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The Effect of Cryptocurrencies' Growing on the Value Relevance and Financial Performance of the International Banking Sector

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Abstract

This paper analyzes and investigates the effect of cryptocurrencies growing on the capital stock prices (value relevance), and the financial performance of the international banking sector for the purpose of answering the paper's major question regarding whether the effect of cryptocurrencies growing leads to a deterioration in the capital stock prices and financial ratios of the international banking sector. I use 5 regression models of significant R^2 to investigate this relation, and to examine the paper's hypothesis. The empirical results show initial empirical evidence that cryptocurrencies have no deteriorating effect on international banks' capital stock prices and financial performance, and predict no potential deteriorating effect in the future as well, even if the cryptocurrencies kept on growing, and the beneficiaries from those cryptocurrencies are favoring and willing to grow the cryptocurrencies markets. I recommend for future research to continue investigating the effect of cryptocurrencies' growing on the value relevance, and financial performance of the international banking Sector, and to replicate and expand my study by using larger sample of international banks financial reports and wider range of cryptocurrencies growing in their markets, in order to monitor the cryptocurrencies growing and banks growing in the meantime, and stand on their sustainability or their collapse in the future.

Keywords: *Cryptocurrencies, Digital coins, Value relevance, Banks' Financial ratios, International banks, Banks' financial performance*

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1. Introduction

Digital coins known as cryptocurrencies have taken a considerable place in the areas of economy, finance and accounting. This considerable place is motivated by the beneficiary parties from such cryptocurrencies, particularly in practice, and as a consequence, in the research area. The beneficiary parties find them a good opportunity to skip the banks' regulations for money transactions, and to skip the governmental regulations regarding the control of physical and monetary policies in the economy to the degree that describes the roles of banks and governments as normal traditional methods for currency transactions (Nabilou and Prum 2019; Malherbe et al., 2019; Allen et al., 2022).

The new trends in modern finance describe the innovations in payment using those cryptocurrencies as financial technology revolution (Fintech), as a new expression in the areas where beneficiary businesses, individuals, and some governments aim to understate and probably eliminate the roles banks provide to the

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economies, and also understate and probably eliminate the monetary policy managed by the governments in the economies.

Regardless of the mechanism of how those cryptocurrencies are functioning and traded, it will never replace the currencies (banknotes) very well known to all economies all over the world, where it is only an intermediate mean to transfer currencies (money) from a party to another through electronic platforms specifically prepared for this purpose, and can help transfer money from a country to another or from a foreign individual to another with exchange rates that usually are higher than the exchange rates set by the economic indications all over the world.

Therefore, I expect its failure by the time if it failed to replace the roles of banks and governments in the economies and sit aside the exchange rates imposed by the economic events and transactions.

In my accidental experiential research (Elnashar, 2023) published in the *International Journal of Cryptocurrency Research*, titled as "The new era of online trading companies for digital coins (cryptocurrency) between integrity and abuse: accounting & finance perspective" I find cryptocurrencies are neither a source of finance nor a good opportunity for investment to grow. Moreover, it is a mean for losing cash without any protection or a guarantee to regain it back, whereas it is not protected by any contract of signed document to protect the investors' rights. Therefore, it is not a promising mean for finance or investment, and it exposes the investors to a high and unseen risk of losing their cash.

In addition, Professor Robert Shiller in year 2019 in one of his lectures at the Miami Herbert business school had analyzed and expected the bitcoin particularity, which is the most evolving cryptocurrency nowadays, to fall down by the time similar to the fall down of the 1870s bimetallism, which had disappeared by the time till today.

In this paper, I focus on analyzing the effect of cryptocurrencies on both the capital stock prices of international banks and on their financial performance, for the purpose of predicting the economic circumstances if such cryptocurrencies replaced the roles provided by the banks and governments to the economies and to the sustainable developments. Whereas I expect cryptocurrencies will never lead to understating banks' tasks and bankers' qualifications and career.

Moreover, if such cryptocurrencies are defended by the beneficiary parties, as there is a need for it when recessions and financial crisis are present in the economies, it won't solve such economic problems, because people's demand are the major contributor to the economic growth in both situations whether cryptocurrencies or current finance and accounting systems are applied. Therefore, traders of such cryptocurrencies are working hard by all means to attract as much investors as they can in order to grow the demand for such cryptocurrencies all over the world.

In this essence, I predict that the use of cryptocurrencies will not eliminate the effect of economic systems and indications of interest rates, exchange rates, fair value changes. Therefore, it is well noticed how beneficiaries from such cryptocurrencies are encouraging the banking sector to use such cryptocurrencies in their financing systems and transactions, because those beneficiaries aim to gain the banks and governments support by using these cryptocurrencies in their system, although they aim to eliminate the roles of banks and governments in the economies in the first place, and to avoid their regulations and policies all over the world.

Nevertheless, banks can't stop issuing money and follow up its purchasing power and its need to finance projects, particularly after some banks have collapsed recently due to the lack and loss of cash and wrong investment decisions in cryptocurrencies with trading companies of no reliability or qualification. Therefore, cryptocurrencies worth nothing if cash (money) is collapsed, accordingly it is not a promising mean to be used between any seller and buyer, if it is not safely traded by them and generating cash, and using the same exchange rates generally known and accepted by the economic systems of the governments all over the world, which is usually lower than the exchange rates for transferring cryptocurrencies to use it as a mean for payments (Othman *et al.*, 2021; Rejeb *et al.*, 2021; Gowda and Chakravorty 2021).

To my knowledge, the magnitude of economic, modern finance and accounting text books do not discuss or present any of those cryptocurrencies in their context, as evidence for its uncertainty and unobvious nature as a mean to be used for financing purposes or investing purposes. Subsequently, companies, whether start up or large, certainly are not and will not prefer cryptocurrencies over cash and securities investment, which is obvious in the magnitude of their annual financial reports and financial statements, in the previous decade,

where these financial reports and financial statements include no disclosures regarding any cryptocurrency activity.

In this paper, I raise the question of “do evolving cryptocurrencies affect banks value relevance and financial performance and deteriorate both”? As a consequence, I sit the hypothesis H_1 of this paper to be “cryptocurrencies don't significantly deteriorate banks' value relevance and financial performance”. I measure banks' value relevance by the change in the banks' average capital stock prices, and the financial performance by the changes in the average of banks' financial ratios related to loans, deposits, earning assets, and interest income. Thus, I use 5 regression models as to measure the association between the most traded and evolving cryptocurrencies with the bank's average capital stock prices and average banks' financial ratios.

The remainder of this paper is organized as: section 2 shows the theoretical models, Section 3 and 4 show the results of the empirical study, and Section 5 shows the discussion and conclusion.

2. Theoretical Model

2.1. Sample

I use 9 international banks' financial reports downloaded from the website of www.annualreports.com in order to obtain the financial data required to measure the financial performance of those banks, I couldn't find banks with complete data required more than those 9 banks for the time period from 2010 till 2021 as the period required to apply this study.

I also managed to obtain the data for the top and leading traded 6 cryptocurrencies from the website of www.investing.com/crypto/xrp/historical-data, as the source for the historical data from year 2010 till 2021.

2.2. Variables Significance

In this paper, I examine the effect of the current growing and trend of cryptocurrencies highly traded in their evolving markets and attracting some investors on both the international banks' value relevance and financial Performance, which will help predict whether those cryptocurrencies are a threat to international banks' roles, and to value relevance and financial performance in the international economies.

I use 5 dependent variables to predict this relation based on the time series of the capital stocks of the sample of the international banks, and the time series of the international banks' financial ratios. In addition, I use for the independent variables the time series of the most traded and top 6 cryptocurrencies attracting investors.

2.3. Dependent Variables

I measure the first dependent variable for the value relevance of the time series of the international banks' capital stocks prices as to indicate those banks' capital growth, and show this dependent variable, as $CAPSTOCKPR_{j,t}$ for the sample of international banks at time t . The second dependent variable till the fifth reflect the international banks' financial ratios for the financial performance identified by: the second dependent variable for the loans to deposits ratio as to indicate the debt coverage ability, and shown as $LOANS/DEPOSITS_{j,t}$, the third dependent variable for deposits times capital or deposits to shareholders' equity as to indicate the margin of safety and the investment potential, and shown as $DEPOSITS/SHAEQUITY_{j,t}$, the fourth dependent variable for earning assets to total assets ratio as to indicate how well the banks put the assets to work, and shown as $EARASSETS/TASSETS_{j,t}$, the fifth dependent variable for interest margin to earning assets as to indicate banks profitability, and shown as $INTMARGIN/EARASSETS_{j,t}$. Figure A1 in Appendix shows the trend of these dependent variable as an initial analysis for the international banks' affected performance.

The empirical study is expected to indicate and measure the cause-and-effect relation of the independent variables of the cryptocurrencies on these dependent variables, for the purpose of measuring the efficiency of the cryptocurrencies in the period of the study and to predict the probabilities of its sustainability or its collapse.

2.4. Independent Variables

For the same time series of the dependent variables, I sit 6 independent variables for this study as the top 6 cryptocurrencies mostly traded in the period of this study. Those cryptocurrencies act as the independent variables for the 5 dependent variables measuring the banks' capital growth and the financial performance

ratios. In Figure 1, I show the trend of the price of those cryptocurrencies from year 2010 till June 2023 as to visually analyze whether beneficiaries from those cryptocurrencies are favoring and willing to grow the cryptocurrencies market. The 6 cryptocurrencies are: bitcoins $BTC_{j,t}$, ethereum $ETH_{j,t}$, binance coins $BNB_{j,t}$, tether $TETHER_{j,t}$, USD coins $USDCOIN_{j,t}$, and XRP $XRP_{j,t}$.

The trends shown in Figure 1 motivate associating them to the international banks' general performance, where threats to banks are expected by the magnitude of the financial analysts internationally because of cryptocurrencies' growth, and motivate working on predicting the potential growth of cryptocurrencies or the collapse of them, which I expect this prediction should be with statistical caution, whereas investors who became beneficiaries from cryptocurrencies are still demanding cryptocurrencies investment and payments based on cryptocurrencies as well, which in turn predicts tradeoffs for cryptocurrencies growth compared to international banks' growth.

2.5 Model (1) of the Value Relevance of the International Banks

I use the regression model (1) to measure the effect of the cryptocurrencies on the growth of the international banks' capital stock prices. Where the average capital stock prices are the dependent variable, and the cryptocurrencies mostly traded are the independent variables. The model takes the following form:

$$CAPSTOCKPR_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t \quad \dots(1)$$

where,

$CAPSTOCKPR_{j,t}$ = The time series of international banks' average stock prices for years 2010 till 2021.

$BTC_{j,t}$ = The time series of the bitcoins for years 2010 till 2021.

$ETH_{j,t}$ = The time series of ethereum for years 2010 till 2021.

$BNB_{j,t}$ = The time series of binance coins for years 2010 till 2021.

$TETHER_{j,t}$ = The time series of tether for years 2010 till 2021.

$USDCOIN_{j,t}$ = The time series of USD coins for years 2010 till 2021.

$XRP_{j,t}$ = The time series of XRP for years 2010 till 2021.

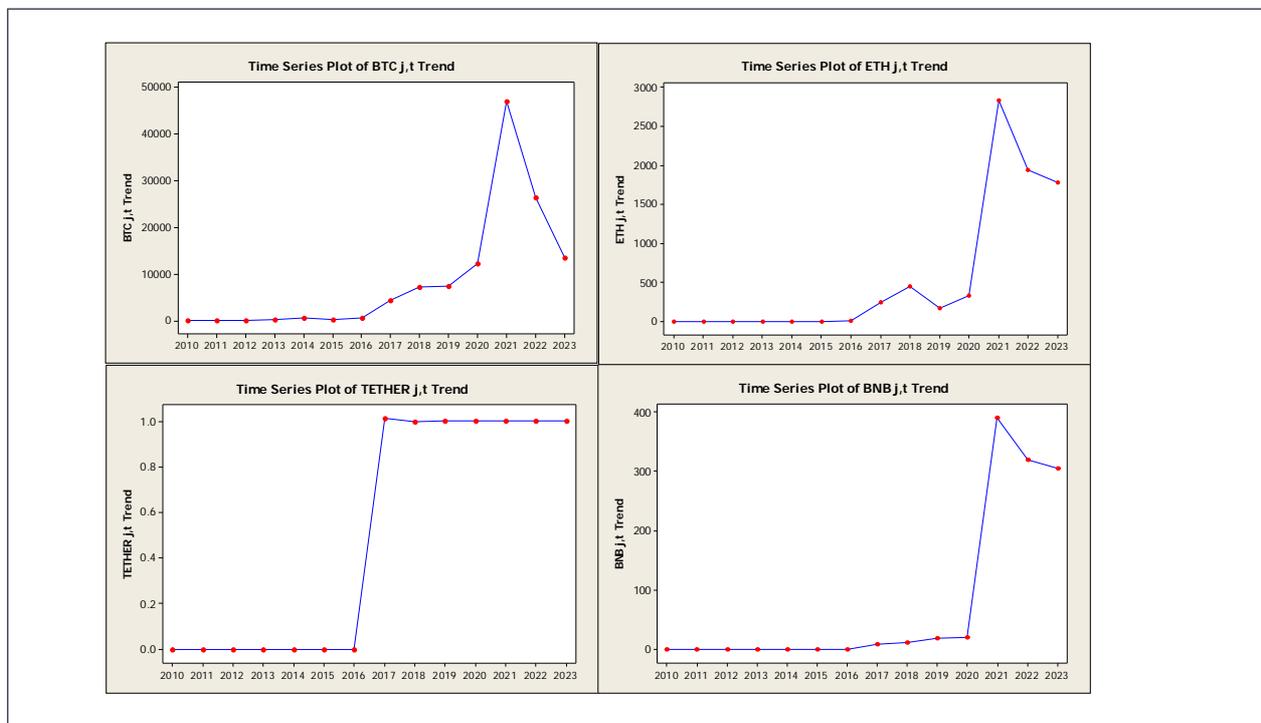


Figure 1: The Top 6 Cryptocurrencies' Trend from Year 2010 to June 2023

Source: www.investing.com/crypto/xrp/historical-data

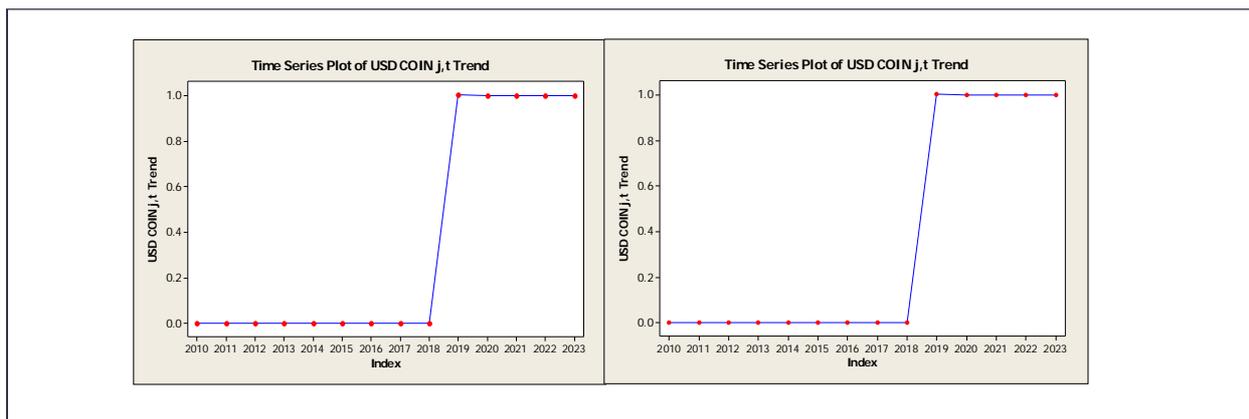


Figure 1 (Cont.)

2.6. Models (2,3,4, and 5) of the Financial Performance of the International Banks

I use the regression model (2, 3, 4, and 5) to measure the effect of the cryptocurrencies on the financial performance ratios of the international banks. Where the average movements of the financial performance ratios are the dependent variables for the models used, and the cryptocurrencies mostly traded are the independent variables. The models take the following form:

$$LOANS/DEPOSITS_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t \quad \dots(2)$$

$$DEPOSITS/SHAEQUITY_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t \quad \dots(3)$$

$$EARASSETS/TASSETS_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t \quad \dots(4)$$

$$INTMARGIN/EARASSETS_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t \quad \dots(5)$$

where

$LOANS/DEPOSITS_{j,t}$ = Loans to deposits ratio as to indicate the debt coverage ability

$DEPOSITS/SHAEQUITY_{j,t}$ = Deposits to shareholders' equity as to indicate the margin of safety and the investment potential

$EARASSETS/TASSETS_{j,t}$ = Earning assets to total assets ratio as to indicate how well the banks put the assets to work

$INTMARGIN/EARASSETS_{j,t}$ = Interest margin to earning assets as to indicate banks profitability

$BTC_{j,t}, ETH_{j,t}, BNB_{j,t}, TETHER_{j,t}, USDCOIN_{j,t}, XRP_{j,t}$ = The independent variables similar to model (1)

Running the 5 regression models helps answer the paper's major question empirically, whilst considering different results for each model, where international banks' capital growth and financial performance can be affected in different manner by the cryptocurrencies as there is no effect expected to be in common. In the next section I analyze the results of the descriptive analysis for all the dependent variables and the independent variables, and the results of running the 5 regression models.

3. The Preparing Empirical Results

I use the Minitab software to run all the required measures for descriptive statistics and the regression analysis as well.

3.1. Descriptive Statistics

Table 1 shows the descriptive statistics for all the variables included in the 5 initial regression models. These descriptive statistics represent the data for all the variables in their original form derived from the sample of the

international banks’ annual financial reports and from the historical data of the most traded cryptocurrencies, all before running the regression models. The interpretation of the descriptive statistics is obvious for reasoning.

Table 1: Sample Statistics					
Descriptive Statistics					
(9) Annual Financial Reports and (6) Major Cryptocurrencies (2010– 2021)					
(Dependent Variable, Independent Variables)					
Variable Name	Mean	Std. Dev.	Median	Minimum	Maximum
Panel (A): Dependent and for the Initial Regression Models (1:5)					
<i>CAPSTOCKPR_{j,t}</i>	21.40	2.317	21.057	17.669	25.441
<i>LOANS/DEPOSITS_{j,t}</i>	77.76	5.950	80.560	63.020	83.260
<i>DEPOSITS/SHAEQUITY_{j,t}</i>	740.20	50.90	728.600	679.000	849.600
<i>EARASSETS/TASSETS_{j,t}</i>	84.16	3.990	85.040	76.080	92.340
<i>INTMARGIN/EARASSETS_{j,t}</i>	0.03	0.003	0.034	0.030	0.041
Panel (B): Independent Variables for the Initial Regression Model (1:5)					
<i>BTC_{j,t}</i>	6648.000	13331.000	551.000	0.000	47000.000
<i>ETH_{j,t}</i>	339.000	801.000	6.000	0.000	2830.000
<i>BNB_{j,t}</i>	37.300	111.300	0.000	0.000	390.000
<i>TETHER_{j,t}</i>	0.418	0.516	0.000	0.000	1.012
<i>USDCOIN_{j,t}</i>	0.250	0.452	0.000	0.000	1.002
<i>XRP_{j,t}</i>	0.194	0.287	0.007	0.000	0.887
<i>CAPSTOCKPR_{j,t}</i>	= The time series of international banks’ average stock prices (Annual reports) in year <i>t</i> .				
<i>LOANS/DEPOSITS_{j,t}</i>	= The time series of international banks’ average loans to deposits ratio (Annual reports) in year <i>t</i> .				
<i>DEPOSITS/SHAEQUITY_{j,t}</i>	= The time series of international banks’ average deposits to share holders equity (Annual reports) in year <i>t</i> .				
<i>EARASSETS/TASSETS_{j,t}</i>	= The time series of international banks’ average earning assets to total assets (Annual reports) in year <i>t</i> .				
<i>INTMARGIN/EARASSETS_{j,t}</i>	= The time series of international banks’ average interest margin to earning assets (Annual reports) in year <i>t</i> .				
<i>BTC_{j,t}</i>	= The time series of bitcoins (www.investing.com) in year <i>t</i> .				
<i>ETH_{j,t}</i>	= The time series of ethereum (www.investing.com) in year <i>t</i> .				
<i>BNB_{j,t}</i>	= The time series of binance coins (www.investing.com) in year <i>t</i> .				
<i>TETHER_{j,t}</i>	= The time series of tether (www.investing.com) in year <i>t</i> .				
<i>USDCOIN_{j,t}</i>	= The time series of USD coins (www.investing.com) in year <i>t</i> .				
<i>XRP_{j,t}</i>	= The time series of XRP (www.investing.com) in year <i>t</i> .				

3.2. Data’s Test of Normality

Table 2 shows the results of Shapiro-wilk test (*w-test*) for normality for all the independent variables used in the initial regression models (1:5). As a result, analysis confirms the need for mathematical transformation for all the independent variables, except for the *USD COIN_{j,t}*, since the $W_{calculated}$ are less than $W_{tabulated}$, proving non normality of the variables to be used for running the initial regression models (1:5) in their original form. Thus, I applied the logarithmic transformation only to the time series of *BTC_{j,t}*, *ETH_{j,t}*, and *BNB_{j,t}*, where other series are not mathematically able to be transformed because of zero numbers included in them, as a result, I use them in their original form in the regression models.

To that extend, test of multicollinearity is insignificant to apply to the data, as it results in eliminating most of the cryptocurrencies independent variables from the initial regression models due to the high correlation

Table 2: Results of the Shapiro-Walk (W test) for Normality for Regression Model (1 : 5)

Independent Variables	$W_{calculated}$
$BT_{j,t}$	0.729
$ETH_{j,t}$	0.743
$BNB_{j,t}$	0.679
$TETHER_{j,t}$	0.922
$USD\ COIN_{j,t}$	0.966
$XRP_{j,t}$	0.918

Note: $W_{tabulated} = 0.883$, Significance Level 0.10 and $n=12$; $W_{tabulated} = 0.943$, Significance Level 0.50 and $n=12$; and Transformation is required to the independent variables of $W_{calculated} < W_{tabulated}$ for both significance levels.

among these variables ($r > 0.70$). Table A1 in Appendix presents the results of the MINITAB for Pearson correlation for these variables in the 5 initial regression models.

4. The Final Empirical Results

4.1. Results from Running the Initial Regression Model (1)

Table 3 shows the results from running the initial regression model (1). The model needs to be improved in order to generate significant t-statistics and R^2 percentage.

Table 3: Results from Running Initial Regression Model (1)

$$CAPSTOCKPR_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t$$

Variable Name	Coefficient	SE Coef	t-Stat	Pr
β_0	19.600	0.739	26.54	0.000
$BTC_{j,t}$	0.002	0.003	0.61	0.569
$ETH_{j,t}$	-0.034	0.076	-0.44	0.678
$BNB_{j,t}$	0.057	0.226	0.25	0.811
$TETHER_{j,t}$	-1.073	3.457	-0.31	0.769
$USDCOIN_{j,t}$	-5.710	15.56	-0.37	0.729
$XRP_{j,t}$	12.410	28.73	0.43	0.684

$R^2 = 0.854$
 $S = 1.313$

$CAPSTOCKPR_{j,t}$	= The time series of international banks' average capital stock prices (Annual reports) in year t .
$BTC_{j,t}$	= The time series of bitcoins (www.investing.com) in year t .
$ETH_{j,t}$	= The time series of ethereum (www.investing.com) in year t .
$BNB_{j,t}$	= The time series of binance coins (www.investing.com) in year t .
$TETHER_{j,t}$	= The time series of tether (www.investing.com) in year t .
$USDCOIN_{j,t}$	= The time series of USD coins (www.investing.com) in year t .
$XRP_{j,t}$	= The time series of XRP (www.investing.com) in year t .

In Table A2 in Appendix, I present the results of MINITAB for the steps I use to generate the final regression model (1/1) that takes the following form:

$$CAPSTOCKPR_{j,t} = \beta_0 + \beta_1 BTC_{j,t}^{(Logarithmic)} + \beta_2 USDCOIN_{j,t} + e_t \quad \dots(1/1)$$

Table 4 presents the results from running the final regression model (1/1)

From Table 4 it is apparent that the variables of $BTC_{j,t}$, and $USDCOIN_{j,t}$ are of high significant t-statistics (greater than + 2) (3.03, 3.34 respectively) whilst the other variables of cryptocurrencies are excluded from the regression model, as the analysis shown in Table A2 in appendix for the steps of statistically improving the regression model (1).

Table 4: Results from Running the Final Regression Model (1/1)

$$CAPSTOCKPR_{j,t} = \beta_0 + \beta_1 BTC_{j,t}^{(Logarithmic)} + \beta_2 USDCOIN_{j,t} + e_t$$

Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	18.859	0.589	32.00	0.000
$BTC_{j,t}^{(Logarithmic)}$	0.308	0.102	3.03	0.014
$USDCOIN_{j,t}$	2.769	0.828	3.34	0.009
$R^2 = 0.849$				
$S = 0.994$				
$CAPSTOCKPR_{j,t}$ = The time series of international banks' average capital stock prices (Annual reports) in year t .				
$BTC_{j,t}^{(Logarithmic)}$ = The time series of bitcoins in the logarithmic form (www.investing.com) in year t .				
$USDCOIN_{j,t}$ = The time series of USD coins (www.investing.com) in year t .				

As a result, bitcoins BTC and USD coins as digital coins are positively affecting international banks' common stocks, where international banks' capital stock prices show upward trend indicating the capital growth of those banks regardless of bitcoins and USD coins growth. Therefore, final regression model (1/1) with significant R^2 of 85% predicts the capital growth of international banks, and predict investors demanding capital stocks of those banks regardless of the growth of digital coins mostly traded like bitcoins and USD coins.

4.2. Results from Running the Initial Regression Model (2)

Table 5 shows the results from running the initial regression model (2). The model needs to be improved in order to generate significant t -statistics and R^2 percentage.

In Table A3 in Appendix, I present the results of MINITAB for the steps I use to generate the final regression model (2/2), without applying any mathematical transformation, as it makes no significant effect on the results. The model takes the following form:

$$LOANS/DEPOSITS_{j,t} = \beta_0 + \beta_1 ETH_{j,t} + \beta_2 BNB_{j,t} + \beta_3 USDCOIN_{j,t} + \beta_4 XRP_{j,t} + e_t \quad \dots(2/2)$$

Table 5: Results from Running Initial Regression Model (2)

$$LOANS/DEPOSITS_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t$$

Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	78.142	1.643	47.57	0.000
$BTC_{j,t}$	0.005	0.006	0.87	0.426
$ETH_{j,t}$	-0.203	0.169	-1.20	0.283
$BNB_{j,t}$	0.729	0.503	1.45	0.207
$TETHER_{j,t}$	1.595	7.688	0.21	0.844
$USDCOIN_{j,t}$	-39.35	34.590	-1.14	0.307
$XRP_{j,t}$	89.13	63.880	1.40	0.222
$R^2 = 0.891$				
$S = 2.922$				
$LOANS/DEPOSITS_{j,t}$ = The time series of international banks' average loans to deposits ratio (Annual reports) in year t .				
$BTC_{j,t}$ = The time series of bitcoins (www.investing.com) in year t .				
$ETH_{j,t}$ = The time series of ethereum (www.investing.com) in year t .				
$BNB_{j,t}$ = The time series of binance coins (www.investing.com) in year t .				
$TETHER_{j,t}$ = The time series of tether (www.investing.com) in year t .				
$USDCOIN_{j,t}$ = The time series of USD coins (www.investing.com) in year t .				
$XRP_{j,t}$ = The time series of XRP (www.investing.com) in year t .				

Table 6: Results from Running the Final Regression Model (2/2)				
$LOANS/DEPOSITS_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t$				
Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	79.300	1.036	76.56	0.000
$ETH_{j,t}$	-0.057	0.022	-2.63	0.034
$BNB_{j,t}$	0.283	0.126	2.25	0.060
$USDCOIN_{j,t}$	-7.376	2.520	-2.93	0.022
$XRP_{j,t}$	45.780	15.320	2.99	0.020
$R^2 = 0.863$				
$S = 2.763$				
$LOANS/DEPOSITS_{j,t}$ = The the time series of international banks' average loans to deposits ratio (Annual reports) in year t .				
$ETH_{j,t}$ = The time series of ethereum (www.investing.com) in year t .				
$BNB_{j,t}$ = The time series of binance coins (www.investing.com) in year t .				
$USDCOIN_{j,t}$ = The time series of USD coins (www.investing.com) in year t .				
$XRP_{j,t}$ = The time series of XRP (www.investing.com) in year t .				

Table 6 presents the results from running the final regression model (2/2)

From Table 6 the variables of $BNB_{j,t}$, and $XRP_{j,t}$ are of high significant t -statistics (greater than + 2) (2.25, 2.99 respectively), and also the variables of $ETH_{j,t}$, and $USDCOIN_{j,t}$ are of high significant t -statistics (within - 2) (-2.63, -2.93 respectively), whilst the other variables of cryptocurrencies are excluded from the regression model based on the analysis shown in Table A3 in Appendix for the steps of statistically improving the regression model (2).

As a result, binance coins BNB and XRP as digital coins are positively affecting international banks' ratio of loans to deposits, where international Banks's loans and deposits show upward trend, and in the meantime ratio is improving by either loans growth or deposits growth, which indicate the financial performance growth of those banks regardless of binance coins BNB and XRP growth. On the other hand, ethereum ETH and USD coins are negatively affecting international banks' ratio of loans to deposits, but not heavily as the positive effect of the binance coins BNB and XRP, whereas the trend of the ratio has more downward trends than upward trends.

Therefore, final regression model (2/2) with significant R^2 of 86% predicts the financial growth of international banks in the area of loans and deposits, and predicts investors willingness to deposit money to the banks and borrow money from the bank to finance their projects, regardless of the growth of digital coins mostly traded like binance coins BNB and XRP, ethereum ETH and USD coins.

4.3. Results from Running the Initial Regression Model (3)

Table 7 shows the results from running the initial regression model (3). The model needs to be improved in order to generate significant t -statistics and R^2 percentage.

In Table A4 in Appendix, I present the results of MINITAB for the steps I use to generate the final regression model (3/3), without applying any mathematical transformation, as it makes no significant effect on the results. The model takes the following form:

$$DEPOSITS/SHAEEQUITY_{j,t} = \beta_0 + \beta_1 BTC_{j,t}^{(Logarithmic)} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 USDCOIN_{j,t} + \beta_5 XRP_{j,t} + e_t \dots(3/3)$$

Table 8 presents the results from running the final regression model (3/3).

From Table 8 the variables of $ETH_{j,t}$, and $USDCOIN_{j,t}$ are of high significant t -statistics (greater than + 2) (4.75, 3.27 respectively), and also the variables of $BNB_{j,t}$, and $XRP_{j,t}$ are of high significant t -statistics (within - 2) (-2.62, -2.93 respectively), whilst the other variables of cryptocurrencies are excluded from the regression model based on the analysis shown in Table A4 in Appendix for the steps of statistically improving the regression model (3).

Table 7: Results from Running Initial Regression Model (3)

$$DEPOSITS/SHAEQUITY_{j,t} = \beta_0 + \beta_1 BTC_{j,t}^{(Logarithmic)} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t$$

Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	775.44	10.190	76.08	0.000
$BTC_{j,t}^{(Logarithmic)}$	-12.188	2.186	-5.58	0.003
$ETH_{j,t}$	0.628	0.129	4.88	0.005
$BNB_{j,t}$	-3.296	0.779	-4.23	0.008
$TETHER_{j,t}$	50.050	38.580	1.30	0.251
$USDCOIN_{j,t}$	34.320	23.020	1.49	0.196
$XRP_{j,t}$	-418.10	115.400	-3.62	0.015
$R^2 = 0.953$				
$S = 16.388$				
$DEPOSITS/SHAEQUITY_{j,t}$ = The time series of international banks' average deposits to shareholders equity ratio (Annual reports) in year t .				
$BTC_{j,t}^{(Logarithmic)}$ = The time series of bitcoins in the logarithmic form (www.investing.com) in year t .				
$ETH_{j,t}$ = The time series of ethereum (www.investing.com) in year t .				
$BNB_{j,t}$ = The time series of binance coins (www.investing.com) in year t .				
$TETHER_{j,t}$ = The time series of tether (www.investing.com) in year t .				
$USDCOIN_{j,t}$ = The time series of USD coins (www.investing.com) in year t .				
$XRP_{j,t}$ = The time series of XRP (www.investing.com) in year t .				

Table 8: Results from Running the Final Regression Model (3/3)

$$DEPOSITS/SHAEQUITY_{j,t} = \beta_0 + \beta_1 BTC_{j,t}^{(Logarithmic)} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 USDCOIN_{j,t} + \beta_5 XRP_{j,t} + e_t$$

Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	774.33	10.720	72.24	0.000
$BTC_{j,t}^{(Logarithmic)}$	-11.605	2.258	-5.14	0.002
$ETH_{j,t}$	0.643	0.135	4.75	0.003
$BNB_{j,t}$	-3.550	0.796	-4.46	0.004
$USDCOIN_{j,t}$	55.620	17.020	3.27	0.017
$XRP_{j,t}$	-328.05	97.210	-3.37	0.015
$R^2 = 0.937$				
$S = 17.295$				
$DEPOSITS/SHAEQUITY_{j,t}$ = The time series of international banks' average deposits to shareholders equity ratio (Annual reports) in year t .				
$BTC_{j,t}^{(Logarithmic)}$ = The time series of bitcoins in the logarithmic form (www.investing.com) in year t .				
$ETH_{j,t}$ = The time series of ethereum (www.investing.com) in year t .				
$BNB_{j,t}$ = The time series of binance coins (www.investing.com) in year t .				
$USDCOIN_{j,t}$ = The time series of USD coins (www.investing.com) in year t .				
$XRP_{j,t}$ = The time series of XRP (www.investing.com) in year t .				

As a result, ethereum ETH and USD coin as digital coins are positively affecting international banks' ratio of deposits to shareholders' equity, where international Banks's deposits and shareholders' equity show upward trend, and in the meantime ratio is improving by either deposits growth or shareholders' equity growth, which indicate the financial performance growth of those banks, and predicts investors willingness to deposit money and invest in capital stocks of the banks, regardless of ethereum ETH and USD coin growth. On the other hand, binance coins BNB and XRP are negatively affecting international banks' ratio of deposits to shareholders' equity, but not heavily as the positive effect of the ethereum ETH and USD coin, whereas the trend of the ratio has more upward downward trends than downward trends.

Therefore, final regression model (3/3) with significant R^2 of 94% predicts the financial growth of international banks in the area of deposits and shareholders' equity regardless of the growth of digital coins mostly traded like ethereum ETH and USD coins, and binance coins BNB and XRP.

4.4. Results from Running the Initial Regression Model (4)

Table 9 shows the results from running the initial regression model (4). The model shows significant t -statistics and R^2 percentage, but for more assurance I use the steps of logarithmic transformation to improve the model.

In Table A5 in Appendix, I present the results of MINITAB for the steps I use to generate the final regression model (4/4). The model takes the following form:

$$EARASSETS/TASSETS_{j,t} = \beta_0 + \beta_1 BTC_{j,t}^{(Logarithmic)} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t \dots(4/4)$$

$EARASSETS/TASSETS_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t$				
Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	83.936	0.461	181.91	0.000
$BTC_{j,t}$	0.004	0.002	2.47	0.056
$ETH_{j,t}$	-0.166	0.047	-3.50	0.017
$BNB_{j,t}$	0.660	0.141	4.67	0.005
$TETHER_{j,t}$	11.152	2.160	5.16	0.004
$USDCOIN_{j,t}$	-38.523	9.718	-3.96	0.011
$XRP_{j,t}$	53.470	17.940	2.98	0.031
$R^2 = 0.981$				
$S = 0.821$				
$EARASSETS/TASSETS_{j,t}$ = The time series of international banks' average earning assets to total assets ratio (Annual reports) in year t .				
$BTC_{j,t}$	= The time series of bitcoins (www.investing.com) in year t .			
$ETH_{j,t}$	= The time series of ethereum (www.investing.com) in year t .			
$BNB_{j,t}$	= The time series of binance coins (www.investing.com) in year t .			
$TETHER_{j,t}$	= The time series of tether (www.investing.com) in year t .			
$USDCOIN_{j,t}$	= The time series of USD coins (www.investing.com) in year t .			
$XRP_{j,t}$	= The time series of XRP (www.investing.com) in year t .			

Table 10 presents the results from running the final regression model (4/4).

From Table 10 the variables of $BTC_{j,t}$, $BNB_{j,t}$, $TETHER_{j,t}$, and $XRP_{j,t}$ are of high significant t -statistics (greater than + 2) (3.10, 9.74, 7.51, 2.27 respectively), and also the variables of $ETH_{j,t}$, and $USDCOIN_{j,t}$, are of high significant t -statistics (within -2) (-9.14, -14.96 respectively). Consequently, all the variables of cryptocurrencies are included in the regression model based on the analysis shown in Table A5 in Appendix for the steps of statistically improving the regression model (4).

As a result, bitcoins BTC, binance coins BNB, tether TETHER, and XRP as digital coins are positively affecting international banks' ratio of earning assets to total assets, where international Banks's earning assets and total assets show upward trend, and in the meantime ratio is stable and favorable by either earning assets growth or total assets growth, which indicate the financial performance growth of those banks regardless of bitcoins BTC, binance coins BNB, tether TETHER, and XRP growth. On the other hand, ethereum ETH, and USD coin are negatively affecting international banks' ratio of earning assets and total assets, but not heavily, whereas the trend of the ratio is stable and favorable.

Therefore, final regression model (4/4) with significant R^2 of 98.5% predicts the financial growth of international banks and their strategies in the area of earning assets to total assets, regardless of the growth of digital coins mostly traded and included in the model.

Table 10: Results from Running the Final Regression Model (4/4)

$$EARASSETS/TASSETS_{j,t} = \beta_0 + \beta_1 BTC_{j,t}^{(Logarithmic)} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t$$

Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	83.683	0.445	188.10	0.000
$BTC_{j,t}^{(Logarithmic)}$	0.296	0.095	3.10	0.027
$ETH_{j,t}$	-0.051	0.006	-9.14	0.000
$BNB_{j,t}$	0.331	0.034	9.74	0.000
$TETHER_{j,t}$	12.655	1.684	7.51	0.001
$USDCOIN_{j,t}$	-15.029	1.005	-14.96	0.000
$XRP_{j,t}$	11.432	5.035	2.27	0.072
$R^2 = 0.985$				
$S = 0.715$				
$EARASSETS/TASSETS_{j,t}$ = The time series of international banks' average earning assets to total assets ratio (Annual reports) in year t .				
$BTC_{j,t}^{(Logarithmic)}$ = The time series of bitcoins in the logarithmic form (www.investing.com) in year t .				
$ETH_{j,t}$ = The time series of ethereum (www.investing.com) in year t .				
$BNB_{j,t}$ = The time series of binance coins (www.investing.com) in year t .				
$TETHER_{j,t}$ = The time series of tether (www.investing.com) in year t .				
$USDCOIN_{j,t}$ = The time series of USD coins (www.investing.com) in year t .				
$XRP_{j,t}$ = The time series of XRP (www.investing.com) in year t .				

4.5. Results from Running the Initial Regression Model (5)

Table 11 shows the results from running the initial regression model (5). The model needs to be improved in order to generate significant t -statistics and R^2 percentage.

Table 11: Results from Running Initial Regression Model (5)

$$INTMARGIN/EARASSETS_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t$$

Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	0.038	0.001	24.61	0.000
$BTC_{j,t}$	-0.00001	0.000	-1.95	0.109
$ETH_{j,t}$	0.0002	0.000	1.88	0.118
$BNB_{j,t}$	-0.00085	0.000	-1.83	0.127
$TETHER_{j,t}$	0.0007	0.007	0.11	0.918
$USDCOIN_{j,t}$	0.063	0.032	1.97	0.107
$XRP_{j,t}$	-0.096	0.060	-1.62	0.167
$R^2 = 0.629$				
$S = 0.003$				
$INTMARGIN/EARASSETS_{j,t}$ = The time series of international banks' average interest margin to earning assets (Annual reports) in year t .				
$BTC_{j,t}$ = The time series of bitcoins in the logarithmic form (www.investing.com) in year t .				
$ETH_{j,t}$ = The time series of ethereum (www.investing.com) in year t .				
$BNB_{j,t}$ = The time series of binance coins (www.investing.com) in year t .				
$TETHER_{j,t}$ = The time series of tether (www.investing.com) in year t .				
$USDCOIN_{j,t}$ = The time series of USD coins (www.investing.com) in year t .				
$XRP_{j,t}$ = The time series of XRP (www.investing.com) in year t .				

In Table A6 in Appendix, I present the results of MINITAB for the steps I use to generate the final regression model (5/5), where I apply mathematical transformation. The model takes the following form:

$$INTMARGIN/EARASSETS_{j,t} = \beta_0 + \beta_1 BTC_{j,t} + \beta_2 ETH_{j,t} + \beta_3 BNB_{j,t} + \beta_4 TETHER_{j,t} + \beta_5 USDCOIN_{j,t} + \beta_6 XRP_{j,t} + e_t \dots(5/5)$$

Table 12 presents the results from running the final regression model (5/5).

From Table 12 the variables of $XRP_{j,t}$ is of a high significant t-statistics (greater than + 2) (2.16) , and also the variables of $BTC_{j,t}$, $ETH_{j,t}$, are of high significant t-statistics (within and close to -2) (-5.42 , -1.80 respectively), whilst the other variables of cryptocurrencies are excluded from the regression model based on the analysis shown in Table A6 in Appendix for the steps of statistically improving the regression model (5).

$INTMARGIN/EARASSETS_{j,t} = \beta_0 + \beta_1 BTC_{j,t}^{(Logarithmic)} + \beta_2 ETH_{j,t} + \beta_6 XRP_{j,t} + e_t$				
Variable Name	Coefficient	SE Coef.	t-Stat.	Pr
β_0	0.039	0.000	45.12	0.000
$BTC_{j,t}$ (Logarithmic)	-0.0009	0.000	-5.42	0.001
$ETH_{j,t}$	-0.000002	0.000	-1.80	0.109
$XRP_{j,t}$	0.008	0.003	2.16	0.063
$R^2 = 0.839$				
$S = 0.001$				
$INTMARGIN/EARASSETS_{j,t}$ = The time series of international banks' average interest margin to earning assets (Annual reports) in year t .				
$BTC_{j,t}^{(Logarithmic)}$	= The time series of bitcoins in the logarithmic form (www.investing.com) in year t .			
$ETH_{j,t}$	= The time series of ethereum (www.investing.com) in year t .			
$XRP_{j,t}$	= The time series of XRP (www.investing.com) in year t .			

As a result, XRP as one of the highly traded digital coins is positively affecting international banks' ratio of interest margin to earning assets, where international Banks's interest margin and earning assets show upward trend, but the ratio is declining which is unfavorable even though earning assets to total assets are growing, which indicate a demand for those banks to improve the strategies for financial performance growth for profitability. On the other hand, bitcoins BTC and ethereum ETH are negatively affecting international banks' ratio of interest margin and earning assets , whereas the trend of the ratio is declining.

Therefore, final regression model (5/5) with significant R^2 of 84% predicts the necessity to improve the strategies for financial growth of international banks in the area of profitability, for interest margin and earning assets, regardless of the growth of digital coins mostly traded and included in the model.

4.6. Overall Revealed Effect

As the results show high explanatory power for the final regression models (1:5), results are significant to reveal the effect of cryptocurrencies mostly traded in the period of this study, based on the positive and negative effect of these cryptocurrencies on the value relevance and financial performance of international banks, where current effect is analyzed and future effect is predicted. Table 13 shows the summary of the current effect of cryptocurrencies on the dependent variable in the 5 final regression models used.

From Table 13, the most traded cryptocurrencies internationally affecting international banks capital stock prices and financial performance. Where only bitcoins BTC as the top leading cryptocurrency in the market of digital coins, and also USD coins USDCOIN are positively associated with the international banks' capital stock prices , which means that those banks' capital stock prices are growing at the same trend the bitcoins BTC and UDS coins USDCOIN are growing. Therefore, international bank's threat because of cryptocurrencies growing is minor, and predictions for those banks to grow are optimistic regardless of cryptocurrencies growing.

On the other hand, international bank's financial performance is affected by the cryptocurrencies growing positively and negatively. In Table 13, it is obvious such controversy situation. Bitcoins BTC, and tether

TETHER have no effect on the international banks' loans to deposits ratio, which indicate those banks' ability to grow their loans and deposits regardless of bitcoins BTC and tether TETHER growing, but binance coins BNB and XRP are positively associated with this ratio indicating an effect on the ratio, this effect is proved by the favorable trend of this ratio's regardless of the growing of binance coins BNB and XRP. And also, ethereum ETH and USD coins USDCOIN are negatively associated with this ratio, but the ratio is improving regardless of ethereum ETH and USD coins USDCOIN growing as well. Therefore, loans to deposits ratio as an indication for financial performance of the international banks is not deteriorating, but instead, it is improving, where both loans and deposits are growing and the international banks maintain a strong financial performance in this area regardless of the effect of the cryptocurrencies growing.

Table 13: Summary of the Effect of Cryptocurrencies on the Dependent Variable in the 5 Regression Models Used					
Independent Variables (Cryptocurrencies)	The Effect of Independent Variables of Cryptocurrencies on the Dependent Variables in the 5 Regression Model				
	Final Regression (1) CAPSTOCKPR_{i,t}	Final Regression (2) LOANS/ DEPOSITS_{i,t}	Final Regression (3) DEPOSITS/ SHAEQUITY_{j,t}	Final Regression (4) EARASSETS/ TASSETS_{j,t}	Final Regression (5) INTMARGIN/ EARASSETS_{j,t}
<i>BTC_{j,t}</i>	Positive	-	Negative	Positive	Negative
<i>ETH_{j,t}</i>	-	Negative	Positive	Negative	Negative
<i>BNB_{j,t}</i>	-	Positive	Negative	Positive	-
<i>TETHER_{j,t}</i>	-		-	-	Positive
<i>USDCOIN_{j,t}</i>	Positive	Negative	Positive	Negative	-
<i>XRP_{j,t}</i>	-	Positive	Negative	Positive	Positive

Ethereum ETH and USD coins USDCOIN are positively associated with deposits to shareholders' equity ratio. In addition, bitcoins BTC, binance coins BNB, and XRP are negatively associated with the international banks' deposits to shareholders' equity ratio, but the ratio's trend is currently improving regardless of the bitcoins BTC, binance BNB, and XRP growing. Therefore, the growing of such cryptocurrencies is not a threat to the international banks' financial growth in this area of deposits and shareholders' equity.

Finally, bitcoins BTC, binance coins BNB, tether TETHER, and XRP are positively associated with the international banks' earning assets to total assets despite the slight declining of the ratio, indicating no threat of such cryptocurrencies on those banks' strategies for assets management. Also, ethereum ETH and USD coins USDCOIN are negatively associated with this ratio, but the earning assets and total assets are showing upward trend regardless of the slight declining in the ratio and such negative association, where those banks need to resize the earning assets to have this ratio significantly growing.

Therefore, interest margin to earning assets ratio, which is slightly declining assures the need of those banks to work on increasing their interest margin more significantly than the current situation. Nevertheless, the financial performance for those banks is still strong, as interest margin and earning assets are growing regardless of this ratio positive association with XRP and tether, and negative association with the bitcoins BTC and ethereum ETH.

As a result, those international banks in this study are still financially strong apart from the threats taking part in the market deliberations, regarding the effect of cryptocurrencies mostly traded on the value relevance and financial performance of those international banks, and the roles they play in the international economies. Thus, results of this paper are robust because of the initial empirical evidence that cryptocurrencies have no effect on international banks' capital growth and financial performance, and the empirical evidence predicts no potential effect in the future as well, even if cryptocurrencies kept on growing.

To that extend, my results answer this paper question and support the hypothesis H_1 of this paper (H_1 : Cryptocurrencies do not significantly deteriorate banks' value relevance and financial performance). Therefore, this paper results can be a motive for companies and investors to rely on when making their various decisions regarding their future investments in cryptocurrencies compared to capital stocks investments in international banks and their financial deals with those international bank in regard to financial assets and liabilities.

5. Conclusion

In this paper, I analyze the effect of cryptocurrencies' growing in the past decade till today on the value relevance of the international banks, and on the financial performance of those banks as well. Where the trend of growing cryptocurrencies motivates the investigation and the prediction, for whether this growing affects the banks' capital stock prices (value relevance), and financial performance ratios, and cause their deteriorations.

I obtain the data and accounting information required for the empirical study from the annual financial reports for a sample of international banks, and a sample of highly traded cryptocurrencies in their markets. I analyze, investigate, and predict this relation, based on the statistical inference I use in this paper.

The empirical study relies on 5 regression models, in order to indicate and measure the cause-and-effect relation of the independent variables of the cryptocurrencies on the dependent variables of international banks' capital stock prices and financial ratios, for the purpose of measuring the efficiency and effect of the cryptocurrencies in the period of the study, and to predict the probabilities of its sustainability or its collapse in the future.

The empirical results in this paper are robust, because of the initial empirical evidence that cryptocurrencies have no deteriorating effect on international banks' capital stock prices and financial performance, even if the beneficiaries from those cryptocurrencies are favoring and willing to grow the cryptocurrencies market.

In addition, the empirical evidence predicts no potential deteriorating effect in the future on the international banks' capital stock prices and financial performance, even if cryptocurrencies kept on growing. The final 5 regression models I use to generate this paper results show high explanatory power for R^2 , which in turn support the paper's hypothesis that (cryptocurrencies don't significantly deteriorate banks' value relevance and financial performance).

This paper motivates the future research to continue investigating the effect of cryptocurrencies' growing on the value relevance, and financial performance of the international banking Sector. Thus, I recommend replicating and expanding my study by using larger sample of international banks financial reports and wider range of cryptocurrencies growing in their markets, in order to monitor the cryptocurrencies growing and banks growing in the meantime, and stand on their sustainability or their collapse in the future.

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Appendix

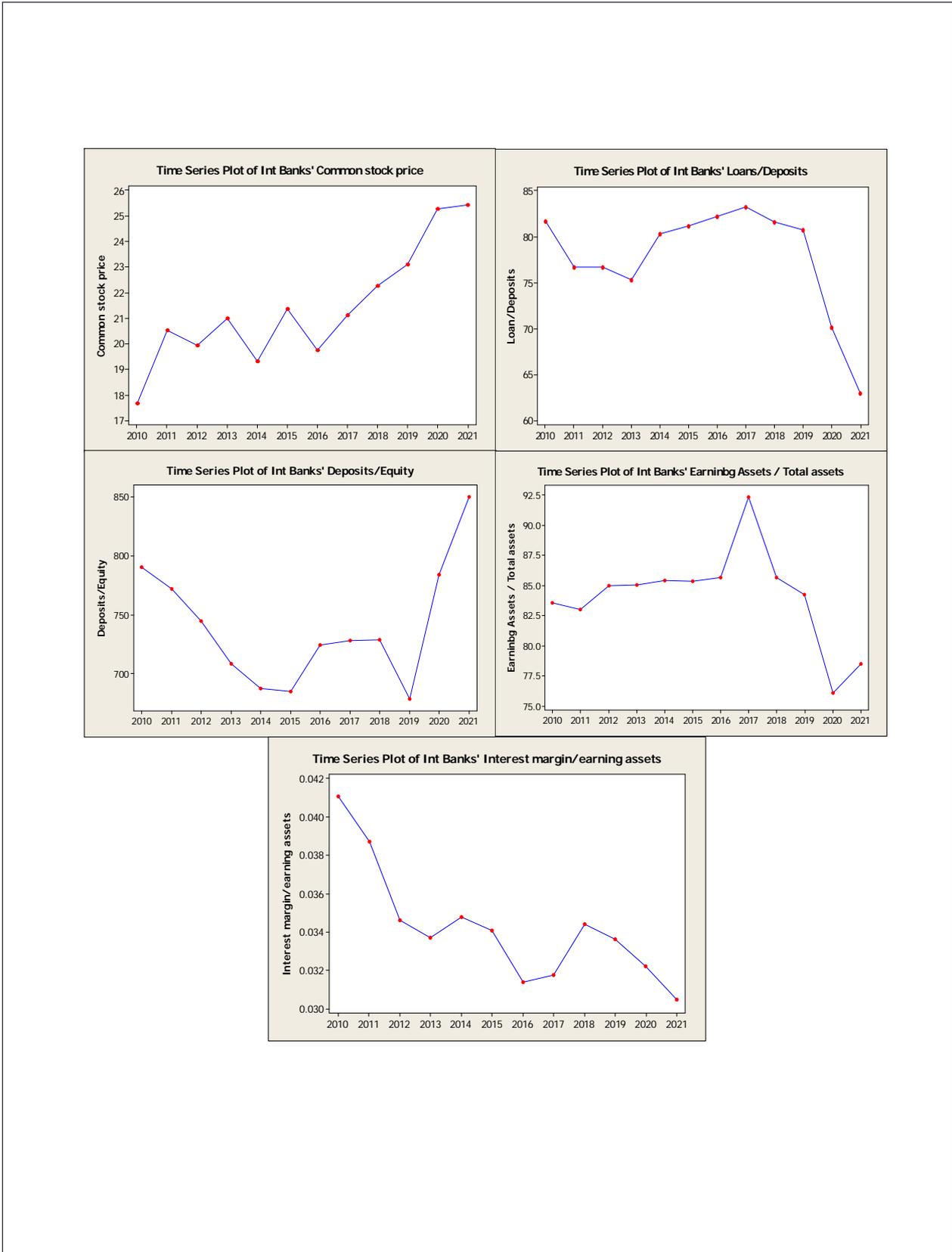


Figure A1: International Banks' Capital Growth and Financial Performance Ratios for Years 2010 to 2021

Source: www.annualreports.com

Appendix (Cont.)

Table A1: MINITAB Results for Pearson Correlation for the Variables of the 5 Initial Regression Models				
Model (1) : Correlations: Common Stock Price, BTC, ETH, BNB, TETHER, USD COIN, XRP				
	Common stock pri	BTC	ETH	
BTC	0.744			
	0.006			
ETH	0.654	0.987		
	0.021	0.000		
BNB	0.595	0.971	0.989	
	0.041	0.000	0.000	
TETHER	0.776	0.593	0.519	
	0.003	0.042	0.084	
USD COIN	0.834	0.703	0.585	
	0.001	0.011	0.046	
XRP	0.753	0.879	0.869	
	0.005	0.000	0.000	
	BNB	TETHER	USD COIN	
TETHER	0.412			
	0.183			
USD COIN	0.569	0.682		
	0.053	0.015		
XRP	0.792	0.827	0.607	
	0.002	0.001	0.036	
Model (2): Correlations: Loans/Deposits, BTC, ETH, BNB, TETHER, USD COIN, XRP				
	Loans/Deposits	BTC	ETH	BNB
BTC	-0.811			
	0.001			
ETH	-0.773	0.987		
	0.003	0.000		
BNB	-0.788	0.971	0.989	
	0.002	0.000	0.000	
TETHER	-0.292	0.593	0.519	0.412
	0.357	0.042	0.084	0.183
USD COIN	-0.649	0.703	0.585	0.569
	0.022	0.011	0.046	0.053
XRP	-0.545	0.879	0.869	0.792
	0.067	0.000	0.000	0.002
	TETHER	USD COIN		
USD COIN	0.682			
	0.015			
XRP	0.827	0.607		
	0.001	0.036		

Appendix (Cont.)

Model (3): Correlations: Deposits/Equity, BTC, ETH, BNB, TETHER, USD COIN, XRP			
	Deposits/Equity	BTC	ETH
BTC	0.676		
	0.016		
ETH	0.682	0.987	
	0.015	0.000	
BNB	0.677	0.971	0.989
	0.016	0.000	0.000
TETHER	0.237	0.593	0.519
	0.459	0.042	0.084
USD COIN	0.361	0.703	0.585
	0.249	0.011	0.046
XRP	0.495	0.879	0.869
	0.102	0.000	0.000
	BNB	TETHER	USD COIN
TETHER	0.412		
	0.183		
USD COIN	0.569	0.682	
	0.053	0.015	
XRP	0.792	0.827	0.607
	0.002	0.001	0.036

Model (4): Correlations: Earning Assets / Total a, BTC, ETH, BNB, TETHER, USD COIN, XRP				
	Earning Assets/	BTC	ETH	BNB
BTC	-0.541			
	0.069			
ETH	-0.455	0.987		
	0.137	0.000		
BNB	-0.466	0.971	0.989	
	0.127	0.000	0.000	
TETHER	-0.170	0.593	0.519	
	0.597	0.042	0.084	
USD COIN	-0.686	0.703	0.585	
	0.014	0.011	0.046	
XRP	-0.299	0.879	0.869	
	0.345	0.000	0.000	
	BNB	TETHER	USD COIN	
TETHER	0.412			
	0.183			
USD COIN	0.569	0.682		
	0.053	0.015		
XRP	0.792	0.827	0.607	
	0.002	0.001	0.036	

Appendix (Cont.)

Model (5): Correlations: Interest Margin/Earning , BTC, ETH, BNB, TETHER, USD COIN, XRP			
	Interest Margin	BTC	ETH
BTC	-0.490		
	0.106		
ETH	-0.452	0.987	
	0.140	0.000	
BNB	-0.416	0.971	0.989
	0.179	0.000	0.000
TETHER	-0.508	0.593	0.519
	0.092	0.042	0.084
USD COIN	-0.423	0.703	0.585
	0.171	0.011	0.046
XRP	-0.495	0.879	0.869
	0.102	0.000	0.000
	BNB	TETHER	USD COIN
TETHER	0.412		
	0.183		
USD COIN	0.569	0.682	
	0.053	0.015	
XRP	0.792	0.827	0.607
	0.002	0.001	0.036

Table A2: MINITAB Results for Running the Initial Regression Model (1) and the Steps for Improving the Model to Reach to the Final Regression Model

Regression Analysis: Initial regression model (1) Common stock price versus BTC, ETH, ...
 The regression equation is
 Common stock price = 19.6 + 0.00158 BTC – 0.0335 ETH + 0.057 BNB – 1.07 TETHER – 5.7 USD COIN + 12.4 XRP

Predictor	Coef.	SE Coef	T	P
Constant	19.6015	0.7386	26.54	0.000
BTC	0.001577	0.002589	0.61	0.569
ETH	-0.03350	0.07598	-0.44	0.678
BNB	0.0572	0.2263	0.25	0.811
TETHER	-1.073	3.457	-0.31	0.769
USD COIN	-5.71	15.56	-0.37	0.729
XRP	12.41	28.73	0.43	0.684

S = 1.31395 R-Sq = 85.4% R-Sq(adj) = 67.8%

Regression Analysis: Initial regression model (1) after logarithmic transformation
Common stock price versus LOG BTC, LOG ETH, ...
 The regression equation is
 Common stock price = 19.0 + 0.292 LOG BTC - 0.303 LOG ETH + 0.05 LOG BNB + 0.82 TETHER + 2.56 USD COIN + 2.42 XRP

Appendix (Cont.)

Table A2 (Cont.)				
Predictor	Coef	SE Coef	T	P
Constant	18.9641	0.7718	24.57	0.000
LOG BTC	0.2917	0.1786	1.63	0.163
LOG ETH	-0.3028	0.5908	-0.51	0.630
LOG BNB	0.047	1.708	0.03	0.979
TETHER	0.820	2.510	0.33	0.757
USD COIN	2.555	2.712	0.94	0.389
XRP	2.416	7.945	0.30	0.773
<p>S = 1.23935 R-Sq = 87.0% R-Sq(adj) = 71.4%</p> <p>Regression Analysis: Initial regression model (1) after manipulating the logarithmic transformation to improve the model</p> <p>Common stock price versus LOG BTC, ETH, ...</p> <p>The regression equation is</p> <p>Common stock price = 19.0 + 0.243 LOG BTC + 0.0114 ETH - 0.0695 BNB - 0.94 TETHER + 3.42 USD COIN - 4.21 XRP</p>				
Predictor	Coef	SE Coef	T	P
Constant	19.0335	0.6781	28.07	0.000
LOG BTC	0.2434	0.1454	1.67	0.155
ETH	0.011368	0.008563	1.33	0.242
BNB	-0.06955	0.05182	-1.34	0.237
TETHER	-0.938	2.567	-0.37	0.730
USD COIN	3.416	1.531	2.23	0.076
XRP	-4.207	7.675	-0.55	0.607
<p>S = 1.09030 R-Sq = 89.9% R-Sq(adj) = 77.9%</p> <p>Regression Analysis: Initial regression model (1) after removing insignificant independent variables to improve the model</p> <p>Common stock pri versus LOG BTC, ETH, BNB, USD COIN</p> <p>The regression equation is</p> <p>Common stock price = 19.1 + 0.210 LOG BTC + 0.00358 ETH - 0.0224 BNB + 2.68 USD COIN</p>				
Predictor	Coef	SE Coef	T	P
Constant	19.0899	0.6277	30.41	0.000
LOG BTC	0.2100	0.1306	1.61	0.152
ETH	0.003585	0.003217	1.11	0.302
BNB	-0.02240	0.02230	-1.00	0.349
USD COIN	2.6751	0.9420	2.84	0.025
<p>S = 1.01440 R-Sq = 87.8% R-Sq(adj) = 80.8%</p>				

Appendix (Cont.)

<p>Regression Analysis: Final regression model (1/1) after removing more insignificant independent variables to improve the model</p> <p>Common stock price versus LOG BTC, USD COIN</p> <p>The regression equation is</p> <p>Common stock price = 18.9 + 0.307 LOG BTC + 2.77 USD COIN</p>				
Predictor	Coef	SE Coef	T	P
Constant	18.8593	0.5894	32.00	0.000
LOG BTC	0.3075	0.1015	3.03	0.014
USD COIN	2.7690	0.8280	3.34	0.009
<p>S = 0.994483 R-Sq = 84.9% R-Sq(adj) = 81.6%</p>				
<p>Table A3: MINITAB Results for Running the Initial Regression Model (2) and the Steps for Improving the Model to Reach to the Final Regression Model</p>				
<p>Regression Analysis: Initial regression model (2)</p> <p>Loan/Deposits versus BTC, ETH, ...</p> <p>The regression equation is</p> <p>Loan/Deposits = 78.1 + 0.00499 BTC - 0.203 ETH + 0.729 BNB + 1.60 TETHER - 39.4 USD COIN + 89.1 XRP</p>				
Predictor	Coef	SE Coef	T	P
Constant	78.142	1.643	47.57	0.000
BTC	0.004989	0.005758	0.87	0.426
ETH	-0.2033	0.1689	-1.20	0.283
BNB	0.7294	0.5033	1.45	0.207
TETHER	1.595	7.688	0.21	0.844
USD COIN	-39.35	34.59	-1.14	0.307
XRP	89.13	63.88	1.40	0.222
<p>S = 2.92187 R-Sq = 89.1% R-Sq(adj) = 75.9%</p>				
<p>Regression Analysis: Final regression model (2/2) after removing insignificant independent variables to improve the model</p> <p>Loan/Deposits versus ETH, BNB, USD COIN, XRP</p> <p>The regression equation is</p> <p>Loan/Deposits = 79.3 - 0.0565 ETH + 0.283 BNB - 7.38 USD COIN + 45.8 XRP</p>				
Predictor	Coef	SE Coef	T	P
Constant	79.300	1.036	76.56	0.000
ETH	-0.05654	0.02153	-2.63	0.034
BNB	0.2833	0.1262	2.25	0.060
USD COIN	-7.376	2.520	-2.93	0.022
XRP	45.78	15.32	2.99	0.020
<p>S = 2.76348 R-Sq = 86.3% R-Sq(adj) = 78.5%</p>				

Appendix (Cont.)

Table A4: MINITAB Results for Running the Initial Regression Model (3) and the Steps for Improving the Model to Reach to the Final Regression Model				
<p>Regression Analysis: Initial regression model after logarithmic transformation (3) Deposits/Equity versus LOG BTC, LOG ETH, ... The regression equation is Deposits/Equity = 775 - 14.0 LOG BTC + 21.6 LOG ETH + 64.8 LOG BNB - 123 TETHER - 53.8 USD COIN - 175 XRP</p>				
Predictor	Coef	SE Coef	T	P
Constant	775.20	19.49	39.77	0.000
LOG BTC	-13.978	4.512	-3.10	0.027
LOG ETH	21.63	14.92	1.45	0.207
LOG BNB	64.81	43.13	1.50	0.193
TETHER	-122.67	63.40	-1.93	0.111
USD COIN	-53.79	68.49	-0.79	0.468
XRP	-174.8	200.7	-0.87	0.424
<p>S = 31.3040 R-Sq = 82.8% R-Sq(adj) = 62.1%</p> <p>Regression Analysis: Initial regression model (3) after manipulating logarithmic transformation Deposits/Equity versus LOG BTC, ETH, ... The regression equation is Deposits/Equity = 775 - 12.2 LOG BTC + 0.628 ETH - 3.30 BNB + 50.1 TETHER + 34.3 USD COIN - 418 XRP</p>				
Predictor	Coef	SE Coef	T	P
Constant	775.44	10.19	76.08	0.000
LOG BTC	-12.188	2.186	-5.58	0.003
ETH	0.6281	0.1287	4.88	0.005
BNB	-3.2963	0.7789	-4.23	0.008
TETHER	50.05	38.58	1.30	0.251
USD COIN	34.32	23.02	1.49	0.196
XRP	-418.1	115.4	-3.62	0.015
<p>S = 16.3877 R-Sq = 95.3% R-Sq(adj) = 89.6%</p> <p>Regression Analysis: Final regression model (3/3) after removing insignificant independent variables to improve the model Deposits/Equity versus LOG BTC, ETH, ... The regression equation is Deposits/Equity = 774 - 11.6 LOG BTC + 0.643 ETH - 3.55 BNB + 55.6 USD COIN - 328 XRP</p>				
Predictor	Coef	SE Coef	T	P
Constant	774.33	10.72	72.24	0.000
LOG BTC	-11.605	2.258	-5.14	0.002
ETH	0.6432	0.1353	4.75	0.003
BNB	-3.5495	0.7958	-4.46	0.004
USD COIN	55.62	17.02	3.27	0.017
XRP	-328.05	97.21	-3.37	0.015
<p>S = 17.2952 R-Sq = 93.7% R-Sq(adj) = 88.4%</p>				

Appendix (Cont.)

Table A5: MINITAB Results for Running the Initial Regression Model (4) and the Steps for Improving the Model to Reach to the Final Regression Model				
Regression Analysis: Initial regression model (4)				
Earning Assets/Total assets versus BTC, ETH, ...				
The regression equation is				
Earning Assets/Total Assets = 83.9 + 0.00400 BTC - 0.166 ETH + 0.660 BNB + 11.2 TETHER - 38.5 USD COIN + 53.5 XRP				
Predictor	Coef	SE Coef	T	P
Constant	83.9357	0.4614	181.91	0.000
BTC	0.003996	0.001617	2.47	0.056
ETH	-0.16633	0.04746	-3.50	0.017
BNB	0.6599	0.1414	4.67	0.005
TETHER	11.152	2.160	5.16	0.004
USD COIN	-38.523	9.718	-3.96	0.011
XRP	53.47	17.94	2.98	0.031
S = 0.820785 R-Sq = 98.1% R-Sq(adj) = 95.8%				
Regression Analysis: Final regression model (4) after logarithmic transformation				
Earning Assets/Total assets versus LOG BTC, ETH, ...				
The regression equation is				
Earning Assets/Total Assets = 83.7 + 0.296 LOG BTC - 0.0514 ETH + 0.331 BNB + 12.7 TETHER - 15.0 USD COIN + 11.4 XRP				
Predictor	Coef	SE Coef	T	P
Constant	83.6837	0.4449	188.10	0.000
LOG BTC	0.29593	0.09542	3.10	0.027
ETH	-0.051354	0.005618	-9.14	0.000
BNB	0.33118	0.03400	9.74	0.000
TETHER	12.655	1.684	7.51	0.001
USD COIN	-15.029	1.005	-14.96	0.000
XRP	11.432	5.035	2.27	0.072
S = 0.715332 R-Sq = 98.5% R-Sq(adj) = 96.8%				

Appendix (Cont.)

Table A6: MINITAB Results for Running the Initial Regression Model (5) and the Steps for Improving the Model to Reach to the Final Regression Model

Regression Analysis: Initial regression model (5)

Interest margin/earning assets versus BTC, ETH, ...

The regression equation is

$$\text{Interest margin/earning assets} = 0.0377 - 0.000010 \text{ BTC} + 0.000297 \text{ ETH} - 0.000858 \text{ BNB} + 0.00078 \text{ TETHER} + 0.0633 \text{ USD COIN} - 0.0962 \text{ XRP}$$

Predictor	Coef	SE Coef	T	P
Constant	0.037660	0.001530	24.61	0.000
BTC	-0.00001043	0.00000536	-1.95	0.109
ETH	0.0002965	0.0001574	1.88	0.118
BNB	-0.0008581	0.0004689	-1.83	0.127
TETHER	0.000779	0.007162	0.11	0.918
USD COIN	0.06333	0.03223	1.97	0.107
XRP	-0.09619	0.05951	-1.62	0.167

S = 0.00272205 R-Sq = 62.9% R-Sq(adj) = 18.4%

Regression Analysis: Initial regression model (5) after logarithmic transformation

Interest margin/earning assets versus LOG BTC, LOG ETH, ...

The regression equation is

$$\text{Interest margin/earning assets} = 0.0389 - 0.000865 \text{ LOG BTC} - 0.000854 \text{ LOG ETH} - 0.00286 \text{ LOG BNB} + 0.00606 \text{ TETHER} + 0.00439 \text{ USD COIN} + 0.0160 \text{ XRP}$$

Predictor	Coef	SE Coef	T	P
Constant	0.0389443	0.0008833	44.09	0.000
LOG BTC	-0.0008653	0.0002045	-4.23	0.008
LOG ETH	-0.0008538	0.0006762	-1.26	0.262
LOG BNB	-0.002855	0.001955	-1.46	0.204
TETHER	0.006064	0.002873	2.11	0.089
USD COIN	0.004392	0.003104	1.42	0.216
XRP	0.016026	0.009094	1.76	0.138

S = 0.00141845 R-Sq = 89.9% R-Sq(adj) = 77.9%

Regression Analysis: Initial regression model (5) after manipulating the logarithmic transformation to improve the model

Interest margin/earning assets versus LOG BTC, ETH, ...

The regression equation is

$$\text{Interest margin/earning assets} = 0.0390 - 0.000961 \text{ LOG BTC} - 0.000003 \text{ ETH} - 0.000004 \text{ BNB} - 0.00246 \text{ TETHER} + 0.00220 \text{ USD COIN} + 0.0136 \text{ XRP}$$

Predictor	Coef	SE Coef	T	P
Constant	0.039016	0.001009	38.67	0.000
LOG BTC	-0.0009612	0.0002164	-4.44	0.007
ETH	-0.00000297	0.00001274	-0.23	0.825
BNB	-0.00000415	0.00007710	-0.05	0.959
TETHER	-0.002462	0.003819	-0.64	0.548
USD COIN	0.002204	0.002278	0.97	0.378
XRP	0.01362	0.01142	1.19	0.286

S = 0.00162223 R-Sq = 86.8% R-Sq(adj) = 71.0%

Appendix (Cont.)

Table A6 (Cont.)				
Regression Analysis: Final regression model (5/5) after removing insignificant independent variables to improve the model				
Interest margin/earning assets versus LOG BTC, ETH, XRP				
The regression equation is				
Interest margin/earning assets = 0.0389 - 0.000930 LOG BTC - 0.000002 ETH + 0.00823 XRP				
Predictor	Coef	SE Coef	T	P
Constant	0.0389273	0.0008628	45.12	0.000
LOG BTC	-0.0009303	0.0001716	-5.42	0.001
ETH	-0.00000203	0.00000113	-1.80	0.109
XRP	0.008233	0.003810	2.16	0.063
S = 0.00141878 R-Sq = 83.9% R-Sq(adj) = 77.8%				

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