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Inflation Hedging And Cryptocurrencies

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INFLATION HEDGING AND CRYPTOCURRENCIES

by

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A Research Paper
Submitted in Partial Fulfillment of the Requirements for the
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This paper analyzes the recent emergence of cryptocurrencies, as well as their performance alongside ongoing inflation in the United States since the creation of the Bitcoin. A series of regression models records statistical evidence to find a possible linkage between inflation and Bitcoin trading activity in the last decade. A Cryptocurrency and Inflation Hedging Survey assists in finding a better understanding of the strategic efforts of the average investor. I found that inflation is not the primary driver of Bitcoin trading activity; however, statistical evidence suggests that the past trading activity level of Bitcoin may be a predictor of future activity levels. The survey proves cryptocurrencies to be a popular investment, but not for inflation hedging purposes. The likeliness of a person entering the crypto market tends to be stronger in males.

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INTRODUCTION

During times of inflation and expected price level increases, it's logical for investors to turn to assets that hedge against inflation. The desire to seek such assets usually occurs when the purchasing power of a country's currency is decreasing or expected to decrease. There are several macroeconomic factors that can cause a currency to depreciate. Inflation hedging is a way for investors to protect the value of their assets, investments, cash, and overall net worth. The idea is for investors to maintain their purchasing power, while also procuring positive real returns on their investments (Attié and Roache). Attié and Roache reveal in their study that the rate and level of inflation, indeed affect the nominal returns on assets like cash, bonds, equities, and diversified portfolios.

It is notable to mention that recent inflation numbers in the last couple of months have investors and consumers worrisome. Consumer prices and asset classes have recently inflated. The key driver in this inflation and depreciation of the dollar is all the excess liquidity the Federal Reserve has pumped into the economy to help sail us out of the COVID-19 pandemic. Although the motives to liquify the country are good, the Fed can only keep interest rates low for so long, until the economic consequences of inflation begin to take a toll. Energy costs, labor shortages, and increasing demand amid supply constraints have also contributed to inflation. Figure 1.0 shows the annual inflation rate in the US accelerated to 7% in the last month of 2021, a fresh high since June of 1982, in line with market expectations and compared to 6.8% in November (Trading Economics U.S. Inflation Rate)." This recent spike indicates that inflation hedging will be the topic of conversation for many banks, companies, and individual investors.

Typically, an anti-inflation asset is one that is expected to maintain or increase its value over a specified period (Chen). There are many studies that have proven gold to be a great hedge against inflation. A study that digs deeper into this notion is one done out of the University of Macedonia by Georgios Bampinas and Theodore Panagiotidis. This study not only examined the hedging ability of gold, but silver as well. Bampinas and Panagiotidis show that the inflation hedging ability of gold is higher than average in the United States through a time invariant Vector Error Correction model. This methodology is called the trace test and was first proposed by famous econometrician Søren Johansen. This cointegration procedure is restrictive in the sense that it assumes that the cointegrating vector is constant and the adjustment is linear. The study concludes that the real price of both gold and silver are stationary during historical fluctuations. Other well-known inflation hedges are believed to be asset classes like commodities, real estate, the S&P 500, 60/40 stock and bond portfolios, etc.

Furthermore, we see the strong emergence of blockchain technology and how it has supplemented new digital asset classes like cryptocurrencies. It's hard to ignore how impactful cryptocurrencies have become in the last decade. Cryptocurrencies are digital money-like coins created on blockchain technology. The Bitcoin is the godfather of all crypto currencies, now with a whopping market cap of about 700 billion. The second largest crypto coin is the Ethereum coin, with a market cap of about 300 billion. These coins can be extremely volatile and undergo dangerous swings in price. But holding the bitcoin over the course of the long run would've provided investors with extraordinary returns (Figure 2.0).

Some societies from all over the world evidently believe cryptocurrencies to be good stores of value and find their technology truly remarkable – other societies do not. However, there is no deniability that they pass as mediums of exchange or units of account, as bitcoins and

increments of bitcoin are being traded in seconds, virtually to anybody that will accept it as a form of payment.

This study will not dive into whether Bitcoin and Ethereum are positive or negative externalities for the world. The aim of this study is to dig further into an individual's stance on them, but solely as asset classes. The demographics that are more or less, likely to engage with them will also be explored. This study will investigate if investors view the Bitcoin as a bubble asset with no intrinsic value, or as a modern digital gold. Are there strategic efforts to buy it during times of inflation or recessions, or are investors just rolling the dice in a digital casino?

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DATA

To properly investigate the type of asset class investors and the general population believe the bitcoin belongs to, it's crucial that the right data is used. A measure for inflation will be required to check bitcoin activity during those times of consumer price swings. We analyzed 1-year inflation expectations data from January 2014 to January 2022 in monthly intervals. Inflation expectations are a summary statistic of where inflation is headed and expressed as percentage. In this study, I will examine the inflation expectations for next year, for every month in that year. This data was collected from the website of the Federal Reserve Bank of Cleveland, one of the twelve Federal Reserve banks in the United States. Inflation expectations allow for investors and the general population to adjust their financial investments accordingly, in response to inflation. For this reason, data on expected inflation makes an excellent variable to compare to bitcoin trading activity. After inflation expectation numbers are released, they will be used to find if any correlation between them and money flowing in and/or out of bitcoin exists.

Furthermore, utilizing a measure to represent bitcoin trading activity is also required. It is true that sudden upswings and downswings in price are a measure for bitcoin transactions. The intuition being that when the bitcoin price increases, there are more people buying bitcoin than selling it. And, when the bitcoin price decreases, there are more people selling it than buying it. The only problem with this measure is it does not capture exactly the number value, or the dollar value of coins that changed hands within a given hour, day, month, etc. Therefore, a clearer representation of bitcoin's trading activity is using the bitcoin volume, which captures exactly that. I will analyze the daily 24-hour bitcoin volumes from January 2014 to January 2022, expressed as the total dollar value of trades within that 24-hour day. All bitcoin volume data was

captured from the CoinMarketCap Co. website, the world's most referenced price tracking website for crypto assets.

After collecting both data sets, turning the daily 24-hour bitcoin volumes into month average 24-hour volumes was essential in analyzing the relationship between inflation and the dollar value of bitcoin volumes. Partly, because now comparing both data sets is easier since we have the same amount of data entries for both sets. For example, the daily bitcoin volumes starting from January 1st, 2014, through January 31st, 2014, was combined into an average value for the whole month of January 2014. We simplified comparing the monthly 1-year inflation expectations data to the month average 24-hour volumes to keep all things similar. This data transformation also corrects the error of comparing our month inflation expectation data to only one trading day's volume. Doing this would not capture all the Bitcoin trading activity for the month. It would only capture how investors reacted to the inflation data on that day. For example, we would only capture the market's reaction on January 1st, 2014, to the released 1-year inflation expectations data for January 2014. Hence, we would leave out the activity from investors that reacted to the inflation data every other day in January 2014.

Observing the relationship between the 1-year inflation expectations data and the data for the performance of the bitcoin overtime will help determine whether they move together, in opposite directions, or have no correlation.

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SURVEY DATA

This study will also involve the conduction of a survey questionnaire to assist in investigating how investors and the general population view crypto currencies. The nine-question survey will serve for the purpose of finding demographic information. Covered topics on the survey include owning and trading Bitcoin, relating Bitcoin to certain subjects, concerns about inflation, and the future of Bitcoin. The survey questions include a series of YES or NO questions, multiple choice, and some optional questions. The questions are:

1. Have you ever traded/bought Bitcoin, ever, or any other cryptocurrency?
2. Do you currently hold any Bitcoin/cryptocurrency?
3. What is your sex? (Optional)
4. How concerned are you about changes in consumer prices, or inflation?
5. Have you ever traded cryptocurrencies to lower your exposure or risk of inflation in consumer prices?
6. Which of the following do you believe is most associated with Bitcoin, or cryptocurrencies?
7. What is your age? (Optional)
8. Would you ever agree to being compensated with Bitcoin (instead of dollars) from your employer?
9. Would you feel comfortable investing into a stock from a company that accepts Bitcoin as a form of payment?

Participation is voluntary and will be available to students and faculty members of Southern Illinois University Carbondale. It will be sent out via email using SurveyMonkey's cloud-based survey tool. Participants will have a month to respond and submit answers. All responses will be kept confidential and anonymous. The recorded responses are to be analyzed using visual analysis and some method of econometrics to solve for this study's Bitcoin asset class investigation.

HEADING 4

METHODOLOGIES

There are various methodological approaches in measuring the relationships of financial variables. The goal is to prove if expected inflation has any effect on the volume, and therefore the value of the bitcoin. This will call for econometrics modeling and more specifically, a series of regression models and time series models to analyze the relationship between a dependent variable and one or more independent variables. A regression model may then read as:

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon$$

As mentioned, regression models estimate the relationships between a dependent variable and one or more independent variables. The goal is to find the expected change in Y, given an expected change in X. A part of the study will require us to observe one independent variable's effect on Y, with the expected inflation data serving as the independent variable and the bitcoin volume data representing the dependent variable. This equation will serve as model 1. If no significant relationship is observed in model 1, I will proceed to conduct an autoregression time series model that regresses the dependent variable on observations from the previous month as input, to attempt to predict the bitcoin volume of the next month. This idea can result in accurate forecasts of changes in the volume of the Bitcoin. This regression equation will serve as dynamic model 1. And so, the first two regression models are then:

Model 1: $Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t$

Dynamic Model 1: $Y_t = \beta_0 + \beta_1 X_t + \beta_2 Y_{t-1} + \varepsilon_t$

Y_t is the month average 24-hour Bitcoin volume (dependent variable)

β_0 is the intercept parameter

β_1 and β_2 are the slope parameters

X_t is the 1 Yr. Inflation Expectation (independent variable)

Y_{t-1} is the lagged month average 24-hour bitcoin volume (independent variable)

ε_t is the regression error term

In turn, I will proceed the goal to find a possible relationship between the volume of the Bitcoin and inflation. Doing so will involve a third model, which will be called model 2. The difference in this model is our dependent variable will no longer be the month average 24-hour Bitcoin volume. It will be the change in volume from last month's volume to this month. This serves as a different way to observe a possible relationship between changes to the volume of the Bitcoin and inflation. If no significant relationship is detected, I will proceed in conducting a new autoregression time series model. Only this time, I will regress the change in volume on the lagged change in volume, where we attempt to link the current change in volume and the past change in volume. Again, autoregression time series models allow for the idea that there is a possible correlation between the volumes overtime. The next two regressions models are then:

Model 2: $\Delta Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t$

Dynamic Model 2: $\Delta Y_t = \beta_0 + \beta_1 X_t + \beta_2 Y_{t-1} + \varepsilon_t$

ΔY_t is the change in month average 24-hour Bitcoin volume (dependent variable)

β_0 is the intercept parameter

β_1 and β_2 are the slope parameters

X_t is the 1 Yr. Inflation Expectation (independent variable)

Y_{t-1} is the lagged change in month average 24-hour bitcoin volume (independent variable)

ε_t is the regression error term

Then, my investigation will continue with setting up a fifth and sixth model: model 3 and dynamic model 3. These models will involve converting the dependent variable into log form. This technical adjustment will allow for observing percent changes from one month to the next so that I may interpret the relationships of the variables in simpler terms. And so, the interpretation slightly differs from model 2 by remarking if the percent change in the volume of the Bitcoin from one month to the next is linked to the inflation expectations variable. Dynamic model 3 will become an autoregression time series model different from dynamic model 1 and dynamic model 2 because it explains how percent change in the Bitcoin volume from one month to the next connects with the percent change in volume in the previous month. These technical changes to the regression methods will allow for a more ideal way to express the data. Model 3 and dynamic model 3 are then:

$$\textbf{Model 3: } \Delta \ln (Y_t) = \beta_0 + \beta_1 X_t + \varepsilon_t$$

$$\textbf{Dynamic Model 3: } \Delta \ln (Y_t) = \beta_0 + \beta_1 X_t + \beta_2 Y_{t-1} + \varepsilon_t$$

$\Delta \ln (Y_t)$ is the change in log month average 24-hour Bitcoin volume (dependent variable)

β_0 is the intercept parameter

β_1 and β_2 are the slope parameters

X_t is the 1 Yr. Inflation Expectation (independent variable)

Y_{t-1} is the lagged change in log month average 24-hour bitcoin volume (independent variable)

ε_t is the regression error term

As previously stated, these methods involve regressing the dependent variables onto our independent variables to test the null hypotheses of no significant relationships between the independent variables and the different variations of the month average bitcoin volumes. Further analysis will require observing our regression's p-values, R-Squared value, and the level of

significance for each independent variable. A p-value is a measure of the probability that an observed difference in the data could have occurred just by random chance. The lower the p-value comes out to be, the greater the statistical significance of the observed difference. The adjusted R-Squared value is a statistic that adjusts for predictors that are no significant in a regression model. A lower adjusted R-Squared value suggests that additional input variables are not adding value to the model. The results from these regressions are systematically conducted using the R software. The results will help us conclude whether changes in inflation expectations influence the volume of bitcoin transactions, and if there are any possible relationships between the volumes overtime. These conclusions will lead to a better understanding of the type of asset class investors believe the bitcoin to be.

To further probe the results from the survey questionnaire, the set-up of a probit model will be introduced and executed using the R software. A probit model is a type of regression where the dependent variable takes only two values. It's like the earlier models except with a non-linear aspect to it. The dependent variable is based on question 1 of the survey, which is whether a person has ever traded/bought Bitcoin or any other cryptocurrency. The model will also contain four independent variables. The first is a dummy variable based on question 3 of the survey, where all male responses will be equal to 1 and female responses will be equal to 0. The other three dummy variables will be based on question 4 of the survey, where we observe how concerned people are about inflation. So, the second dummy variable will equal 1 for extremely concerned and equal 0 otherwise. The third dummy variable will equal 1 for very concerned and equal 0 otherwise, and the last dummy variable will equal 1 for somewhat concerned and equal 0 otherwise.

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REGRESSION RESULTS

All regressions were successfully executed as anticipated using the R software. Table 1 shows the regression results for model 1 and dynamic model 1. For model 1, β_1 came out to have a value of -1.019e[11] and the β_0 intercept parameter came out to have a value of 1.49e[10]. The slope for the independent variable, 1-Yr. expected inflation, then came out to form our linear regression model:[1]

Model 1: $Y_t = \ 1.49\text{e}\hat{}10 - \ 1.019\text{e}\hat{}11X_t + e_t$

This model can be interpreted as: a one unit increase in expected inflation would decrease the value of the Bitcoin volume by -1.019e[11] dollars. This coefficient is enormously high. The results also show the independent variable as having no statistical level of significance of any kind. A high p value of 0.7889 and a very small, adjusted R-Squared value of -0.00976 were captured.

Dynamic model 1 shows β_1 as having a value of 8.06e[10], β_2 having a value of 0.9341, and an intercept parameter of -1.78e[8]. The p-values are pretty much zero and the adjusted R-squared value is high, indicating high correlation between the variables. It is important to note that this does not necessarily mean the variables are impacting the Bitcoin volume in any way. Our multiple linear regression dynamic model 1 is then:

Dynamic Model 1: $Y_t = \ -1.78\text{e}\hat{}8 + \ 8.06\text{e}\hat{}10X_t + 0.9341Y_{t-1} + e_t$

This model is interpreted as: a one unit increase in 1-Yr. expected inflation leads to an increase in the dollar value of the volume of Bitcoin by 8.06e[10] units. This coefficient is once again extremely high, with no level of significance observed in the results. This model also suggests

[1] Notation e^10 means the number ten raised to the tenth power as in R software number reporting.

that a 1 unit increase in the Bitcoin volume this period, increases the dollar value of the Bitcoin volume by 0.9341 units in the next period. That is, holding fixed the inflation variable. The results show the volume on its own lag being extremely significant, as the chances of the slope being zero are pretty much 0%. Due to the simplicity of the research, it is important to take these results as examples of possible relationships between variables and not exact estimates.

Table 2 shows the regression results for model 2 and dynamic model 2. Model 2 resulted in β_1 taking on the value of 9.37e^{10} and β_0 taking on the value of -1.26e^{9}:

Model 2: $\Delta Y_t = -1.26\text{e}\text{\^{}}9 + 9.37\text{e}\text{\^{}}10X_t + e_t$

Model 2 is interpreted as: a one unit increase in 1-yr. expected inflation would increase the volume change by 9.37e^{10} dollars. The results captured a somewhat high p value of 0.5 and a negative adjusted R-squared value. Again, no statistical level of significance is recorded for the inflation variable in the study.

For dynamic model 2, β_1 equals 9.44e^{10}, β_2 equals 7.72e^{-3}, and β_0 is -1.27e^{9}:

Dynamic Model 2: $\Delta Y_t = -1.27\text{e}\text{\^{}}9 + 9.44\text{e}\text{\^{}}10X_t + 7.72\text{e}\text{\^{}}(-3)Y_{t-1} + e_t$

The model is then interpreted as: a one-unit increase in 1-Yr. expected inflation, increases the change in the dollar value of the Bitcoin by 9.44e^{10} units. Our lagged change in volume variable is interpreted as: if there's a one-unit increase in the last period's volume change, then the expected effect on the next period's volume change is an increase of 0.00772 dollars. This is a small effect on the dependent variable, and it is not statistically significant. The results captured a high p value of 0.941 and a negative adjusted R-Squared value. Again, these results show no level of statistical significance, and many control variables are not considered. Therefore, it is important to take these results as possible connections between the variables and not exact approximations.

Table 3 exhibits the regression results for model 3 and dynamic model 3 where the models were converted into percentages. In model 3, β_1 takes on the value of 2.97834 and β_0 comes out to be 0.01986. Model 3 is then:

$$\textbf{Model 3: } \Delta \ln (Y_t) = 0.01986 + 2.97834\, X_t + e_t$$

Model 3 can then be interpreted as: a percent increase in 1-Yr. expected inflation triggers almost a 3% increase in the Bitcoin volume. Again, we see a very small, adjusted R-squared value and a very high p value. The results indicate no level of significance for our independent variable in this model.

For dynamic model 3, β_1 came out to be 2.05384, β_2 came out to be -0.2899, and intercept parameter β_0 is 0.05466. Dynamic model 3 then shows up as:

$$\textbf{Dynamic Model 3: } \Delta \ln (Y_t) = 0.05466 + 2.05384 X_t + -0.2899 Y_{t-1} + e_t$$

The first independent variable is interpreted as: with a one percent increase in 1-Yr. inflation expectations, it is expected that the change in volume will increase by approximately 2%. The results from dynamic model 3 present no statistical significance for the inflation variable X_1, and with a high p value. It does, however, present a statistically significant Y_{t-1} variable. The lagged changed in log volume variable is statistically significant at about the 1% level. This part of the model can be expressed as: a one percent increase in last periods volume is leading us to anticipate a decline of the volume of Bitcoin by roughly 0.3% in the next period. The results indicate a negative statistical relationship between these variables and show a low p value. They also exhibit a low adjusted R-Squared value, but not as tiny as previous R-Squared values observed from last regressions.

Figure 4.0 shows the original month average 24-hour Bitcoin volume plotted over time. The illustration suggests a positive sloping graph with times of extreme volatility. Figure 4.1

shows the change in log volume plotted over time. This graph exhibits a much more stationary line of data across time. It seems to exemplify that there is some predictive power of dynamic model 3, whereas model 1 the data seems to be harder in determining what's next for the Bitcoin volume.

Table 4 shows the estimated probit model that was constructed from questions 1, 3 and 4 of the survey. The first dummy variable that codes for a participant being either male or female took on a coefficient value of 0.7676. It is indeed a positive value and more importantly, presents itself to be statistically significant at about the 1% level. This suggests that more male participants answered yes to trading Bitcoin, or any other cryptocurrency than females holding fixed their inflation concerns. The estimates displayed in Table 4 for dummy variables 1-3 show some positive and some negative coefficients, but none that are statistically significant. It was interesting to observe that the second dummy variable that coded for being extremely concerned about inflation came out to have a positive coefficient of 0.1022. This would propose that if a person were extremely concerned about inflation, this would increase the chances of them engaging in the crypto market. Nevertheless, it is not statistically significant.

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SURVEY QUESTIONNAIRE RESULTS

The SurveyMonkey survey response tool indicates a total of 117 submitted responses. The typical time spent answering all nine questions was exactly one minute. A successful completion rate of 100% was recorded for every participant who opened and took the survey.

Question one asked *Have you ever traded/bought Bitcoin, ever, or any other cryptocurrency?* Figure 3.0 shows about 42% of the participants answered yes, and 58% answered no.

The second question asked *Do you currently hold any Bitcoin/cryptocurrency?* 34% of participants answered yes, while 66% of participants answered no.

The third question of the survey attempts to distinguish the number of male and female participants, which was listed as an optional question in the survey. Only three participants skipped this question. 62% of participants were male and 38% of participants were female.

The fourth question in the survey asked *How concerned are you about changes in consumer prices, or inflation?* 7% of participants were not at all concerned, 51% of participants were somewhat concerned, 30% of participants were very concerned, and 12% of participants were extremely concerned.

Question five asked *Have you ever traded cryptocurrencies to lower your exposure or risk of inflation in consumer prices?* A low 17% of participants answered yes and a high 83% of participants said no.

The sixth question asks participants which of the following do they believe is most associated with Bitcoin, or cryptocurrencies: Gold, Gambling, Money, or Security. 9% of participants said gold, 43% answered gambling, 34% said money, and 14% answered security.

Question seven was the second optional question in the survey that asked about the ages of the participants. 24% of the participants were between the ages of 18-21. Most of the participants were between the ages of 22-25, which accounted for 41% of them. 13% of participants were between the ages of 26-29 and 22% of participants were 30 or older. Only one person skipped this question.

The eighth question asked *Would you ever agree to being compensated with bitcoin (instead of dollars) from your employer?* 32% of participants said yes, they would, and 68% of them answered no.

The last question in the survey asked participants *Would you feel comfortable investing into stock from a company that accepts bitcoin as a form of payment?* 65% of total participants answered yes and 35% of them answered no.

HEADING 7

CONCLUSIONS

It is understood that moderate inflation is healthy for a country's economy. In fact, the U.S. Federal Reserve aims at increasing inflation at around 2% every year. Inflation helps in encouraging consumer demand. When a country's consumption levels increase, it helps stimulate economic growth. In turn, investors must find different ways to protect themselves during times of inflation spikes. In this research, we investigated how people view cryptocurrencies – such as the Bitcoin – as an investment tool. For example, some people may view cryptocurrencies like gold or other traditional assets, while others may view them as "bubble" assets with no intrinsic value. In either case, blockchain technology and cryptocurrencies are now a part of financial markets and institutions. Getting familiar with the behaviors of these digital asset coins is becoming essential.

In this study, no statistical significance was observed for the 1-Yr. expected inflation variable in any of the models. I will fail to reject the null hypothesis of inflation having no effect on the dollar value of the Bitcoin volume. I will fail to reject this null hypothesis of inflation having no effect on the dependent variable for all dynamic models as well. No connection was found in any of the original models that movements in inflation are linked to the dollar value of the Bitcoin volume. I conclude that a lot of the action going on in these crypto markets does not seem to be bouncing around because of inflation expectations and so, inflation hedging is not the primary driver in these markets. Hence, inflation proved to not be a very good factor in justifying Bitcoin trading activity in this study. This conclusion does, however, go hand in hand with conclusions drawn from the conducted survey in this study.

The results from question one of the surveys came out to be the most evenly distributed amongst all the other questions. This reflects how popular digital asset coins like the Bitcoin have become in less than a decade. It goes on to show how almost half of a population has had some experience with trading cryptocurrencies. Although it does not prove crypto investors had any strategic effort to buy during times of inflation or recession, it does prove that investors find some type of benefit or value in trading cryptocurrencies. Moreover, a notable increase in the answer no from the first question to the second suggests that investors are not comfortable with the idea of holding cryptocurrencies for the long-term. This suggests that making a quick buck is most likely to be the thought process of today's crypto investor.

Question five of the survey reveals the stance that investors in this population have on using cryptocurrencies as inflation hedgers. It was shocking to see that this question was the most unevenly distributed amongst all the questions and suggests that there are very minimal crypto investors using the Bitcoin or other cryptocurrencies to protect themselves from inflation. Especially, since question four tells us that the people in this population are fairly concerned about inflation. It was interesting to find out that participants do view the Bitcoin and other cryptocurrencies as a form of money, however, they associate these assets with gambling just a little more (Question 6). Thereby, giving the impression that a population today might think of the Bitcoin as a rolling the dice type of asset.

Our regression analysis for dynamic model 1 and dynamic model 3 showed up as having statistically significant results for the lagged variables. In dynamic model 1, a unit increase in the volume leads to an increase in the volume next period, holding fixed the value of the inflation variable. Therefore, I reject the null hypothesis of the lagged Bitcoin volume having no effect on

current Bitcoin volume. Moreover, dynamic model 3 reveals that an increase in last period's volume leads to a decrease in next period's Bitcoin volume, holding fixed the value of the inflation variable. I can reject the null hypothesis of the percent change in lagged volume having no effect on the percent change in current volume. Autoregression time series models are useful for prediction purposes. In this case, we discovered that the Bitcoin volume can possibly be predicted and forecasted with different econometrics methods, but it's important to note that these methods did not explain causality between the variables.

The probit model designed from the survey questionnaire adds value to the notion that investors are simply not thinking about inflation when partaking in cryptocurrency trading. The dummy variables based on question 4 of the survey that ask about a person's level of concern about inflation reveal no statistical significance in connection with trading cryptocurrencies. The probit model did, however, prove that being male increases the chances of participating in cryptocurrency trading in a statistically significant way. The results from survey question 3 do signify that more males participated in the survey than females, and it could be the case that males are more optimistic about making money trading crypto coins.

Although the inflation expectations data that was intercepted from the Federal Reserve bank of Cleveland website is well respected, one possible improvement for this experiment might be to consider other variations of the inflation variable. One possible variation is the interest rate spread, or the difference between long term and short-term interest rates. Some will say that a different measure of inflation expectations is contained within the difference of these rates. Other flaws within this experiment could be the fact that there is simply not enough

historical data on the Bitcoin's performance. The Bitcoin has only been around for roughly a decade and large fluctuations in inflation have not yet been experienced during its existence.

A possible error to consider within the survey analysis is the average time spent on the survey by participants. The average time came out to be one minute, which was a time shorter than anticipated. It could be possible that in the moment participants are sliding down the questions, instead of taking them step by step. Other room for improvement may include simply reaching out to more people due to sample selection bias. Meaning, that the people that are more likely to respond to the survey are those with some degree of experience and knowledge of the cryptocurrency market. 117 participants were also less than anticipated in terms of participation. Survey results may vary if an audience of over 1000 participants were to be reached.

Overall, it's clear that inflation hedging is not the primary driver in today's cryptocurrency markets. Cryptocurrencies are still fairly new to the world. People are still in a haze of what to think of them, and what role they will have in the future. The results in this research should be taken with circumspection due to the simplified version of the models. Discovering significant results for this analysis will require elaborate models with more factors to consider and time to elapse. However, it was evident that statistically significant connections between the dollar value of the Bitcoin volume and it's lagged values exist.

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FIGURES

Figure 1.0 – Annual Inflation Rate in U.S.

Figure 2.0 – Bitcoin Historical Performance

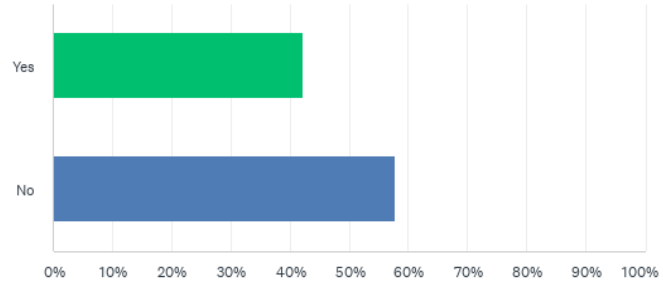

Figure 3.0 – Q1 Have you ever traded/bought Bitcoin, ever, or any other cryptocurrency?

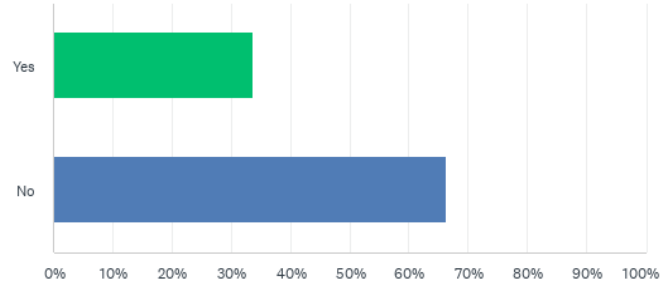

Figure 3.1 – Q2 Do you currently hold any Bitcoin/cryptocurrency?

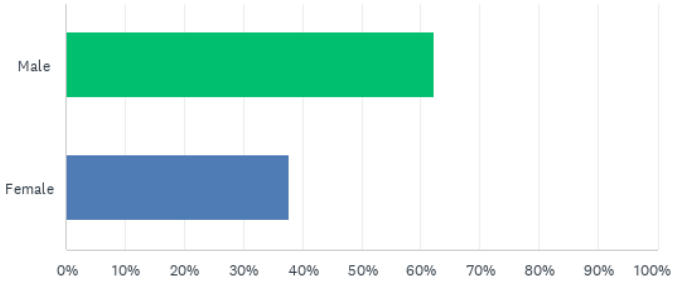

Figure 3.2 – Q3 What is your sex? (Optional)

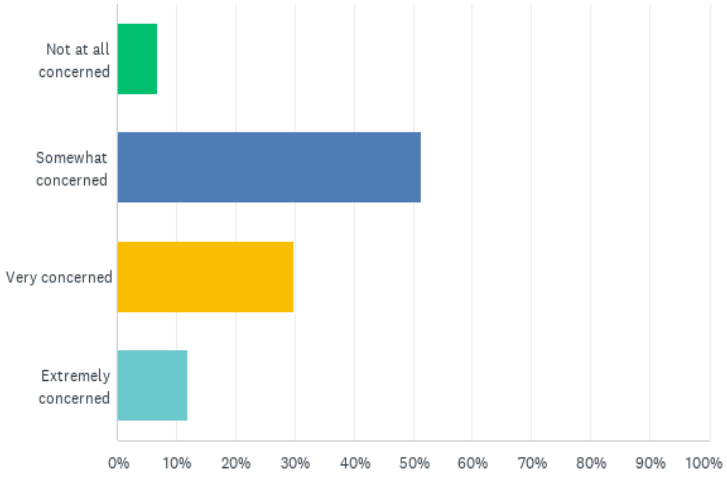

Figure 3.3 – Q4 How concerned are you about changes in consumer prices, or inflation?

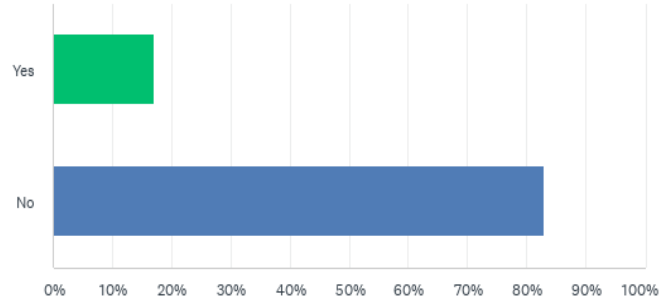

Figure 3.4 – Q5 Have you ever traded cryptocurrencies to lower your exposure or risk of inflation in consumer prices?

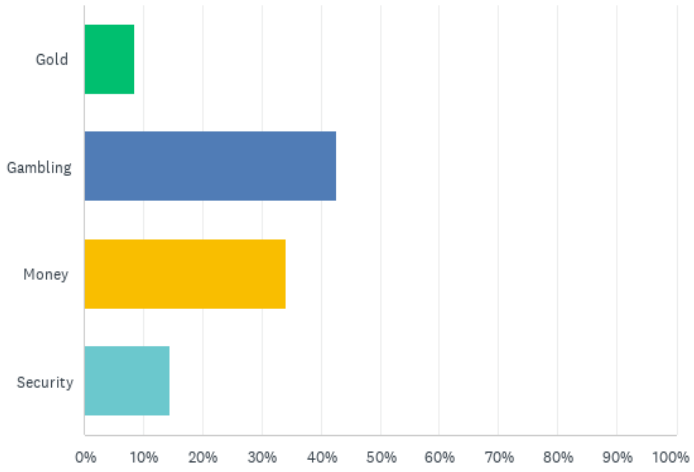

Figure 3.5 – Q6 Which of the following do you believe is most associated with Bitcoin, or cryptocurrencies?

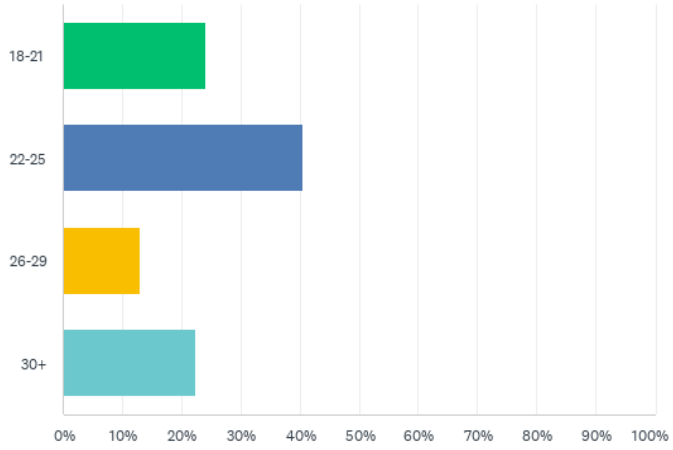

Figure 3.6 – Q7 What is your age? (Optional)

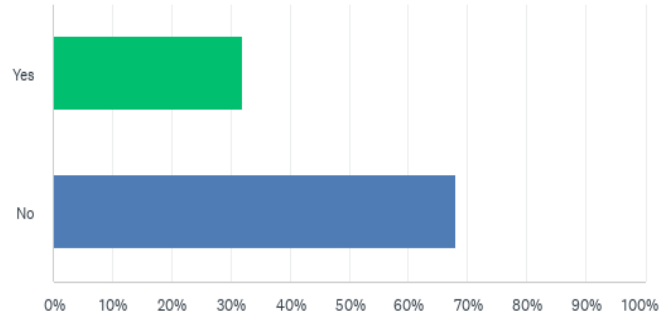

Figure 3.7 – Q8 Would you ever agree to being compensated with Bitcoin (instead of dollars) from your employer?

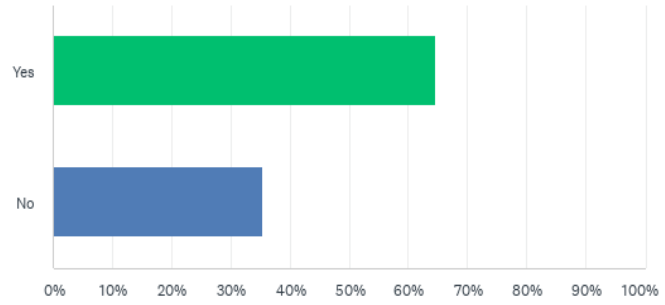

Figure 3.8 – Q9 Would you feel comfortable investing into a stock from a company that accepts Bitcoin as a form of payment?

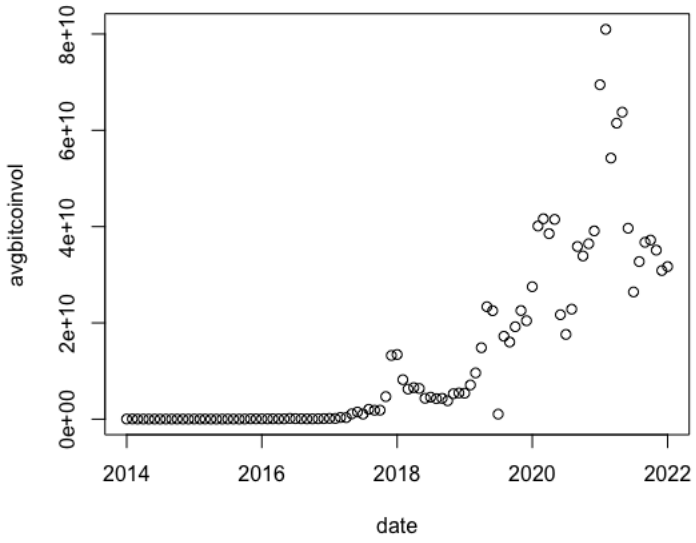

Figure 4.0 – Month average 24-hour Bitcoin volume plotted over time

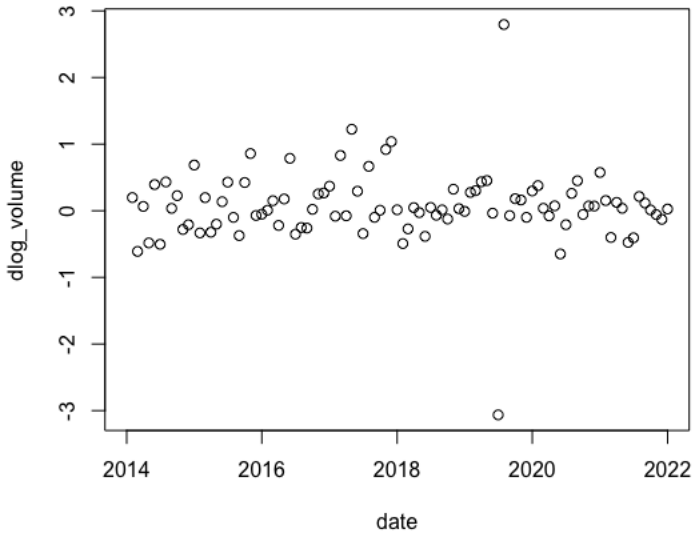

Figure 4.1 – Change in log volume plotted over time

TABLES

Table 1 – Model 1 and Dynamic Model 1 Regression Results

		Model 1	**Dynamic Model 1**
Statistic	**Variable**	**Volume**	**Volume**
	Inflation		
Coefficient		-1.019E+11	8.06E+10
Standard Error		3.797E+11	1.403E+11
t statistic		-0.268	0.575
p-value		0.7889	0.567
	Lagged Volume		
Coefficient			0.9341***
Standard Error			0.03809
t statistic			24.522
p-value			0
	Intercept	1.49E+10	-1.78E+08
	Standard Error	1.85E+10	6.82E+09
	Adjusted R Square	-0.00976	0.8633

Table 2 – Model 2 and Dynamic Model 2 Regression Results

		Model 2	**Dynamic Model 2**
Statistic	**Variable**	**Δ in Volume**	**Δ in Volume**
	Inflation		
Coefficient		9.37E+10	9.44E+10
Standard Error		1.416E+11	1.44E+11
t statistic		0.662	0.658
p-value		0.51	0.512
	Lagged Δ in Volume		
Coefficient			7.72E-03
Standard Error			1.04E-01
t statistic			0.074
p-value			0.941
	Intercept	-1.26E+09	-1.27E+09
	Standard Error	6.89E+09	6.97E+09
	Adjusted R Square	-0.005949	-0.01695

Table 3 – Model 2 and Dynamic Model 3 Regression Results

		Model 3	**Dynamic Model 3**
Statistic	**Variable**	**Δ in log (Volume)**	**Δ in log (Volume)**
	Inflation		
Coefficient		2.97834	2.05384
Standard Error		11.49117	11.12107
t statistic		0.259	0.185
p-value		0.796	0.85389
	Lagged Δ in log (Volume)		
Coefficient			-0.2899**
Standard Error			0.09976
t statistic			-2.906
p-value			0.00459
	Intercept	0.01986	0.05466
	Standard Error	0.5594	0.541
	Adjusted R Square	-0.009917	0.06485

Table 4 – Probit Model Regression Results

Statistic	Variable	Y (dependent)
	Dummy 1 (Male or female)	
Coefficient		0.7676**
Standard Error		0.2695
t statistic		2.848
p-value		0.0044
	Dummy 2 (Extremely concerned)	
Coefficient		0.1022
Standard Error		0.5808
t statistic		0.176
p-value		0.8604
	Dummy 3 (Very concerned)	
Coefficient		-0.376
Standard Error		0.5086
t statistic		-0.739
p-value		0.4598
	Dummy 4 (Somewhat concerned)	
Coefficient		-0.4065
Standard Error		0.4905
t statistic		-0.829
p-value		0.4073
	Intercept	-0.3838
	Standard Error	N/A
	Adjusted R Square	N/A

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Major Professor: Dr. Scott Gilbert