https://doi.org/10.51483/IJCCR.4.1.2024.101-112

ISSN: 2790-1386

SvedbergOpen
DISSEMINATION OF KNOWLEDGE

International Journal of Cryptocurrency Research

Publisher's Home Page: https://www.svedbergopen.com/

Research Paper

Open Access

Is it Doubtful for Financial Analysts to Make a Cryptocurrency's Investment Decision? : Accounting and Economic Challenges

Tamer A. Elnashar[1*]

[1]Part-time Faculty, School of Continuing Education, The American University in Cairo, Egypt. E-mail: tamer_a@aucegypt.edu

Article Info

Volume 4, Issue 1, June 2024

Received : 26 February 2024

Accepted : 30 May 2024

Published : 21 June 2024

doi: 10.51483/IJCCR.4.1.2024.101-112

Abstract

This paper predicts the decision of financial analysts and the government regarding making a cryptocurrency investment decision using a mathematical approach in the game theory and linear programming solved by a simplex algorithm, the approach is based on the challenges in the market of cryptocurrencies related to the accounting and economic issues, and also related to the unethical actions in the trading of cryptocurrencies. The challenges are the inputs to the mathematical approach, where I assign weights for the importance of each variable of the challenges in a payoff matrix that affects the game between the financial analysts and the government. Based on the accounting, economic, and unethical challenges, the mathematical results of the game show pessimistic predictions for cryptocurrencies trading and usage in the future, where it predicts that financial analysts' best decision is not to invest in cryptocurrencies, and the government's best decision is not to encourage investment in cryptocurrencies. This paper encourages future research to study cost-effective analysis of investing in cryptocurrencies, calculate the gain from investing in cryptocurrencies compared to costs, consider the competitive advantages for financial instruments compared to the cryptocurrencies', the solution to the accounting, economic, and unethical problems, and the government's regulations. Therefore, schools of business should include a subject for educating cryptocurrencies and its issues to undergraduate and postgraduate learners. Future research if optimistically predicts the future of cryptocurrencies, would benefit the new generation to keep on and find good opportunities for investments and new jobs, and in the meantime protect the economies.

Keywords: *Financial analysts, Cryptocurrencies investment decisions, Game theory, Linear programming, Accounting issues, Economic issues, Unethical issues*

Introduction

Cryptocurrencies are considered financial innovations in the previous decade till today, it has gained popular attention among young investors and some large investors as well, where it is considered an investment opportunity regardless of the high volatility associated with it, in addition, it has some important benefits for trading and money transfer among countries. It has opened new trends for new jobs for young qualified generations to work as brokers and market analysts to help beginner investors yield the desired returns from investing in cryptocurrencies. Nevertheless, not all trading companies for cryptocurrencies are trustworthy

* *Corresponding author: Tamer A. Elnashar, Part-time Faculty, School of Continuing Education, The American University in Cairo, Egypt. E-mail: tamer_a@aucegypt.edu*

due to the high hidden costs they impose on the investors before getting any return on their initial investments, to the degree that some of these trading companies are considered scams, and investors lose their investments with such companies.

Subsequently, large companies and small and medium-sized companies might monitor the markets of cryptocurrencies and their technical analysis performed by technical analysts and financial analysts to make the correct investment decisions when needed. But in fact, the magnitude of such investment decisions is doubtful for financial analysts to make cryptocurrencies' investment decisions due to various complications related to the accounting problems for cryptocurrencies, the economic challenges among countries worlds apart, and the regulations differences among countries. All that makes cryptocurrency markets unpredictable markets with high risk and potential changes in the investors' demand if restrictions by governments are imposed over the investment in cryptocurrencies, regardless of the predictions by some trading experts that look optimistic for the future prices of cryptocurrencies for the coming two decades.

The challenge of accounting for cryptocurrencies is the major caution financial analysts should take into account before making investment decisions to invest in cryptocurrencies, where accounting issues are related to measuring the cost of mining and trading, such as energy consumption and electricity, to allocate to the investment cost and record in the books, and reporting high-quality financial reports for better governance and transparency in respect to cryptocurrencies (e.g., Makurin 2020; Chou *et al.*, 2022; Gallersdörfer *et al.*, 2023).

Moreover, there is no specific GAAP or IFRS to account for cryptocurrencies, which leads to financial reporting issues, auditing issues, and taxation issues. Therefore, cryptocurrencies controversially can be accounted for as cash and cash equivalent, inventory, intangible assets, or financial instruments with the purpose for holding it, subsequently raising the issues of cryptocurrency valuation and earning management in the financial reporting (e.g., Foy, 2019; Hyytiä and Sundqvist, 2019; Shehada and Shehada, 2020; Liu *et al.*, 2021; Chou *et al.*, 2022; Huang *et al.*, 2023; Niftaliyev, 2023; Luo and Yu, 2024).

In the meantime, political economies seek to overcome the international economic issues related to high inflation rates, taxes, balance of payment, wage prices, oil shocks, interest rates, budget deficit, trade deficit, budget balancing, and other issues leading to international economic recessions. Therefore, political economists focus on economic fluctuations, international trade issues, and monopolies to predict cryptocurrency exchange rate challenges, as a consequence, governments work on regulating cryptocurrencies due to their speculative nature to protect investors against losing their investments in cryptocurrencies(e.g., Foy, 2019; Hyytiä and Sundqvist, 2019; Tarasovaa *et al.*, 2020; Huang *et al.*, 2023).

Moreover, on the other side, governments impose more restrictions nowadays than in the past decade to protect the economies and the economic indications from downfall issues, where cryptocurrencies in some contexts form a threat to the exchange rates by governments and central banks, and the international trade measures for imports and exports. Government restrictions work to prevent illegal actions like money laundering, drug trade, and terrorist activities. Therefore, not all governments accept the cryptocurrencies trade and using it as a tool for payments.

To that extent, there is a game between the investors (more specifically financial analysts) and the governments regarding favoring and encouraging the decision to invest in cryptocurrencies or not. Therefore, this paper's major question is "Is it doubtful for financial analysts to make a cryptocurrency investment decision"? taking into account the effect of cryptocurrencies' bright side and dark side, demand changing of investors, future prediction of cryptocurrencies prices, political aspects, cost of trading and mining cryptocurrencies, economic recessions, accounting issues for cryptocurrencies, international trade volume, financial instruments prices, banks' projects to investors, cryptocurrencies regulatory bodies, educating cryptocurrencies, unregulated trading for cryptocurrencies, and unethical considerations of cryptocurrencies trading.

In this paper, I use a 2×2 game in the game theory using linear programming method to decide the best strategy for financial analysts and governments. Where the hypothesis of this paper is (H_1: it is doubtful for financial analysts to make a cryptocurrency investment decision). The calculations for the game theory and linear programming methods are calculated using my estimated inputs to a website calculator helpful for easing the calculations of the payoff matrix and forming the linear programming equations and their results for unfamiliar researchers with mathematical techniques.

The remainder of this paper is organized as follows: section II presents the method, section III presents the results, and section IV presents the conclusions and discussion.

2. Method

2.1. The Model

Cryptocurrencies investment decisions are questionable by most of the financial analysts in the companies interested in investing in cryptocurrencies to include in the investment portfolio. The risk and volatility attached to cryptocurrencies make it a risky investment that should be carefully analyzed before making any investment decisions.

I use a 2 × 2 two-person game of two players, player A is the investor (financial analyst) who has two strategies, one is to decide to invest in cryptocurrencies, and the other is to decide not to invest in cryptocurrencies, and on the other side is player B who is the government that has two strategies, one is to encourage investment in cryptocurrencies, and the other is to not encourage investment in cryptocurrencies, and the game takes into considerations most of the significant variables shown in the introduction of this paper, that affect the strategy's choice of both players A and B, where I assign weights for such variables based on my estimation to its importance to affect the decision to choose the best strategy for both players. In addition, I use a linear programming model to predict more accurately the best strategy for each player and make the best choice regarding the cryptocurrency's investment decision.

I use the website https://cbom.atozmath.com/CBOM/GameTheory.aspx?q=lpp as the tool to prepare the 2 × 2 two-person game and the linear programming model used in this paper to predict the best strategy for the financial analysts and the government. The model is based on a mathematic payoff matrix in the game theory for analyzing a conflict to choose between the financial analysts' two strategies to be used against the conflicting interests of the government's strategies, where both consider the cryptocurrencies' benefits and challenges. The model is based on the two strategies for the financial analysts A_1 and A_2, and two strategies of the government B_1, B_2, B_3, B_4, B_5, B_6, B_5, B_6. All regarding the decision to invest in cryptocurrencies or not by the financial analysts and to encourage this investment or not by the government.

Table 1 presents the weights I assign to the variables I predict to affect the decisions of both the financial analysts and the government (ranging between W_i = 10 to W_i =40) based on each one's expected payoff whether high or low weight, which I list in order based on my judgment about their importance and are used to prepare the mathematic payoff matrix in the game theory, followed by the linear programming method to help make the accurate decision to help answer this paper's major question and compare to the hypothesis H_1.

Table 1: Weights for the Importance of the Variables Expected to Affect the Decision of Player A (Financial Analysts) and the Decision of Player B (Governments) Regarding the Cryptocurrencies Investment Decision

Variables	Weights for the Payoff Matrix in a Descending Order	Weights to Assign to the Payoff Matrix	Indications
Investors demand	40	f	Warrant a sustainable growth of cryptocurrencies
Political aspects	39	a	Political economies push forward
Educating cryptocurrencies	38	p	Enrichment of learners' knowledge regarding cryptocurrencies
Cryptocurrencies bright side	37	b	The benefits guaranteed
Cryptocurrencies regulatory bodies	37	n	The regulation for protecting investors
Cryptocurrencies dark side	35	c	The high risk of losing the investment

Table 1 (Cont.)

Variables	**Weights for the Payoff Matrix in a Descending Order**	**Weights to Assign to the Payoff Matrix**	**Indications**
Unethical considerations of cryptocurrencies trading	32	m	The unaccepted actions for imposing hidden costs on the investors by trading companies
Cryptocurrencies future prediction	30	e	The bias to promising predictions by the beneficiary parties
Banks' projects offered to investors	27	l	The banks' investment opportunities in production, manufacturing, and services offered to investors other than financial investments
Accounting issues for cryptocurrencies	25	d	No one unified accounting standard to account for cryptocurrencies
Economic recession	20	h	The lack of investments in production, manufacturing, and services
Unregulated trading for cryptocurrencies	17	o	Lack of governance and control over the cryptocurrencies trading
Cost of trading and mining cryptocurrencies	15	g	High cost incurred by the investors to invest in cryptocurrencies with trading companies
International GDP	14	j	The production growth's negative or positive effect on investment in cryptocurrencies
Financial instruments prices	12	i	The competitive advantages of financial instruments other than cryptocurrencies.
International trade volume	10	k	The exchange rates' high or moderate fluctuations among countries and their effect on cryptocurrencies prices

Note: (*) Since: f<a<b<..............<k (as the variables rank),
Then: the inputs to the 2 × 2 two-person gamemathematic payoff matrix in thegame theory, between the financial analysts and the government regarding the investment in cryptocurrencies decision are:

Government strategies

Financial analysts strategies

	B1 ***B2***	***B3*** ***B4***	***B5*** ***B6***	***B7*** ***B8***
A1	a, b	c, d	e, f	g, h
A2	I, j	k, l	m, n	o, p

Government strategies

Financial analysts strategies

	B1 ***B2***	***B3*** ***B4***	***B5*** ***B6***	***B7*** ***B8***
A1	39, 37	35, 25	30, 40	15, 20
A2	12, 14	10, 27	32, 37	17, 38

Note: Inputs are entered into the matrix before running the linear programming model using the website of : https://cbom.atozmath.com/CBOM/GameTheory.aspx?q=lpp
A1 = to invest in cryptocurrencies; A2 = to not invest in cryptocurrencies; B1, ..., B8 = to encourage investment or to not encourage investment

In this game theory, I determine firstly the payoffs for each player A and B in each possible outcome using the website aforementioned. I use linear programming method to determine the best value for each player in the game, which is the amount that each player can rely on to predict the decision to best answer the question for each player in this game.

3. Results

I use the data in Table 1 to generate the results of the game theory problem using linear programming method calculator on the website aforementioned, without presenting equations to the researchers unfamiliar with algebraic and algorithms techniques, where the website calculator makes all the required calculations and presents the results and equations to interpret and make the decision quickly in practice, and to answer this paper's major question as well. The payoff matrix in Table (1) shows the inputs to the website calculator that I run to obtain the required results. Table 2 shows the payoff matrix of the game to run between the financial analysts (player A) and the government (player B). The payoff matrix is not at a saddle point. Therefore, I can continue running the algorithm.

3.1. Results for the Steps of Running the Game and Using the Linear Programming

Table 3 presents the results summary of the algorithm running the game using the linear programming method between the financial analysts and the government regarding the cryptocurrencies investment decision, by running the game using the website for the mathematic payoff matrix in the game theory. Where the goal of the game is to make the best correct decision by both the financial analysts and the government.

Table 2: The Mathematic Payoff Matrix in the Game Theory Between the Financial Analysts and the Government Regarding the Cryptocurrencies Investment Decision (The Payoff Matrix is not at a Saddle Point)

		Player B								
		B_1	B_2	B_3	B_4	B_5	B_6	B_7	B_8	Row Minimum
Player A	A_1	39	37	35	25	30	40	[15]	20	[15]
	A_2	12	14	10	27	32	37	(17)	38	10
	Column Maximum	39	37	35	27	32	40	(17)	38	

Note: Player A = the financial analyst with two strategies (to invest in cryptocurrencies or not) matching B1 B2, B3 B4, B5, B6, B7, and B8, Player B = the government with two strategies B1 B2, B3 B4, B5, B6, B7, and B8 to encourage investing in cryptocurrencies or not.

From Table 3, the algorithm shows the steps beginning with the payoff matrix that has no saddle point, followed by the linear programming which is solved by an appropriate simplex method. Financial analysts' (player A's) objective is to maximize the expected gains by deciding to invest in cryptocurrencies, which can be achieved by maximizing the value of the game V, i.e., it might gain more than V if the government (player B) adopts a poor strategy and encourages cryptocurrencies investment. The expected gain for financial analysts (player A) is shown mathematically in step 4 in the table. On the other hand, the government's (player B's) objective is to minimize its expected unfavorable situation to encourage cryptocurrencies investment, which can be reduced by minimizing V, i.e., the financial analysts (player A) adopt a strategy to not invest in cryptocurrencies. The expected unfavorable situation for the government (player B) is shown mathematically in step 7 in the table.

3.2. Interpreting the Optimal Solution for Both Players (Financial Analysts and the Government)

Figure 1 shows the value of the game on the graph, which is the lowest point *V* in the shaded region, the value of the game is 16.48 units. It presents the amount that each player can expect to win or lose on average and is calculated too in the linear programming shown in Table 3.

Table 3: Results Summary for the Steps of Running the Game Between the Financial Analysts and the Government Regarding the Cryptocurrencies Investment Decision

1) The game has no saddle point

Player B

		B_1	B_2	B_3	B_4	B_5	B_6	B_7	B_8	Row Minimum
Player A	A_1	39	37	35	25	30	40	[15]	20	[15]
	A_2	12	14	10	27	32	37	(17)	38	10
Column Maximum		39	37	35	27	32	40	(17)	38	

2) Reducing the payoff matrix

2. Dominance rule to reduce the size of the payoff matrix
Using dominance property

Player B

		B_1	B_2	B_3	B_4	B_5	B_6	B_7	B_8
Player A	A_1	39	37	35	25	30	40	15	20
	A_2	12	14	10	27	32	37	17	38

column-8 is dominated by column-7 (column-8 $\geq$ column-7), so column-8 is deleted. $\left(B_8 \geq B_7 : 20 \geq 15, 38 \geq 17\right)$

Player B

		B_1	B_2	B_3	B_4	B_5	B_6	B_7
Player A	A_1	39	37	35	25	30	40	15
	A_2	12	14	10	27	32	37	17

3) Final reduction to the payoff matrix

So the value of the game lies between 15 and 17
Let V = value of the game
p_1, p_2 = probabilities of selecting strategies A_1, A_2 respectively.

q_1, q_2 = probabilities of selecting strategies B_3, B_7 respectively.

Player B

		B_3	B_7	Probability
Player A	A_1	35	15	p_1
	A_2	10	17	p_2
Probability		q_1	q_2	

4) Financial analysts' (player A's) objective is to maximize the expected gains by deciding to invest in cryptocurrencies, which can be achieved by maximizing V, i.e., it might gain more than V if the government (player B) adopts a poor strategy and encourages cryptocurrencies investment. The expected gain for financial analysts (player A) is as follows:

$$35p_1 + 10p_2 \geq V$$

$$15p_1 + 17p_2 \geq V$$

5) From step 4:

Dividing the above constraints by V,

$$35\left(\frac{p_1}{V}\right) + 10\left(\frac{p_2}{V}\right) \geq 1$$

$$15\left(\frac{p_1}{V}\right) + 17\left(\frac{p_2}{V}\right) \geq 1$$

To simplify the problem, we put

$$\frac{p_1}{V} = x_1, \frac{p_2}{V} = x_2$$

6) In order to maximize V, player A can

Minimize $Z_p = \frac{1}{V} = x_1 + x_2$

subject to

$$35x_1 + 10x_2 \geq 1$$

$$15x_1 + 17x_2 \geq 1$$

and $x_1, x_2 \geq 0$

7) The government's (player B's) objective is to minimize its expected unfavorable situation to encourage cryptocurrencies investment, which can be reduced by minimizing V, i.e., the financial analysts (player A) adopt a strategy to not invest in cryptocurrencies. The expected unfavorable situation for the government (player) B is as follows:

$$35q_1 + 15q_2 \leq V$$

$$10q_1 + 17q_2 \leq V$$

8) Dividing the above constraints by V,

$$35\left(\frac{q_1}{V}\right) + 15\left(\frac{q_2}{V}\right) \leq 1$$

$$10\left(\frac{q_1}{V}\right) + 17\left(\frac{q_2}{V}\right) \leq 1$$

To simplify the problem, we put

$$\frac{q_1}{V} = y_1, \frac{q_2}{V} = y_2$$

Table 3 (Cont.)

9) In order to minimize V, player B can

Maximize $Z_q = \frac{1}{V} = y_1 + y_2$

subject to

$35y_1 + 15y_2 \le 1$

$10y_1 + 17y_2 \le 1$

and $y_1, y_2 \ge 0$

10) Solve this problem in step 9 using algorithm of the simplex method

Problem is

Max $Z_q = y_1 + y_2$

subject to

$35y_1 + 15y_2 \le 1$

$10y_1 + 17y_2 \le 1$

and $y_1, y_2 \ge 0$;

The problem is converted to canonical form by adding slack, surplus and artificial variables as appropiate

1. As the constraint-1 is of type ' $\le$ ' we should add slack variable S_1

2. As the constraint-2 is of type ' $\le$ ' we should add slack variable S_2

After introducing slack variables

Max $Z_q = y_1 + y_2 + 0S_1 + 0S_2$

subject to

$35y_1 + 15y_2 + S_1 = 1$

$10y_1 + 17y_2 + S_2 = 1$

and $y_1, y_2, S_1, S_2 \ge 0$

Iteration-1		C_j	1	1	0	0	
B	C_B	X_B	y_1	y_2	S_1	S_2	MinRatio $\frac{X_B}{y_1}$
S_1	0	1	(35)	15	1	0	$\frac{1}{35} = 0.03$ →
S_2	0	1	10	17	0	1	$\frac{1}{10} = 0.1$
$Z_q = 0$		Z_j	0	0	0	0	
		$C_j - Z_j$	1 ↑	1	0	0	

Positive maximum C_j-Z_j is 1 and its column index is 1. So, the entering variable is y1. Minimum ratio is 0.03 and its row index is 1. So, the leaving basis variable is S1. 4" The pivot element is 35.

Table 3 (Cont.)

11) Entering $= y_1$, Departing $= S_1$, Key Element $= 35$

− $R_1(\text{new}) = R_1(\text{old}) \div 35$

$R_1(\text{old}) =$	1	35	15	1	0
$R_1(\text{new}) = R_1(\text{old}) \div 35$	0.03	1	0.43	0.03	0

− $R_2(\text{new}) = R_2(\text{old}) - 10R_1(\text{new})$

$R_2(\text{old}) =$	1	10	17	0	1
$R_1(\text{new}) =$	0.03	1	0.43	0.03	0
$10 \times R_1(\text{new}) =$	0.29	10	4.29	0.29	0
$R_2(\text{new}) = R_2(\text{old}) - 10R_1(\text{new})$	0.71	0	12.71	-0.29	1

Iteration-2		C_j	1	1	0	0	
B	C_B	X_B	y_1	y_2	S_1	S_2	**MinRatio** $\frac{X_B}{y_2}$
y_1	1	0.03	1	0.43	0.03	0	$\frac{0.03}{0.43} = 0.07$
S_2	0	0.71	0	(12.71)	-0.29	1	$\frac{0.71}{12.71} = 0.06 \rightarrow$
$Z_q = 0.03$		Z_j	**1**	**0.43**	**0.03**	**0**	
		$C_j - Z_j$	0	0.57 ↑	-0.03	0	

Positive maximum *Cj-Zj* is 0.57 and its column index is 2. So, the entering variable is *y*2. Minimum ratio is 0.06 and its row index is 2. So, the leaving basis variable is *S*2. 4" The pivot element is 12.71.

12) Entering $= y_2$, Departing $= S_2$, Key Element $= 12.71$

+ $R_2(\text{new}) = R_2(\text{old}) \div 12.71$

+ $R_1(\text{new}) = R_1(\text{old}) - 0.43R_2(\text{new})$

Iteration-3		C_j	1	1	0	0	
B	C_B	X_B	y_1	y_2	S_1	S_2	**MinRatio**
y_1	1	0	1	0	0.04	-0.03	
y_2	1	0.06	0	1	-0.02	0.08	
$Z_q = 0.06$		Z_j	**1**	**1**	**0.02**	**0.04**	
		$C_j - Z_j$	0	0	-0.02	-0.04	

Table 3 (Cont.)

13) Since all $C_j - Z_j \leq 0$

Hence, optimal solution is arrived with value of variables as :
$y_1 = 0, y_2 = 0.06$

Max $Z_q = 0.06$

$$\therefore Z_q = \frac{1}{V} = 0.06$$

$$\therefore V = \frac{1}{0.06} = 16.48$$

player B's optimal strategy
$q_1 = V \times y_1 = 16.48 \times 0 = 0.07$

$q_2 = V \times y_2 = 16.48 \times 0.06 = 0.93$

Hence, player B's $\left(B_3, B_7\right)$ optimal strategy is $(0.07, 0.93)$.

player A's optimal strategy
The values for x_1, x_2 can be obtained from the $z_j - c_j$ row of final simplex table

$x_1 = 0.02, x_2 = 0.04$

$p_1 = V \times x_1 = 16.48 \times 0.02 = 0.26$

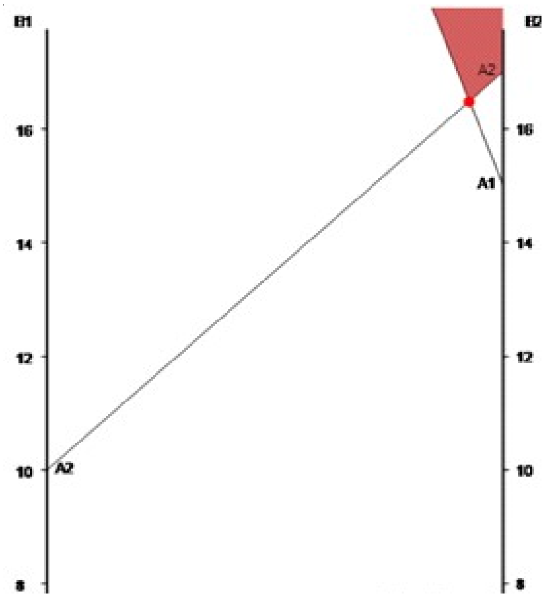
$p_2 = V \times x_2 = 16.48 \times 0.04 = 0.74$

Hence, player A's $\left(A_1, A_2\right)$ optimal strategy is $(0.26, 0.74)$.

So, finally player B's $\left(B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8\right)$ optimal strategy is $(0, 0, 0.07, 0, 0, 0, 0.93, 0)$.

and player A's $\left(A_1, A_2\right)$ optimal strategy is $(0.26, 0.74)$.

Results are found using the calculator on the following website: https://cbom.atozmath.com/CBOM/GameTheory.aspx?q=lpp&q1=39%2c37%2c35%2c25%2c30%2c40%2c15%2c20%3b12%2c14%2c10%2c27%2c32%2c37%2 c17%2c38%60A 1%2cA2%60B1%2cB2%2cB3%2cB4%2cB5%2cB6%2cB7%2cB8%60lpp%60true&dm=D&dp=2&do=1#PrevPart



Note: Results are found using the calculator on the following website:

Source: https://cbom.atozmath.com/CBOM/GameTheory.aspx?q=graph&q1=39%2c37%2c35%2c25%2c30%2c40%2c15%2c20%3b12%2c14%2c10%2c27%2c32%2c37%2c17%2c38%60A1%2cA2%60B1%2cB2%2cB3%2cB4%2cB5%2cB6%2cB7%2cB8%60graph%60true&dm=D&dp=2&do=1#PrevPart

Figure 1: Results of the Graphical Method for Calculating the Value of the Game Between Financial Analysts and the Government Regarding the Cryptocurrencies Investment Decision

From Table 3 financial analysts' (player A's) optimal strategy is the greater ($A1$ = 0.26 to invest in cryptocurrencies, and $A2$ = 0 .74 not to invest in cryptocurrencies). Therefore, the peak that cryptocurrencies show now in the market might be temporary for a while ahead, and unlike the predictions of the experts and the beneficiary parties in the market, the upward trend soon will turn into a downward trend till such investment in cryptocurrencies will be at very low level, and it all depends on the investors' demand and studies for such opportunity of cryptocurrencies to invest in. Therefore, the beneficiary parties are exerting all the efforts to grow the marketing for such opportunities of investment online and in businesses to attract investors. The successes of such cryptocurrencies will be based on the cost-effective analysis and the benefits to exceed the costs, and on solving accounting, economic, and ethical issues around such investment, which is not very well understood now in the current phase by most of the investors who are looking for quick returns from such cryptocurrencies trading and mining techniques that grow the investment quickly and to the maximum return possible.

On the other hand, the government's (player B's) optimal strategy is the greater (B3 = 0.07 to encourage investment in cryptocurrencies, B7 = 0.93 not to encourage investment in cryptocurrencies).Therefore, the governments in most countries work on regulating the investment in cryptocurrencies to the degree that will not harm itself and its fiscal policies and the exchange rates' economic fundamentals related to international trade and money transfers' control. Therefore, the accounting, economic, and ethical issues around cryptocurrencies have a big impact on the government's decision not to encourage investment in cryptocurrencies to a certain degree that allows control over money transfer abroad, and smoothing the exchange rates risk to avoid high fluctuations and economic instability, as well as avoiding the unpredictable economic indications. It is unpredictable in the current phase whether the governments and the political economists in most countries will continue discouraging investment in cryptocurrencies for a long period ahead, or will soon participate in the trading and the usage of cryptocurrencies to transfer money and make investments in coordination with the central banks. Nevertheless, if investors' demand for investment in cryptocurrencies declines, as the prediction shows in this study, the entire system may be eliminated from the economies. Therefore, this questionable matter will remain unanswered till the governments and political economists influence its success and growth for the foreseeable future.

As a result, based on the accounting, economic, and ethical issues around the investment in cryptocurrencies, hypothesis H_1 is verified, where it is doubtful for financial analysts to make a cryptocurrency investment decision, and is assured by the government's strategy to not encourage investment in cryptocurrencies. Therefore, the paper's results are significant for showing the doubtful insights around the cryptocurrencies investment decision for both investors and governments.

4. Discussion

Innovations in finance like cryptocurrencies have attracted beginner and professional investors in developed countries and developing countries as well, because of the expected benefits it provides and overcoming governments' restrictions, as well as the expected return on this type of investment. Therefore, the demand of investors for cryptocurrencies has made peak prices, in a world now facing economic recession, high inflation rates, and a rise in living costs. In addition, some investors are looking for investment opportunities in cryptocurrencies to grow and expand their business and investment portfolios.

However, there are issues around cryptocurrencies, related to accounting, economies, and ethical considerations. There is no unified GAAP or IFRS to account for cryptocurrencies, and different standards can be used and affect financial reporting and earnings management in practice. In addition, the negative effect on the international economies is witnessed by governments and central banks regarding the exchange rates and the unpredictable economic indications. Moreover, the unethical issues raised by cryptocurrencies trading companies in respect to the hidden cost of the investment and lack of transparency, as well as by the investors' illegal actions to transfer money, money laundering, drug trade, and terrorist financing activities.

As a result, governments work to impose restrictions to regulate this type of investment, and in the meantime, experts and beneficiary parties from cryptocurrencies predict a promising future for cryptocurrencies growth and usage, which I consider a doubtful prediction, and needs future research to follow up and analyze carefully.

As a consequence, there is a game between the investor (financial analysts in particular) and the government regarding the financial analysts' cryptocurrencies investment decisions and the government's encouraging investment in cryptocurrencies. Therefore, in this paper, I present this game by using a 2× 2 games in game theory approach and a linear programming method solved by a simplex method algorithm using an appropriate website calculator.

The results of the game show pessimistic predictions for cryptocurrencies trading and usage in the future, where the financial analysts' best decision is to not invest in cryptocurrencies, and the governments' best decision is to not encourage investment in cryptocurrencies. The reason behind the results of not to invest in or encourage investment in cryptocurrencies is because of the issues around cryptocurrencies regarding accounting issues, economic issues, and unethical issues unless political economists influence cryptocurrencies usage and investment the same as other financial instruments in the markets are still used and traded.

5. Conclusion

This paper encourages future researchers and financial analysts to follow up cautiously on the answer to the currently unanswered question in the market regarding the future of cryptocurrencies, where cost-effective analysis is required, benefits compared to costs need calculations, competitive advantages for financial instruments need to be compared to the cryptocurrencies', the accounting, economic and unethical problems need to be solved, the governments' regulations need to be protective, fair and encouraging. Therefore, schools of business should include a subject for educating cryptocurrencies and its issues to undergraduate and postgraduate learners. Future research if optimistically predicts the future of cryptocurrencies, would benefit the new generation to keep on and find good opportunities for investments and create new jobs using the new technologies around the trading of cryptocurrencies, and in the meantime taking into consideration the protection of international economies to not downfall.

References

Chou, J.H., Agrawal, P. and Birt, J. (2022). Accounting for Crypto-Assets: Stakeholders' Perceptions. *Studies in Economics and Finance*, 39(3), 471-489.

Foy, J. (2019). Financial Accounting Classification of Cryptocurrency. Available at: https://digitalcommons.liberty.edu/honors/858/#:~:text=The%20results%20will%20show%20that,as%20property%20for%20tax%20purposes

Gallersdörfer, U., Klaaßen, L. and Stoll, C. (2023). Accounting for Carbon Emissions Caused by Cryptocurrency and Token Systems. *Crypto Carbon Ratings Institute (CCRI)*, 2. Available at: https://scholar.google.com/citations?view_op=view_citation&hl=de&user=vORQYV4AAAAJ&citation_for_view=vORQYV4AAAAJ: roLk4NBRz8UC

Huang , R.H., Deng , H. and Chan, A.F.L. (2023). The Legal Nature of Cryptocurrency as Property: Accounting and Taxation Implication. *Computer Law and Security Review*, 51. Available at: https://doi.org/10.1016/j.clsr.2023.105860

Hyytiä, P. and Sundqvist, E. (2019). Accounting for Cryptocurrencies – A Nightmare for Accountants: A Qualitative Study Exploring the Issues and Challenges when Accounting for Cryptocurrencies. Available at: https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1331799&dswid=6327

Liu, Y., Tsyvinski, A. and Wu, X. (2021). Accounting for Cryptocurrency Value. Available at SSRN: https://ssrn.com/abstract=3951514 or http://dx.doi.org/10.2139/ssrn.3951514

Luo, M. and Yu, S. (2024). Financial Reporting for Cryptocurrencies. *Review of Accounting Studies*, 29, 1707-1740. Available at: https://doi.org/10.1007/s11142-022-09741-w

Makurin, A.A. (2020). Display of Cryptocurrency in Accounting. *Economies' Horizons*, 3(14), 13–22.

Niftaliyev, S. G. (2023). Problems Arising in the Accounting of Cryptocurrencies. *Financial and Credit Activity : Problems of Theory and Practice,* 3(50), 76-86. Available at doi: 10.55643/fcaptp.3.50.2023.4046

Shehada, F. and Shehada, M. (2020). The Challenges Facing IFRS for Accounting of Cryptocurrencies. The 1st International Conference on Information Technology & Business ICITB2020. Available at SSRN: https://ssrn.com/abstract=3664571 or http://dx.doi.org/10.2139/ssrn.3664571

Tarasovaa , T., Usatenkob, O., Makurinb,A., Ivanenkoc, V. and Cherchatad, A. (2020). Accounting and Features of Mathematical Modeling of the System to Forecast Cryptocurrency Exchange Rate. *Accounting*, 6, 357–364. Available at: doi: 10.5267/j.ac.2020.1.003

Cite this article as: Tamer A. Elnashar (2024). Is it Doubtful for Financial Analysts to Make a Cryptocurrency's Investment Decision?: Accounting and Economic Challenges. *International Journal of Cryptocurrency Research,* 4(1), 101-112. doi: 10.51483/IJCCR.4.1.2024.101-112.