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The Impact of Cryptocurrency over the Turkish Capital Market: A Case Study of Bitcoin (BTC)

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ABSTRACT

Purpose: The study analyses what impacts Cryptocurrency Bitcoin (BTC) has as an alternative investment asset to diversify the investment portfolio for the case of Turkish Capital market. For this purpose, this study analyses the impact of cryptocurrency Bitcoin on companies' stock market price. To analyse the financial behaviour of investors, the financial statements of the biggest 24 companies (airlines, retail and manufacturing, excluding the banking sector) listed on BIST 30 National Index for 4 years, from (01.01.2017 to 12.12.2020) have been taken into account.

Methodology: The quantitative analysis is based on two multiple linear regression between the stock market price of companies (dependent variable), and the main return ratios and financial leverage (independent variables). As a first step, analyse the influence of rate of returns on companies' stock price. The second step, represented by the standardization of companies' stock price and analysing the correlation with the Bitcoin price.

Findings: Return rates, which were employed as variables in the empirical model, revealed that financial statements had little impact on the stock market price of the companies, analysed, with the weak correlation between the independent variables and the dependent variable explaining stock price fluctuations during the period.

Conclusion: The results of the empirical study negated the initial formulated hypothesis regarding the backward correlation between the Bitcoin price and the stock price of quoted companies for the period.

KEYWORDS- Bitcoin, Bursa Istanbul, Value Relevance, Multiple Linear Regression, Financial Information.

1. INTRODUCTION

Due to rapid increase in technological advancement during the last few decades, investors' interest in alternative investments has increased dramatically, especially in the COVID-19 pandemic period, investors showed a huge interest in new financial instruments to diversify their investment portfolio. Such as cryptocurrencies, which are attractive and alternative financial assets. In cryptocurrencies, the Bitcoin (BTC) is the oldest and most popular digital currency with its significant return characteristics.

A financial market is a place where investors and traders exchange (buy or sell) financial assets. These markets have physical places such as the New York Stock Exchange (NYSE), London Stock Exchange (LSE), Bombay Stock Exchange (BSE), Borsa Istanbul (BIST). Capital market, a component of financial market, where securities and investments are routed between investors or institutions to diversify their investment portfolio. While the cryptocurrency market allows traders to trade digital assets and financial technology.

Cryptocurrencies have evolved into a means of investment and payment. They let people to make payments in a secure electronic environment without the involvement of third parties such as banks or financial institutions. There are over 6,000 distinct cryptocurrencies in use until 2021 [1].

In 2008 - 2009, a mysterious person, using the pseudonym Satoshi Nakamoto, published a white paper called "Bitcoin – A Peer to Peer Electronic Cash System", stated as to referenced to Hashcash, that to create a distributed time stamp server on a peer-to-peer basis, will need to employ a proof-of-work system similar to Adam Back's Hashcash [2]. Hence, Satoshi Nakamoto started the history of Bitcoin, and age of subsequent cryptocurrencies, began [3].

Bitcoin was one of the first digital currencies to make use of peer-to-peer (P2P) based on blockchain technology to allow for immediate transactions without involving any third party. In peer-to peer technology, every computer acts as a server without the need for central server and a blockchain is a decentralized distributed ledger that records all peer-to-peer transactions using a hash, which is an irreversible cryptographic signature. The information can be recorded or distributed but cannot be altered, deleted or hacked. Each virtual coin has a public key with three unique elements (buyer, seller and quantity) to record the information of the transaction.

This proposed study has three stages: The first stage contains the literature review about value-relevance concepts regarding Turkish Capital. Second stage contains the research methodology and results. As a first step of the empirical models to analyse the influence of rate of returns on companies' stock price. The second step of the empirical approach is represented by the standardization of companies' stock price and analysing the correlation with the Bitcoin price. Lastly, third stage of the study analyse the research hypothesis to assess the correlation between the stock market price and the cryptocurrency market price to show the validation of the Hypothesis as the what impact, Cryptocurrency Bitcoin (BTC) as an alternative investment asset to diversify the investment portfolio.

2. LITERATURE REVIEW

The research offers to examine the notion of value-relevance in this part, cryptocurrency bitcoin as an alternative investment instrument as well as the evolution of the cryptocurrency market, which is considered an emerging market.

2.1 Cryptocurrency Bitcoin as An Alternative Investment Instrument

Alternative investment also called an alternative asset is a type of investment that does not fall under any of traditional investment classes like stocks, bonds, and cash.

Financial crisis of 2008-2009 developed a sense of insecurity among many financial firms and investors. They realized the need to diversify their investment portfolio more than the traditional methods of investment. Portfolio managers started to include more alternative financial instruments in their asset allocation models for their investors. People were looking for a money that was not regulated by a government body, as they put their faith in a bank, but bank lost their money, While the government had no limit on how much money it might create, the volatility and uncertainty about the value of people's money was always evident [4].

According to PPB Capital Partners' Survey (2021), conducted regarding alternative financial assets allocation, 45 percent of financial advisors proposed to raise the investor's participation in alternative investments to 5%–10% of the portfolio [5].

Studies from 2014 to 2017 show that there is a strong correlation between the US Dollar and Bitcoin when the values of Bitcoin and the US dollar are rapidly growing because when investors are deciding between Bonds and Bitcoin, they inspect both the USD and Bitcoin values [6]. In 2017 when Bitcoin price rose 19 times higher than investors who like to take risk chose Bitcoin rather than Gold, during the analysis period, opposed to Gold, this condition suggests that Bitcoin has a stronger alternative relation with Borsa Istanbul National Index [6]. Although Ozyesil (2019) studies revealed that, it is impossible to establish that Bitcoin, USD, and EUR are complementary investment instruments [7]. But it is also true that Cryptocurrency is the newest alternative investment to hit the capital market.

2.2 The Value-Relevance of Financial Information on The Stock Market

The potential of financial statement information to capture and represent firm value is known as value relevance.

Value relevance is determined as a statistical relationship between financial statement information published by firms and stock market returns. For investors, value relevance is very important in decision-making process in investment management.

2.2.1 Value Relevance and Financial Statements

Financial statements are published by firms annually and quarterly, as these are a critical source of information that provides the relevant information on financial position, financial performance, and the cash flow statement to potential and current investors, for the decision-making process. Investors decide either they would maintain, reinforce or reduce their investment in a specific firm.

According to the Conceptual Framework for Financial Reporting, financial statements must fulfil the two conditions, first, relevance and second, faithful representation of information [8]. The value relevance of financial information provides information about the company's financial condition and future performance that is very crucial for investors to make financial decisions [8]. The correlation between the capital market and the financial information released by corporations may be used to assess the value relevance of financial information [8]. According to conservative accounting principles, Faithful representation or credibility [8] may be described as a financial statement that represents accurate and fair information to show the true portrayal of a company's financial condition and performance [10].

Conservatism is one of the most ancient and effective auditing techniques [11] it waves the overvaluation of assets or income and undervaluation of liabilities or costs, according to the IASB (2005) [8], is the incorporation of a degree of caution in the essential assessments when creating uncertainty evaluations [10].

2.2.2 Value Relevance and Stock Market Price

The market efficiency concept may be used to explain the association between financial knowledge and stock prices. There is a strong association between the two of them because when positive or bad news are issued, an efficient market defines how financial instruments respond would be treated.

In the research of Basu (1997) investigated the influence of conservatism principle on a company's performance. In his studies, he categorized the impact of financial statements on the firms into two forms as positive or negative. His research revealed the assessment of positive news ($P_{31.12} > P_{01.01}$) and Negative news ($P_{31.12} < P_{01.01}$) for the market. Under the prudence concept, negative news about the firm influences the investors six times stronger than the good news [12].

2.2.3 Cryptocurrencies and Their Financial Market Evaluation

Over the past few years and especially during the COVID-19 pandemic period, investors turned their interest towards the investment in cryptocurrencies due to its high rate of returns. Bitcoin has a very high return in the cryptocurrency market.

In the studies of Venter (2016), commercial bank transactions referred to as "electronic money" differ from the term "cryptocurrency,". Electronic money exists as physical money as printed in a certain currency like USD, Turkish Lira, Euro, etc. it is deposited into a bank account and can be utilized as cash in hand or through bank card transactions [13]. While cryptocurrency operates differently. Cryptocurrencies are not tangible money, rather than it operates in the digital realm [13]. Bitcoin is the most commonly used and oldest cryptocurrency which will be studied in this research that what is its impact over Turkish Capital market.

3. DEVELOPMET OF HYPOTHESIS

Diversification of an investment portfolio is a strategy for a modern investor to reduce the risk related with financial markets. In the investment management, Bitcoin is considered as a solid alternative financial instrument. Through literature review above, the purpose of this study is to examine the following hypothesis:

Hypothesis: The cryptocurrency Bitcoin (BTC) market prices have inverse correlation with the evolution of companies' stock prices listed on Istanbul Stock Exchange, based on published annual financial statements.

4. RESEARCH METHODOLOGY

The present study analyses the correlation between the stock prices of companies listed in the Istanbul Stock Exchange (Bursa Istanbul) and the cryptocurrency Bitcoin price. This study analyses those investors show strong interest in investing either in cryptocurrency, as represented by the digital currency Bitcoin or the Companies' stocks in Turkish Capital market. As a result of the parameters examined: *rate of returns*, *stock prices*, and *Bitcoin price*, the research has an empirical aspect.

4.1. Dataset and Sample for Research

Datasets used in this study are taken from www.investing.com and www.isyatirim.com.tr websites and related to the best 24 companies listed in the BIST 30 national index. This list includes companies operating in several sectors: airlines, retail and manufacturing, excluding the banking sector. Related datasets cover stock prices and financial statements for the period 2017-2020. Additionally, a dataset of Bitcoin prices is used from the same period.

Metrics taken from financial statements (Balance Sheet, Income Statement) are: *Operating Result*, *Total Assets*, *Total Debts*, *Owners Equity* and *Net Result*. They served to calculate return rates (variables) used in the multiple regression Model no.1 detail further below in this chapter.

Table no. 1, shows summary information of sample companies selected**.**

Table 1: Summary Information of Sample Firms as of 29/12/2021

Equity Code (Ticker)	Equity Name	Industry	Closing Price (TRL)	Market Value (mn $)	Free Float Ratio (%)	Paid - Up Capital (mn TRL)
ARCLK	Arçelik	Durable Equipment	49,54	2 825	25	676
ASELS	Aselsan	Military Services	21,16	4 071	25,8	2 280
BIMAS	Bim Birleşik Mağazalar A. Ş	Retail	62,6	3 207	67,6	607
DOHOL	Doğan Holding	Holdings	2,74	605	35,8	2 617
EKGYO	Emlak Konut GYO	REIT	2,2	705	50,7	3 800
EREGL	Ereğli Demir Çelik	Steel - Iron	27,82	8 216	47,6	3 500
FROTO	Ford Otosan	Automobile	238,1	7 050	17,8	351
GUBRF	Gübre Fabrikaları	Agricultural Chemicals (Fertilizer)	81,85	2 307	23,8	334
KCHOL	Koç Holding	Holdings	28,7	6 141	26,4	2 536
KOZAA	Koza Anadolu Metal	Mining	17,77	582	44,9	388
KOZAL	Koza Altın	Mining	119,6	1 539	29,9	153
KRDMD	Kardemir (D)	Steel - Iron	8,99	592	91,2	780
PETKM	Petkim	Oil	7,82	1 672	38	2 534
PGSUS	Pegasus Hava Taşımacılığı	Airlines	86,3	745	36,2	102
SAHOL	Sabancı Holding	Holdings	13,02	2 242	49,1	2 040
SASA	Sasa Polyester Sanayi A.Ş.	Industrial Textile	52,8	4 990	19,6	1 120
SISE	Şişecam	Glass	13,41	3 466	49,1	3 063
TAVHL	TAV Holding	Airlines	31,56	967	47,6	363
TCELL	Turkcell	GSM Operator	18,6	3 453	54	2 200
THYAO	Türk Hava Yolları	Airlines	20,48	2 385	50,6	1 380
TKFEN	Tekfen Holding	Construction	19,94	623	51,4	370
TTKOM	Türk Telekom	GSM Operator	9,85	2 909	15	3 500

TUPRS	Tüpraş	Oil	149,6	3 161	49	250
VESTL	Vestel Elektronik	Durable Equipments	23,8	674	36,3	336

(Source: www.isyatirim.com.tr)

4.2. Research Methodology

The econometric models used in the present study are using, on one hand, the companies' stock prices and the Bitcoin price, both being expressed in logarithmic scale and, on the other hand, by the return on equities, return on assets and financial leverage. The empirical models used, are two multiple regression models, serving to analyse, as a first step, the influence of rate of returns on companies' stock price and as a second step, the correlation between companies' stock prices and Bitcoin price.

4.2.1 Multiple Regression Models

The analysis will be based on a multiple linear regression between the stock market price of 24 top performing companies listed in the BIST 30 Index (dependent variable), and the main return ratios and financial leverage (independent variables). Metrics taken from financial statements are: *total assets*, *total liabilities*, *equity*, *net result* and *stock price*.

The empirical models used are:

$$\textbf{Company\_Price} = \beta_0 + \beta_1 \textbf{ROE} + \beta_2 \textbf{ROA} + \beta_3 \textbf{FL} + \varepsilon \quad \text{……. (Model. 1)}$$

Where:

Company_Price = ln (P_1 / P_0)

P_1 _ represents the stock price on 31.12.N;

P0 _ represents the stock price on 01.01.N;

(P_1 / P_0) _ represents the change between the stock price on 31.12.N and the stock price on 01.01.N;

ROE _ return on equity;

ROA _ return on assets;

FL _ financial Leverage;

βi, i=1,3 _ represents the regression coefficients;

ε = error random variable;

4.2.2 Standardisation of Companies' Stock Price and Analysing the Relation with The Bitcoin Price

The next step of the empirical approach is represented by the standardization of companies' stock price and analysing the correlation with the Bitcoin price.

$$\textbf{Standard\_company\_price} = \beta_0 + \beta_1 \textbf{Bitcoin\_price} + \varepsilon \quad \text{……... (Model. 2)}$$

Where:

Standard_company - represents the standardized equation of the econometric model presented in the first regression equation.

Bitcoin Price – $\ln(P_1/P_0)$

$\ln(P_1/P_0)$ represents the logarithmic changes in the Bitcoin price;

βi - represents the regression coefficients;

ε = residual component;

5. FINDINGS

5.1. Results on the impact of financial statements on the financial market

Table no. 2 shows the descriptive statistics results, which show that there were 72 observations in the whole sample (n), with the averages of the return ratios and financial leverage derived using the financial statement items. The mean of the investigated variables is positive, indicating that the companies in the sample are profitable and have a positive impact on the stock price. With a value of 0,096, the use of assets efficiency reflects a positive operating income and total assets for the investigated period. Compared to other return rates, the financial leverage is the highest, reflecting the debt burden in financial statements for the companies' stock price has a positive value, showing a positive trend on the financial market.

Table 2: Descriptive statistics of Model. 1

	N	Minimum	Maximum	Mean	Standard deviation
ROE	72	-0,3648	0,5955	0,1521	0,1179
ROA	72	-0,0468	0,2539	0,0962	0,0489
FL	72	0,0804	0,8602	0,5887	0,1612
Standard Company	72	-0,6801	2,2533	0,1208	0,2799
Valid N	72				

(Source: Own processing in Excel)

The results of the descriptive statistics are presented in Table no. 3 related to the total sample (n) of 72 observations, where are presented the company's stock prices and the Bitcoin averages. Both the mean of standardized equation of companies' stock prices and the mean of Bitcoin price are positive. Based on these results, the positive sign could mean a positive correlation in the analysed period.

Table 3: Descriptive statistics of Model 2

	N	Minimum	Maximum	Mean	Standard deviation
Standard Bitcoin	72	-1,2817	1,3897	0,2468	1,0190
Standard_Company	72	-0,6801	2,2533	0,1611	0,3336
Valid N	72				

(Source: Own processing in Excel)

Table no. 4 presents the correlation and determination coefficients calculated on the basis of the regression model no. 1. The relation between the two types of variables demonstrates the value relevance of financial data provided by the companies, with positive and negative events being found in the stock price. There is a positive correlation between the variables of 21%. Meanwhile the determination coefficient (R square), shows that return rates explain the variation of the stock price fluctuation by around 4,5%.

Table no. 4. Statistics Regarding Model no 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,213	0,045	0,003	0,463

(Source: Own processing in Excel)

The parameters estimate for the Model no.1 are presented in Table no. 5, where each parameter is explained by its relation to the market price. The positive sign of the parameters of the analysed model indicates the direct link with the stock price, but no significant influence for any of the three variables (the return on equity, the return on assets and the financial leverage). Depending on their influence on the dependent variable, the return on asset (ROA) followed by the return on equity (ROE) has the greatest influence on the price, because the investors are interested on the net result of the company alongside the operational performance.

Table no. 5. Parameters estimates for Model. No. 1

	Coefficients		Standardized coefficients	t	Sig.
	B	Standard Error	Beta		
Constant	-0,129	0,271		-0,475	0,636
ROE	0,436	0,427	0,183	1,019	0,312
ROA	0,604	1,355	0,106	0,446	0,657
FL	0,285	0,327	0,164	0,870	0,387

(Source: Own processing in Excel)

The correlations of the analysed model are presented in Table no. 6, where we can see the link between the stock price and the financial ratios. We can see a strong positive correlation between the return on equity and the return on assets (r=0,63), which can explain the efficiency of the activity valued by the operating result, whose value is 0.604. However, the financial leverage has a negative correlation with the return on equity (r=-0,20), return on assets (r=-0,56) on one hand, and almost no correlation with the stock price (r=0,05).

Table no. 6. The correlations between the variables included in Model.no. 1

		Standard Company	ROE	ROA	FL
Pearson Coef	**Company Price**	1,00	0,19	0,11	0,05
	ROE	0,19	1,00	0,63	-0,20
	ROA	0,11	0,63	1,00	-0,56
	FL	0,05	-0,20	-0,56	1,00
Sig. (1-tailed)	**Company Price**	0	0	0	0
	ROE		0	0	0
	ROA			0	0
	FL				0
N	**Company Price**	72	72	72	72
	ROE	72	72	72	72
	ROA	72	72	72	72
	FL	72	72	72	72

(Source: Own processing in Excel)

5.2. Results on Bitcoin's influence on the standardized stock price of listed companies

Table no. 7 shows the weak link of positive intensity between the Bitcoin stock price and the stock price that includes the influence of the main rates of returns. The study presents that the exchange rate fluctuation of listed companies only influences the change of the Bitcoin in the proportion of (R square) 18,8%. The stocks listed on the BIST 30 index are less volatile than Bitcoin, which is characterized by a high level of volatility. Investors, for risk management issues, prefer to build diversified financial portfolios by adding uncorrelated or negatively correlated assets in order to offset big losses.

Table no. 7: Statistics for Model. no. 2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	0,434	0,188	0,176	0,421

(Source: Own processing in Excel)

Table no. 8 shows the correlations between the stock price of listed companies and the Bitcoin price (r=43%). The results mean that investors may consider Bitcoin for portfolio diversification because of its weak positive correlation with Stock prices although other securities showing inversed correlation may be preferred.

Table no. 8. The correlations between the variables included in Model. no. 2

		Standard Company	Bitcoin Price
Pearson Coef	**Standard Company**	1	0,43
	Bitcoin Price	0,43	1
Sig. (1-tailed)	**Standard Company**	0	
	Bitcoin Price		0
N	**Standard Company**	72	72
	Bitcoin Price	72	72

(Source: Own processing in Excel)

From Tables no. 8 and no. 9, one can see the positive sign of the coefficient β1, indicating the positive relation between the two variables at the time of publishing the financial statements. The Bitcoin price is significant, so at an increase of one unit of the company's stock price, the Bitcoin price tends to increase by 0.12.

Table no. 9. Parameters estimates for Model no. 2

	Coefficients		Standardized coefficients	t	Sig.
	B	Standard Error	Beta		
Constant	0,117	0,051		2,312	0,024
Bitcoin Standard	0,178	0,044	0,542	4,027	0,000

(Source: Own processing in Excel)

6. CONCLUSION AND RECOMMENDATIONS

With the goal of diversifying their investment portfolio, investors are looking for the finest options that will provide a return on their investment both in the short and long term. The goal of this research is to look into the relationship between a company's stock market price and the Bitcoin exchange rate as reported in its annual financial statements. Return rates, which were employed as variables in the empirical model, revealed that financial statements had little impact on the stock market price of the companies analysed, with the weak correlation between the independent variables and the dependent variable explaining stock price fluctuations. The results of the empirical study negated the initial formulated hypothesis regarding the backward correlation between the Bitcoin price and the stock price of quoted companies for the period studied.

For future research, the price of Bitcoin, might be investigated through time series in the context of speculative bubble occur or not.

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