positively affects the propensity to plan. Similar results were found in other financial contexts like the presence or not of emergency funds (Robb and Woodyard 2011), and homeownership (Almenberg and Widmark 2011). Liao et al. (2018), using data from the 2014 China Survey of Consumer Finances, examine the relation between financial literacy and the risky asset holding behaviour of Chinese households, and their findings reveal that consumers with higher levels of financial literacy are more likely to hold risky financial assets than those with lower levels.

B. Financial Literacy and Retirement Planning

Other studies investigated the connection between financial literacy and financial behaviors in retirement planning. Gustman et al. (2012) studied the retirement preparedness of Americans by analyzing data from the 2004 Health and Retirement Survey (HRS). Song (2020) studied retirement planning in China using a sample of 1,153 Chinese adults linking the contribution to retirement savings plans (in local currency) with two measures of financial literacy. Klapper et al. (2013) used a sample of over 1,400 Russian individuals to test how financial literacy is related to the decision to invest in privately or publicly owned retirement funds. Honekamp (2012) studied the correlation between financial literacy and investment in supplemental pension insurance in Germany, while Brown and Graf (2013) did a similar study in Switzerland. All

these studies support the hypothesis that financial literacy helps individuals make better financial decisions.

C. Measuring Financial Literacy

In a recent study on the assessment of financial literacy, Nicolini (2019) reviewed more than 80 studies and found that the majority of the cases rely on financial literacy measures developed from a small set of items that addressed basic financial concepts. A set of three items developed by Lusardi and Mitchell in 2004[1] - the "Lusardi-Mitchell questions" - addressed basic economic principles such as inflation, compound interest, and the diversification in the stock market. The three items were easy to add to pre-existing surveys and the basic knowledge addressed by those items made them an ideal measure to examine financial literacy and to study its correlation with financial behaviors. A few years later, two more items were added to the "big three" questions in the National Financial Capability Study (FINRA 2012), dealing with the functioning of mortgages, and bond pricing. This set of five items has been widely used in further studies and added to several surveys, becoming a sort of "gold standard" in the assessment of financial literacy. The so-called Lusardi-Mitchell questions proved to be a quite effective measure of financial literacy, especially keeping in mind that (1) they are just five items, (2) they address basic concepts, and (3) they refer to different areas of knowledge (e.g., mortgage, bond, stock, etc.). An overview of financial literacy requires addressing basic concepts and referring to different areas of knowledge, but the same items could be less appropriate to study specific financial behaviors, as the use of credit cards, or the decision to default on a mortgage. Some items may be more associated with certain financial decisions than others. For instance, the decision to default on a mortgage may be related to the knowledge about how mortgages work but may be less correlated with knowledge about bond pricing. The use of credit cards can be explained by knowledge about interest rates more than knowledge about mortgages, and investment decisions are logically related to items that address bond pricing and the stock market more than mortgages. Also, the five items do not provide the flexibility to address the same topic using more than one item, therefore, reducing the opportunity to assess whether an individual knows only basic concepts or if the individual has advanced knowledge. The opportunity to include many items in large surveys is not always feasible and the use of items on fundamental principles should be preferred to the use of items on a single topic to guarantee the availability of at least one item related to a certain financial behavior[2]. However, the curiosity to understand the results that could have been found if more items - addressing different topics, and testing different levels of knowledge - remains, and it is one of the aims of this study.

An ideal survey would include a balanced number of items. When more items are available it is possible to analyze not only knowledge of basic principles but also knowledge of more advanced concepts. It is also helpful to test different levels of knowledge. Moreover, the assessment of financial literacy could be extended beyond knowledge to include an assessment of skills and attitudes (Huston 2010, Remund 2010, Atkinson and Messy 2012). However, assessing financial literacy more precisely may not require adding several items to increase the assessment from basic to more sophisticated. To assess the reliability of the widely used measures of financial literacy, we first focused on the assessment of financial knowledge and its relationship to financial behaviors.

The aim of this study was to examine how financial literacy results change when assessing it using different measures of financial literacy based on more than a few items. In particular, this study used data from a new survey to compare measures of financial literacy used in previous studies with other measures made possible by adding items on specific areas of knowledge and using more than one item for the same area of knowledge.

Ⅲ. Data and Methodology

This study is based on data collected by a specific survey administered in 2020 on a sample of 514 American

[1] The questions were added to the 2004 Health and Retirement Study and used for the first time in a research output in 2006 (see Lusardi and Mitchell 2006).

[2] The item on the knowledge of mortgage can be useful to study borrowing behaviors, as the item on stock can be used to study investment behaviors, etc.

adults. Data were collected online with the support of a professional survey firm[3]. The aim to target an adult population was to include individuals in different stages of their lives but to restrict the analysis to those who were already involved in the use of financial products in their lives. The use of online survey allowed to easily reach individual from different area of the country, and it has avoided the restrictions due to the safety measures required to contrast the spread of the Covid-19 virus that caused the pandemic (e.g., social distance, lockdown, etc.). The questionnaire used in the survey was developed to test how the availability of a broad set of items affects the assessment of financial literacy and explains the relationship between financial literacy and financial behaviors. Starting from the Lusardi-Mitchell questions on (1) inflation, (2) compound interest, (3) stocks, (4) bond pricing, and (5) mortgages, those five areas of knowledge were extended with five other areas, including bank accounts, payment cards, loans and debts, and insurance and retirement planning. Each of the ten areas of knowledge was addressed by five items. For each of the first five areas of knowledge, the first question was one of the Lusardi-Mitchell questions. The additional items in each group of questions differ from the Lusardi-Mitchell for their difficulty, but not for the topic. The five questions on each topic differ in terms of difficulty to test if the knowledge of the respondent goes beyond very basic principles and is enough to answer more sophisticated questions. A total of 50 items (5 questions × 10 areas of knowledge) were available to assess financial literacy. Another additional fifty items analyzed several financial behaviors. Some items collected data on money management and the use of credit cards. Other questions were about saving and investments, and debt. A special section was dedicated to student loans, and another to financial difficulties. Some questions collected information about the socio-demographic characteristics of the respondents (e.g., age, gender, education, income, job status, etc.).

The socio-demographic characteristics of the sample are summarized in Table 1.

The sample is equally balanced between male (47.5%) and female (49%) and represents all the age groups from 18 years old and older, with the over 65 a bit oversampled (15.2%). Data on education shows that the majority of

Table 1. Socio-demographic characteristics of the sample

Variable	Value	%
Gender		
Male	244	47.5%
Female	252	49.0%
N.A.	18	3.5%
Age		
18-24	52	10.2%
25-30	46	9.0%
31-35	61	11.9%
36-40	44	8.6%
41-45	54	10.5%
46-50	45	8.8%
51-55	53	10.4%
56-60	44	8.6%
61-65	33	6.4%
65+	78	15.2%
N.A.	4	0.8%
Education		
Primary school (or less)	5	1.0%
Middle School	5	1.0%
High School	89	17.3%
Some college	139	27.0%
University degree	162	31.5%
Post-graduate degree	108	21.0%
N.A.	6	1.2%
Income		
Less than 15,000	77	15.0%
At least $15,000 but less than $25,000	67	13.0%
At least $25,000 but less than $35,000	68	13.2%
At least $35,000 but less than $50,000	59	11.5%
At least $50,000 but less than $75,000	91	17.7%
At least $75,000 but less than $100,000	69	13.4%
At least $100,000 but less than $150,000	42	8.2%
$150,000 or more	25	4.9%
N.A.	16	3.1%
Marital Status		
Single	187	36.4%
Cohabiting	19	3.7%
Married/Civil Partnership	221	43.0%
Separated	9	1.8%
Divorced	56	10.9%
Widow/Widover	15	2.9%
Prefer not to say	2	0.4%
N.A.	5	1.0%
Total	514	100%

[3] Data was collected with the support of Dynata (www.dynata.com).

the sample (79.5%) attended some college, while only 2% did not complete high school. Income is reported by eight income brackets where only the last two (from $100,000 to $150,000, and above $150,000) represent less than 10% of the sample. The most frequent marital status of the respondents is 'married or in a civil partnership' (43%), followed by single (36.4%) and divorced (10.9%). Other groups were 'cohabitating' (3.7%), 'widow/widower' (2.9%), and 'separated' (1.8%).

The five Lusardi-Mitchell questions were used to develop an index of financial literacy equal to the sum of the correct answers to these five questions. This index, used here, will replicate the findings of several previous studies (Collins 2012; Mottola 2013; Allgood and Walstad 2013) as it has been used often. Fifty items in ten areas of financial knowledge were used to measure financial literacy and then compared to the standard Lusardi-Mitchell questions. The sum of the correct answers to the five questions in the specific areas of knowledge, for each of the ten areas of knowledge, replicated the structure of the Lusardi-Mitchell index. Both the Lusardi-Mitchell and the ten specific knowledge indices have a range from zero to five. The structure, a measure of financial literacy based on five items covering the same topic with varied difficulty, allowed us to study the correlation between financial literacy and financial behaviors using financial literacy items that are strictly related to the financial behaviors. For instance, the use of credit cards might be related to financial literacy via the Lusardi-Mitchell questions - about inflation, mortgage, etc. - or by a set of five questions about credit cards. If the latter exposes a potential reverse causality issue, it will stress the presence of a correlation between financial literacy and financial behaviors. Knowledge of credit cards should be more relevant in the explanation of the use of credit cards than knowledge about stocks or inflation. The same "five specific items" measure was developed for each of the ten areas of knowledge and provided the opportunity to test the relationship between financial literacy and financial behaviors referring to different financial behaviors. The comparison between results of the Lusardi-Mitchell index with results from the five-specific-items index can be repeated for different financial behaviors, and it will work as a robustness test of the whole comparison. In the meantime, the correct answer to the entire fifty items on financial literacy can be used as an additional comprehensive measure of financial literacy, to be compared with the previous ones. The difference between items in terms of topics and difficulty makes this "overall index" quite analytical. Because this index includes the five Lusardi-Mitchell questions it can be used to show the marginal effect produced by the increase in the number of items from five to fifty. This comparison is interesting to test the hypothesis that a correlation between financial literacy and financial behaviors exists, but a measure of financial literacy developed from just a few items may not be powerful enough to make it clear in a statistical analysis. If the fifty-item index showed a correlation between financial literacy and financial behaviors that previous studies did not find, we could conclude that the relevance of financial literacy was underestimated.

The descriptive statistics of all the financial literacy measures are summarized in Table 2.

Table 2. Financial literacy measures

Variable	Mean	Std. Dev.	Min	Max	Obs.
FL_Lusardi-Mitchell	2.72	1.66	0	5	514
FL_Interest rates	2.21	1.48	0	5	514
FL_Inflation	2.61	1.81	0	5	514
FL_Mortgages	2.45	1.75	0	5	514
FL_Investments	2.19	1.83	0	5	514
FL_Bonds	1.35	1.54	0	5	514
FL_Bank accounts	2.83	1.62	0	5	514
FL_Payments	3.26	1.69	0	5	514
FL_Savings	1.55	1.39	0	5	514
FL_Loans and Debts	2.01	1.64	0	5	514
FL_Retirement and Planning	1.48	1.16	0	5	514
FL_TOTAL	21.94	12.00	0	50	514

The average number of correct answers to the five Lusardi-Mitchell questions (2.72) indicates this index is above the average of the topic-based scores in eight out of ten cases. Only knowledge about bank accounts (2.83) and payments (3.26) seems to be bigger than the knowledge regarding the basic principles of the Lusardi-Mitchell questions (e.g., inflation, compound interest, etc.). The most critical areas - with the smallest average scores - are bonds (1.35), savings (1.55), and retirement and planning (1.48). The average value of the financial literacy measure assessed by the sum of the correct answers to all the fifty items (FL_TOTAL), is 21.94 and shows how on average Americans failed or did not know how to answer correctly 50% of the questions.

To compare the explanatory power of different measures of financial literacy on financial behaviors a set of multivariate regression models were run. Different financial behaviors related to the use of financial products or services were used as dependent variables in different sets of regression analyses. In addition, for each regression model run, the financial literacy measures were replaced, and demographic characteristics were used as control variables (e.g., age, gender, education, income, etc.). The first regression used the Lusardi-Mitchell measure. The second regression replaced it with the financial literacy measure developed using the items more closely related to the financial product/service used as dependent variables[4]. The next regression replaced again the financial literacy measure and used the sum of correct answers to all the fifty items of financial literacy. The comparison between results from step 1 (Lusardi-Mitchell) and step 2 (specific items) tested whether the use of items closely related to the financial behaviors analyzed increased the explanatory power of financial literacy and provided a robustness test for the Lusardi-Mitchell measure. The comparison between step 1 (Lusardi-Mitchell) and step 3 (fifty items) tested the differences between a small item measure (based on five items) and a larger item measure (based on fifty items). Additionally, in this case, the explanatory power of financial literacy was assessed in more detail and provided an additional robustness test for the Lusardi-Mitchell measure. The analysis was repeated for different financial behaviors (the use of different financial products and services) to guarantee the reliability of the results and to consider the possibility that results could differ when different areas of knowledge were considered.

The financial behaviors used in the analysis were: (1) the use of stocks as the main investment vehicle in an investment portfolio (InvestmentA), (2) the use of stocks or mutual funds as the main investment vehicles in an investment portfolio (InvestmentA2), (3) the availability of emergency funds for at least three months of living expenses (InvestmentB), (4) if the respondent ever tried to figure out his/her retirement needs (RetirementC), (5) the use of credit cards (PaymentD), (6) the use of any card - including credit, debit, and pre-paid cards - (PaymentsE), (7) the presence of student loans (StudentLoans), (8) the presence of any retirement account - employer sponsored pension fund, employer sponsored retirement account (e.g. 401k), any other retirement account - (RetirementTOT), (9) the use of a pawn shop to sell (PawnSell) or (10) to pawn (PawnLoan).

Descriptive statistics for these variables are listed in Table 3.

Because the independent variables were binary, the model used logistic regression for the study that, in its basic form, uses a logistic function to model a binary dependent variable. The main equations of the models are

$$\log \frac{p}{1-p} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_m x_m \quad (1)$$

and

$$\operatorname{logit}(\mathrm{E}[Y_i \mid x_{1,i}, \ldots, x_{m,i}]) = \operatorname{logit}(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 x_{1,i} + \cdots + \beta_m x_{m,i} \quad (2)$$

where

$$p = \frac{1}{1 + b^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_m x_m)}} . \quad (3)$$

[4] For instance, when the dependent variable was the use of stocks, the Lusardi-Mitchell index was replaced by the sum of correct answers to five questions on investments, while the sum of correct answers to five questions on retirement and planning was used to replace the Lusardi-Mitchell when the dependent variable considered the use of a retirement accounts, and so on.

Table 3. Descriptive statistics of financial behaviors

Variables*	Mean	Std. Dev.	Min	Max	Obs
InvestmentA	0.160	0.367	0	1	514
InvestmentA2	0.362	0.481	0	1	514
InvestmentB	0.558	0.497	0	1	514
RetirementC	0.424	0.495	0	1	514
PaymentsD	0.623	0.485	0	1	514
PaymentsE	0.835	0.372	0	1	514
Studentloans	0.288	0.453	0	1	514
RetirementTOT	0.634	0.482	0	1	385
PawnSell	0.298	0.458	0	1	466
PawnLoan	0.289	0.454	0	1	467

** All the variables are dummy variables equal to one if the product/service has been used (and zero otherwise)*

Ⅳ. Results

The analysis of ten financial behaviors and the test of three financial literacy measures (FL_Lusardi-Mitchell, Topic-based measure, and FL_TOT) required 30 regression analyses. An additional three-model specification was added where more than one topic-based measure fit with the observed financial behavior. To preserve the readability of the paper and to focus the attention on the results related to financial literacy, the table of results (Table 4) presents only the odds ratios for the financial literacy measures[5]. Each row of the table is the output of a different logistic regression model.

The first research question was about the explanatory power of the Lusardi-Mitchell questions compared with alternative measures of financial literacy that differ in terms of (1) topics of the questions or (2) number of topics and number of items. Results show the financial literacy measure based on the Lusardi-Mitchell questions was statistically significant and confirms the positive effect of financial literacy on financial behaviors. At the same time, all the financial literacy measures based on the five topic-based questions related to financial behavior were also statistically significant each time with only two exceptions.

A. Financial Literacy and Investment Behaviors

In the first three cases, when the analysis focused on the use of stocks (InvestmentA) or "stock or mutual funds" (InvestmentA2) as the most prominent investment in the portfolio, and the presence of funds to be used for rainy days (InvestmentB), there was not a big difference between the results obtained from the Lusardi-Mitchell questions and those from the investment knowledge-based measures. The positive effect of financial literacy on financial behaviors is clear in both cases and the values of the odds are slightly higher for the Lusardi-Mitchell compared with the investment measure.

B. Financial Literacy and Retirement Decisions

A similar result was found in the analysis of whether the respondent ever figured out how much to save for retirement (RetirementC). Both the Lusardi-Mitchell (odds 1.65) and the retirement knowledge-based measures (odds 1.32) showed that higher financial literacy is associated with a higher likelihood that people thought about their retirement needs. Even in this case, there is not a big difference between the two results, and the Lusardi-Mitchell measure performed a bit better than the other. The relationship between financial literacy and retirement and planning decisions was analyzed also by another variable, where the respondent said not only if he/she thought about retirement savings, but also if he/she has an active retirement account (e.g., pension funds, 401k, IRA, etc.). In this

[5] Details of the results are available on request by the authors.

Table 4. Logistic regression results (summary)

Mean	Range	Variables	Odds	P-value	Item
		InvestmentA			
2.72	(0-1-2-3-4-5)	FL_Lusardi	1.29	0.018	
2.18	(0-1-2-3-4-5)	FL_Investments	1.11	0.210	*Most prominent investment in the portfolio…1=Stocks*
21.94	(0-1-2-…-50)	fl_tot	1.03	0.038	
		InvestmentA2			
2.72	(0-1-2-3-4-5)	FL_Lusardi	1.43	0.000	
2.18	(0-1-2-3-4-5)	FL_Investments	1.33	0.000	*Most prominent investment in the portfolio…1= Stocks or Mutual funds*
21.94	(0-1-2-…-50)	fl_tot	1.07	0.000	
		InvestmentB			
2.72	(0-1-2-3-4-5)	FL_Lusardi	1.68	0.000	
1.55	(0-1-2-3-4-5)	FL_Savings	1.63	0.000	*Have you set aside emergency or rainy-day funds that would cover your expenses for 3 months in case of sickness, job loss, economic downturn, or other emergencies*?*
2.18	(0-1-2-…-50)	FL_Investments	1.23	0.002	*(1=YES) (Pre-pandemic scenario)*
21.94	(0…5)	fl_tot	1.07	0.000	
		RetirementC			
2.72	(0-1-2-3-4-5)	FL_Lusardi	1.65	0.000	
1.48	(0-1-2-3-4-5)	FL_Retirement	1.32	0.007	*Have you ever tried to figure out how much you need to save for retirement? (1=Yes)*
21.94	(0-1-2-…-50)	fl_tot	1.08	0.000	
		PaymentsD			
2.72	(0-1-2-3-4-5)	FL_Lusardi	1.77	0.000	
3.26	(0-1-2-3-4-5)	FL_Payments	1.53	0.000	*Which of the following payment instruments do you use? (1=Credit Card)*
21.94	(0-1-2-…-50)	fl_tot	1.08	0.000	
		PaymentsE			
2.72	(0-1-2-3-4-5)	FL_Lusardi	1.80	0.000	
3.26	(0-1-2-3-4-5)	FL_Payments	1.73	0.000	*Which of the following payment instruments do you use? (1=Credit Card or Debit Card or Pre-paid card)*
21.94	(0-1-2-…-50)	fl_tot	1.10	0.000	
		StudentLoans			
2.72	(0-1-2-3-4-5)	FL_Lusardi	0.85	0.064	
3.26	(0-1-2-3-4-5)	FL_Payments	0.85	0.039	
2.01	(0-1-2-3-4-5)	*FL_Loansan~s*	*0.95*	*0.535*	*Do you currently have any student loans?*
21.94	(0-1-2-…-50)	*fl_tot*	*0.98*	*0.124*	
		RetirementTOT			
2.72	(0-1-2-3-4-5)	FL_Lusardi	1.26	0.025	*Do you have…*
1.48	(0-1-2-3-4-5)	*FL_Retirem~g*	*1.14*	*0.313*	*... an employer sponsored pension fund?* *...an employer sponsored retirement account (e.g. 401k, 403b)?*
21.94	(0-1-2-…-50)	fl_tot	1.03	0.029	*...any other retirement accounts NOT through an employer, like an IRA, Keogh, SEP, or any other type of retirement account that you have set up yourself?* *(Equal to 1 if at least one of those)*
		PawnSell			
2.72	(0-1-2-3-4-5)	FL_Lusardi	0.72	0.001	
3.26	(0-1-2-3-4-5)	FL_Payments	0.51	0.000	*In the last 12 months - how many times did you use a pawnshop to sell an item?*
2.01	(0-1-2-3-4-5)	FL_Loansan~s	0.78	0.015	*(Equal to 1 if at least once)*
21.94	(0-1-2-…-50)	fl_tot	0.95	0.001	

Table 4. Continued

Mean	Range	Variables	Odds	P-value	Item
		PawnLoan			
2.72	(0-1-2-3-4-5)	FL_Lusardi	0.67	0.000	*In the last 12 months - how many times did you use a pawnshop to pawn an item? (Equal to 1 if at least once)*
3.26	(0-1-2-3-4-5)	FL_Payments	0.49	0.000	
2.01	(0-1-2-3-4-5)	FL_Loansan~s	0.79	0.019	
21.94	(0-1-2-⋯-50)	fl_tot	0.95	0.000	

case, the measure based on the knowledge of retirement and planning concepts was not statistically significant, while the Lusardi Mitchell confirmed its explanatory power (odds 1.26).

C. Financial Literacy and Payment Behaviors

Two financial behaviors analyzed the role of financial literacy in explaining payment behaviors. In one case, the use of at least one credit card was measured. In the second case, the use of any payment card (credit, debit, or pre-paid card) was measured. In the first case, the Lusardi-Mitchell variable (odds 1.77) and the measure of payment tools knowledge (odds 1.53) confirmed that the ownership of a credit card is more frequent for individuals with more financial knowledge, even controlling for several socio-demographic characteristics. Similar results were obtained when the analysis extended from credit cards to include the ownership of debit cards and pre-paid cards. Again, no substantial differences arise between the use of the Lusardi-Mitchell questions (odds 1.80) and the questions based on payment tools knowledge (odds 1.73).

D. Financial Literacy and Borrowing

Some differences arose when borrowing decisions are considered. The use of pawn shops seems to be explained more in detail by financial literacy measures based on payment tools than the Lusardi-Mitchell questions. When the financial behavior was the use of a pawn shop to sell an item, the knowledge on payment tools (odds 0.51) reduced the use of a pawn shop more than the Lusardi-Mitchell questions suggest (odds 0.72). Similar results were found when analyzing the use of pawn shops to pawn items (knowledge on payments odds 0.49, Lusardi-Mitchell questions 0.67). In the third case, for the borrowing decision variables group, which considered the presence of student loans or not, the Lusardi-Mitchell questions (odds 0.85) and the knowledge based on payment (odds 0.85) indicated a similar influence of financial literacy on the use of student loans, indicating a decreased likelihood to have student loans with higher financial literacy.

Hence, we can conclude that the association of financial literacy and consumer financial behaviors could be larger than what has been estimated by previous studies using the Lusardi-Mitchell questions. This is confirmed when financial behaviors are related to borrowing. While there is not a substantial difference in the other cases (investment, retirement and planning, use of credit cards), this result can be interpreted as evidence that the Lusardi-Mitchell questions are able to summarize the financial knowledge.

E. Comparison With Previous Studies

These results differ from a study by Nicolini and Haupt (2019) that used the same analysis and the same items in the surveys presented in this study in several European countries (UK, Germany, France, Italy, Sweden). In the 25 analyses related to five financial behaviors in each of the five countries, the Lusardi-Mitchell questions underperformed the topic-based items in 19 cases, showing how a more specific measure of financial literacy performs better and highlights clearer evidence of the positive effect of financial literacy on financial behaviors.

This study also analyzed the use of financial literacy measures based on fifty items as compared to the five Lusardi-Mitchell questions. The hypothesis is that more items could enrich the informative value of the measure and investigate more in detail the knowledge of individuals in different financial topics and testing the ability to answer questions with different levels of difficulty. This measure, which was a sum of correct answers to 50 items (FL_TOT),

represents an extension of the Lusardi-Mitchell questions, adding other questions on the same topics (e.g., inflation, compound interest, etc.) and adding new areas not covered by the Lusardi-Mitchell questions (e.g. retirement and planning, bank accounts, payment cards, etc.). The difference in the scale of the two measures (zero to five and zero to fifty) called for an adjustment to the value of the odds given the average value of the Lusardi-Mitchell measure was 2.72, while the average of FL_TOT was 21.94. This latter measure is intrinsically more powerful. A rule of thumb to bypass the difference in scale between the two measures is to leverage by ten (the ratio between the two scales: fifty and five) the distance from the unit of the digits to the right of the decimal point of the FL_TOT odds[6]. In the case of the use of stocks as the main investment tool in a portfolio (InvestmentA) the Lusardi-Mitchell measure (odds 1.29) and the FL_TOT (odds 1.03...rescaled to 1.30) indicates quite similar results. When the analysis is enlarged from stocks to mutual funds (Investment2A) the Lusardi-Mitchell odds (1.43) tended to underestimate the effect of financial literacy measured by the FL_TOT (odds 1.07... rescaled to 1.70). The analysis of the presence of rainy days funds (Lusardi-Mitchell (odds 1.68) and the FL_TOT (1.07...rescaled to 1.70) showed similar results, as did the retirement (for RetirementC) Lusardi-Mitchell (odds 1.65) and the FL_TOT (1.08...rescaled to 1.80), for (RetirementTOT) Lusardi-Mitchell (odds 1.26) and the FL_TOT (odds 1.03...rescaled 1.30). The results for credit cards for Lusardi-Mitchell (odds 1.77) and the FL_TOT (1.08...rescaled to 1.80); for credit/debit/pre-paid cards for Lusardi-Mitchell (odds 1.80) and the FL_TOT (1.10...rescaled to 2.00); for student loans for Lusardi-Mitchell (odds 0.85) and the FL_TOT odds (0.98... rescaled to 0.80); for pawn to sell for Lusardi-Mitchell (odds 0.72) and the FL_TOT (0.95...rescaled to 0.50); for pawn to loan for Lusardi-Mitchell (odds 0.67) and the FL_TOT (0.95...rescaled to 0.50) complete the comparison.

Overall, the Lusardi-Mitchell measure works as a good proxy for the measure with the additional 45 items. Except for the use of pawn shops, the results for the Lusardi-Mitchell questions do not differ substantially from the results for the FL_TOT questions. This result demonstrates the reliability of the financial literacy measures based on the Lusardi-Mitchell questions. Despite the use of a small set of items, the Lusardi-Mitchell questions do not fail to assess the effect of financial literacy on financial behaviors. This conclusion differs a lot from the one from Nicolini and Haupt (2019). Using the same questionnaire and the same methodology the authors found in a sample of European countries where the Lusardi-Mitchell questions widely underestimated the effect of financial literacy when analyzed against the fifty-item scale. The difference in this result may be explained by the difference in the sample. A possible explanation is that the financial knowledge of Americans is more homogeneous across the different areas of knowledge, making the Lusardi-Mitchell align better with the average scores based on fifty items. Other differences could be related to financial behaviors. For instance, the use of stocks as investment tools could be more common in some countries than others - as well as the use of credit cards - making a financial literacy measure based on few items perform just as well as a measure based on fifty items in some countries but not in others.

V. Conclusions

This study dealt with the reliability of financial literacy measure used in previous studies and referred as the Lusardi-Mitchell questions, based on a small number of items related to different financial topics. The availability of a broad range of financial literacy items allowed us to test whether a measure of financial literacy based on items, all logically related to a certain financial behavior, worked better than the standard five items (the Lusardi-Mitchell questions) in explaining the influence of financial literacy on financial behaviors. Results from the American sample did not show a substantial difference in the explanatory power of the Lusardi-Mitchell compared with "specific-topic" financial literacy measures. The fact that the Lusardi-Mitchell questions were introduced for the first time in survey that target Americans and were developed to summarize the financial literacy of these individuals can be a possible explanation of this results. However, further investigation could better explain it. This result allows researchers to consider the Lusardi-

[6] Doing so a odds equal to 1.03 can be rescaled to 1.30 (1+ [1.03-1] × 10) and a odds equal to 0.98 can be rescaled to 0.90 (1+ [1-1.02] × 10). At the same time, the average of the FL_TOT should be rescaled from 21.94 to 2.194.

Mitchell questions as an effective measure of financial literacy even when some of the items do not have a logical connection with the financial behavior analyzed (e.g., stock market participation and the item on mortgages). A second test compared the Lusardi-Mitchell measure - based on the sum of correct answers to the five items - to a measure based on fifty items (including the five Lusardi-Mitchell). This was done to test if the effect of financial literacy could be underestimated by using a small number of items. Results from the Lusardi-Mitchell questions do not perfectly match the results from the fifty-item scale, but the difference between the two was small enough to reject the hypothesis that results from previous studies could be biased by the small size of the financial literacy measure. The only concern is for the use of a pawn shop, where the effect of financial literacy assessed by the Lusardi-Mitchell underestimates the effect measured by the fifty-item scale. It is interesting to note how these results based on a US sample differ from the one estimated in Europe by Nicolini and Haupt (2019). These authors have found that the availability of a broad set of financial literacy items helped to develop specific-topic measures and measures based on a large number of items that improve the quality of the results and show a more relevant role of financial literacy in explaining financial behavior than what has been found in previous studies.

Results from the present study increase the reliability of results from previous studies when the measure of financial literacy was based on the Lusardi-Mitchell questions. Despite that the measure is (1) based on only a few items, (2) cannot address specific competences, and (3) cannot consider all the different areas of knowledge in finance, it can provide similar results to more specific measures or measures based on a more generous number of items. However, the limited sample size and the fact that differences between countries can make the financial literacy of an individual be relevant and crucial to take some financial decisions in a country, but not as much in others, represent a limitation of this study and suggest replicating it addressing different geographical areas. Additionally, results from this paper support the hypothesis that the financial literacy affects financial behaviors and support financial educators and policy makers promoting financial education, under the assumption that improving financial literacy through financial education we can improve the quality of consumers' financial behaviors.

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Received/ 2022. 04. 14
Revised/ 2022. 06. 08
Accepted/ 2022. 06. 29

Editorial Principles

1. Mission

The International Review of Financial Consumers (IRFC) aims to offer a communication platform for scholars, regulators, and practitioners to share their latest academic research on financial consumers and related public policy issues in both advanced economies and emerging market countries. All theoretical, empirical, and policy papers of relevancy are welcome, with the following as the topics to cover:
① protection for financial consumers
② business ethics of financial institutions
③ market discipline of financial industries
④ corporate social responsibility of financial institutions
⑤ renovation or innovation of law and regulations related to financial consumption
⑥ public policies for financial consumption
⑦ fair trading of financial products
⑧ dispute resolution for financial consumption
⑨ case studies of best practices for financial consumption
⑩ international comparison on any of the above topics

2. Publication schedule and contents

IRFC, the affiliated journal of the International Academy of Financial Consumers (IAFICO), will be published twice a year - April and October each year - and will pursue to be the first international academic journal focusing on the research related to financial consumers. As the contribution of financial consumption becomes increasingly important to the national economy for most countries, how to maintain an efficient and equitable financial market is an imminent issue for research. The trend of globalization and liberalization policies has reinforced the challenges in financial markets. Not only the financial instruments become more complicated and hard to understand by the public, but also the frequent changes in regulations and business practices cause confusions to the financial consumers. Consumption disputes regarding the financial products have drawn attention by the media in recent years. IRFC attempts to serve as a forum to publish and share original and innovative research, both academic and policy-oriented, on all the above issues.

3. On ethics for research

The range of research misconducts
① Misconducts related to academic research (“misconducts” hereafter) means that fabrication, falsification, plagiarism, unfair showing of papers' author, during research proposal, research performing, research report and research presentation,

etc. It is as follows.

1) “Fabrication” is the intentional misrepresentation of research results by making up data or research result.

2) “Falsification” is the distortion of research contents or results by manipulating research materials, equipment and processes, or changing or omitting data or results.

3) “Plagiarism” is the appropriation of another person's ideas, processes or results, without giving appropriate approval or quotation.

4) “Self-plagiarism” is the reusing a large portion of their own previously written research.

5) “Unfair showing of papers' author” is not qualifying people, who have been contributing to research contents or results scientifically, industrially and politically, as an author without just reason, or qualifying people, who have not been contributing the same, as an author with an expression of thanks or respectful treatment.

6) Obstructing investigation about misconducts of their own or others, or harming an informant.

7) Action which is out range of usually acceptable in the course of the research.

8) Action which is suggestion, pressure or threat to others to do the above things.

4. On plagiarism

Types of plagiarism

Following two forms are defined the representative action of research misconducts (Plagiarism).

① Using the original author's idea, logic, unique terms, data, system of analysis without indicate the source.

② Indicating the source but copying the original paper's words, idea, data and so on without quotation marks.

Author Guidelines

General

The IRFC publishes rigorous and original research related to protection of financial consumers. IRFCs shall be published twice a year, in April and in October. Papers submissions shall be accepted throughout the year. Editorial Board will evaluate manuscripts in terms of research contribution to the field and paper's quality. Research area includes but is not limited to the following topics:

1. Protection for financial consumers
2. Business ethics of financial institutions
3. Market discipline of financial industries
4. Corporate social responsibility of financial institutions
5. Renovation or innovation of law and regulations related to financial consumption
6. Public policies for financial consumption
7. Innovation or fair trading of financial products
8. Dispute resolution for financial consumption
9. Case studies of best practices for financial services or their consumption
10. International comparison of protection for financial consumers.

Publication Ethics

When authors submit their manuscripts to IRFC for publication consideration, they agree to abide by IRFC's publication requirements. In particular, authors confirm that:

- The manuscript is not under review for publication elsewhere, and will not be submitted to another publication entity during the review period at IRFC
- The empirical results of the manuscript have not been previously published.
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There is no fee for a submission of an article at the IRFC journal.

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1. Papers must be submitted in Microsoft Word format. The structure of the work should be as suggested by the Publication Manual of the American Psychological Association 6 edition:
   - Title
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   - Method
   - Results
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   - References
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2. Manuscripts should be written as concisely as possible without sacrificing meaningfulness and clarity. They should be no longer than 40 double-spaced pages with one-inch margins and Times New Roman 12-point font, including references, tables, figures and appendixes.

3. Submitted papers should be in English, with grammar, spelling and punctuation thoroughly checked.

4. Make sure lettering and sizing of your manuscript, as well as bullet points and numerals are uniform.

5. The title page must include the title of the paper and an abstract of no more than 200 words. Indicate not more than seven key words after the abstract.

6. Please provide author name(s) contact information in a separate page.

7. Sections, including introduction, should be numbered in Roman numerals. Subsection headings should be in letters, e.g. A, B, C.

8. Tables must be typewritten, not in the form of pictures, and given Arabic numerals. They should have a descriptive name following the table number. Tables can be placed either after the text in the paper or in appendix section, if too detailed.

9. Figures must be given Arabic numbers as well and must not include any explanatory materials, which should go to the legend or to the caption. Captions should include a brief description of the figure. Please ensure that figures are of as high quality as possible.

10. The last section of a paper should include main conclusions of the research.

11. References should be placed at the end of the paper. All references must be in the style of American Psychological Association 6th edition, the basics can be found here. Make sure all in-text citations are presented in the reference list. The examples of reference entries are as follows:

For monographs:

Henderson, J. (2012). *Health economics and policy* (5th ed.). Mason, OH: South-Western, Cengage Learning.

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Leonidou, L. (Eds.). (2018). Advances in global marketing: A research anthology.

For periodicals:

Nam, S. (2006). A study on the causality between the insurance and economic growth, *Korea Insurance Journal* 74, 169-197.

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With any issues regarding the publication of your paper, please email the IRFC Editor, Professor Sharon Tennyson, at irfc@cornell.edu.

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1) Fabrication is the intentional misrepresentation of research results by making up data or research result.
2) Falsification is the distortion of research contents or results by manipulating research materials, equipment and processes, or changing or omitting data or results.
3) Plagiarism is the appropriation of another person's ideas, processes or results, without giving appropriate approval or quotation. We define two types of plagiarism:
   3.1) Using the original author's idea, logic, unique terms, data, system of analysis without indicating the source.
   3.2) Indicating the source but copying the original paper's words, ideas, data and so on without quotation marks.
4) Self-plagiarism is the reusing of a large portion of author's own previously written research.

Other misconducts include:

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Bylaws of the International Academy of Financial Consumers (IAFICO)

March 31, 2015
First revision on April 19, 2016
Second revision on September 30, 2019

Section 1 General Provisions

Article 1 (Official Name)

The official name of this academic society shall be the "International Academy of Financial Consumers (IAFICO hereafter)".

Article 2 (Registered office and Branch offices)

The registered office is to be in Seoul, South Korea. Branch offices may be established in provincial cities in Korea or overseas should the need arise.

Section 2 Objectives and Undertakings

Article 3 (Objectives)

*Pending
The IAFICO is a non-profit association aiming at promoting and developing at an international level collaboration among its members for the study of various issues relating to financial consumers, including its education, legislation, creation of best practices, supervision, and policy advancement to contribute to the development of the global economy and financial market, through investigation or research into financial consumers, and other academic activities.

Article 4 (Undertakings)

The following activities shall be carried out in order to achieve the objectives of the IAFICO.
1. Publication of journal and other literature
2. Hosting of academic conferences
3. Additional undertakings corresponding to the objectives of the academic society which are deemed necessary at the board of directors meeting or the general meeting

Section 3 Membership

Article 5 (Requirements and Categories)

The IAFICO shall have following categories of membership:

① Individual member
Individual members are categorized further into a regular member or an associate member.

1. Regular member shall be a specialist in the area such as finance, consumer studies, economics, management, law, or education etc, and must be a full-time instructor at a domestic or overseas university, a researcher at a research institute with equivalent experience, or should hold equal credentials to those mentioned previously, and shall become its member by the approval of the board of directors. Regular members attend general meetings and may participate in discussions, hold the right to vote, and are eligible to be elected to a director or other status of the IAFICO.
2. Associate members shall be divided into either a student member, who is a current domestic or overseas graduate school student, or an ordinary member, who works for a financial institution or a related organization. Associate members do not hold the right to vote and are not eligible to be elected to a director or other status of IAFICO.
3. Both regular member and associate member must pay the membership fee to the IAFICO every year.
4. In the case that a decision is made by the Board of Directors to expel a member due to a violation of the objective of the society, or demeaning the society, or in the case that a member fails to pay the membership fees for two years continuously without prior notice, their membership shall be revoked.

② Institutional member

1. Institutional member shall be organizations related to financial consumers who do not damage the impartiality of the IAFICO subject to approval of the Board of Directors. Institutional members do not hold the right to vote and are not eligible for election.
2. Institutional member must pay its membership fee to the IAFICO every year.

Section 4 Organization

Article 6 (Designation of Board of Director)

The following Directors are designated to constitute the Board of Directors to run the IAFICO.

1. Chairperson
2. Vice-Chairperson
3. President
4. Vice-President
5. ordinary Directors
6. Auditor

Article 7 (Election of Board Members and Director)

① The Chairperson, Directors, and Auditors shall be elected or dismissed at the general meeting.
② Appointment of the Directors may be entrusted to the Chairperson pursuant to the resolution of the general meeting.
③ The Vice-Chairperson, President, and Vice-President shall be appointed and dismissed by the Board of Directors.

Article 8 (General Meetings)

① General meeting shall decide following matters relating to the activities of the IAFICO.
1. Amendments to the Bylaws
2. Approval of the budget and settlement of accounts
3. Election or Dismissal of the Chairman
4. Election or dismissal of Auditors
5. Regulations concerning the duty and rights of members
6. Resolutions regarding items submitted by the President or Board of Directors
7. Other important matters

② The Chairperson must call a regular general meeting at least once a year and report on the undertakings of the IAFICO. Provisional general meetings may also be held by the call of the Chairperson, or at the request of at least a quarter of current regular members, or according to the resolution of the Board of Directors.
③ At a general meeting, a quorum is formed by one third of regular members. However, regular members who are not able to participate in the general meeting in person may be represented by proxy, by entrusting a specific regular member attending the general meeting with their attendance or voting right. In this case the letter of proxy is included in the number of attendees.
④ Resolutions at the general meeting will be made according to the majority vote of the attending members who hold the right to vote.
⑤ In principle, the general meeting shall be held with face-to-face meeting, however, it may be held web-based meeting when needed.

Article 9 (Auditors)

① The auditors shall audit financial affairs, accounts and other transactions of IAFICO, shall participate in, and may speak at board meeting, and must present an auditor's report at the regular general meeting.
② There shall be two appointed auditors.
③ Auditors are elected at the general meeting.
④ An auditor shall serve a term of two years and may be reappointed.

Article 10 (Board of Directors)

① The Board of directors shall be made up of chairperson and fewer than 80 directors.
② The Board of Directors shall decide a plan of operation and establish the budget, in addition to matters on the running of IAFICO.
③ Board meeting requires a quorum of at least one third of current board members. Resolutions at the Board meeting will be made according to the majority vote of the attending members. However, board members

who are not able to participate in the board meeting in person may be represented by proxy, by entrusting another specific board member attending the board meeting with their attendance or voting right.
④ A board member shall serve a term of two years, with a possibility of serving consecutive terms.
⑤ A number of sub-committees or branches in each country or region may be set up under the Board of Directors to support the running of the IAFICO.

Article 11 (Steering Committee)

① The Board of Directors may entrust some decisions relating to the conducting of business to the Steering Committee.
② The Steering Committee shall be comprised of the Chairperson, Vice-Chairperson, President, and the heads of each subcommittee.
③ Temporary task forces may be established by the Steering Committee when necessary to run the business of the Steering Committee.

Article 12 (Chairperson)

① The Chairperson shall represent the IAFICO and chair its general meeting and board meeting.
② There shall be one appointed Chairperson who serves a term of three years.
③ In the case of an accident involving the Chairperson, the Vice-Chairperson shall complete the remaining term of office of less than one year. If it lasts longer than one year, a new Chairperson shall be elected at the general meeting.
④ A new Chairperson should be elected at the general meeting one year prior to the end of the current Chairperson's term of office.
⑤ Should it be judged that it is difficult for the Chairperson to carry out their duty any longer, he or she may be dismissed from their post by the decision of the Board of Directors and general meeting.

Article 13 (Vice-Chairperson)

① The Vice-Chairperson shall assist the Chairperson, and serve as a member of the Board of Directors.
② The Vice-Chairperson shall serve a term of two years, or the remaining term of office of the Chairperson, whichever is shortest.
③ The Vice-Chairperson shall be elected from one of the regular members at a meeting of the Board of Directors, according to the recommendation of the Chairperson.
④ The Vice-Chairperson may be reappointed.

Article 14 (President)

① During its term of office, the President shall become the head of the organizing committee supervising international conferences, and serves for a term of one year. The President shall attend the board meeting as a member of the Board of Directors.
② The succeeding President shall be elected by the Board of Directors after considering their ability to organize and host the following year's conferences. The succeeding President shall also attend board meeting as a member

of the Board of Directors.

③ The Board of Directors may elect the next succeeding President should the need arise. The next succeeding President shall also attend board meeting as a member of the Board of Directors.

④ The President, succeeding President, and the following President may appoint a Vice- President respectively by obtaining approval of the Board of Directors.

⑤ The appointment and dismissal of the President is decided at the board meeting.

Article 15 (Vice-President)

① A Vice-President is a member of the Board of Directors and shall assist the President, supervise applicable international conferences.

② A Vice-President is recommended by the President and shall be approved by the Board of Directors.

③ Multiple Vice-Presidents may be appointed.

④ A vice-President shall serve a term of one year, the same as the term of President.

⑤ In the event of an accident involving the President, a Vice-President shall fulfil the President's duties during the remaining term of office.

Article 16 (Editorial Board)

① The Editorial Board shall be responsible for editing of journals and other materials to be published by the IAFICO.

② The head of the Editorial Board shall be appointed by the Board of Directors, and shall serve a term of office decided by the Board of Directors.

③ The head of the Editorial Board shall be a member of the Board of Directors.

④ Additional matters concerning the running of the editorial board shall be decided separately by the Board of Directors.

Article 17 (Advisory Board and Consultants)

① The Chairperson may select individuals who could make a large contribution to the development of the IAFICO, and appoint them as advisors subject to the approval of the Board of Directors.

② The Chairperson may appoint consultants subject to the approval of the Board of Directors in order to receive advice relating to all business matters of the IAFICO, such as development strategies, conferences, research plans, and research projects etc.

③ Advisors and consultants shall serve terms of one year and may be reappointed.

Section 5 Financial Affairs

Article 18 (Accounting and Revenue)

① The fiscal year of the IAFICO shall run from the 1st of January to the 31st of December each year.

② The finance required to operate the IAFICO shall be sourced from membership fees, member contributions, society participation fees, and other incomes. Related matters shall be decided by the Board of Directors or the Steering Committee.
③ Should the need arise, the IAFICO may accept sponsored research, donations or financial support from external parties in order to support the business performance of the IAFICO. The Chairperson shall report the details of these at the board meeting.
④ Chairperson should report all the donation from outside and their usage of the year at the IAFICO homepage by the end of March of the next accounting year.

Section 6 Supplementary Rules

Article 19 (Revision of the Bylaws)

① Any other matters not stipulated by this Bylaws shall be resolved by the Board of Directors.
② Revision of the Bylaws shall be carried out, by the proposition of the Board of Directors, or at least one-tenth of regular members, at a general meeting where at least one-third of the total regular members are in attendance, or at a provisional general meeting, with the agreement of at least two-thirds of current members.

Article 20 (Dissolution)

Should the IAFICO intend to be dissolved, it must be decided upon at a general meeting with the agreement of at least two-thirds of current members, and permission must also be received from the Fair Trade Commission. Except for bankruptcy, the dissolution must be registered and reported to the Ministry of Strategy and Finance within three weeks, accompanied by a certified copy of register.

Article 21 (Residual Property upon Dissolution)

Should the IAFC be dissolved, according to article 77 of the Korean civil law, all remaining assets of IAFICO shall belong to the state, local government, or other non-profit corporations carrying similar objectives.

Additional Clause

These Bylaws shall become effective from the 1st April 2015

The International Review of Financial Consumers

Vol.7 No.1

Printed	2022. 4. 30.
Published	2022. 4. 30.
Publisher	Man Cho
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