

Behavioral Finance in Crypto Currency Market: An Integrated and Empirical Investigation

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Abstract

A cryptocurrency is a tradable digital asset or digital form of money, built on blockchain technology that only exists online. The cryptocurrency market has gained immense consideration in media and academia, because of huge price fluctuation of the currencies in the market. The authors review empirical literatureon behavioral financeof the investors in the cryptocurrencymarket. The study investigates into the influence of behavioral financefactors on investment decisions of the Indian investors who invest in cryptocurrencies. A quantitative approach was adopted by employing a snowball sampling method through 200 questionnaires.The results of the investigation show that herding factor, heuristic factor and prospect factor have statistically significant effect on investors' investment decisions in the cryptocurrencymarket. This emphasizes the significant role of the proposed behavioral factors as determinants of investment decisions. The study contributes to the existing stock of knowledge by consolidating the results of different researches in the area of behavioral financewith regard to investment in cryptocurrencies. It also contributes to the investors' understanding of the dynamics of cryptocurrency market and enhances the ability to make informed decisions. Furthermore, the findings of the study will encourage financial specialists to realize that information on the traditional finance theory is not adequate to excel in the cryptocurrency market.

Keywords : Cryptocurrency Market, Behavioral Finance Factors, Investment Decision.

JEL Classification Codes

G40, G41, D91

Introduction

Behavioral finance explains why and how people make decisions when theyspend, invest, save and borrow money (Samal & Mahapatra, 2020). Behavioral financerefers to the psychology that focuses on the fact that investors are not always rational, have limits to their self-control, and are influenced by biases (Rezaei & Elmi, 2018; Samal&Mahapatra, 2020).Behavioral finance constitutes a sub-group of behavioral economics and suggests that psychological factors and biases exert impacts on financial decisions of investors and economic units in general. These influences are at the route of

anomalies in markets of financial assets and generate bull or bear phenomena in high speed (Kyriazis, 2020).

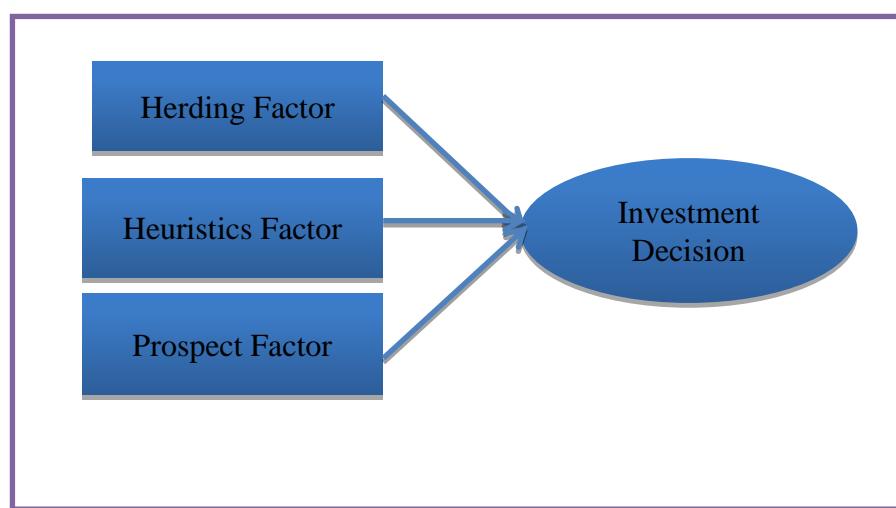
The worldwide liquidity shortages brought up to the surface by the year 2008, the *Global Financial Crisis* has prompted traders, policymakers and academics to focus on alternative forms of money and investment options (Kyriazis, 2020). Digital currencies constitute alternative forms of liquidity with remarkable differences in ownership, transactions and production matters in relation to the traditional monetary assets (Böhme, 2015). Bitcoin is a digital currency that is based on public-key cryptography. The major innovation of Bitcoin is to have the decentralization of technology. The Bitcoin database is distributed across a network of contributing computers instead of storage of transactions on a single server (Casino et al., 2019). The database holding Bitcoin database is known as “blockchain”, where blocks are added in the chain during the process of Bitcoin mining. The mining process revolves around the solution of compound computational puzzles. In doing so, miners receive the incentive of Bitcoin rewards and transaction fees (Casino et al., 2019; Almansour, 2020).

The turbulence in financial markets has led most investors to search for new investment opportunities. The cryptocurrency market is a new investment platform for investors to invest their capital in addition to common capital markets. Behavioral finance of the investors in the cryptocurrency market may differ with that of the investors of common capital markets (Chowdhury & Mendelson, 2013).

Conceptual Background

The conceptual background of behavioral finance in the cryptocurrency market can be traced in the previous studies (Poyer, 2018; Rezaei & Elmi, 2018; Almansour, 2020; Kyriazis, 2020). Figure 1 gives the conceptual framework where relationship of behavioral finance factors with investment decisions is illustrated.

Figure 1: Conceptual Framework



Investment decisions in the cryptocurrency market are affected by a number of behavioral finance factors such as herding factor, heuristic factor and prospect factor. The herding is a situation where rational investors tend to act irrationally by imitating others' judgments when it comes to making investment decisions (Almansour, 2017). The heuristic is a method of learning or solving problems that allows people to discover things themselves and learn from their own experiences.

Ritter (2003) described heuristics as rule of thumb that could encourage decision making in an uncertain environment by reducing the difficulty of probability assessments as well as predicting values for simpler judgments. The prospect theory asserts that investors value gains and losses differently, placing more weight on perceived gains than perceived losses. An investor presented with a choice, both equal, will choose the one presented in terms of potential gains (Barberis, 2013).

Literature Review & the Gap

A good number of studies in the field of *behavioral finance in the cryptocurrency market* have been reviewed and a summary of the same is given below.

Baur and McDermott (2012) investigated whether Bitcoin should be best considered as a medium of exchange or an asset for speculation. They argued that it is not a safe haven, because of its weak correlation with conventional assets such as stocks, bonds and commodities in normal times as well as during crises. Findings of the study indicate that Bitcoin is mostly used for speculative trading rather than as a medium of exchange and a new form of currency. *Barots (2015)* examined whether Bitcoin follows efficient market hypothesis or not. The results show that Bitcoin price follows an efficient market hypothesis which indicates that the price of Bitcoin will react directly to new public information. It is opined that the structure and efficiency of information in financial markets are vital for understanding investor's behavior. *Chowdhury (2016)* inquired into the relationship between heuristics factor and investment decisions in the financial market. They found that investment decisions made by the investors are significantly affected by heuristics factor. Furthermore, it is concluded that there is a positive relationship between behavior finance factors and investment decisions. *Poyser (2018)* carried a study on 'herding theory' as a behavior finance factor in the cryptocurrency market. The results show that herding theory plays an important role to determine prices in the cryptocurrency market. That's why investors do not often pay attention to their private information rather than public information in the cryptocurrency market. *Almansour (2020)* explored the effect of personal finance behavior on investment decisions in the cryptocurrency market. It is opined that investors' choices of selecting the types of digital currencies are affected by other investors' choices and therefore, will significantly affect their investment decisions. Besides, the results show that when investors make a profit on their investment, they will make another investment decision in selecting their next portfolios based on their past knowledge and experience which means that investors behave as speculators in the cryptocurrency market. It is concluded that the herding theory factors, prospect theory, and heuristic theory have a significant effect on investors' investment decisions in the cryptocurrency market. *Kyriazis (2020)* analyzed the nexus of herding phenomena with a spectrum of financial assets such as stocks, bonds, commodities, derivatives and cryptocurrencies. The results of the study reveal that investors present an inclination towards irrational behaviour and mimicking others' decisions which is more emphasized during turbulent market periods. Nevertheless, outcomes are split concerning whether bull markets are more able to provide higher herding incentives than bear markets. It should be noted though that during normal economic conditions no evidence of herding is brought to the surface. Distortions in the rational thinking of economic units are detected in a range of financial assets.

The literature reviewed so far reveals that there is a scarcity of studies investigating the effect of behavioral finance factors on investment decisions in the cryptocurrency market, especially in the context of Indian investors. Moreover, several studies have focused only on variables such as herding and volatility in the cryptocurrency market. However, the present study considers various

underlying aspects and factors of behavioral finance such as herding, heuristics and prospect factor. The inclusion of these variables aims at offering insights for making more sound and steady investment decisions in the highly dynamic cryptocurrency market.

Research Methodology

The study aims to investigate the effect of behavioral finance factors on investment decisions in the cryptocurrency market. In order to investigate this effect, a quantitative approach was used. Due to the difficulty of determining the sampling frame, the snowball sampling technique was applied. The study performs various statistical analyses such as demographic analysis, descriptive statistics for all variables and multiple regression analysis.

Population & Sample: The study focuses on individual investors of India who invest in the cryptocurrency market. The sample size of the study is 200 individual investors. A snowball sampling technique is adopted and the questionnaire employs a Likert scale. Data are collected by constructing an online questionnaire, and it is sent to investors via email. A list of statements has been adopted and applied in the survey (Almansour, 2020). The respondents are asked to rate each of the statements on a 5-point scale, ranging from strongly agree to strongly disagree.

Research Design: In order to investigate the influence of behavioral finance factors on investment decisions in the cryptocurrency market, a quantitative approach is employed. The questionnaire has been designed based on the previous studies (Almansour, 2020). Table 1 illustrates the statements (variables) used in the questionnaire.

Table 1: Statements used in the Questionnaire

Factors	Statements
Herding Factor	Other investors' decisions of choosing cryptocurrency types have an impact on your investment decisions
	Other investors' decisions of the cryptocurrency volume have an impact on your investment decisions
	Other investors' decisions of buying and selling cryptocurrency have an impact on your investment decisions
	You usually react quickly to the changes of other investors' decisions and follow their reactions to the cryptocurrency market
Heuristics Factor	You believe that your skills and knowledge of the cryptocurrency market can help you to outperform the market
	You rely on your previous experiences in the market for your next investment
	You forecast the changes in cryptocurrency prices in the future based on the recent cryptocurrency prices
Prospect	After a prior gain, you are more risk-seeking than usual
	After a prior loss, you become more risk-averse
	My instinct has often helped me make a good investment
	I am capable of identifying the low point of the market

Factor	You avoid selling cryptocurrency that has decreased in value and readily sells cryptocurrency that has increased in value
Investment Decision	I would never make go hang-gliding or bungee jumping
	I would stick to the rules
	I would avoid dangerous situations
	I would make my investment decision based on other investors opinions

[Source: Almansour, 2020]

In order to investigate the influence of behavioral finance factors on investment decisions in the cryptocurrency market, the general equation is formatted using multiple regression as follows:

$$IND = \beta_0 + \beta_1 HDF + \beta_2 HRF + \beta_3 PSF + \varepsilon$$

Where, IND: Investment Decisions, β_0 : Constant, HDF: Herding Factor, HRF: Heuristics Factor, PSF: Prospect Factor, and ε : Error term.

Objective & Hypotheses

The objective of the study is to examine the effect of behavioral finance factors on investors' investment decision-making in the cryptocurrency market.

Based on the objective set for the study, the hypotheses framed and tested are H_1 : Investment decisions in the cryptocurrency market are not significantly influenced by the herding factor; H_2 : Investment decisions in the cryptocurrency market are not significantly influenced by the heuristic factor; and H_3 : Investment decisions in the cryptocurrency market are not significantly influenced by the prospect factor.

Results & Discussion

Respondents' Profile: This section of the study presents a detailed examination of the demographic and socio-economic profile of the respondents which includes Gender, Age, Education and Income level. Table 2 shows the demographic and socio-economic distribution of the respondents.

Table 2: Demographic and Socio-economic Profile

Variables	Categories	Count	Percent
Gender	Male	130	65
	Female	70	35
	Total	200	100
Age	Less than 20 years	16	8
	21-30 years	30	15
	31-40 years	50	25
	41-50 years	56	28
	51-60 years	28	14
	61 years and above	20	10
	Total	200	100
	Undergraduate	48	24
	Graduate	112	56

Education	Post-Graduate	40	20
	Total	200	100
Income (Monthly)	Below Rs.40,000	36	18
	Rs.40,000- Rs.55,000	56	28
	Rs.55,001-Rs.70,000	64	32
	Rs.70,001- Rs.85,000	30	15
	Rs.85,001 and above	14	7
	Total	200	100

[Source: Primary Data]

Table 2 illustrates the demographic and socio-economic variables employed in the study. These variables are classified into gender, age, educational qualification and income level. It is observed that majority of the investors (65 percent) are male and the rest are female (35 percent). Age distribution shows that majority of the respondents (53 percent) are from two age groups, i.e. 31-40 years and 41-50 years which indicates that majority of the investors are matured investors in the cryptocurrency market. With regard to educational qualifications, majority of the respondents (56 percent) are graduates and some of them (24 percent) are undergraduates which implies the presence of educated investors in the cryptocurrency market. So far as income level is concerned, majority of the respondents (60 percent) belong to two income groups, i.e. Rs.40,000-Rs.55,000 and Rs.55,001-Rs.70,000 and some of them (7 percent) have income Rs.85,001 and above which implies that majority of the investors in the cryptocurrency market belong to medium and higher income groups.

Descriptive Statistics: The results of the descriptive analysis give the mean and standard deviation for each statement(variable) listed in the questionnaire. Table 3 shows the results of the descriptive analysis.

Table 3: Descriptive Statistics

Factors	Codes	Statements	Mean	S.D.
Herding Factor	HDF1	Other investors' decisions of choosing cryptocurrency types have an impact on your investment decisions	3.18	0.76
	HDF2	Other investors' decisions of the cryptocurrency volume have an impact on your investment decisions	3.56	0.84
	HDF3	Other investors' decisions of buying and selling cryptocurrency have an impact on your investment decisions	3.67	0.98
	HDF4	You usually react quickly to the changes of other investors' decisions and follow their reactions to the cryptocurrency market	3.28	0.83
	Overall (Average)		3.42	0.85
Heuristics Factor	HRF1	You believe that your skills and knowledge of the cryptocurrency market can help you to outperform the market	3.56	0.84
	HRF2	You rely on your previous experiences in the market for your next investment	3.38	0.80

	HRF3	You forecast the changes in cryptocurrency prices in the future based on the recent cryptocurrency prices	3.84	0.72
	Overall (Average)		3.59	0.78
Prospect Factor	PSF1	After a prior gain, you are more risk-seeking than usual	3.82	0.81
	PSF2	After a prior loss, you become more risk-averse	3.76	0.74
	PSF3	My instinct has often helped me make a good investment	3.56	0.88
	PSF4	I am capable of identifying the low point of the market	3.45	0.78
	PSF5	You avoid selling cryptocurrency that has decreased in value and readily sells cryptocurrency that has increased in value	3.24	0.93
	Overall (Average)		3.57	0.82
Investment Decision	IND1	I would never make go hang-gliding or bungee jumping	3.18	0.95
	IND2	I would stick to the rules	2.99	0.63
	IND3	I would avoid dangerous situations	3.14	0.70
	IND4	I would make my investment decision based on other investors opinions	3.67	0.78
	Overall (Average)		3.24	0.76

[Source: Primary Data]

The results of the descriptive analysis are interpreted in this section of the study. From the herding factor perspective, it is observed that investors in the cryptocurrency market change their investment decisions based on other investors' decisions. The results of the analysis show that "*other investors' decisions of choosing cryptocurrency types have an impact on investment decisions*" and the statement has a mean (average value) of 3.18 with standard deviation 0.76 (Statement-HDF1). The analysis reveals that "*other investors' decisions of the cryptocurrency volume have an impact on investment decisions*" and the statement has a mean of 3.56 with standard deviation 0.84 (Statement-HDF2). It is clear from the analysis that "*other investors' decisions of buying and selling cryptocurrency have an impact on investment decisions*" and the statement records the highest mean of 3.67 and standard deviation 0.98 (Statement-HDF3). Furthermore, the analysis shows that "*investors usually react quickly to the changes of other investors' decisions and follow their reactions to the cryptocurrency market*" and the statement has a mean of 3.28 with standard deviation 0.83 (Statement-HDF4). The overall average value for herding factor is 3.42 and standard deviation 0.85, indicating that the herding factor plays an important role in determining investors' investment decisions in the cryptocurrency market.

From the heuristics factor point of view, it is observed that investment decisions in the cryptocurrency market are based on knowledge, skills and past experiences of the investors. The results of the analysis show that "*skills and knowledge of the cryptocurrency market can help investors to outperform the market*" and the statement has a mean of 3.56 with standard deviation 0.84 (Statement-HRF1). The analysis reveals that "*investors rely on previous experiences in the market for the next investment*" and the statement has a mean of 3.38 with standard deviation 0.80 (Statement-HRF2). Furthermore, it is clear from the analysis that "*investors forecast the changes in cryptocurrency prices in the future based on the recent cryptocurrency prices*" and the statement records the highest mean of 3.84 and standard deviation 0.72 (Statement-HRF3). The overall average

value for heuristics factor is 3.59 and standard deviation 0.78, indicating that heuristics factor plays an important role in determining investors' investment decisions in the cryptocurrency market.

From the prospect factor perspective, it is observed that investment decisions are based on prior profit or loss of the investors. The results of the analysis show that "*after a prior gain, investors are more risk-seeking than usual*" and the statement records the highest mean of 3.82 and standard deviation 0.81 (Statement-PSF1). The analysis reveals that "*after a prior loss, investors become more risk-averse*" and the statement has a mean of 3.76 with standard deviation 0.74 (Statement-PSF2). From the analysis it is clear that "*investors' instincts have often helped them to make a good investment*" and the statement has a mean of 3.56 with standard deviation 0.88 (Statement-PSF3). The analysis indicates that "*investors are capable of identifying the low point of the market*" and the statement has a mean of 3.45 with standard deviation 0.78 (Statement-PSF4). Moreover, it is observed that "*investors avoid selling cryptocurrency that has decreased in value and readily sells cryptocurrency that has increased in value*" and the statement has a mean of 3.24 with standard deviation 0.93 (Statement-PSF5). The overall average value for prospect factor is 3.57 and standard deviation 0.82, indicating that the prospect factor plays an important role in determining investors' investment decisions in the cryptocurrency market.

From the perspective of investment decisions, the investors in the cryptocurrency market are considered as rational investors as the investors stick to rules, avoid dangerous situations and make decisions based on knowledge and experience. The average mean of the statements with regard to investment decision is 3.24 and standard deviation 0.76.

Influence of Behavioral Finance Factors on Investment Decisions: The objective of the study is to investigate the influence of behavioral finance factors on investment decisions in the cryptocurrency market. In order to investigate this effect, multiple regression analysis technique is applied. Before applying the regression model, it is important to comply with the assumptions of regression analysis. It is observed that all the assumptions have been met to apply regression analysis. The reliability and validity analyses were conducted to assess the measurement scale. The Cronbach's Alpha test gives acceptable values for all the statements (variables) which range from 0.732 to 0.875. The results of the regression analysis have been presented in Table 4.

Table 4: Multiple Regression Analysis

	Std. Error	β_0	t	p
Constant	0.348	0.162	5.468	0.000
Hherding	0.066	0.204	2.324	0.024
Heuristics	0.058	0.196	2.016	0.043
Prospect	0.065	0.258	2.893	0.007
R ²	0.154			
F	6.138			
α	0.05			
VIF	All values less than 10			
Normality	Data are normally distributed			

[Source: Primary Data]

Table4 shows that herding factor, heuristics factor and prospect factor scored 15.40 percent of the variance in investors' decisions in the cryptocurrency market. Furthermore, the results of the analysis show that the general model is acceptable as the F-value of 6.138 is significant at 5 percent level of significance. The regression model used to investigate the influence of behavioral finance factors on investment decisions is as follows:

$$\text{Investment Decisions} = 0.162 + 0.204\text{Herding Factor} + 0.196 \text{ Heuristics Factor} + 0.258 \text{ Prospect Factor}$$

The results of the regression analysis show that investors' investment decisions in the cryptocurrency market are significantly influenced by the herding factor ($p=0.024<0.05$, $t=2.324$, $\beta_0=0.204$). If the respondents' scores in herding factor change by one unit, it will change respondents' scores in investment decisions by 0.204. Therefore, H_1 : Investment decisions in the cryptocurrency market are not significantly influenced by the herding factor is rejected and concluded that investment decisions in the cryptocurrency market are significantly influenced by the herding factor.

From the regression analysis it is clear that investors' investment decisions in the cryptocurrency market are significantly influenced by the heuristic factor ($p=0.043<0.05$, $t= 2.016$, $\beta_0=0.196$). If the respondents' scores in heuristic factor change by one unit, it will change respondents' score in investment decisions by 0.196. Therefore, H_2 : Investment decisions in the cryptocurrency market are not significantly influenced by the heuristic factor is rejected and concluded that investment decisions in the cryptocurrency market are significantly influenced by the heuristic factor.

Moreover, the regression analysis reveals that investors' investment decisions in the cryptocurrency market are significantly influenced by the prospect factor ($p=0.007<0.05$, $t= 2.893$, $\beta_0=0.258$). If respondents' scores in the prospect factor change by one unit, it will change respondents' scores in investment decision by 0.258. Therefore, H_3 : Investment decisions in the cryptocurrency market are not significantly influenced by the prospect factor is rejected and concluded that investment decisions in the cryptocurrency market are significantly influenced by the prospect factor.

To sum up, it is concluded that the herding factor, heuristics factor and prospect factor have a statistically significant effect on investors' investment decisions in the cryptocurrency market. This is an indication that the cryptocurrency market is determined by certain behavioral finance factors. However, the value of R^2 (15.40 percent) indicates that other important factors can also have an impact and this gives room for more research concerning this issue.

Theoretical and Practical Implications: The results of the study provide theoretical as well as practical implications. The study gives a theoretical idea that behavioral finance factors such as herding, prospect and heuristic factor are all important and significantly influence investors' investment decisions in the cryptocurrency market. The important objective of behavioral finance theory is that it does not declare that each investor will suffer from a similar illusion, rather it sheds light on taking such appropriate steps to prevent these illusions which influence investors' decisions in the cryptocurrency market.

The practical implication of the findings of the study on investment decisions in the cryptocurrency market is enormous. First, it will prepare hit and run investors to be progressively prepared to stay in the cryptocurrency market and develop their abilities on the most proficient

method to settle on sound venture choices. Second, it will encourage financial specialists to realize that information on the traditional finance theory is not adequate to excel in the cryptocurrency market. Thus, they need to have a better understanding and be more knowledgeable about behavioral finance. Third, financial specialists will explore different reasons why investment decisions go amiss from expected and various methods for overcoming the difficulties encountered when arriving at an investment decision. Finally, it will allow policymakers in the financial markets to comprehend the speculators' conduct.

Conclusion

The traditional finance theory asserts that investors' behavior does not significantly affect the asset price. The argument behind is that asset price is determined by the investors' demand that will be neutralized by the arbitrageurs' transaction and by the trades. Investors believe that they make their investment decisions logically and rationally (Almansour, 2017). However, the behavioral finance theory states that investors' behavior significantly affects the prices of assets. This indicates that behavioral finance factors play a significant role in affecting investment decisions made by investors in the cryptocurrency market. The bubble existing in the cryptocurrency market is caused by noise traders which makes the market inefficient. Noise traders thus provide a hypothesis to behavioral finance factors such as herding, heuristic and prospect to be important factors in studying the cryptocurrency market.

The study aims at exploring the effect of behavioral finance factors on investment decisions in the cryptocurrency market. The results declare that investors' choices of selecting the types of cryptocurrencies are affected by other investors' choices and therefore, will significantly affect their investment decisions. Besides, the results show that when investors make a profit on their investment, they will make another investment decision in selecting their next portfolios based on their experience, knowledge and skills which concludes that investors behave as speculators in the cryptocurrency market.

The results of the regression analysis reveal that the herding factor, heuristic factor and prospect factor have statistically significant effect on investors' investment decisions in the cryptocurrency market. This leads the market to be inefficient and that is why market prices of the cryptocurrencies do not always reflect their true values and pushes prices to high volatility. The future studies may concentrate on the volatility of cryptocurrencies as well as on exploring the association between global financial markets indices and cryptocurrencies.

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