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RESEARCH PAPER

Scale Development and Exploration in Representativeness Bias Intervening Investment and Financial Decisions

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PAPER INFO	ABSTRACT
	This research aims to explore the antecedents behind the generation of representativeness bias of investors in the Stock Market of Pakistan, as well as develop its scale. Schwab (1980)'s three-step analysis has been adopted; i.e. item establishment, scale development and scale assessment. 30 interviews were conducted and 250 questionnaires were distributed among brokers and investors of the Stock Market of Pakistan. The results indicate that stock market experts and investors can experience representativeness bias due to being, Overwhelmed by Recent Information, Misinterpretation of Chance and Misuse of Faith in Intuition. By confirming the causes of Representativeness bias, Security and Exchange Commission of Pakistan can control said bias by providing workshops, leading to an improved economy

Introduction

In the first generation of behavioral finance (1980s onward), the notion of 'rational' wants was mainly based on standard finance's notion of people's want i.e. wanting high returns for low risk endeavors. The first generation labeled humans as 'irrational'; they are deceived by subconscious biases and impulsive errors in their attempts of satisfying their rational wants. The following era disregards the concept of rationality and irrationality, and defines humans as 'normal'. Normal people have wants, variable from person to person, and all people apply knowledge, cognitive and emotional shortcuts to satisfy their wants. Occasionally, humans get diverted from their wants by ignorance, cognitive biases and emotional errors. These wants, far more than human knowledge, shortcuts, ignorance and errors, provide answers to significant financial inquiries, e.g. portfolio development, asset valuation, as well as market efficiency (Statman, 2017; 2019).

Behavioral finance proposes that psychological influences and behavioral biases affect investors and financial advisors. It further posits that biases can be the source of market anomalies, especially those in stock exchange, like the abrupt rise and fall in prices (Woo, Mai, McAleer and Wong, 2020). It helps to understand how people make certain financial decisions and how these decisions can affect financial markets. It attempts to elucidate cognitive forms of market contestants and how their behavior affects financial markets. Human behavior is unpredictable because of behavioral biases prevailing in their thought process. Furthermore, majority of stock market investors and advisors are unaware of the reasons behind the generation of such biases. Understanding and classifying behavioral biases can be very crucial when narrowing in on the study e.g. research need to be conducted investigating antecedents of cognitive biases of investors in Pakistan Stock Exchange (PSX) and further developing scales of cognitive biases (Awais and Rehman, 2017; Awais, 2018; Awais and Estes, 2019).

Highly fluctuated stock markets are considered immature, as a high level of variation is problematic for the market (Ouyang and Li, 2018). This study is advantageous for stock market investors and advisors, as through it they may recognize the presence of representativeness bias while making investment decisions, and take preventive measures for both current and future transactions. This study is beneficial for Pakistan's economic condition, as through it the regulatory authorities of PSX such as Security and Exchange Commission of Pakistan (SECP) may understand the investors' behavior and develop policies to regulate representativeness bias of investors. SECP can also train the investors towards their rational decision-making by arranging workshops and seminars. From the extensive literature on scale development of biases in the stock market, the following study on antecedent investigation and scale development of representativeness bias has been developed.

Literature Review

Representativeness Bias

Behavioral portfolio theory (Shefrin and Statman, 2000) proposes that investors wish for an efficient diversification of their portfolio to achieve their long term goals. The development of such a portfolio can be greatly hampered by various biases present in the thought process of investors. Representativeness is a normal behavioral characteristic in financial decision-making, where investors have a propensity to overweigh contemporary events and underweight ancient events. This leads to instantaneous judgments on queries based on their seeming semblance to a prior matter. Kahneman and Tverskey (1972) initially proposed representativeness bias as an evaluation of "the likelihood of an event that is uncertain", or a sample by the amount to which it is related to its parent population, and imitates the properties of the procedure through which it was generated. Tverskey and Kahneman (1984) stated representativeness heuristics as the measurement of the extent of correlation between a sample and its populace,

between an instant and its division, or more specifically between an event and its representative.

An investor's insensitivity to prior probabilities of an outcome increases his representativeness bias. Prior probabilities are important factors that investors and advisors should consider while evaluating the chances of an outcome. When likeness among situations confuses an investor's rational concerning the possibility of an event, investors suffer representativeness heuristics. Investors often commit the mistake of believing that two similar objects or events are far more closely correlated than they actually are.

H1: Insensitivity to prior probability of outcomes may lead to an increase in representativeness bias of investor

Rrepresentativeness is in effect when investors approximate the possibility of a particular criterion of a sample. Insensitivity to sample size or law of small numbers is a cognitive mistake that causes investors to judge the likelihood of gaining an accurate sampling, without comparing the sample size to the actual population being sampled. In case that criterion highly represents the populace, it is then assigned a high probability. This appraisal then neglects the influence of sample size. A limited sample size allows a statistical constant to diverge significantly as compared to a bigger sample.

H2: Insensitivity to the representativeness of sample size known to an investor may lead to an increase in representativeness bias of investor

An investor's misconception of chance plays an important role in decision making and lead to representativeness bias. The concept of misconception of chance illustrates the aspect of individuals assuming extensive samples to samples of lesser size. Investors and advisors have trouble directing the sometimes contradictory laws of statistics and probability, leading to misconception of chance. Investors expect that a series of occurrences created via a stochastic event will correspond the essential attributes of that event, regardless the short length of said sequence.

H3: Having a misconception of chance may lead to an increase in representativeness bias of investor

Material and Methods

This research applied mixed methodology (Pragmatic approach). Qualitative research is about capturing people's opinions and emotions; to provide a rich, detailed picture on why an individual acts in a certain way, and how they feel about their actions (Hennink, Huttler and Bailey, 2020). This research aims at investigating key aspects of representativeness bias of investors and financial advisors in PSX. This study is exploratory in nature as no prior study regarding

representativeness bias of investors and advisors in PSX has been conducted. This study also hypothesized and tested the explored antecedents, which displays the quantitative nature of this study. Following the explored antecedents, this research created scales on Representativeness bias.

The development of scale proposed by Schwab (1980) falls under three main phases.

Stage 1: Item Generation

Initially interviews were conducted as they help with more accurate screening, secure verbal and non-verbal cues and aid in capturing emotions and behavior. Interviews provided an in-depth investigation of the problem (Potter and Hepburn, 2012). Resulting unstructured data was organized and analyzed using NVivo.

Stage 2: Scale Development

After a potential set of items are identified, it is compulsory to recognize the characteristics of said items and the length of scale to be developed.

Population

At the primary stage, the population of this study composed of PSX investors and advisors, with an aim to explore the antecedents of representativeness bias. At the secondary stage, in order to affirm the scale, investors were again considered the population of this study. The self-developed scale was distributed among investors working in stock exchanges of Lahore, Karachi and Islamabad.

Sample

Initially, to develop the representativeness bias scale, interviews were conducted with 30 experts of PSX. Evaluation of the replies was done by arranging informal meetings with 250 investors. The study also checked for outliers and applied exploratory factor analysis (EFA) to eliminate overloaded items.

Secondly, the study gathered 80 more responses and applied inter-item correlation to refine the scale. To test the generated scale, this research gathered responses of investors at various stages of the study.

Scale Development and Testing

Third, this study set frequency scales to measure respondent's attitude by assessing the degree to which they agreed with a particular statement (Likert, 1932).

Fourth, this study conducted pilot testing to check the reliability of the developed scale, in order to confirm stable and consistent results.

Stage 3: Scale Evaluation

Fifth, the study conducted descriptive analysis in order to summarize and interpret data, providing an idea of distribution of data and find out emerging patterns.

Sixth, the research analyzed the results of each respondent, aiming at cumulative scores of individual elements in the scale.

Seventh, the study gathered the responses of 150 respondents and applied EFA to identify the underlying relationships between measured variables and explore the underlying theoretical structure.

Eighth, this research performed inter-item correlation analysis to analyze the reliability of the scale.

Ninth, the study performed Principal component analysis (PCA) that reduced dimensionality and compressed the data, with an ultimate objective to remove the occurrence of repetition.

Results and Discussion

NVivo

Initially, this study transformed the interviews of 30 expert brokers and professional investors to a word cloud for in-depth analysis and investigation through NVivo. From image 01, it can be perceived that representativeness heuristics is the most observable heuristic in PSX. In case an investor is overwhelmed by the most recent, surprising, unexpected and possibly catastrophic events and/or information, they may suffer representativeness bias. In financial markets recent and attention grabbing events cause people to overreact, ignoring the fact that its effect will most likely be temporary.

H4: Being overwhelmed by surprising information may lead to an increase in representativeness bias of investor

An investor's misuse of faith in intuition plays an important role in decision making. Investors with eminent scores in belief in intuition are more likely to suffer the representativeness heuristic. Faith in intuition reveals an investors' reliance on their own (sometimes flawed) experimental system.

H5: Misuse of faith in intuition may lead to an investors' representativeness bias

For every decision that investors make, they do not always have the necessary time and resources to make an informed choice. In such cases, investors use heuristics in order to reach decisions quickly. They estimate the likelihood of an event by comparing it to a prototype that already exists in their minds. Yet without proper data, investors are more likely to overestimate the likelihood that such specified event will occur.

H6: Quick thinking for decision making may lead to representativeness bias of investor
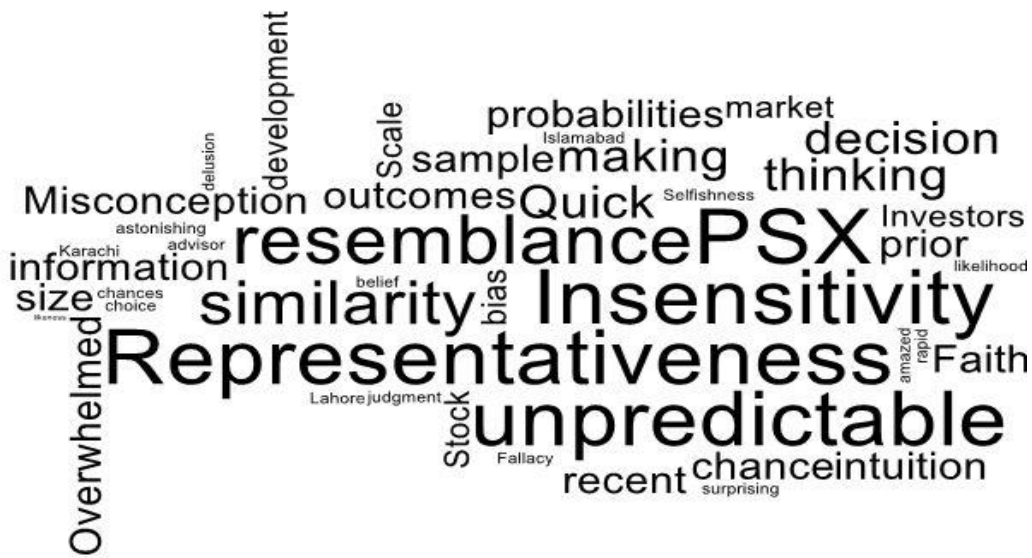
Image 01: Word Cloud

First time floatation of Questionnaire in PSX

As a first step, this study employed survey methodology where 250 questionnaires were floated among the investors of PSX, containing 7 variables including Insensitivity to prior probabilities of outcomes (IPP), Insensitivity to sample size (ISS), Misconception of chance (MOC), Misuse of faith in intuition (MFI), Overwhelmed by the recent information (ORI), Quick thinking for decision making (QTD) and Representativeness (REP).

191 responses were gathered, containing 169 valid responses. Study checked for outliers and found an aggregate of 07 outliers from rows 155, 131, 120, 99, 98, 34 and 33.

Table 1. Exploratory Factor Analysis (EFA)
Rotated component matrix[a]

	Component						
	1	2	3	4	5	6	7
MFI4	0.798						

MFI2	0.752					
MFI6	0.746					
MFI3	0.742					
MFI1	0.720					
MFI5	0.711					
REP5		0.741				
REP6		0.740				
REP4		0.719				
REP2		0.698				
REP1		0.684				
REP3		0.630				
IPP4			0.806			
IPP3			0.743			
IPP5			0.736			
IPP2			0.732			
IPP1			0.731			
IPP6			0.621			
MOC5				0.792		
MOC2				0.752		
MOC6				0.735		
MOC3				0.687		
MOC4				0.675		
MOC1				0.627		
ORI5					0.770	
ORI6					0.739	
ORI1					0.704	
ORI4					0.689	
ORI3					0.566	
ORI2					0.557	
QTD5						0.839
QTD2						0.807
QTD3						0.806
QTD4						0.806
QTD1						0.797
ISS3						0.721
ISS2						0.687
ISS1						0.644
ISS5						0.582
ISS4						0.535

Extraction method: Principal component analysis.
Rotation method: Varimax with Kaiser Normalization.

a. Rotation converged in 07 iterations.

From the above mentioned results of Rotated Component Martix: MFI1-MFI6 are significantly loaded on Factor (component) 1; REP1-REP6 are significantly loaded on Factor (component) 2; IPP1-IPP6 are significantly loaded on Factor (component) 3; MOC1-MOC6 are significantly loaded on Factor (component) 4, ORI1-ORI6 are significantly loaded on Factor (component) 5; QTD1-QTD5 are significantly loaded on Factor (component) 6, and ISS1-ISS5 are significantly loaded on Factor (component) 7.

Second time floatation of Questionnaire in PSX

After study performed EFA, 200 more questionnaires were floated among investors of PSX containing 07 variables (Insensitivity to prior probabilities of outcomes, Overwhelmed by recent information, Insensitivity to sample size, Misuse of faith in intuition, Misconception of chance, Quick thinking for decision making and Representativeness), containing 40 items where each variable involved items ranging 05-06. Responses of 150 investors were gathered in total that included 130 completely filled feedback forms.

Inter-item correlation was conducted, where correlation of less than 0.15 shows no correlation, above 0.15 and less than 0.5 shows average correlation, above 0.5 and less than 0.8 shows good correlation and above 0.8 shows very high correlation (BrakaLorenz, Chiang and Nelson Laird, 2013).

Table 2
Inter-item correlation (Representativeness)

	REP1	REP2	REP3	REP4	REP5	REP6
REP1	1					
REP2	0.695**	1				
REP3	0.612**	0.591**	1			
REP4	0.516**	0.559**	0.568**	1		
REP5	0.494**	0.606**	0.596**	0.658**	1	
REP6	0.555**	0.621**	0.441**	0.519**	0.594**	1

From the above mentioned results, it is clear that the study will take REP1-REP6 for variable 1 (Representativeness) of Representativeness bias.

Table 3
Inter-item correlation (Misuse of faith in intuition)

	MFI1	MFI2	MFI3	MFI4	MFI5	MFI6
MFI1	1					
MFI2	0.733**	1				
MFI3	0.642**	0.645**	1			
MFI4	0.661**	0.663**	0.566**	1		
MFI5	0.444**	0.440**	0.451**	0.624**	1	
MFI6	0.576**	0.569**	0.534**	0.669**	0.586**	1

From the above mentioned results, it is clear that study will take MFI1-MFI6 for variable 2 (Misuse of faith in intuition) of Representativeness bias.

Table 4
Inter-item correlation (Insensitivity to representativeness of sample size)

	ISS1	ISS2	ISS3	ISS4	ISS5
ISS1	1				
ISS2	0.641**	1			
ISS3	0.461**	0.464**	1		
ISS4	0.452**	0.498**	0.264**	1	
ISS5	0.365**	0.407**	0.265**	0.400**	1

From the above mentioned results, it is clear that study will take ISS1-ISS5 for variable 3 (Insensitivity to representativeness of sample size) of Representativeness bias.

Table 5
Inter-item correlation (Insensitivity to prior probabilities of outcomes)

	IPP1	IPP2	IPP3	IPP4	IPP5	IPP6
IPP1	1					
IPP2	0.806**	1				
IPP3	0.544**	0.567**	1			
IPP4	0.575**	0.558**	0.699**	1		
IPP5	0.468**	0.505**	0.615**	0.632**	1	
IPP6	0.493**	0.475**	0.549**	0.559**	0.596**	1

From the above mentioned results, it is clear that study will take IPP1-IPP6 for variable 4 (Insensitivity to prior probabilities of outcomes) of Representativeness bias.

Table 6
Inter-item correlation (Misconception of chance)

	MOC1	MOC2	MOC3	MOC4	MOC5	MOC6
MOC1	1					
MOC2	0.475**	1				
MOC3	0.520**	0.617**	1			
MOC4	0.469**	0.520**	0.648**	1		
MOC5	0.556**	0.565**	0.661**	0.812**	1	
MOC6	0.625**	0.509**	0.624**	0.646**	0.735**	1

From the above mentioned results, it is clear that study will take MOC1-MOC6 for variable 5 (Misconception of chance) of Representativeness bias.

Table 7
Inter-item correlation (Overwhelmed by recent information)

	ORI1	ORI2	ORI3	ORI4	ORI5	ORI6
ORI1	1					
ORI2	0.559**	1				
ORI3	0.641**	0.572**	1			
ORI4	0.572**	0.608**	0.488**	1		
ORI5	0.577**	0.523**	0.615**	0.576**	1	
ORI6	0.576**	0.517**	0.495**	0.534**	0.628**	1

From the above mentioned results, it is clear that study will take ORI1-ORI6 for variable 6 (Overwhelmed by recent information) of Representativeness bias.

Table 8
Inter-item correlation (Quick thinking for decision making)

	QTD1	QTD2	QTD3	QTD4	QTD5
QTD1	1				
QTD2	0.682**	1			
QTD3	0.642**	0.629**	1		
QTD4	0.615**	0.671**	0.651**	1	
QTD5	0.639**	0.667**	0.697**	0.680**	1

From the above mentioned results, it is clear that study will take QTD1-QTD5 for variable 7 (Quick thinking for decision making) of Representativeness bias.

Third time floatation of Questionnaire in PSX

After the study checked inter-item correlation, 150 more questionnaires were floated among investors of PSX containing 07 variables (Insensitivity to prior probabilities, Overwhelmed by surprising information, Insensitivity to sample size, Quick thinking for decision making, Misconception of chance, Misuse of faith in intuition and Representativeness), containing 40 items where each variable involved items ranging from 05-06. Responses of 80 investors were gathered in total that included 60 completely filled feedback forms.

Table 9
Reliability Analysis

Variables	Cronbach's Alpha
REP	0.886
MFI	0.895
ISS	0.778
IPP	0.891
MOC	0.899
ORI	0.886
QTD	0.990

Note: > 0.7*, > 0.8**, > 0.9***

From the above mentioned results it is clear that all the variables are highly reliable and acceptable for the study.

Table 10
Correlation Analysis

	QTD	MFI	MOC	ORI	IPPO	ISS	REP
QTD	1						
MFI	0.072	1					
MOC	0.129	0.337**	1				
ORI	0.009	0.504**	.608**	1			
IPPO	0.113	0.377**	.532**	0.457**	1		
ISS	0.023	0.436**	.420**	0.339**	.489**	1	

REP	0.044	0.564**	0.515**	0.583**	0.434**	0.433**	1

Note: < 0.1**, < 0.5*, < 0.9.

From the above mentioned results it is clear that ISS, MOC, ORI, IPP and MFI are significant and correlated positively with REP. The values of all the variables except QTD are acceptable for the study.

Table 11
Regression Analysis

	Un-standardized Coefficients			
	B	SE	t	Sig.
REP	0.422	.441	.957	.340
MFI	0.300	.069	4.377	.000
MOC	0.168	.068	2.482	.014
ORI	0.233	.073	3.206	.002
IPP	.042	.060	.695	.488
ISS	.127	.082	1.562	.120
QTD	-.033	.054	-.612	.541

Note: $R = 0.701$, $R^2 = 0.492$, F-stat significant at 0.00, $p < 0.01$

From the above mentioned results it is clear that MFI, MOC, ORI are significant with positive beta while IPP, ISS and QTD are insignificant. From beta co-efficient, it is clear that one unit change in MFI brings 0.300 units change in REP; a variation of one unit of MOC brings 0.168 units change in REP; and a variation of one unit in ORI brings 0.223 units change in REP.

Above results depict that representativeness bias will increase among investors when investors; are overwhelmed by recent information, misuse their faith in intuition and have misconception of chance.

Table 12
Eigen Value: Total Variance Explained

Component	Eigen Value
1	12.72
2	3.06
3	2.60
4	1.91
5	0.74
6	0.46
7	0.19

The scale on Representativeness bias contain seven variables (six independent and one dependent). Eigen value of variables (REP, MFI, MOC and ORI) are greater than one and acceptable for this research.

Fourth time floatation of Questionnaire in PSX

Once again, 100 stock market investors were selected from PSX and feedback forms were distributed among them containing 4 variables (Misuse of faith in intuition, Overwhelmed by recent Information, Misconception of chance and Representativeness) and 36 items where each variable involved items ranging from four to six. The study attained responses from a total of 88 investors, out of which 60 were valid.

Table 13
Reliability Analysis

Variables	Reliability
MFI	0.897
MOC	0.906
ORI	0.794
REP	0.914

According to the results of table 13 it is clear that all the variables are highly reliable and acceptable for this research.

Table 14
Correlation analysis

	MFI	MOC	ORI	REP
MFI	1			
MOC	0.440**	1		
ORI	0.417**	0.536**	1	
REP	0.561**	0.616**	0.573**	1

From table 14, it can be observed that all the independent variables are highly correlated with Representativeness and thus acceptable for the study.

Table 15
Regression analysis

	Un-standardized Coefficient		t	Sig.
	B	SE		
REP	0.146	0.498	0.293	0.770
MFI	0.281	0.079	3.569	0.001
MOC	0.346	0.091	3.784	0.000
ORI	0.295	0.101	2.913	0.005

Note: R=0.729, R²=0.532, F-stat significant at 0.00, p<0.01

From table 15, the value of adjusted R-square indicates that 53.2% variation in representativeness is attributed to all independent variables. Further, the standard error estimate has a value close to zero, indicating an overall well organization of the data. Studies have concluded that a standard error of equal to or less than 2.5 produces approximately acceptable 95% prediction level. F-stat is significant at 0.00, indicating that the independent variables are the true antecedents of representativeness bias and that the model developed for testing representativeness bias of investor in PSX is correct. Results conclude that all of the

independent variables are true predictors of dependent variable, are significant with positive beta signs and are thus acceptable for the study; with an insignificant constant indicating no chances of redundancy. The value of Beta coefficients indicate: a variation of one unit in MFI brings 28.1% change in REP, a variation of one unit in MOC brings 34.6% change in REP; and a variation of one unit in ORI brings 29.5% change in REP.

Table 16
Eigen value: Total variance explained

Component	Eigen Value
1	9.952
2	2.453
3	1.715
4	1.627

Table 16 indicates that the scale of representativeness bias contain 4 variables including 3 independent and 1 dependent. All variables have Eigen value greater than 1 and thus are acceptable for the study

Exploring the Antecedents of Representativeness bias of Investors and advisors in PSX and their reasons.

Finally, the scale on the Representativeness bias of investors and advisors was developed which contains four factors (Misuse of faith in intuition, Overwhelmed by recent Information, Misconception of chance and Representativeness) as indicated in figure 01, along with 36 items, in which each variable contains items ranging from 04-06. In general investors with representativeness bias are likely to estimate the probability of an outcome by searching for an equivalent event and concluding that odds will be comparable.

Investors with high score in Misuse of faith in intuition are more likely to display representativeness heuristics. Investors are subject to MFI when they do not have the relevant knowledge and experience to make valid intuitive decisions. Misconception of chance is one of the important reasons behind representativeness bias of investors. Investors believe that a stochastic series of outcomes portrays vital characteristics of that event, regardless of the size of the sequence. Overwhelmed by recent information is the last crucial factor that plays a role in the generation of representativeness bias of an investor. While sometimes warranted, investors may overestimate the effect of catastrophic events and/or surprising new information regarding stocks, not realizing that their effects on the market are only temporary in nature.
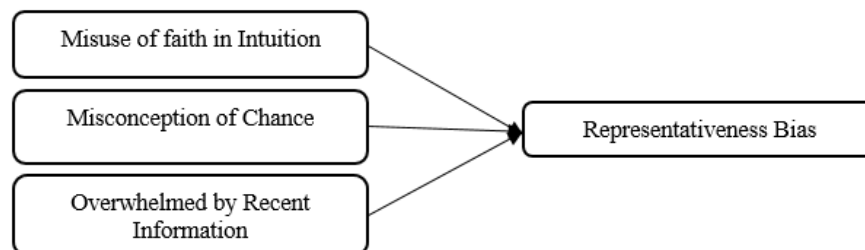
Figure 01: Antecedents of Representativeness Bias

Conclusion

According to the results of the study: H1 is rejected, as Insensitivity to prior probability of outcomes has no impact on Representativeness bias; H2 is rejected, as Insensitivity to the Representativeness of sample size known to an investor does not lead to an increase in Representativeness bias; H3 is approved as having a Misconception of chance may lead to an increase in Representativeness bias; H4 is accepted as overwhelmed by surprising information has an impact on representativeness bias; H5 is accepted as Misuse of faith in intuition may lead to an investors' representativeness bias; and H6 is rejected as Quick thinking for decision making has no impact on representativeness bias.

Among independent variables of representativeness, one of the most important variables playing a vital role is being overwhelmed by recent information, as it reflects on a persistent fear of investors regarding the value of their stocks. Second, misconception of chance is also an important variable playing a role in the generation of representativeness bias, because investors have a tendency to generalize patterns of large scale population to much smaller units. Stock market investors fail to make accurate predictions about probability. Small sample sizes do not fully describe the future value of business' shares. Third, misuse of faith in intuition is plays a vital role in the generation of Representativeness bias. Unless backed by years of knowledge and experience, intuition reduces to nothing more than guesses or anticipation for something an investor wants.

For new and amateur investors, knowledge on stock trading is an important factor in determining the direction of the investment. This knowledge is greatly impaired by high fluctuations in stock prices, market scams and persistent myths and biases regarding stock trading. This study showcases one form of bias known as representativeness bias. Moreover through the development of scale, this study has found the antecedents behind the generation of representativeness bias of investor at the time of decision making in PSX. As a detailed procedure has been followed in developing the scale of representativeness bias, this research will strengthen the existing body of literature in terms of procedure followed for developing scale.

More research is needed to learn the true extent to which the overwhelming nature of fads, disasters and global events affect representativeness bias in investors and advisors. Future studies and complex study designs are needed to confirm the true nature and extent to which misuse of faith in intuition affect representativeness bias in investors and advisors. Future research is needed to understand to what extent misconception of chance plays a role among the investors and advisors working in PSX.

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