

## The Forecasting of Cryptocurrency Price by Correlation and Regression Analysis

Krod Songmuang<sup>1</sup>

Laksamee Thungwha<sup>2</sup>

Chanapai Tanaram<sup>3</sup>

### Abstract

In the present, the investment in cryptocurrencies is popular, both in and outside the stock market. Cryptocurrencies' two main genera are Bitcoin and Ethereum, but they also have other several genera in the investment by investors. In the investment, investors are at a very high risk of fluctuations of the value of the currency that will affect the profit or loss. Forecasting of cryptocurrencies price is an interesting topic to researchers from different fields. The data analyzed were the real price of cryptocurrencies in February 2018. Objectives of this study are to search for a relationship between cryptocurrencies and to forecast the price of target cryptocurrencies when the price of cryptocurrency base has been changed. In the analysis, we used two steps for searching the relationship of cryptocurrencies, and it was found that ETH had the highest correlation with XRP. Then, we used regression analysis to create the function for forecasting the price of cryptocurrencies. In the forecasting, it was found that the forecasting price of XRP varied in the same direction as the real price. So, the high price per coin (ETH) of cryptocurrencies can be used for forecasting the low price per coin (XRP) significantly.

**Keywords:** cryptocurrencies, digital currencies, Bitcoin, Ethereum

---

<sup>1</sup>Lecturer of Faculty of Business Administration

Department of Accounting, Kasem Bundit University.

E-Mail: krod.son@kbu.ac.th

<sup>2</sup>Lecturer of Faculty of Business Administration

Department of Management, Kasem Bundit University.

E-Mail: laksamee.thu@kbu.ac.th

<sup>3</sup>Interdisciplinary Research Center, Faculty of Science and Technology

Kasem Bundit University.

## Introduction

Cryptocurrencies are, as the name suggests, intended to be used as currencies. Therefore, they attract a variety of different people, including *technology enthusiasts, businesses and investors, ideologists, researchers, cypherpunks, libertarians, public authorities and policy makers, financial regulators, banks, and also criminals*. This highlights the important role that decentralized currencies can play for inhabitants of such countries (Aljosha Judmayer, Nicholas Stifter, Katharina Krombholz, & Edgar Weippl, 2017).

Since the introduction of Bitcoin in 2009 (Satoshi Nakamoto, 2009), cryptocurrencies or digital currencies have become increasingly popular. Cryptocurrencies are digital tokens that can be exchanged on the internet, using cryptographic hashing and digital signatures to verify transactions and avoid double-spending of the same token (Hanna Halaburda & Miklos Sarvary, 2016). Thanks to these technical features, cryptocurrencies have introduced the notion of scarcity to the digital world by preventing users from

copying the bytes that represent the token. Because the scarcity of cryptocurrencies is protected by the cryptography embedded in their open-source code, cryptocurrencies can potentially become valuable. But what explains fluctuations in their market value?

Currently, cryptocurrencies have many currencies around the world. The investing.com reports that up to 1,642 currencies and a total market cap on Mar 14, 2018 at value 331,480,703,202USD. However, it has only a few genera that are primarily known, such as Dogecoin, Litecoin, Ethereum, Bitcoin, and DASH.

Investment in cryptocurrencies can be done in two ways: mining and trading. The mining into the investment can be the easiest. They can be invested in platform, powering, electric bills, and earned by yourself. The payback period of 10 months to one year is said to depend on the Diff and price of the coins unearthed that are good or not (Neil Gandal & Hanna Halaburda, 2016). In the process of mining, the 'miner' collects post transaction into a block. They complete with each other in order

to add their block of transactions to the blockchain (Young Bin Kim et al., 2016). For the trading like investing in the stock market, investors will be in a very high risk of fluctuations of the value of the currency that will affect the profit or loss.

Forecasting of cryptocurrencies price is an interesting topic to researchers from different fields. Particular studies have been conducted to forecast the movement of cryptocurrencies price.

### Objectives

This Study has objectives as follows:

1. Search the correlation of cryptocurrencies' base price with other crypto-currencies prices.
2. Forecast the price of other cryptocurrencies when the cryptocurrency base price changes.

### Data

Our aim is to analyze whether there are correlation and forecasting price of the cryptocurrencies. We did so by examining the market price of cryptocurrencies on February 2018, such that the time had a fluctuating price. The market price was in USD.

In selecting data, we selected the five cryptocurrencies that had been traded on investing.com, which were the top ten of cryptocurrencies. After that, we divided the cryptocurrencies into two groups. One is the cryptocurrencies' base, such as Bitcoin (BTC) and Ethereum (ETH), which had a high value per coin, and the other was Ripple (XRP), Cardano (ADA), and Nem (XEM), which had a low value per coin. The price of five cryptocurrencies is shown in Table 1.

**Table 1.** The market price of cryptocurrencies on February 2018

Date	Price (USD)				
	BTC	ETH	XRP	ADA	XEM
01/02/18	9,008.87	1,036.30	0.94185	0.41449	0.65120
02/02/18	8,813.84	923.30	0.89400	0.40171	0.59838
03/02/18	9,239.20	972.40	0.96061	0.45821	0.63405



Table 1. (Continued)

Date	Price (USD)				
	BTC	ETH	XRP	ADA	XEM
04/02/18	8,210.75	829.98	0.81537	0.38281	0.54473
05/02/18	6,930.82	698.62	0.67646	0.31612	0.44916
06/02/18	7,695.88	781.60	0.76149	0.35863	0.53205
07/02/18	7,574.66	751.25	0.71449	0.33133	0.51317
08/02/18	8,252.98	813.20	0.78257	0.34266	0.54648
08/02/18	8,713.62	878.90	0.91950	0.37627	0.58246
10/02/18	8,558.74	852.00	1.02980	0.38199	0.56529
11/02/18	8,088.43	810.64	0.96300	0.34991	0.51804
12/02/18	8,899.98	866.40	1.04479	0.37009	0.53658
13/02/18	8,515.07	839.69	0.98759	0.35296	0.51444
14/02/18	9,496.11	919.11	1.13489	0.38916	0.54141
15/02/18	10,025.33	926.32	1.10800	0.38663	0.55650
16/02/18	10,184.27	937.38	1.11964	0.38978	0.52230
17/02/18	11,099.39	973.28	1.18100	0.40840	0.59542
18/02/18	10,388.37	912.21	1.06900	0.36174	0.52438
19/02/18	11,163.11	939.18	1.11000	0.37539	0.52489
20/02/18	11,226.72	884.51	1.02623	0.34611	0.48221
21/02/18	10,470.54	837.79	0.95092	0.32942	0.46448
22/02/18	9,824.00	802.85	0.89001	0.31233	0.43040
23/02/18	10,164.11	852.79	0.94112	0.31944	0.44352
24/02/18	9,683.39	831.51	0.90001	0.29966	0.40948
25/02/18	9,589.83	838.47	0.90227	0.32445	0.39920
26/02/18	10,296.80	867.76	0.92614	0.32490	0.39889
27/02/18	10,570.73	871.36	0.92889	0.32825	0.39641
28/02/18	10,300.52	851.26	0.88300	0.30271	0.40501

Source: investing.com

## Analysis

### 1. Correlation Analysis

In analysis, we started at analyzing the relationship between cryptocurrencies' base and other cryptocurrencies to search for a

correlation that other cryptocurrencies have a relation with the cryptocurrencies. We used function data analysis in Excel to analyze correlation. The results of five cryptocurrencies correlation are shown in Table 2.

**Table 2.** Correlation of the Cryptocurrencies

	XRP	ADA	XEM
BTC	0.681747	-0.01755	-0.24825
ETH	0.728999	0.721681	0.548745

From the table above, the price of cryptocurrencies with the most correlation is the price of ETH with XRP.

Ranked second is the price of EHT with ADA. The price of ETH, XRP, and ADA are shown in Figures 1–3.



Source: investing.com

**Figure 1.** The price chart of ETH on February 2018



Source: investing.com

Figure 2. The price chart of XRP on February 2018



Source: investing.com

Figure 3. The price chart of ADA on February 2018

## 2. Forecasting Analysis

From the result of the correlation analysis in Table 2, we used the relation of ETH and XRP to forecast the price of XRP by Regression Analysis to predict the price of XRP. To forecast the price of XRP, we used the price of ETH because the price of XRP had correlation with the price of ETH mostly.

To analyze, we used the function:

$$\hat{Y} = a + bx \quad (1)$$

By  $\hat{Y}$  = prediction price of XRP

a = Coefficients of Intercept

b = Coefficients of ETH

x = true price of ETH

**Table 3.** Summary output of regression analysis of ETH and XRP by Excel

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.172922108	0.207214322	-0.83451	0.411597
ETH	0.001292361	0.000237987	5.430384	1.08E-05

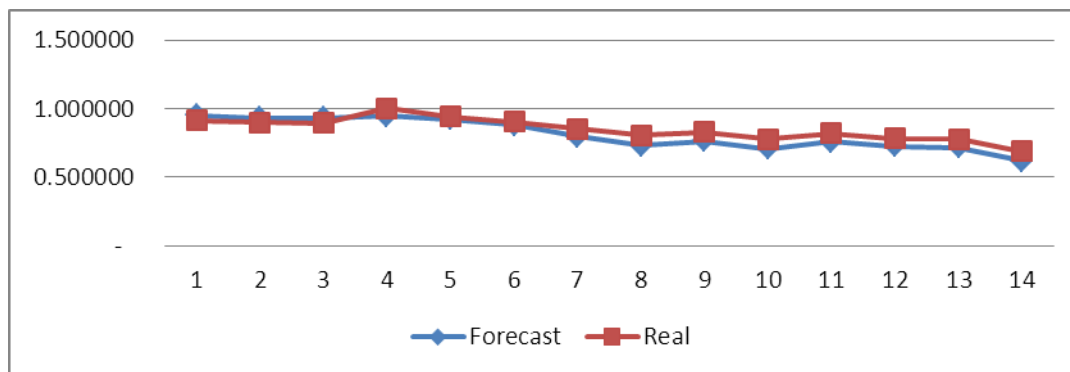
From the summary output in Table 3, to create the function to forecast is as follows:

$$Y = -0.172922108 + 0.001292361x$$

From this function, we could forecast the price of XRP in Table 3.

**Table 3.** Forecast price of XRP

Date	ETH Price (USD)	XRP Price (USD)	
		Forecast ( $\hat{Y}$ )	Real
Mar 01, 2018	869.24	0.950450	0.91500
Mar 02, 2018	854.50	0.931400	0.89813
Mar 03, 2018	855.30	0.932434	0.89570
Mar 04, 2018	866.07	0.946353	1.00000
Mar 05, 2018	847.76	0.922690	0.94237
Mar 06, 2018	816.31	0.882045	0.90153
Mar 07, 2018	749.21	0.795328	0.85147
Mar 08, 2018	697.31	0.728254	0.80470
Mar 09, 2018	724.61	0.763536	0.82746
Mar 10, 2018	679.68	0.705470	0.77628
Mar 11, 2018	719.86	0.757397	0.81815
Mar 12, 2018	696.52	0.727233	0.78063
Mar 13, 2018	688.50	0.716868	0.77816
Mar 14, 2018	610.92	0.616607	0.68844



**Figure 4.** Chart compare the forecast price and real price of XRP

From Figure 4, it can be seen that the forecast price varies in the same direction of the real price by having a correlation that equals 0.95. Thus, the price of cryptocurrencies having high value per coins (ETH) can be used in forecasting the price of cryptocurrencies that have low value per coin (XRP) significantly.

### Conclusions

In the investment in cryptocurrencies, investors are at a very high risk of fluctuations of the value of the currency that will affect the profit or loss. Forecasting of cryptocurrencies price is an interesting topic to researchers from different fields. The data for analysis were the real price of

cryptocurrencies in February, 2018. The objectives of this study are to search for the relationship between cryptocurrencies and to forecast the price of target cryptocurrencies when the price of cryptocurrencies' base has changed. In analysis, we used two steps to analyze for searching the relationship of cryptocurrencies, which was found that ETH had the highest correlation with XRP. Then, we used regression to create function for forecasting the price of cryptocurrencies. In the forecasting, it was found that the forecasting price of XRP varied in the same direction as the real price.

In addition, the low price per coin of cryptocurrencies (XRP) is moving in the same direction with the high price



per coin of cryptocurrencies (ETH). Thus, the price of cryptocurrencies has a high value per coin that can be used for forecasting the price of cryptocurrencies that has a low value per coin significantly.

However, this study has not studied the period of time to change the price of cryptocurrencies that have low

value per coin that will have time to be responsive to the change of the price of cryptocurrencies that have high value. In addition, this study studied specifically the relationship of ETH and XRP but has not studied the relationship of ETH and other cryptocurrencies.

## References

- Aljoshia Judmayer, Nicholas Stifter, Katharina Krombholz, and Edgar Weippl. (2017). **Block and Chain: Introduction to Bitcoin, Cryptocurrencies, and Their Consensus Mechanisms**. 1<sup>st</sup> Edition. Place: Morgan and Claypool Publisher.
- Antweiler, Werner, and Murray Z. Frank. (2004). "Is All That Talk Just Noise? The Information Content of Internet Stock Message Boards." *The Journal of Finance*, 59(3): 1259-94.
- Bollen J, Mao H, Zeng X. (2011). Twitter mood predict the stock market. *Journal of computational Science*: 2(1), 1-8.
- Hanna Halaburda and Miklos Sarvary. (2016). **Beyond bitcoin: The economics of digital currencies**. 1st Edition. Place: Palgrave Macmillan.
- Neil Gandal and Hanna Halaburda. (2016). **Can we Predict the Winner in a Market with Network Effects? Competition in Cryptocurrency Market**. *Games*. July 7, 2016.
- Peng Xie, Jiming Wu, and Chongqi Wu. (2017). Social Data Predictive Power Comparison Across Information Channels and User Groups: Evidence from the Bitcoin Market. *The Journal of Business Inquiry* 2017, 17(1), 41-54.
- Reid, Fergal, and Martin Harrigan. (2013). "An Analysis of Anonymity in the Bitcoin System." in *Security and Privacy in Social Networks*, eds. Yaniv Altshuler, Yuval



Elovici, Armin B. Cremers, Nadav Aharony, and Alex Pentland, 197-223. Dublin: Springer New York.

Satoshi Nakamoto. (2009). **Bitcoin: A peer-to-peer electronic cash system.** Available: <https://bitcoin.org/bitcoin.pdf>. Accessed February 1, 2018.

Womack, Kent L. (1996). "Do Brokerage Analysts' Recommendations Have Investment Value?" **The Journal of Finance**, 51(1): 137-67.

Young Bin Kim, Jun Gi Kim, Wook Kim Jae ho Im, Tae Hyeong Kim, Shin Jin Kang and Chang Hun Kim. (2016). **Prediction Fluctuations in Cryptocurrency Transactions Based on User Comments and Replies.** CrossMark. August 17, 2016.