



Financial Literacy and Risk Tolerance of Indonesian Crypto-Asset Owners

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ABSTRACT

This paper investigates the characteristics of crypto-asset investors in Indonesia and the key factors affecting their investment decision. The authors apply the Probit model on a dataset of Indonesian equity investors collected through a primary survey. This study complements and extends the current literature of financial literacy and investment decision by providing country-specific evidence of Indonesia. Our results suggest that younger Indonesian males with higher risk tolerance and who have some previous experiences in equity investing are more likely to invest in crypto assets. In contrast, we found no significant evidence that higher financial literacy and higher income increase the likelihood to invest in crypto assets. In addition, we conclude that most crypto asset investors in Indonesia are risk-loving investors driven mainly by profit-seeking motives and willing to accept higher risk. The study sheds light on the interplay of owners' characteristics, financial literacy, risk tolerance, and how they affect investing behaviors. This study would assist the Indonesian Financial Services Authority in better regulate crypto assets investing and focus on which type of investors need to be provided with more financial education regarding the risk and return of their investment type. The second implication is that the information obtained from this research can be used by firms, brokerage, and dealers providing investment services to target better the type of investors who would be more likely to invest in crypto assets.

CCS CONCEPTS

• User characteristics; • Electronic commerce; • Information systems applications;

KEYWORDS

Financial literacy, risk tolerance, crypto-assets investment, e-trading

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1 INTRODUCTION

Crypto assets saw their most significant change in market cap and individual prices in the early months of 2017. In response to this increase in market cap and prices, regulations surrounding the use of cryptocurrency were also created in 2017. An example of cryptocurrency regulations created that year is the Japanese Payment Service Act (PSA). The PSA was released in April of 2017 and allowed the use of cryptocurrency as a legal tender in Japan. It also requires that all cryptocurrency exchanges register with the Japanese Financial Services Agency. By September of 2017, there were officially 11 registered cryptocurrency exchanges within the country [1].

However, in the following year, the crypto-asset market crashed. It started by dropping bitcoin's price - the most popular cryptocurrency to date - by almost seventy percent in 2018. The prices of other crypto assets such as Ethereum and Tether also declined by at least half of their previous prices. Despite this risk of a sudden price drop, the number of investors holding cryptocurrency assets appears not to be affected. For example, in the United Kingdom (UK), the number of cryptocurrency investors rose from 1.5 million people in 2018 to a staggering estimate of 9.8 million by February 2021 [2]. Similarly, the US has also seen the number of crypto-asset owners triple 2 percent to 6 percent from 2018 to 2021 [3].

The growing popularity of cryptocurrency as an investment instrument also occurs in Indonesia. According to data from Triple AAA, there are currently 7.4 million Indonesians holding and trading crypto assets, which represents around 80 percent increase from 2018. Interestingly, the growing popularity of cryptocurrency investing in Indonesia happened simultaneously with the growing cases of fraudulent digital trading and investment of other financial assets such as foreign currencies and stocks. All these fraudulent investment schemes only added to the risk of investing in cryptocurrencies, which perhaps are not fully understood by the investors. Thus, it is interesting to examine the motivations and characteristics of these investors, as, despite the inherent risk, their numbers are growing.

Several studies investigate crypto-asset owners' trading behavior and characteristics [4]–[6]. However, the results vary from one research to another, depending on the country's context. For example, a crypto asset research in Japan found that crypto-asset investors in Japan are more likely to be male and from a younger age group [4], [7]. The same results were found by research conducted in Canada, the US, and China. However, some studies found

that the age group was not a significant factor in the likelihood of crypto-asset investment. For example, research by [8] found that an investor from an older age group is more likely to invest in crypto assets in Germany. In comparison, one study found that the age group is not a significant factor for crypto-assets investing in Malaysia [9].

Furthermore, the variables used by these researchers are also different. Some of these studies only focused on specific factors or characteristics of investors. For example, the study in Malaysia only analyzed the age group, education, and income of the investors [9]. At the same time, another study had a more extensive variable list, consisting of the three mentioned above, gender and employment status [10]. The study using Japanese data added further to their list of variables by including risk tolerance, investment experience, and financial literacy of the investors [4]. Some research, such as the case of [11], focuses only on certain variables such as investment experience and financial literacy while only briefly mentioning the effects of an investor's characteristics on the likelihood of crypto-asset investment.

Based on the above, there seems to be a lack of consistency of results from previous studies on crypto assets investments and owners' characteristics. Moreover, the relations between owners' characteristics and investment decisions in crypto assets depend on the country's context. Therefore, our study extends the current literature by exploring the interplay between owner characteristics and crypto-assets investment in the Indonesian context. As such, we offer insights into the dynamics of investment decisions, financial literacy, and risk tolerance in a unique empirical environment.

We organize the paper as follows. The subsequent section reviews the factors that ex-ante is thought to be associated with the likelihood to invest in crypto-assets and determines the dependent and independent variables of the research that ex-post will be tested. Next, we outline the methodology and data. Section 4 discusses the findings of this research, and Section 5 concludes and provides the policy implications of the research

2 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Crypto asset or cryptocurrency is the term used to describe digital currencies which use a cryptography system called "Blockchain" to function. It was first introduced in 2008 when the first cryptocurrency called "Bitcoin" was created by the internet pseudonym, Satoshi Nakamoto. Subsequently, the first whitepaper on Bitcoin was published in October of 2008, where Nakamoto described it as a peer-to-peer digital payment system without the need for a central governing agency [12].

After the creation of Bitcoin, the popularity of cryptocurrency as an alternative investment instrument to traditional assets such as stocks or bonds has increased. Moreover, a study by [13] shows that the addition of multiple cryptocurrencies to a portfolio containing traditional asset classes can reduce the portfolio risk through the effects of diversification. This finding only adds to the popularity of cryptocurrency investment. It also became the consideration by some financial firms that crypto-asset could be used as an additional hedging instrument in countries with a registered cryptocurrency exchange. With this increasing popularity and demand, it is critical

to find out who are the people investing in cryptocurrency and why they do so. One method of determining this is through analyzing the different factors and trends of current crypto investors. Previous research has examined the different factors that affect investment decisions of cryptocurrency as their investing instrument. The following subsections discuss the literature on these factors and develop the hypotheses.

2.1 Dependent Variable: Cryptocurrency Investment

The dependent variable is the investor's decision to invest in cryptocurrency. The factors that affect this dependent variable will be examined by employing a probit model, a particular type of regression model that uses a binary variable as a dependent variable. In our study, this variable is whether our respondent had previously invested in cryptocurrencies or not. It was created as a binary variable based on the question, "Have you ever invested in cryptocurrency?" The binary variable takes the value of 1 if the answer is "yes" and 0 otherwise. Previous research has employed this measurement in investigating factors that affect cryptocurrency investment. For example [4], [7], [11] used the probit model for their research.

This research follows [4] to determine factors that affect investment decisions to invest in cryptocurrency. However, it adds factors found to be relevant from [11], where financial literacy and investment experience are added as additional variables in the research. Next, we review the independent variables or factors that affect cryptocurrency investment decisions.

2.2 Independent Variables

2.2.1 Age and Gender. The investor profile is an essential factor in determining which types of investors invest in crypto assets. Previous research has identified five variables in an investor's profile that affect their decision to invest in cryptocurrency. These variables are Age, Gender, Education, Occupation, and Income [10], [14].

A survey conducted by [15] in the United States (US) shows that 74 percent of crypto investors are male, compared to 26 percent for females. With the age range of 25 - 34 being the most dominant at 39 percent, the second-highest age group of 35-44 at 34 percent, a sharp drop-off to 19 percent for ages 45-54.4 percent for 55 to 65 years old, and lastly 3 percent for ages 18 to 24. The respondents were asked to rate themselves on their knowledge of cryptocurrency. Forty-four percent of respondents declared themselves as 'somewhat knowledgeable.' Thirty-three percent regarded themselves as 'very knowledgeable.' Twelve percent of the investors think they are 'highly knowledgeable in crypto. The remaining 11 percent regard themselves as 'not very knowledgeable. A similar survey was conducted in the United Kingdom (UK) with 2000 respondents [16]. This survey is similar to the results in the US that the average crypto investors are young male adults who are somewhat knowledgeable in cryptocurrency.

Similarly, Fujiki [4] supported the above finding using data from Japan and stated that "the average crypto-asset owners in Japan are likely to be young and male." Their study found that most crypto-asset owners in Japan are under 30 years old. Likewise, research by [10] found that among Chinese investors, the age group of 18-30 were the most likely to invest in cryptocurrency. Furthermore,

those older than 40 years old only plan to invest in the future. Nevertheless, a conflicting finding regarding the owner's age was found in Germany by [8]. They show that most cryptocurrency investors are middle-aged males with an average age of 47.

While in terms of gender, most studies conclude that men are overall more risk-tolerant than women and more likely to invest in crypto assets [17]–[22]. Based on these, we postulate the following hypotheses:

H1: A younger age group is positively associated with a higher probability of investors selecting cryptocurrency as their investment instrument.

H2: Male Indonesian investors are more likely to invest in cryptocurrency than female Indonesian investors.

2.2.2 Income and Education. Income was one of the factors listed by the Gemini survey [16] when determining the demographic of cryptocurrency investors. Their survey result shows that in the UK, the household income of cryptocurrency investors is mostly £25,001 to £35,000 per annum. This result suggested that cryptocurrency investing does not correspond to higher disposable income, as the income bracket was the third-lowest income bracket out of 9.

Similarly, [10] found that those who currently hold cryptocurrency investments have incomes between 1,000 and 2,500 AUD per week in Australia. These numbers range around the average weekly earnings of a full-time working adult in Australia, which as of November 2019, is \$1,658.70 per week [Australian Bureau of Statistics, 2020]. Therefore, we could conclude from the two findings that crypto-asset investing does not necessarily correspond to higher income.

Indeed, the existing literature shows that people who invest in cryptocurrency have some form of disposable income [4], [7], [9], [11]. Generally, people become more risk-tolerant when they have an additional income buffer than their living costs, as it means that they can plan for any unexpected circumstances. Furthermore, investing in cryptocurrency can make an investor acquire significant wealth in a short duration due to its volatility, thus being more attractive to people who are not in the high-income bracket. Based on this discussion, the following hypothesis is proposed:

H3: Higher-income level is not significantly related to a higher probability of cryptocurrency investing.

Like income, Gemini [15] found that the level of investors' education does not correlate with cryptocurrency investing. For example, only 29.1 percent of current and previous investors achieved a bachelor's degree or equivalent in their survey. In contrast, half (50.1 percent) have no university degree. Adding to this, [9] show no statistical significance between the behavioral intention to use cryptocurrency compared to an individual's education level in Malaysia. On the other hand, Al-Mansour [14] found that 79.5 percent of their survey respondents hold at least a bachelor's degree in their research. Al-Mansour argued that his finding was in line with the culture of Arabian investors, where most of them hold bachelor's degrees or above. Xi, et al. [10] also found that most of their survey respondents were from people who have completed their undergraduate studies. Specifically, their findings suggest that advanced knowledge of cryptocurrency impacts the decision of investment. For instance, Australian respondents who have studied economics,

business, or finance are more likely to invest in the future. A post-graduate degree positively predicts cryptocurrency investment for Chinese individuals" [10].

Furthermore, quoting the results of the Bitcoin Omnibus Survey (BTCOS) conducted by the Bank of Canada, Huynh, et al. [23] show that in recent years, those with higher education or household income were more likely to own Bitcoin than those with low education or income. Nevertheless, they also showed that the owners of Bitcoin when it was first introduced were those with lower education and income level. People with higher income and education levels invested in Bitcoin.

All in all, it appears that there are variations of results between scholars. These may be due to different country contexts and data of the study. It is therefore interesting to empirically test the result using Indonesian data by postulating the following hypothesis:

H4: Higher education level is positively associated with a higher probability that investors select cryptocurrency as their investment instrument.

2.2.3 Risk Tolerance. Risk tolerance is an important factor in an investor's decision-making process, especially when the investment instrument is a very risky one [24]. The concept of risk and return itself is a fundamental part of finance. In his seminal paper, Fama [25] shows that risk and returns in investing are highly correlated, where investments with a high potential return have a high risk. Cryptocurrency could be considered a high-risk investment due to its price volatility and its nature as a speculative asset [26]. The volatility of cryptocurrency is also substantially larger than any standard financial assets [27].

Several authors suggest that risk tolerance is positively associated with cryptocurrency investing. For instance, Xi et al. [10] found that individuals with a higher risk tolerance are relatively more willing to invest in cryptocurrency. Similarly, Wang and Hanna [28] showed that risk tolerance is positively associated with risky asset investments, particularly for older investors. Finally, Huang et al. [29] argued that the tendency to invest in risk assets for investors with higher risk affinity is due to its diversification benefits. Accordingly, this study postulate that:

H5: High-risk tolerance is positively associated with a higher probability to invest in crypto assets.

2.2.4 Employment Status and Cryptocurrency Investment. Another factor to be considered is employment status. An individual's occupation has been noted in previous research as an essential factor of which kind of individuals invests in cryptocurrency. Occupation here refers to the employment status of an individual. When determining an individual's employment status, an individual's employment status is divided into four types: Full-Time Employment, Part-Time Employment, Unemployed, and Retired. Self-Employed individuals are combined in either full-time employment or part-time employment status.

Fujiki [7] found that crypto investors are more likely to be employed, either by companies or self-employed. This result is quite broad but can be interpreted that individuals with a form of income would be more likely to have the disposable income to invest in cryptocurrency. Adding to this, Xi et al. [10] stated that their Chinese survey shows that those who have fixed incomes or are freelancers prefer investment in cryptocurrencies, specifically coins.

With these two pieces of literature in mind, the researcher hypothesizes that in the Indonesian market, employment status will be associated with cryptocurrency investment as well. Therefore, the following hypothesis is formed:

H6: Investors with full-time employment status are more likely to invest in crypto assets.

2.2.5 Financial Literacy. "Financial literacy is defined as measuring how well an individual can understand and use personal finance-related information" [30]. Research by [11] found that financial literacy is an important factor determining a person's financial behavior and well-being. Several factors determine how financially literate investors are. One of the most important factors is their financial knowledge [31].

In their research, Fujiki [4] noted that the average crypto-asset owners tend to have a higher level of financial literacy. Fujiki measured investor financial literacy using questions on how financially knowledgeable they are. Likewise, Zhao and Zhang [11] found financial literacy to be positively associated with crypto asset investing, mainly the subjective financial literacy of investors. Allgood and Walstad [32] supported the notion that subjective financial literacy is critical in explaining investing behavior.

In this research, we measure financial literacy by questions regarding the investor's confidence regarding their financial knowledge and ability in financial decision-making. In other words, we measured investors' literacy by their subjective financial literacy. Based on the literature discussed above, we postulate that:

H7: Subjective financial literacy is positively associated with a higher probability of investors selecting cryptocurrency as their investment instrument.

2.2.6 Investment Experience. Investment experience is accumulating skills or knowledge from participating in investment activities. First, [Krische. 2019] found that investment experience affects an individual's investment-related judgments. Following this, [10] and [11] found that investment experience is an important factor in determining an investor's decision to invest in cryptocurrency.

Previous research by [7] shows that investors who hold stocks are more likely to own crypto assets in Japan. [11] also found that risky asset holdings also had a significant positive association with cryptocurrency investment in addition to stock holdings. Additionally, investors with more experience with high-risk investment products are more likely to invest in cryptocurrency. Therefore, this study postulates that:

H8: Investment experience in stockholding is positively associated with a higher probability of investors selecting cryptocurrency as their investment instrument.

H9: Investment experience in risky asset holding is positively associated with a higher probability of investors selecting cryptocurrency as their investment instrument.

3 METHODOLOGY

3.1 Data and Sample

This research uses a survey as the data collection method. The survey employs a stratified random method, where a sample of Indonesian financial asset investors is taken for each age group. This sampling technique allows a better understanding of investing

practices within various age groups. The rationale for employing this technique is to ensure that all age groups are included. A total of 377 respondents were obtained. Observations with missing answers and information were excluded, resulting in a final sample size of 339 respondents.

3.2 Variables and Measurements

The dependent variable of cryptocurrency investment measures whether respondents had previously invested in cryptocurrencies. It was created as a binary variable based on the question, "Have you ever invested in cryptocurrency?" The binary variable takes the value of 1 if the answer is "yes" and 0 otherwise.

Investment experience is measured by asking, "Do you have any prior experience in investment?" followed by "Which of the following investment instruments did you have experience in?" if the respondents answered yes. Choices are provided for different types of investment instruments. However, they will be divided into two variables in the research: investment experience in stock holdings and investment experience in risky assets. We also ask, "How long have you been investing in those assets?". Although stocks are listed as one of the investment instruments within the available choices, experience in risky assets will be measured by investments in other forms of risky assets such as options, commodities, or futures.

Financial literacy is divided into two sections, objective financial literacy, and subjective financial literacy. Objective financial literacy is measured by the number of correct answers provided by the respondent in two multiple choice cryptocurrency questions and three multiple-choice questions about stocks and bonds. The five questions will be provided in the Appendix. Subjective financial literacy is measured through the respondent's self-assessment of their investment knowledge. Additionally, the respondents are asked about their perceived knowledge of cryptocurrency. Both questions use a 5-point Likert scale, where 1 is "very low knowledge" and 5 is "very knowledgeable".

For the factors relating to investor profile, the variables included are age, gender, employment status, income, education, and risk tolerance. Six different choices are provided for the age group of which age groups the respondent falls. The choices are under 18, 18-24, 25-35, 36-50, 51-60, and above 60. The gender of the respondent has four options: Male, Female, Others, and Prefer not to say. Employment status has the options of Full-Time Employed, Part-Time Employed, Unemployed, and Retired. Income has seven options of which group the respondents fall under, which are under 2 million rupiah, 2-3 million rupiah, 3-5 million rupiah, 5-10 million rupiah, 10-20 million rupiah, 20-40 million rupiah, and finally above 40 million rupiahs. Education asks the respondent's highest qualification, ranging from Primary School (SD) to Doctorate (S3). The last factor is the investor's risk tolerance, a 5-point Likert scale, where 1 is risk-averse, and 5 is very risk-tolerant. Table 1 summarizes this paper's variables, definitions, and measurements.

3.3 Empirical Model

Following [8], [7], [4] we employed the probit regression model below to examine factors affecting Indonesian investors' decisions

Table 1: List of Variable, Proxy, and Definition

Variable	Type	Definition
ProbInvest (<i>Y</i>)	Dependent	The cryptocurrency investment decision of the respondent, 1 indicates that the respondent has investments in cryptocurrency while 0 is otherwise.
ageG (<i>A</i>)	Independent	age represents the respondent's age, which is a variable determining which age group the respondent falls under.
Gender (<i>G</i>)	Independent	This variable represents the gender of the respondents; it is a binary variable where 0 is female and 1 is male.
Employment (<i>E</i>)	Independent	Whether or not the respondent is currently employed (includes both full-time and part-time employment) or unemployed (including retired).
IncomeB (<i>I</i>)	Independent	IncomeB represents the income group the respondents fall under. This variable takes the median of each income group available in the survey.
Educ (<i>S</i>)	Independent	Educ represents the education level of the respondents. It is in the form of a variable where 1 is high school education or lower, and 3 is postgraduate education or higher.
Tolerance (<i>T</i>)	Independent	Tolerance represents the risk tolerance of the respondent. It is a metric variable where 1 is low-risk tolerance, and 3 is high-risk tolerance.
Dinvexp1 (<i>D</i>)	Independent	Dinvexp1 is the respondent's experience in equity investment. It is a binary variable where 1 means that they have previous experience in equity investment and 0 is otherwise.
Dinvexp2 (<i>R</i>)	Independent	Dinvexp2 is the respondent's experience in other forms of risky investments other than cryptocurrency. It is in the form of a binary variable where 1 means that they have previous experience in risky investment and 0 is otherwise.
Literacy (<i>L</i>)	Independent	Literacy measures the respondent's subjective financial literacy, which refers to how financially knowledgeable the respondents think they are. It is in the form of a metric variable where 1 is low financial literacy, and 3 is high financial literacy.
Cknowledge (<i>C</i>)	Independent	Cknowledge is the measure of how knowledgeable the respondents think they are regarding cryptocurrency. It is also a metric variable where 1 is very-low cryptocurrency knowledge, and 5 is very high cryptocurrency knowledge.

in Crypto assets:

$$P_i(Y = 1|A, G, E, I, S, T, D, R, LA, G, E, I, S, T, D, R, L) = \Phi(\beta_0 + \beta_1 A + \beta_2 G + \beta_3 E + \beta_4 I + \beta_5 S + \beta_6 T + \beta_7 D + \beta_8 R + \beta_9 L) \quad (1)$$

P_i is the probability that the project will succeed; Y is a binary of dependent variable which given '1' if the respondent invest in cryptocurrency and '0' if the respondent does not; A is the age group of the respondent; G is the gender; E is the employment status of the respondent; I is the income level of the respondent; S is the highest education attained by the respondent; T is tolerance level of the respondent; D is whether or not the respondent has experience in equity investment; R is whether or not the respondent has experience in risky investments aside from cryptocurrency; L is the subjective financial literacy of the respondent, and β_i is the coefficient of the regressor. The coefficients of the above Probit model will be estimated along with their marginal effects at the individual's average.

The next section discusses the results of the estimation.

4 FINDINGS AND DISCUSSION

This section presents the findings on investigating the factors that affect the probability of crypto-asset investments. The results are divided into two sections: descriptive statistics and regression analysis.

4.1 Descriptive Statistics

Table 2 shows the respondents' demographic profile and whether they have experience in crypto-asset investments. As seen in Table 2, there are significantly more male investors than females. Next, regarding the age of investors, almost half (46.0 percent) of the crypto asset investors is between 36-50 years old. Further, more than a quarter (27.0 percent) of the investors belong to the 51-60 age group and 12.0 percent from the 25-35 age group. Our survey also reveals that only 9.0 percent of investors are above 60 years old, and 6 percent are in the 18-24 age group.

Table 2: Investor Demographic

	N	Percent
Gender		
Male	174	80.6
Female	41	19
Prefer not to say	1	0.4
Age		
18 - 24	13	6
25 - 35	25	12
35 - 50	100	46
51 - 60	59	27
> 60	19	9
Education		
Middle School	1	0.4
High School	17	7.8
Diploma	20	9.3
Bachelors	147	68.1
Masters	31	14.4
Doctorate	0	0
Risk Tolerance		
1	3	1
2	15	7
3	66	31
4	77	36
5	55	25
Employment Status		
Part-Time Employed	27	12.5
Full-Time Employed	119	55.1
Retired	40	18.5
Unemployed	30	13.9
Income		
< Rp2.000.000	8	3.7
Rp2.000.000 - Rp3.000.000	9	4.2
Rp3.000.000 - Rp5.000.000	12	5.6
Rp5.000.000 - Rp10.000.000	25	11.6
Rp10.000.000 - Rp20.000.000	28	13.0
Rp20.000.000 - Rp40.000.000	40	18.4
> Rp40.000.000	94	43.5

In terms of education, most crypto asset investors received a high level of education. For example, 91.8 percent of the respondents have completed at least an undergraduate study, 7.8 percent completed high school, and 0.4 percent completed middle school as their highest education. Our results are thus similar to [10], [14], [23], which suggest that crypto-asset investors tend to be more educated. Furthermore, the average risk tolerance of the investors is also relatively high, 3.77 based on a 5-point Likert scale, where 1 is risk-averse investors and 5 is very risk-tolerant investors. Table 3. show the respondents' financial literacy, which was divided into two different types: objective and subjective financial literacy. First, the dataset has an objective financial literacy score of 3.37 and a subjective financial literacy score of 3.25, out of a 5-point Likert scale. Next, the crypto asset investors have an objective score of 3.89 and a subjective financial literacy score of 3.40. Finally, the

non-crypto asset investors have an objective financial literacy score of 2.47 and a subjective financial literacy score of 2.98.

Overall, the overall dataset and crypto-asset investors have high financial literacy and do not seem overconfident, as the average score of objective financial literacy is higher than the average score of subjective literacy. In contrast, the non-crypto asset investors have lower financial literacy and overestimate their financial knowledge. Thus, the preliminary descriptive result suggests that our findings are different from previous research by [11]. They found that crypto asset investors are more likely to be overconfident in their financial literacy than non-investors. However, the regression analysis below will further examine this contrasting suggestion.

Table 3: Average Financial Literacy

	Objective Financial Literacy	Subjective Financial Literacy
All Sample	3.37	3.25
Crypto Investor	3.89	3.40
Non-Crypto Investor	2.47	2.98

Table 4: Probit Model Estimations

ProbInvest	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
ageG: base 1							
2	1.9612	.4915	3.99	.0001	.9978	2.9245	***
3	.9578	.355	2.70	.007	.2621	1.6535	***
4	.3983	.3569	1.12	.2644	-.3012	1.0977	
5	-.0601	.3848	-0.16	.8758	-.8143	.694	
gender: base 0							
1	.7996	.1962	4.07	.0001	.415	1.1842	***
employment: base 0							
1	-.1284	.1884	-0.68	.4957	-.4977	.2409	
incomeB	-.0225	.1016	-0.22	.8249	-.2216	.1766	
educ: base 1							
2	.3348	.244	1.37	.1701	-.1435	.8131	
3	.3312	.3216	1.03	.3031	-.2991	.9616	
tolerance: base 1							
2	.4760	.2435	1.95	.0506	-.0013	.9533	*
3	.7968	.2377	3.35	.0008	.3309	1.2626	***
dinvexp1: base 0							
1	.7590	.1822	4.17	.0001	.4019	1.1162	***
dinvexp2: base 0							
1	.1634	.2063	0.79	.4282	-.2409	.5677	
literacy: base 1							
2	.2555	.2367	1.08	.2803	-.2083	.7194	
3	.1344	.248	0.54	.5880	-.3518	.6205	
Constant	-1.6177	1.47	-1.10	.2711	-4.4988	1.2634	
Mean dependent var	0.6372		SD dependent var			0.4815	
Pseudo r-squared	0.2887		Number of obs			339	
Chi-square	99.9536		Prob > chi2			0.0000	
Akaike crit. (AIC)	347.9007		Bayesian crit. (BIC)			409.1167	

*** p<.01, ** p<.05, * p<.1

4.2 Regression Results and Discussions

We provide the results of the estimated coefficients of the Probit model and the average marginal effect of each variable in Table 4 and Table 5 below. As shown in Table 4, only four of the nine independent variables are found to be statistically significant. These variables are Age, Gender, Risk Tolerance, and Investment Experience in Equity, marked by ageG, gender, tolerance, and dinvexp1, respectively. However, all four variables point towards a positive sign, indicating that these variables are likely to increase the probability of crypto asset investing.

First, the ageG variable was significant for the age group 25-35 and the age group 36-50, with marginal effects of 0.4625 and 0.2804, respectively. This result indicates that younger investors are more likely to invest in crypto assets than older ones, thus accepting our

first hypothesis (H1). This result is consistent with the findings of previous research by [7] and [10]. The only difference is in the strength of the younger age effect on the likelihood to invest in crypto assets.

The second demographic variable is gender. This variable determines whether being male or female increases the probability of investing in cryptocurrency. Results in Table 4 indicate that Indonesian male investors are significantly more likely to invest in crypto assets than female investors. Further, as shown in Table 5, being a male investor increases the probability of investing in crypto assets by 0.2318. This result is consistent with the findings of [4], [7], [11], which confirms that being a male investor increases the probability of crypto assets investing.

Table 5: Probit Model Estimations (Delta-Method)

	dy/dx	St. Err.	z	P>z	[95%Conf.]
ageG					
2	0.4625	0.1076	4.3	0.000	0.2517-0.6733
3	0.2804	0.1074	2.61	0.009	0.07-0.4908
4	0.1236	0.1106	1.12	0.263	-0.0931-0.3404
5	-0.0188	0.1202	-0.16	0.876	-0.2543-0.2168
1.gender	0.2318	0.0593	3.91	0.000	0.1156-0.348
1.employment	-0.0331	0.048	-0.69	0.491	-0.1271-0.0609
incomeB	-0.0059	0.0264	-0.22	0.825	-0.0576-0.0459
					-
educ					
2	0.0909	0.0684	1.33	0.184	-0.0432-0.225
3	0.09	0.0878	1.02	0.306	-0.0821-0.2621
tolerance					
2	0.1411	0.0732	1.93	0.054	-0.0023-0.2845
3	0.2289	0.0718	3.19	0.001	0.0882-0.3697
1.dinvexp1	0.2069	0.0489	4.23	0.000	0.1111-0.3027
1.dinvexp2	0.0425	0.0534	0.8	0.426	-0.0622-0.1472
literacy					
2	0.0679	0.0643	1.06	0.291	-0.0582-0.194
3	0.0362	0.0678	0.53	0.593	-0.0966-0.1691

Nonetheless, there were some variations in the magnitude of impacts of being male on the likelihood of investing in crypto assets between authors. It depends on the country's context. We could accept our second hypothesis (H2) that male investors are more likely to invest in cryptocurrency than female investors.

The third variable found to be significant is the investor's risk tolerance (tolerance). Table 4 indicates that investors with maximum risk tolerance (tolerance level = 3) are significantly more likely to invest in cryptocurrencies. Investors with medium risk tolerance (tolerance level = 2) are also more likely to invest in cryptocurrency, although at a slightly less significant level (* $p < .1$). In contrast, those with low-risk tolerance (tolerance level = 1) are not likely to invest in cryptocurrency. This finding suggests that the higher risk tolerance an investor has, the more likely the investor will be willing to invest in cryptocurrency. This result is not too surprising because cryptocurrency is a very high-risk investment at its core. Previous research by [10], [11] also found that a higher risk tolerance will increase the probability of cryptocurrency investment. Thus, confirming our fifth hypothesis (H5) that higher risk tolerance increases the probability of Indonesian investors selecting cryptocurrency as their investment instrument.

Another variable that significantly affects the likelihood of investing in cryptocurrency is Investment Experience in Equity (Dinvexp1). Table 5 indicates that previous experience in equity investment enhances the probability of investing in crypto assets by a marginal effect of 0.2069. This result is consistent with the findings of [11] and partly consistent with the findings of [10]. In their study, Xi et al.

[10] used two different sets of country samples: from Australia and China. On the one hand, their Chinese samples found a similar result to this research, where having previous investment experience in equity increases the likelihood of crypto assets investment.

On the other hand, their Australian samples found that investors with previous experience in equity investing tend to avoid crypto assets investing. These differences may indicate market awareness and financial inclusion levels between countries. Thus, we could confirm our eight hypotheses (H8) that Indonesian investors experienced in equity investment have a greater probability of crypto-asset investment.

Our estimation in Table 4 found that income was not a significant factor affecting the probability of crypto investing. This result is consistent with [7], [11], who also suggests that income is not a significant factor explaining the likelihood of cryptocurrency investment. Interestingly, our result suggests that the more income an investor has, the less likely to invest in cryptocurrency. This result contrasts with the results of the scholars previously mentioned. They found that an increase in income also increases the probability of cryptocurrency investment. However, after a closer examination of the data, we found that most of the cryptocurrency investors in our sample are from the higher monthly income brackets of Indonesia, with only minor differences in the actual income. Thus, it is not surprising if income is not a significant explanation. Therefore, we accept our third hypothesis (H3) that a higher-income level is not significantly related to a higher probability of cryptocurrency investing.

Similarly, we found that education at all levels and employment status are not significant variables affecting the likelihood to invest in crypto assets. These results are consistent with [11], who found that employment level and education are not statistically significant variables affecting cryptocurrency investment. In contrast with our results, Fujiki [7] found that employment level significantly affected the tendency to invest in crypto assets. In his result, investors with all employment statuses were more likely to invest in crypto assets than those without employment. Fujiki [7] also revealed some variations in the impact of education on cryptocurrency investing. He showed that education at bachelor's degree level and below were not significant factors affecting the probability to invest in crypto assets. However, Fujiki found that education at the graduate level was a statistically significant factor affecting the inclination to invest in crypto assets. Therefore, we reject our fourth (H4) and sixth (H6) hypotheses that a higher education level and employment status are positively associated with a higher probability of cryptocurrency investment.

Table 4 also found that previous experiences in risky asset holding are not a significant factor explaining crypto assets investing. Other scholars such as found this variable a statistically significant variable affecting crypto assets investing [7], [11]. Nevertheless, we find that the coefficient of experiences in risky asset holding is positive, similar to the sign of coefficients estimated by the researchers mentioned above for experiences in risky assets. The fact that the variable is not statistically significant in our estimation is quite puzzling because cryptocurrency is normally considered a risky asset. One possible explanation is that we use relatively limited data in our research, whereas [7], [11] use relatively larger datasets from national surveys. Therefore, it is inconclusive whether to reject or accept our ninth (H9) hypothesis.

The final variable is subjective financial literacy. This result is different from what [11] found. They found that subjective financial knowledge was statistically positive and significant in all their alternate models. In our research, the coefficient sign is also a positive sign, albeit with a smaller magnitude compared to what was estimated by [11]. Therefore, our result somehow suggests that financial literacy is not a key factor for Indonesian investors when making investment decisions in risky assets such as cryptocurrencies, which is quite perplexing. Nonetheless, the many cases of fraudulent investment schemes in Indonesia, such as the recent so-called binary trading of foreign currency, commodities, and equity through digital platforms in Indonesia, seem to vindicate our results.

Our result that subjective financial literacy is not a significant factor affecting investment in risky assets is also consistent with results from the study in 15 countries by [33]. Therefore, based on these findings and recent empirical experience in Indonesia, we could firmly reject our seventh (H7) hypothesis that subjective financial literacy is positively associated with a higher probability of cryptocurrency investment.

5 CONCLUSION AND RECOMMENDATIONS

Based on Indonesian samples, our study found that cryptocurrency investing is related to the characteristics of the investors. We tested

nine variables to determine what factors affect an Indonesian investor's decision to choose cryptocurrency as their investment instrument. From these nine variables, only four were found to be statistically significant. These variables are Gender, Risk Tolerance, Age Group, and Investment Experience in Equity. Additionally, all of the significant variables positively affect the probability of cryptocurrency investment in Indonesia. These results are consistent with most findings from other countries, with some gradations and variations in terms of the magnitude of the coefficients and significance levels.

For instance, the gender of investors provided a result consistent with the findings of [4], [7], [10] with varying degrees of marginal effect. Suppose the investor is from the male gender, the probability of cryptocurrency increases. Additionally, the magnitude was found to be 0.2318, meaning that the strength of the effect is relatively strong. Therefore, this variable would be relevant in determining which investors would invest in cryptocurrency. Similarly, results from variables Age, Risk Tolerance, Investment Experiences in Equity Assets were statistically significant factors and corresponded to results from other research.

We also found that three variables are not significant explanatory variables for cryptocurrency investing in Indonesia. These variables are income, education level, and financial literacy. In comparison, we found inconclusive evidence to accept or reject the hypothesis with one variable: Investment Experience in Risky Asset. Nevertheless, our findings for these four variables are not unique, as several studies also found similar results in their studies. For financial literacy, in particular, our result is similar to studies from other countries and seems vindicated by the current state of affairs of many fraudulent investment schemes in Indonesia.

There are some important implications that these findings offer. First, the Indonesian financial authorities, the OJK, can use the important characteristics found in this research to focus on which type of investors need to be provided more financial education regarding crypto assets. This consideration is critical because, as seen from the analysis results, these investors consist of people from the younger age groups, which will become the majority of the market participants after the current ones retire. Therefore, a more comprehensive financial education might help these young and risk-taking investors make better investment decisions, especially in cryptocurrency or risky financial assets.

The second implication is using the information obtained from this research by firms, brokerage, and dealers working in the crypto asset market. They will be able to use the results of this research to target which type of investors would more likely invest in crypto assets. For example, they can find users matching these criteria within their database to predict which investors would be more likely to invest in a fund consisting primarily of crypto assets. As a result, they would garner more interest because they know which groups of investors would be more likely to invest in their crypto-asset funds.

In conclusion, this research found that variables affecting investing in crypto assets differ from country to country. In the case of Indonesia, the number of significant variables was found to be lacking compared to previous research. Regardless, these variables are still impactful towards determining who the Indonesian crypto-asset investors are and what factors affect their decision to invest in

cryptocurrency. Therefore, when these significant variables are taken together, the average crypto asset investor in Indonesia is more likely to be a young male with a high-risk tolerance and prior investment experience in equity.

This research has achieved its objectives by determining what factors affect an investor's decision to choose cryptocurrency as their investment instrument in Indonesia and examining the strength and significance of these variables. However, we have limited data for analysis. Future research on this topic would benefit from using a larger rich dataset.

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