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Journal of Advanced Research in Business and Management Studies

Journal homepage:
https://karyailham.com.my/index.php/arbms/index
ISSN: 2462-1935

Emotions and Financial Decision-Making: A Mediating Effect of Availability Heuristic

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ARTICLE INFO

Article history:
Received 7 September 2025
Received in revised form 28 September 2025
Accepted 10 October 2025
Available online 22 October 2025

Keywords:
Availability heuristic; emotions; financial decision-making; behavioural finance; mediation effect

ABSTRACT

Financial decision-making is strongly shaped by both emotions and cognitive shortcuts, which often lead to systematic biases. One important shortcut is the availability heuristic, where individuals judge risks and probabilities based on information that is most easily recalled. While prior studies have examined the direct influence of emotions or heuristics on financial behavior, limited research has investigated the mediating role of the availability heuristic in linking emotional states to financial decision outcomes. This study addresses that gap by exploring how positive and negative emotions influence financial risk perception and investment choices indirectly through heuristic processing. Drawing on dual-process theories, it is proposed that emotions heighten the salience of certain memories, thereby increasing reliance on easily accessible information. Survey data from retail investors, analyzed using structural equation modeling, reveal that the availability heuristic significantly mediates the relationship between emotions and financial decision making. Specifically, fear and anxiety amplify risk-averse choices through recall of negative market events, whereas optimism fosters greater risk-taking via vivid recall of success stories. These findings enrich the behavioral finance literature by identifying cognitive heuristics as a psychological mechanism through which emotions shape financial behavior. The study contributes to investor education, financial advisory practices, and policy design by suggesting strategies to mitigate bias and promote more rational decision making.

1. Introduction

Financial decision making is rarely a purely rational process. Traditional finance theories assume that investors act logically, evaluating risks and returns to maximize utility. However, evidence from behavioural finance consistently demonstrates that emotions and cognitive shortcuts strongly influence individual choices, often leading to systematic deviations from rationality [1,2]. Emotions such as fear, anxiety, or optimism can significantly shape perceptions of market conditions, while

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https://doi.org/10.37934/arbms.41.1.3143

heuristics as mental shortcuts used to simplify complex judgments and often serve as underlying mechanisms driving biased behaviour.

In recent years, the intersection of emotions and financial decision-making has garnered significant scholarly attention, particularly in the context of cognitive biases such as the availability heuristic. Among the heuristics identified in cognitive psychology, the availability heuristic plays a particularly salient role in financial contexts. It refers to the tendency to assess the likelihood of an event based on how easily instances or memories come to mind [3]. Behavioural finance challenges the classical assumption of investor rationality, emphasizing that emotional states often distort judgment and lead to suboptimal financial choices [4]. Emotions whether integral to the decision or incidental, they can influence risk perception, investment preferences, and the processing of financial information, thereby shaping the trajectory of financial behaviour.

The availability heuristic, a mental shortcut where individuals assess the probability of events based on how easily examples come to mind, plays a pivotal mediating role in this dynamic. Investors frequently rely on salient or recent financial news, personal experiences, or vivid market events, which can amplify emotional responses and skew decision-making processes [5]. For instance, heightened media coverage of market volatility may trigger fear or overconfidence, leading investors to overestimate the likelihood of similar future outcomes.

Recent systematic reviews have reinforced the enduring influence of such biases. Katenova *et al*., [6] conducted a comprehensive review of behavioural finance literature and identifying overconfidence, herding, anchoring, and loss aversion as dominant forces in investor behaviour. Notably, the review also introduced automation bias in an emerging distortion arising from over-reliance on AI-driven fintech platforms which further complicates the emotional and heuristic landscape of modern investing. Despite growing interest in behavioural finance, the mechanisms through which emotions influence financial decision-making remain underexplored, particularly in relation to cognitive heuristics. While emotions are known to affect risk perception and financial decision behaviour. The mediating role of the availability heuristic as a mental shortcut that relies on the ease of recalling information has not been sufficiently examined in contemporary financial contexts.

This study addresses that gap by examining the mediating effect of the availability heuristic in the relationship between emotions and financial decision making. Grounded in dual-process theories of cognition, the research posits that emotional states heighten the salience of specific memories, thereby amplifying reliance on heuristic-driven judgments. Using a field experiment from small medium entrepreneurs (SMEs) and structural equation modelling, this study investigates how both positive and negative emotions shape financial risk perception and financial behaviour through heuristic processing. Thus, the study aims to investigate the mediating effect of availability heuristic on emotions and financial decision-making.

The contribution of this research is threefold. First, it advances behavioural finance literature by conceptualizing the availability heuristic as a mediating mechanism rather than a stand-alone bias. Second, it offers empirical evidence on the emotional–cognitive interplay underlying financial decisions. Third, it provides practical insights for SMEs, financial advisory practices, and regulatory interventions aimed at reducing biased in financial decision outcomes.

1.1 Emotion and Financial Decision-Making

Emotions play a central role in shaping financial behaviour, often leading to departures from rational decision making assumed in classical finance. Psychological research argues that emotional states such as fear, excitement, or regret can significantly alter risk tolerance and decision outcomes

[4]. Their work emphasizes that emotions are not merely incidental but integral to the cognitive processes involved in financial choices. Similarly, Lerner *et al*., [7] found that specific emotions like anxiety and anger have divergent effects on risk perception, with anxiety increasing risk aversion and anger promoting risk-seeking behaviour. These findings align with Loewenstein and Lerner's [8] affective forecasting model, which posits those emotional states shape expectations about future outcomes, often leading to biased decisions. Positive emotions also play a role. Isen and Labroo [9] found that individuals in a positive mood are more likely to rely on heuristic processing, including availability bias, due to increased cognitive fluency. Cohn *et al*., [10] demonstrated that emotional resilience particularly through positive affect that can buffer investors against market volatility, reducing impulsive reactions.

In the context of investing, emotional states can directly affect portfolio allocation, asset pricing, and trading behaviour. Empirical studies show that investors in negative moods tend to reduce stock exposure, while positive moods encourage more aggressive strategies [11]. Despite such findings, emotions are not merely transient factors; they interact with cognitive processes, shaping the way individuals retrieve, interpret, and act upon financial information.

For SMEs, emotions are even more salient. Unlike large corporations, SMEs often depend on owner-managers whose personal emotions directly influence financial and strategic decisions [12]. For example, fear of debt may cause entrepreneurs to underutilize external financing, while excessive optimism may drive overinvestment in risky ventures. These emotional influences are magnified by limited resources, information asymmetries, and the personal stakes involved in SME ownership. Furthermore, Lerner *et al*., [7] found that anxiety increases risk aversion, while anger promotes risk-seeking behaviour patterns that are particularly relevant to SME owners navigating volatile markets. Kaushik [13] noted that fear and greed often drive SME investment decisions, leading to overreaction during market downturns and excessive optimism during booms. These emotional responses can result in misallocation of capital, poor debt management, and reactive pricing strategies. In SMEs, where decision-makers often operate without formal financial training, these emotional cues become even more influential.

In external finance contexts, studies in Saudi Arabia shows that perceived risk is a major deterrent for SMEs seeking external finance; emotional factors such as risk perception are closely tied to business age and manager experience [14]. Moreover, a study of Indonesian MSMEs stress that financial anxiety and emotional exhaustion are shown to hurt performance [15]. While this study did not explicitly model availability heuristic, it demonstrates strong emotional impact in SME financial outcomes.

1.2 Availability Heuristics in Finance

Availability is a cognitive heuristic which refers to the tendency to rely on already available information [16]. The availability heuristic, first introduced by Tversky and Kahneman describes the tendency to evaluate probabilities based on the ease with which examples come to mind. In financial contexts, this heuristic manifests in overreactions to salient or recent events. For example, [5] demonstrated that availability bias significantly influences investment decisions, especially when investors rely on salient market events or media narratives. Their moderated mediation model revealed that external locus of control and risk tolerance amplify the effects of availability bias, suggesting a complex interplay between personality traits and heuristic processing. Recent studies have expanded this understanding. Traczyk *et al*., [17] extended this work by showing that emotionally salient stimuli increase the accessibility of related memories, thereby enhancing reliance on the availability heuristic. Gigerenzer and Gaissmaier [18] argued that heuristics are not inherently flawed but can be adaptive

under certain conditions especially when decisions must be made quickly with limited information. [6] conducted a systematic review of behavioural finance literature from 2020 to 2025, identifying availability bias as one of the most persistent cognitive distortions. They also introduced automation bias where investors overly trust algorithmic recommendations as a new heuristic emerging from fintech adoption. This evolution underscores the need to revisit traditional models of decision-making in light of technological and emotional shifts.

Similarly, highly publicized success stories can fuel speculative bubbles by making positive outcomes more cognitively accessible [19]. The heuristic is powerful because financial markets are inherently uncertain, and individuals often lack the cognitive capacity to process all available information. Furthermore, availability heuristic is used to evaluate the probability of an event based on how quickly instances or associations have recalled [20]. It means that if an event related to each other are easily reached to mind, it will lead to an overestimation of the probability of that event. In the certain situations, this heuristic provides an excellent basis for decision making in the events or items be most commonly happened in the environment that leads people position to their mind easily [21]. However, this tendency leads to biases because the events or items are more readily available in memory that evokes emotions, imaginations or distinct in nature than unfamiliar events or items that difficult to imagine, vague or unemotional in nature. However, limited work has examined how emotions activate or amplify the heuristic's influence.

For SMEs, reliance on the availability heuristic is common due to cognitive and informational constraints. Entrepreneurs typically lack access to the sophisticated financial models used by larger firms and instead depend on intuition and past experiences [22]. A business owner who recently witnessed peers succeed through digital payments, for instance, may overestimate the likelihood of success in adopting similar technologies, regardless of contextual differences. Conversely, recalling recent loan rejections may discourage entrepreneurs from seeking external financing, even if their creditworthiness has improved. Thus, the heuristic provides both a coping mechanism under uncertainty and a source of systematic bias in SME decision making.

Recent empirical studies, Salman *et al*., [5] demonstrated that emotionally salient market events, such as sudden currency fluctuations or viral business failures, disproportionately influence SME financial decisions. This heuristic bias is magnified when entrepreneurs rely on recent experiences or media narratives rather than analytical forecasting. Traczyk *et al*., [17] showed that emotional salience enhances memory accessibility, thereby increasing heuristic reliance. For SMEs, this means that a recent cash flow crisis or a competitor's bankruptcy may loom larger in decision-making than objective financial indicators. [6] identified availability bias as one of the most persistent distortions in SME investment behaviour, often leading to short-termism and reactive financial planning. Additionally, a study in Nairobi, Kenya found that availability heuristic positively predicts SME financial performance, and this effect is partially mediated by investment decisions [23]. In Indonesia, Fadhillah *et al*., [24] examined how heuristic availability and financial self-efficacy affect SME performance, with investment decisions mediating. The study found that investment decisions are able to mediate the relationship between both availability and financial efficacy and SME's performance. A mediation study in Pakistan of women entrepreneurs found availability heuristic and overconfidence positively influence investment decisions; financial literacy mediates these relationships [25]. That indicates that heuristic bias (including availability) is partly shaped by emotional or cognitive bias plus capacity (literacy) to override or moderate.

These studies show, in real SME settings, that availability heuristic is not just influential but interlinked with investment decisions and financial self-efficacy, and with outcomes like performance. While both emotions and heuristics have been widely studied, their interplay remains underexplored.

1.3 Theories

There are two theories are relevant to this study which are Prospect Theory and Dual-Process Theory.

1.3.1 Prospect Theory

McDermott [26] defined Prospect Theory as a theory of decision making under conditions of risk. The challenging of decision making under conditions of uncertainty is difficult to foresee the consequences of the events with clarity. Furthermore, the internal conflict over value trade-offs in decision making made difficult when choices promote contradictory values and goals. Tversky and Kahneman [27] demonstrated most of the time, people systematically violate all the basic axioms of subjective expected utility theory in actual decision making. It is contrary to the normative implications inherent within classical subjective expected utility theories. Due to that the prospect theory was introduced to provide the alternative of choice that accurately describes how people practice on making their decisions. The theory also designed to explain in descriptive and empirical in nature about the common pattern of choice. This theory predicts that individuals tend to be risk averse in a domain of gain and relatively risk seeking in a domain of losses.

1.3.1 Dual-Process Theory

Dual-process theories of cognition [28] suggest that individuals employ two modes of thinking: System 1 (fast, heuristic-driven) and System 2 (slow, deliberate). Emotions often activate System 1, increasing reliance on heuristics such as availability. Empirical evidence supports this pathway. Kuhnen and Knutson [29] demonstrated that emotional neural responses predict financial risk-taking, while Slovic *et al*., [30] showed that affective experiences shape judgments under uncertainty through heuristic shortcuts. In SME contexts, decision-making is frequently intuitive, shaped by emotions and cognitive biases rather than formal analysis [31]. This makes mediation models particularly relevant: emotions heighten memory salience (e.g., recalling peers' bankruptcies or growth stories), which in turn influences financing, investment, and innovation decisions.

1.4 Theoretical Framework

In relation to the irrational behaviour, heuristics behaviour is continuing to identify, reconcile and understand by scholars that might affect financial decision making [32]. (This study focuses of availability heuristics to explain the observation as proposed by Tversky *et al*., [27]. Duxbury [33] stressed the important of understanding heuristics and biases at the heart of behavioural models, along with the influence of emotions on financial behaviour. Then, Nigam *et al*., [34] suggested on those heuristics are an imperative research mediator and moderator for financial decision making not yet tested. Evidently, Mathiyarasan and Krishnamoorthi [35] reinforces heuristics as mediators and introduces personality traits as moderators. Hence, in this study, the availability heuristic is examined as mediator variable when it plays as intervention on emotion (independent variable) and financial decision making (dependent variable). Referring to the literature, Figure 1 shows the theoretical framework of this study:

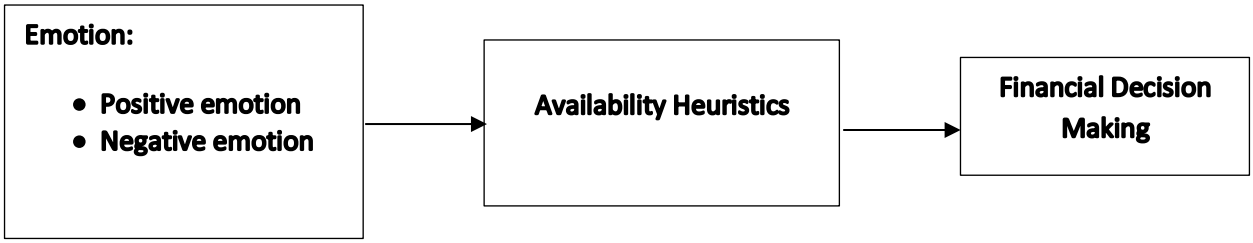

Fig.1. Theoretical framework

From Figure 1, it shows the independent variable, dependent variable and mediating variable. Neurofinance as an independent variable and emotion is identified as a neuro factor that consists of positive emotion and negative emotion. The dependent variable is financial decision making. It is considered the decision making in saving, spending and borrowing. Lastly, heuristics as a mediator in behaviour factor with the availability.

1.5 Hypotheses

Availability heuristic implies that if an event identified with one another are effectively come to mind, it will prompt an overestimation of the likelihood of that event. In the specific circumstances, few studies affirm that the availability heuristic provides a compelling basis for decision-making when emotionally vivid or frequently encountered events dominate memory. As Chaudhary *et al*., [36] and Verma *et al*., [37] demonstrate, emotional states not only influence what is recalled but also how it is interpreted as a leading to biased financial judgments. This supports the hypothesis that different emotional states mediate the effect of availability heuristic on financial decision-making, particularly in contexts like SMEs where intuition and experience often replace formal analysis. Therefore, the hypothesis 1, 1a, 1b will be hypothesized and expected as:

Hypothesis 1:
The mediating effect of availability heuristic significantly influence the emotions and financial decision making.
Hypothesis 1a:
The mediating effect of availability heuristic significantly influence the positive emotion and financial decision making.
Hypothesis 1b:
The mediating effect of availability heuristic significantly influence the negative emotion and financial decision making.

2. Methodology

According to Hayes and Preacher [38], the simple mediation model reveals a causal arrangement in which an independent variable affects the dependent variable indirectly through a mediator variable. From the theoretical framework in Fig.1, it reflects a causal sequence in which emotion affect the financial decision making indirectly through mediator variable, availability heuristics. It means that there is a possibility that the emotion also can affect financial decision making directly and emotion can indirectly effect financial decision making as mediated by availability heuristic. It also identifies the control effect of the survey questionnaire consisting of the demographic profile such as the age of business, education level and level of financial knowledge.

This study is non-contrived settings when it conducted to establish cause-and-effect relationships using the natural environment, called field experiment [39]. The experiment is one of the best research designs to reveal a causal relationship between variable [40]. In this study, emotion will be manipulated in positive and negative emotion. These manipulations as treatments that will be assigned to the experimental group, not to the control group. The experimental group is exposed to the treatments, called as pretest and posttest experimental [39].

Nature of this study is to analyse the issues of SMEs' financial decision making. Thus, this study offers to determine the issues using the entrepreneur as a unit of analysis. This is because it involved the owners of SME making an important decision in the financial perspective. On the other hand, this study was applied to cross-sectional research as the experiment was conducted in a one-shot period. The data were gathered within one day upon completing the experimental process. Then, analyse those data by examining the total effect, direct effect and indirect effect using general linear model.

The population of this research is SMEs in Kelantan. This is because entrepreneurs are having the issues of poor financial decision making that lead to massive number of business failure [41-43]. especially among new entrepreneurs within five years in business operations [44-46]. This study using purposive sampling as stated by Blakstad [47], the chosen participants using judgmental sampling are to be part of the sample with a specific purpose in mind. The entrepreneurs who are registered in "Pusat Usahawan MARA" (PUSMA) Kelantan is used as experimental unit.

2.1 Experimental Design

This study employs a one-factor between-subjects design in which to compare the effects of two emotions which are positive emotion and negative emotion with control group. There are forty-two selected entrepreneurs from PUSMA involved in the experiment. In determining the experimental research with tight experimental controls, it is possible with the sample size as small as 10 to 20 in size to ensure the successful research [39]. Therefore, forty-two entrepreneurs were completed the pretest and posttest experiment designed true experiment with homogeneous characteristics are employed. The aimed of the experiment was examined the financial decision making, emotion and heuristic of entrepreneurs who receive the positive and negative emotions of video clips. This study decided to choose four video clips for each of the emotions (happy, excitement, sad and fear). There are three sets of questionnaires used in the experiment, which are emotion questionnaire, financial decision-making questionnaire and heuristic questionnaire.

2.2 Experiment Procedure

An actual experimental design involved pretest and posttest experiment measures that conducted with both experimental and control groups. The experiment was conducted in PUSMA that involved in three separate venue, Entrepreneur Incubator and two training rooms. Upon arriving at PUSMA, the subjects were welcomed by the researchers and joined some refreshment that have been provided. In the initial stage, the researcher started the session with welcoming speech and short briefing to the subjects. Then, the researcher had given the instruction about the experiment procedure to the subjects. The researcher has informed the subjects that the experiment will be conducted in three different rooms and approximately lasted in 60 minutes. The pretest and posttest experiment was conducted to the three groups. The two experimental groups were involved in the treatments where they have to watch the video clips that can change their mood either in positive or negative. Whereas, the control group was given the session of emotion control by the researcher.

Then, the forty-two subjects were answered the financial decision-making questionnaire. To answer this questionnaire, it took approximately 10 minutes. While waiting the subjects answered

the questionnaire, the subject's group is identified using randomisation. Three groups involved in this research is consisting of two experimental groups (positive emotion group and negative emotion group) and one control group. The researcher was observed not just the correlation between variables, but also the actual causal relationships between variables with randomisation. An alphabet lottery procedure is used to assign treatment to each subject. Then, we collected the financial decision making questionnaires. Next, after assigning the group to each subject, the treatment had been given to the experimental group. The control group has listened to ten minutes sharing session of emotion management. The contents of the slides are more give the information on how to control the emotion.

The subjects in the experimental group were received either the treatment of positive emotion and negative emotion. This research was followed by emotion treatment on brand attachment [48]. For positive emotion treatments, each subject was watching four video clips in excitement and happy that derived from dramas and comedies genres and also documentary. For negative emotion treatments, each subject was watching four video clips of fear and sad in genres of horror, dramas and trackjacker. Two video clips are selected in each of excitement, happy, fear and sad emotions to provide subjects with emotional priming. All video clips were pretested and validated to ensure that they are effectively generated the target emotion.

After watching the video clip, the subjects immediately ask to fill in the same emotion questionnaires. The subjects were ranked their current emotions at that time to identify the changes of the subjects' emotion from the video clips . Then, the subjects were repeated assessed themselves on financial decision making through same financial decision-making questionnaire. Finally, they have to rate themselves on the given scenarios of heuristic behaviour from the heuristic questionnaire. The repeated measure of questionnaires such as emotion questionnaire and financial decision making questionnaire had been rearranged the order of the questions to avoid memorization of the questions [49]. The process involved in this experiment was ended within 60 minutes for each subject including with pretest process, treatment process and posttest process. It was shown in Figure 2.

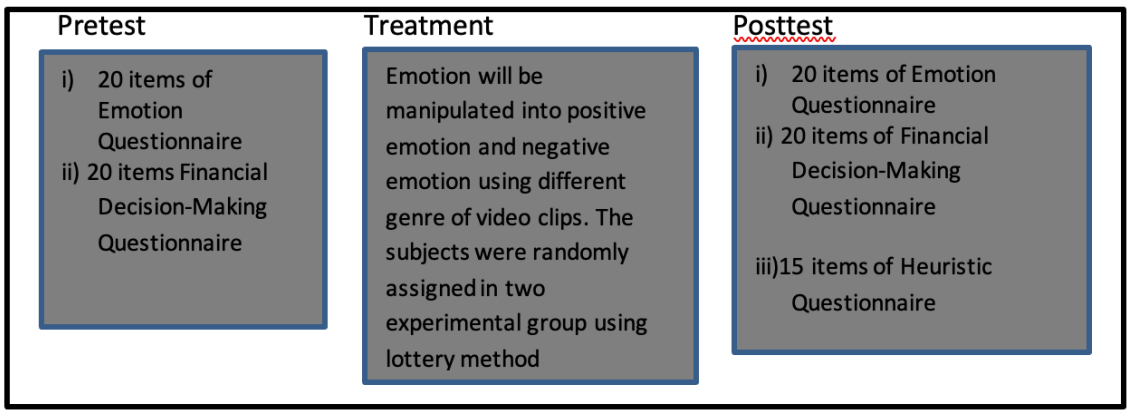

Fig. 2. Pretest and posttest experiment

The analysis of mediation was used SPSS PROCESS Macro Version 3.3 (PROCESS V3.3) developed by Hayes [50]. PROCESS was used to analyse the general linear regression of multicategorical of emotion (control group, positive group and negative group). A general linear modelling approach was articulated by the researcher to in estimating the direct and indirect effects when the independent variable is multicategorical [38].

3. Results

The mediating effect of availability heuristic was presented in financial decision making. As presented in Table 1, emotion significantly influence the financial decision making through mediating effect of availability heuristic with F-value = 5.0787 and p-value = 0.0047 which is less than 0.05. Therefore, the hypothesis 1 is supported.

Table 1
Mediation analysis result: The effect of emotion on financial decision making through availability heuristic

Models	**Coeff**	**MSE**	**t**	**P**	**LLCI**	**ULCI**
Availability						
F-value = 0.2809, p-value = 0.7566, R^2 = 0.0141						
Constant	5.3857	0.1839	29.2818	<0.0001	5.0137	5.7577
D1 (a_1)	-0.1286	0.2699	-0.4764	0.6365	-0.6745	0.4174
D2 (a_2)	-0.1714	0.2302	-0.7448	0.4609	-0.6370	0.2942
Posttest FDM						
F-value = 5.0787, p-value = 0.0047, R^2 = 0.2703						
Constant	4.1504	0.5710	7.2682	<0.0001	2.9944	5.3064
D1 (Direct Effect) (c'_1)	-0.9227	0.1665	-2.3805	0.0224	-0.7333	-0.0593
D2 (Direct Effect) (c'_2)	-0.4514	0.1454	-1.3332	0.1904	-0.4882	0.1005
Availability (b)	0.2234	0.1037	2.1533	0.0377	0.0134	0.4334
Mediation (through Availability)	**ab**	**BootSE**			**Bootstrapped CI**	
D1 (Indirect Effect) (a_1,b)	-0.0287	0.1578			-.7080	-.0897
D2 (Indirect Effect) (a_2,b)	-0.0383	0.1406			-.4695	.0822

The negative emotion produce direct effect (c'_1 = -0.9227, p-value = 0.0224) and reduce the financial decision making as shown in Table 1. Similarly, it reduces the financial decision making indirectly (a_1,b = -0.0287; CI: -0.7080, -0.0897) as compared with control group through availability heuristic. However, the positive emotion was not directly (c'_2 = -0.4514, p = 0.1904) influence the financial decision making. Likewise, it is also not indirectly (a_2,b = -0.0383; CI: -0.4695, 0.0822) influence the financial decision making through availability heuristic as compared with the control group. Hence, the hypothesis 1a is not supported. On the other hand, the hypothesis 1b is supported as evidence that negative emotion reduce indirectly the financial decision making by 0.03% through availability heuristic as compared with control group. It indicates that the negative emotion significantly influence poor financial decision making mediated by availability heuristic. Likewise, the negative emotion reduce directly the financial decision making by 0.9%. We can conclude that the partial mediation exist with the significant effect of emotion on financial decision making mediated by availability heuristic. It is showed in Figure 3.

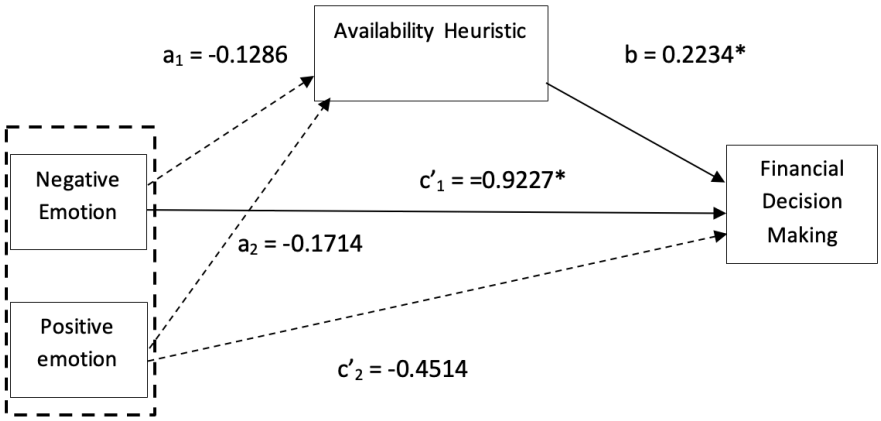

Fig. 3. Availability heuristic: Partial mediation of emotion on financial decision making

The negative emotion shows the mediating effect of availability heuristic significantly influence the poor financial decision making. On the other hand, positive emotion shows that the mediating effect of availability heuristic not significantly influence the good financial decision making.

4. Conclusions

The mediation analyses are examined on availability heuristic (mediator) effect on emotion (negative emotion and positive emotion) and financial decision making. Therefore, the findings of this study includes availability heuristic as a mediator on the effect of emotion (negative emotion and positive emotion) and financial decision making among SMEs. Only negative emotion gives mediating effect of availability heuristic as compared with the control group. The results consistent [7] and [13], the negative emotion felt in risk situation and increase improper decision because they generalized the kind of information that they received. However, the availability heuristic shows the results that consistent with Katenova *et al*., [6] and Venkatapathy and Sultana [20] where it shows that SMEs are easily to recall the negative information that they received and lead to overestimate of the probability on financial decision making. Venkatapathy and Sultana [20] and Gál *et al*., [21] revealed that the availability heuristic give tendency to bias on financial decision making as the actions are readily available in memory that evokes negative emotion.

To enhance financial decision-making among SME owners, behavioural interventions can be employed to help them recognize when emotional states such as recent negative news or peer failures. It cause bias their recall and distort judgment, using tools like decision checklists, prompts to consider counter-examples, and narrative balancing techniques. Combining financial literacy programs with emotional regulation training has been shown to be more effective than literacy alone. As evidence indicates that financial knowledge can mitigate heuristic biases. Policy makers, lenders, and investors should be mindful that SME managers often over- or under-estimate risks due to the availability of salient but unrepresentative events. By reducing information asymmetry, providing balanced case studies, and offering reliable forecasting data, these institutions can help counteract such biases. Methodologically, longitudinal designs are recommended to observe how reliance on the availability heuristic evolves over time, while other experimental approaches can manipulate emotional states to better understand their effects, and mixed-methods research can integrate qualitative narratives and memories with quantitative measures of heuristic reliance for a more comprehensive analysis.

Acknowledgement
We would like to express our sincere gratitude to all those who have contributed to completing this research. We are grateful to Pusat Usahawan MARA" (PUSMA) Kelantan for providing the necessary resources and facilities to conduct this research. Special thanks to Universiti Teknologi MARA, our colleagues and peers for their constructive feedback and collaboration.

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