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Research Paper

The evolution of the relationship between cryptocurrencies and stocks: an empirical analysis of the influence of Bitcoin and Ethereum on Euronext

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ABSTRACT

Purpose: This work analyzes whether cryptocurrencies significantly influence Euronext stock returns.

Design/methodology/approach: To this end, this quantitative research analyzes companies from 4 Euronext financial markets between 2017 and 2022 using the panel data methodology. The Generalized Method of Moments (GMM) methodology was also used to make the analysis more robust.

Findings: This study concluded that Bitcoin and Ethereum positively and statistically significantly influence Euronext stock returns. Their notoriety caused them to lose the safe haven characteristics they displayed in a more embryonic phase and led them to be influenced by the same systemic factors that affect the stock market.

Originality/value: The results of this study are immensely important for private and institutional investors investing in Euronext stocks and looking to diversify their portfolios.

Keywords: *Stock Returns; Euronext; Bitcoin; Ethereum; Cryptocurrencies*

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1. Introduction

The capital market is a very beneficial instrument for both companies and investors. Every type of investor, even the cautious ones, will look for more profitable destinations, at least for part of their assets (Nalurita, 2017). Considering this, it is essential to emphasize that historically, at least in developed countries, investment in stocks has proven to be a remarkable curriculum, as it is the asset that best remunerates capital (Fabris and Ješić, 2023).

However, reality also demonstrates that investing in stocks is a challenging task. For potential investors, stock investment decisions must be preceded by each company's economic and financial analysis. The literature suggests that investors can make sound investment decisions by analyzing historical data from companies, including balance sheets and income statements (Muhammad and Ali, 2018). A company's economic and financial analysis involves the treatment and analysis of all the information, and it can be an essential tool for investors in their decision-making process (Antara et al., 2014; Thakur and Workman, 2016).

In addition to the company-specific variables, the literature indicates that external indicators are also crucial in determining the returns of stocks (Lestari et al., 2022). Considering how well-known cryptocurrencies have become and the focus placed on them by the media and financial and government institutions, it is essential to analyze the impact these assets had on stock returns in capital markets (Glaser et al., 2014; Gil Alana, 2020).

The origin of cryptocurrencies dates back to 2008 (Nakamoto, 2008). Its technology has revolutionized the market by implementing a decentralized system where transactions are executed without intermediaries (peer-to-peer). These cryptocurrencies allow monitoring transactions through a public network, the Blockchain (Glaser et al., 2014; Almeida et al., 2021). Bitcoin was the first digital currency, but its success led to the emergence of many other cryptocurrencies, such as Ethereum, Ripple, Stellar, Tether, Dogecoin, Litecoin, Solana, and Binancecoin (Guesmi et al., 2019; Ahmed et al., 2024; Riahi et al., 2024; Suprayitno et al., 2024).

Cryptocurrencies are becoming increasingly popular as investment products with interesting returns and high risks (Dyhrberg, 2016a; Ciaian and Rajcaniova, 2018;

Nguyen, 2022). Sabalionis et al. (2021), Bouri et al. (2023), and Vries (2023) indicate that Bitcoin and Ethereum are the cryptocurrencies with the most incredible notoriety and transaction volume. Therefore, considering the current situation and the scarcity of studies on the topic, the main objective of this work is to study the influence that Bitcoin and Ethereum have on Euronext stock returns.

This work is relevant because Bitcoin and Ethereum have increased in popularity and become investment assets for many institutional and private investors (Bouri et al., 2023; Vries, 2023). Therefore, understanding how changes in Bitcoin and Ethereum prices can affect Euronext stock returns is crucial for investors and portfolio managers, considering that if a strong causality between Bitcoin/Ethereum price movements and stock returns from Euronext exists, it could have significant implications for investors looking to diversify their portfolios. For example, suppose Bitcoin and Euronext stock prices tend to move in the same direction. In that case, the potential risk of investment portfolios increases, so investors may need to adjust their asset allocation strategies to manage that risk appropriately. For this reason, carrying out this work is relevant to building a more comprehensive and informed understanding of contemporary financial markets. Furthermore, this work is relevant as we are unaware of any study that analyzes Bitcoin and Ethereum's impact on Euronext stock returns. As one of the leading stock exchanges in Europe, Euronext is not immune to the constant technological changes, and as such, understanding how blockchain technology and cryptocurrencies are shaping financial markets is essential for the stock exchange to adapt to technological changes, develop new products and services, and maintain its competitiveness.

This work analyzes a sample of non-financial companies listed on Euronext Amsterdam, Brussels Lisbon, and Paris between 2017 and 2022. Our results show that Bitcoin and Ethereum positively impact Euronext stock returns. Furthermore, company-specific and macroeconomic indicators are essential in determining Euronext stock returns.

The rest of the chapter develops as follows: section 2 contains a literature review, while section 3 presents the methodology, the database, and the variables used. Section 4 presents and discusses the empirical results. Finally, we present a conclusion for the study, its limitations, and suggestions for future research.

2. Bibliographic Review

Cryptocurrency markets have grown in importance worldwide in recent years, gaining much attention from the scientific community. The notoriety acquired by cryptocurrencies, as well as the rapid development of their market, has been associated with the sharp increase in the trading volume of Bitcoin, and its study is still in an embryonic stage (Šafka, 2014; Urquhart, 2016; Gil Alana, 2020). Kristoufek (2015) states that Bitcoin has unique characteristics and can simultaneously represent a financial and speculative asset.

One of the most unique and essential characteristics of Bitcoin is that it is not controlled by any monetary authority, company, or government (Jia et al., 2023). This cryptocurrency also has low transaction costs and is protected by cryptography, making it practically impossible to be targeted by fraud. These facts highlight the tremendous competitive advantage that Bitcoin has when compared to other existing assets that are transacted in financial markets. Therefore, increasing economic agents believe that Bitcoin will receive more acceptance in the future (Sinlapates et al., 2023). Several studies on Bitcoin already exist, focusing on the store of value (Baumöhl, 2019; Kristjanpoller and Bouri, 2019; Bouri et al., 2020; Kwon, 2020; Shahzad et al., 2020), market efficiency (Bouoiyour and Selmi, 2015; Cheah and Fry, 2015; Urquhart, 2016; Bariviera, 2017; Nadarajah and Chu, 2017; Vidal Tomás and Ibañez, 2018), price volatility (Katsiampa, 2017; Dastgir et al., 2019; Urquhart, 2018; López Cabarcos et al., 2021) and the relationship with stock returns (Van Wijk, 2013; Klein et al., 2018; Salisu et al., 2019; Hu et al., 2020; Kwon, 2020; Maghyereh and Abdoh, 2020; Matkovskyy et al., 2020). However, the literature regarding the relationship between Bitcoin and stock returns is not consensual. Some studies find a positive association, others find a negative relationship, while others do not find any evidence of a significant association between the two variables.

Guesmi et al. (2019) analyzed the relationship between Bitcoin and stock returns worldwide, considering the period between 2012 and 2018. The results indicate no significant association between Bitcoin and stock returns, and therefore, the use of Bitcoin in an investment portfolio can considerably reduce the risk compared to the risk of a portfolio composed only of stocks. Afterward, Gil Alana et al. (2020) analyzed whether any association exists between the top six cryptocurrencies and stock returns in the United

States. The sample was established between 2015 and 2018, and Ethereum, Ripple, Litecoin, Stellar, and Tether were also observed in addition to Bitcoin. The combined market capitalization of the selected cryptocurrencies constituted 80.22% of the top 100 cryptocurrencies by market capitalization value as of the end of October 5, 2018. The results suggest no association between Bitcoin and stock returns, which implies that Bitcoin is decoupled from the leading financial assets and belongs to a new asset class, different from the others. The authors argue that the lack of a strong and consistent relationship between Bitcoin and the stock market can be attributed to several reasons, including lack of regulation, instability in the cryptocurrency market, and lack of measurable intrinsic value.

Fabris and Ješić (2023) indicate that Bitcoin and other cryptocurrencies have high volatility, making them risky for investors. Considering this and to clarify the literature, the authors analyzed whether Bitcoin impacts stock returns worldwide. The results corroborate the research by Liu and Tsyvinski (2021) and suggest that no relationship exists between Bitcoin and the stock market.

Studies that found evidence that the Bitcoin price variation has a negative association with stock returns also exist. Bouri et al. (2017) examined whether Bitcoin can act as a hedge and a safe haven for equity investments worldwide. For this purpose, the authors gathered a sample between 2011 and 2015. Empirical results indicate that Bitcoin is generally a hedge that investors can use for diversification purposes, with this association being more evident for Asian stocks. Bouri et al. (2020) investigate whether Bitcoin, gold, and commodities can be considered safe havens for stocks in periods of crisis. The results suggest that Bitcoin has a negative association with stocks and, therefore, can be considered a safe haven for stocks in times of crisis, but gold and commodities remain more effective.

Marçal et al. (2020) studied whether Bitcoin can be used as a hedge for the investors of 89 companies listed on the São Paulo Stock Exchange. For this purpose, and using the panel data methodology, the authors used the price and returns of stocks as dependent variables. Independent variables bring together a set of company-specific variables alongside the value of Bitcoin. The results suggest that the increase negatively influences the market value of companies in terms of the price of Bitcoin. Furthermore, the relevance of the company-specific variables is reduced when Bitcoin is included in the model,

indicating a potential risk of losing relevance regarding company-specific information in the face of this type of indicator. According to the authors, when the economy grows, investors tend to profit more from the stock market; therefore, during the bull market period, the price of Bitcoin will fall. On the other hand, when the economy is in recession, the stock market is depressed and falling, and the price of Bitcoin tends to rise. All of this validates the idea that Bitcoin is a safe haven asset in the face of stock market uncertainty, especially when the markets are falling.

Attarzadeh and Balcilar (2022) state that Bitcoin has the potential to be a risk protection tool against any uncertainty, be it political, economic, or natural. Other additional studies indicate that when the value of Bitcoin goes up, the value of stocks goes down, and vice-versa. This evidence suggests that investors can use Bitcoin as a safe haven asset and can use cryptocurrencies as a form of diversification outside the stock market (Wang et al., 2016; Corbet et al., 2018; Matkovskyy and Jalan, 2019; Shahzad et al., 2019; Bouri et al., 2020; Hu et al., 2020; Chu et al., 2021; Mariana et al., 2021; Sensoy et al., 2021). Dyhrberg (2016b) investigated whether an association existed between Bitcoin and stock returns on the London Stock Exchange between 2010 and 2015. The results show that, on average, Bitcoin associates positively with stock returns. This may occur because investors consider stocks and Bitcoin as high-risk, high-return assets and tend to invest in these assets in times of economic optimism.

Salisu et al. (2019) examined Bitcoin's impact on stock returns in G7 countries (Canada, Germany, France, Italy, Japan, the UK, and the US). The authors justify the sample selection because they are classified as the most critical developed stock exchange markets and are primarily influenced by common factors. The sample contains data from 2010 to 2017. The results indicate that Bitcoin has a positive association with stock returns, with this effect being statistically significant in all the analyzed stock exchanges. These results contradict the thesis that Bitcoin can serve as a hedge asset in an equity portfolio, as it is an asset that tends to follow the market trend, ultimately increasing the risk level of an equity portfolio. These authors indicate that the stock returns of the G7 countries are more easily identified by models based on the price of Bitcoin than by their respective macroeconomic variables, except for Japan. An explanation for this result is the fact that the stocks of the G7 markets are integrated into the world economy, which can result in them being more prone to external shocks rather than internal ones.

Conlon and MacGee (2020) analyzed whether a relationship existed between Bitcoin and the USA stock market during the year 2020. The results suggest that stock prices tend to decline as Bitcoin declines in value, which indicates that investing in Bitcoin is not a safe haven for stock investments. The authors corroborate a study by Al-Khazali et al. (2018) and indicate that Bitcoin is a volatile asset that tends to increase an investment portfolio's risk substantially. Finally, Curto (2022) analyzed the correlation between Bitcoin and the NASDAQ index stocks between 2014 and 2021. The author indicates a positive association between the variables and that the correlation per year reached the highest value in 2020. In 2021, despite the decrease in value, the correlation continued above the average value of the total sample, demonstrating that Bitcoin behaves increasingly similarly to the stock market. Other investigations report a positive association between Bitcoin and stock returns (Van Wijk, 2013; Symitsi and Chalvatzis, 2018; Smales, 2019; Chaim and Laurini, 2019; Almeida et al., 2021; Rai, 2022; Jia et al., 2023). Based on the literature analyzed, we propose our first research hypothesis.

Hypothesis 1: There is a positive association between the annual returns of Bitcoin and the annual returns of Euronext stocks.

This study will include Ethereum because it is the second-largest cryptocurrency (Beneki et al., 2019; Bouri et al., 2020; Gil Alana et al., 2020; Meshcheryakov and Ivanov, 2020; Mariana et al., 2021; Sabalionis et al., 2021; Bouri et al., 2023; Vries, 2023). The inclusion of this cryptocurrency may allow for the validation of the results obtained about Bitcoin. If the identified patterns and trends are consistent between both cryptocurrencies, the confidence in the results of this investigation will be strengthened. Therefore, we propose our second research hypothesis.

Hypothesis 2: There is a positive association between the annual returns of Ethereum and the annual returns of Euronext stocks.

3. Data, Variables, Methodology

3.1 Sample

The sample is composed of 311 companies belonging to the financial centers of Amsterdam (13.18%), Brussels (15.43%), Lisbon (7.07%), and Paris (64.31%) and focuses on the period between 2017 and 2022. Only non-financial companies that

reported their accounts in euros on December 31 were selected (Ribeiro and Quesado, 2017; Li et al., 2020).

3.2 Variables

The dependent variable used in this study is stock returns (Din, 2017; Neves et al., 2018; Muhammad and Ali, 2018; Vieira et al., 2019; Costa et al., 2021; Dinh; 2023; Costa et al., 2024b).

The literature states that companies' economic and financial indicators such as size, liquidity, leverage, and return on assets (ROA) are essential in determining stock returns, as they allow for a detailed view of companies' financial and operational performance (Nisa and Nishat, 2011; Narayan and Bannigidadmath, 2015; Phan et al., 2015; Narayan et al., 2016; Nonejad, 2017; Pražák and Stavárek, 2017; Todorova, 2017; Devpura et al., 2018; Muhammad and Ali, 2018; Husna and Satria, 2019; Salisu et al., 2019; Santo sa, 2019; Vieira et al., 2019; Meurer et al., 2020; Ozturk and Karabulut, 2020; Costa et al., 2021; Kim et al., 2021; Lucita and Mulyana, 2021; Costa 2022a; Costa 2022b; Fernandes and Costa, 2023; Costa et al., 2024a; Costa et al., 2024b; Costa et al., 2024c). On the other hand, macroeconomic variables, such as the inflation rate and the real GDP growth rate, play a crucial role in determining the economic environment in which companies operate and, consequently, in determining stock returns (Nisa and Nishat, 2011; Din, 2017; Neves et al., 2018; Vieira et al., 2019; Pericoli, 2020; Costa et al., 2021; Costa 2022a; Islam et al., 2023). Therefore, in this study, economic and financial indicators and macroeconomic control variables are used to obtain a more accurate analysis of the impact of Bitcoin and Ethereum on the return of Euronext stocks. The variables used in this study were chosen based on the most recent scientific evidence, as well as their relevance in capturing the dynamics of Euronext stocks returns. (Neves et al., 2018; Vieira et al., 2019; Meurer et al., 2020; Ozturk and Karabulut, 2020; Kim et al., 2021; Lucita and Mulyana, 2021; Costa et al., 2024b; Rahmi et al., 2024; Sun et al., 2024; Zhao et al., 2024). Table 1 displays the variables used in the empirical part of this chapter.

Table I: Presentation of the variables

Variable	Code	Description	Calculation form	Expected influence	
Dependent variable	*R*	Stock Returns	$ln\frac{P_t}{P_{t-1}}$ P is the year-end price of the stock		Tehrani and Tehrani (2015), Anwaar (2016), Din (2017), Muhammad and Ali (2018), Neves et al. (2018), Nurfadila (2020), Costa et al. (2021), Costa (2022b), Dinh (2023)
Crypto assets (Independent variables)	*Bit*	Bitcoin	$ln\frac{Bit_t}{Bit_{t-1}}$; Bit is the year-end price of Bitcoin	+	Attarzadeh and Balcilar (2022), Hu et al. (2020), Chu et al. (2021), Mariana et al. (2021), Sensoy et al. (2021)
	Eth	Ethereum	$ln\frac{Eth_t}{Eth_{t-1}}$; Eth is the year-end price of Ethereum	+	Gil Alana et al. (2020), Meshcheryakov and Ivanov (2020), Mariana et al. (2021), Sabalionis et al. (2021), Bouri et al. (2023), Vries (2023)
Control variables (Independent variables)	*Size*	Size	Ln (Total Assets)	+	Vieira et al. (2019), Costa (2022a), Costa (2022b), Sun et al. (2024)
	Liq	Liquidity	$\frac{Current\ Assets}{Current\ Liabilities}$	+	Nisa and Nishat (2011), Vieira et al. (2018), Costa et al. (2024a)
	Lev	Leverage	$\frac{Total\ Liabilities}{Total\ Assets}$	-	Nisa and Nishat (2011), Adami et al. (2013), Santosa and Puspitasa, (2019), Nguyen et al. (2019), Nadyayani and Suarjaya (2021), Sun et al. (2024), Zhao et al. (2024)
	ROA	Return on Assets	$\frac{Ebit}{\text{Assets}}$	+	Neves et al. (2018), Husna and Satria (2019), Nguyen et al. (2019), Rahmi et al. (2024), Sun et al. (2024)
	Infl	Inflation rate (%)	The Consumer Price Index (CPI) inflation as a proxy for the company's country inflation	-	Nisa and Nishat (2011), Nguyen et al. (2019), Pericoli (2020), Costa et al. (2021)
	GDP	Real GDP growth rate (%)	Real growth rate of Gross Domestic Product (GDP) of the company's country	+	Gan et al. (2006), Acikalin et al. (2008), Nisa and Nishat (2011), Din (2017), Costa (2022a), Islam et al. (2023), Sun et al. (2024)

Source: Own preparation

The values from the financial statements and the quotations of the companies were collected from the website of The Wall Street Journal (Serafeim and Yoon, 2022). Macroeconomic variables were taken from Eurostat (Amaro and Costa, 2023). Finally, the value of Bitcoin and Ethereum in euros was collected from the Investing website, based on the study by Gil Alana et al. (2020).

3.3 Methodology

We use the panel data methodology, as it is the appropriate methodology when longitudinal observations are available, that is, the same companies over a period of time. This allows for a more accurate analysis of the effects of the independent variables on the dependent variable. The panel data econometric methodology is widely used in several areas, such as economics, finance, political science, and sociology. It allows for analyzing complex relations between variables over time, allowing a more accurate and compelling analysis of the studied phenomena (Baltagi, 2008; Wooldridge, 2010). Econometric panel data models can be classified into models with fixed effects (FE) and random effects (RE). Models with fixed effects control the individual differences, while models with random effects assume that individual differences are random and unrelated to the independent variables (Schielzeth et al., 2020). We use the Hausman test to find the best model between the FE or RE estimator (Gujarati and Porter, 2009; Di Simone and Zanardi, 2021). Furthermore, we used the Wooldridge test to assess the need for estimators with robust standard errors in each panel model (Wooldridge, 2010).

In the second phase, we will use the GMM methodology to make the analysis more robust because endogeneity may affect the model (Arellano, 2003; Santana et al., 2020). The GMM is considered one of the most advanced econometric techniques, and its application is increasing (Farooq et al., 2020). In this chapter, we cautiously ensured the data were stationary for the most accurate results (Kalam, 2020; Harvey et al., 2021). For this purpose, we used the first differences in all variables (Johnston and DiNardo, 1997; Hamilton, 2020; Kalam, 2020; Costa et al., 2024).

The econometric models of this study are shown below.

$$R_{it} = \beta_0 + \beta_1 Bit_{it} + \beta_2 Size_{it} + \beta_3 Liq_{it} + \beta_4 Lev_{it} + \beta_5 ROA_{it} + \beta_6 Inf_{it} + \beta_7 GDP_{it} + \varepsilon_{i,t} \quad (1)$$

$$R_{it} = \beta_0 + \beta_1 Eth_{it} + \beta_2 Size_{it} + \beta_3 Liq_{it} + \beta_4 Lev_{it} + \beta_5 ROA_{it} + \beta_6 Inf_{it} + \beta_7 GDP_{it} + \varepsilon_{i,t} \quad (2)$$

We used the panel data methodology to estimate the parameters of the coefficients of equations (1) and (2) and called them model 1 and model 2. Furthermore, we used the GMM methodology to calculate the coefficients of equations (1) and (2) to strengthen the results. We called them models 3 and 4.

3.4 Descriptive statistics and correlations between variables

Table 2 displays the descriptive statistics between variables.

Table II: Descriptive statistics

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
R	-0.04	0.00	0.54	-8.36	3.95
Bit	0.47	0.61	1.32	-1.31	2.57
Eth	0.83	0.83	2.05	-1.72	4.43
Size	7.05	7.06	2.42	0.45	12.60
Liq	3.21	1.38	27.00	0.27	916.00
Lev	0.98	0.60	11.50	0.00	359.00
ROA	0.40	0.03	7.39	-1.79	230.00
Inf	0.03	0.02	0.03	0.00	0.12
GDP	0.01	0.02	0.04	-0.08	0.07

Source: Own preparation

Notes: The variables are defined in Table I.

Except for stock returns, all variables show positive values when averaged. This data indicates that contrary to what happened with Euronext stocks, Bitcoin and Ethereum tended to present positive returns between 2017 and 2022. The liquidity ratio has an average value of 3.21. According to Fernandes and Costa (2023), this value indicates that, on average, Euronext companies had no difficulties fulfilling their short-term responsibilities. The data also indicates that, on average, the inflation rate in the sample was 3%, while the GDP was 1%. In Table 3 below, the correlations between the empirical variables are presented.

Table III: Correlation Matrix

Variable	R	Bit	Eth	Size	Liq	Lev	ROA	Dps	Inf	GDP
R	1.00	0.27	0.25	0.09	0.02	0.03	0.04	0.02	-0.13	0.02
Bit		1.00	0.95	-0.03	0.02	-0.02	-0.01	-0.03	-0.53	-0.25
Eth			1.00	-0.03	0.03	-0.03	0.00	-0.03	-0.43	-0.09
Size				1.00	0.00	-0.09	-0.10	0.06	0.05	0.02
Liq					1.00	-0.01	0.00	0.29	0.00	0.01

Lev						1.00	0.39	-0.19	-0.01	0.00
ROA							1.00	-0.01	-0.01	0.03
Dps								1.00	0.01	0.00
Inf									1.00	0.38
GDP										1.00

Source: Own preparation

Bitcoin has a strong correlation with Ethereum, so we will not place both variables in the same econometric model to avoid the emergence of multicollinearity problems (Maroco, 2007). On the other hand, the remaining variables have a low correlation, which leads us to conclude that there are no multicollinearity problems (Costa and Matias, 2020). This was further reinforced with VIF tests pointing in the same direction.

4. Empirical Results

In Table 4, it is possible to observe that the Hausman test was used to select the best models, namely whether it is the FE estimator or the RE estimator (Hausman, 1978). The Hausman test results, in conjunction with the one by Wooldridge, suggest that we select the RE regressions with robust standard errors (Gujarati, 2003; Wooldridge, 2010).

Table IV: Estimation results of Models 1 and 2

Dependent variable	**ΔR**	**ΔR**
Model	1	2
FE or RE	RE	RE
ΔSize	0.033**	0.033**
ΔLiq	0.001	0.001
ΔLev	-0.000***	-0.000***
ΔROA	0.002***	0.001***
ΔInfl	-2.065***	-2.293***
ΔGBP	1.906***	1.577***
ΔBit	0.127***	-
Δ Eth	-	0.074***
Const	0.037***	0.032***
Obs N	1514	1514
R^2 (Overall)	0. 1934	0.1659
Hausman (p-value)	9.38 (0.22)	8.85 (0.26)
Wooldridge (p-value)	10.11 (0.00)	7.18 (0.01)

Notes: The variables are defined in Table I. It should also be noted that *** significance level of 1%, ** significance level of 5%, * significance level of 10%.

Source: Own preparation

The results indicate that the models are globally significant at a significance level of 5%, with Model 1, which contains Bitcoin, having a better explanatory capacity than Model 2, which contains Ethereum. The returns on Euronext stocks are explained by the variables of Model 1 by around 19.34% and by around 16.59% by the variables that make up Model 2.

This data indicates that Bitcoin and Ethereum are important for analyzing Euronext stock returns, which corroborates the studies by Chaim and Laurini (2019), Conlon and MacGee (2020), and Almeida et al. (2021). The results suggest that an increase in Bitcoin value tends to have a positive and statistically significant effect on stock returns. This positive association contradicts the study by Bouri et al. (2017) and Marçal et al. (2020). Still, it aligns with the results presented by Almeida et al. (2021) and suggests that the evolution of Bitcoin prices can help understand the evolution of stock values.

These results can be explained by the fact that Bitcoin has gained great maturity and acceptance among institutional investors, which has made it increasingly more present in investor portfolios (Sun et al., 2021; Nguyen, 2022). This phenomenon made Bitcoin present characteristics more similar to those of the stock market and provoked a decline in its safe haven properties, as referenced by Bouri et al. (2017) and Marçal et al. (2020). Thus, by becoming “just another asset”, the value of Bitcoin became affected by the same systemic factors that influence the traditional markets. The same interpretation must be made for Ethereum.

Table 4.3 suggests that company size tends to have a positive and statistically significant effect on the returns of Euronext stocks. One of the primary explanations for this phenomenon is that larger companies are generally more diversified in products and markets, which can reduce risk and increase the stability of their revenues. Another critical factor is that larger companies tend to have economies of scale and to be more visible and attractive for investments made by institutional investors (Lestari et al., 2022).

The results also suggest that corporate leverage negatively affects Euronext stock returns. These results corroborate the study by (Adami et al., 2013) in the sense that indebtedness increases the company's financial risk, which can affect investor confidence and, consequently, the stock price. When a company is heavily indebted, it may face

difficulties paying interest and outstanding capital. This can lead to a reduction in the company's profitability and decreased cash flows available to shareholders. In addition, the company may have to resort to more short-term loans to pay its debts, which may increase financing costs further.

ROA shows a positive causality with Euronext stock returns. These results suggest that investors seek to allocate their capital to companies that demonstrate improved operational efficiency (Husna and Satria, 2019).

For robustness reasons, we estimate Models 3 and 4 through the GMM methodology in two phases, as shown in Table 5.

Table V: Estimation Results of Models 3 and 4

Dependent variable	**ΔR**	**ΔR**
Model	**3**	**4**
ΔR (-1)	-0,41***	-0.45***
ΔSize	1,12***	1.29***
ΔLiq	0,00	0.00
ΔLev	-0,00*	-0.00*
ΔROA	0,00***	0.00***
ΔInfl	-2.81**	-0.74*
ΔGBP	0.90***	0.46*
ΔBit	0.08***	-
Δ Eth	-	0.10***
Obs N	898	898
Sargan (p-value)	0.47 (0.52)	0.42 (0.31)
Wald (p-value)	907.55 (0.00)	905.44 (0.03)
Hansen over-identification (p-value)	9.30 (0.28)	11.84 (0.11)

Notes: The variables are defined in Table I. It should also be noted that *** significance level of 1%, ** significance level of 5%, * significance level of 10%.

Source: Own preparation

The results obtained using the GMM methodology confirm the results presented in Table 4 on the impact that Bitcoin, Ethereum, size, leverage, and ROA have on stock returns. Thus, it was possible to validate the two research hypotheses proposed by this work and demonstrate that the cryptocurrency market is increasingly interconnected with the Euronext stock market.

Furthermore, Model 3 confirms the results in Table 4 regarding the impact of the inflation rate and real GDP growth rate on Euronext stock returns. These results align with the study by Islam et al. (2023) and indicate that an increase in the real GDP growth rate tends to be associated with a reduction in the unemployment rate and an increase in family income. Consumption tends to increase with more people employed and more significant disposable income. This could increase corporate profits and, in turn, Euronext stock returns.

Furthermore, the inflation rate negatively and statistically significantly affects stock returns. These results can be explained by the fact that, in response to an inflation level above 2%, the European Central Bank tends to increase interest rates to control inflationary pressure. Rises in the interest rate can increase the cost of credit for businesses and consumers, which can slow economic activity and reduce corporate profits, negatively affecting stock returns (Lee, 2011; Momirović et al., 2021).

5. Conclusion

The price of stocks traded on the capital market fluctuates considerably. Thus, reliably predicting the tendencies regarding the evolution of the value of companies' stocks is difficult, as it may depend on several factors. The main objective of this chapter was to study whether the variation in the price of Bitcoin and Ethereum impacts the annual returns of Euronext stocks, focusing on the period between 2017 and 2022. The results achieved in this empirical investigation suggest that Bitcoin and Ethereum positively influence the returns of Euronext stocks. The notoriety obtained by these cryptocurrencies among investors caused them to lose the safe haven characteristics they had in a more embryonic phase. The fact that they are seen as just another financial asset means they are influenced by the same systemic factors that affect the stock market. Therefore, this research concludes that investors who add Bitcoin and Ethereum to their investment portfolios have potentially increased the risk factor and should adjust their investment allocation strategies to manage that risk.

Likewise, this study demonstrates the importance of company-specific indicators in determining market price. The importance of factors such as size, leverage, and ROA in

explaining the evolution of the market price of Euronext stocks is evidenced in the results of this chapter.

Carrying out this study proves relevant for all investors operating in the stock market, as it highlights important indicators that should be considered when making a stock investment decision. Another contribution made by this study is that it focuses on the enrichment of the Euronext market analysis, given the existence of a deficit in studies relating to this market.

Finally, it is important to highlight that this study does not consider the level of regulation imposed by each country on cryptocurrencies and only analyzes Bitcoin and Ethereum. Therefore, we suggest that future investigations analyze the level of regulation regarding cryptocurrencies in each country. Additionally, more cryptocurrencies, such as Ripple, Stellar, Tether, Dogecoin, Litecoin, and Binancecoin, may be included in the analysis.

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