The Association of Cryptocurrency and the Use of Alternative Financial Services

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Abstract

Alternative financial services (AFS) have been studied in recent years in terms of how these financial markets are utilized. The products and services include check cashing, pawnshop loans, payday advance loans, electronic cash transmissions, tax refund anticipation arrangements, rent-to-own contracts, prepaid debit cards, gift cards, and loans collateralized by automobile titles. Cryptocurrency has become part of this AFS ecology. The 2023 Survey of Household Economics and Decisionmaking collected information on AFS use, including the use of cryptocurrency as an AFS. This research answered the questions: (a) Do users of cryptocurrencies for AFS also tend to use them for investments; (b) do users of cryptocurrencies to make payments tend to use them for other AFS purposes, and (c) do users of cryptocurrencies to send money to friends and family tend to use them for other AFS purposes?

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Introduction

The rate at which households are considered banked, that is, having access to traditional financial services such as savings and checking accounts, has steadily increased in the United States from 2011 to 2021 (Federal Deposit Insurance Corporation, 2021). The increase was from 91.8% to 95.5% of households banked. There are still unbanked households. Underbanked households also exist, with some access to but not full use of traditional sources of savings, investments, payment methods, and credit (Birkenmaier & Fu, 2023). The unbanked and underbanked use alternative financial services that are generally less efficient, harder to access, and more expensive than traditional services from banks, credit unions, and other financial institutions (CFPB 2016). Since almost 5% of U.S. households face these challenges, it is interesting to understand their use of cryptocurrencies as alternative financial instruments in services and as investments.

Alternative financial services (AFS) have been studied in recent years regarding how these financial markets are utilized (Barcellos & Zamarro, 2021; Birkenmaier & Fu, 2023; Fan et al., 2024). The products and services include check cashing, pawnshop loans, payday advance loans, electronic cash transmissions, tax refund anticipation arrangements, rent-to-own contracts, prepaid debit cards, gift cards, and loans collateralized by automobile titles (CFPB 2016).

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Cryptocurrency has become part of this AFS ecology (Board of Governors of the Federal Reserve System, 2022). For background on the alternative financial service providers before cryptocurrency use, see Prager's 2014 article "Determinants of the Locations of Alternative Financial Service Providers."

Investing in cryptocurrency has two distinct sets of market participants. Investment professionals, both institutional and sophisticated individuals, use cryptocurrency as an alternative asset class as a portfolio enhancement to hedge against currency volatility, stock market risk, geopolitical instability, and global economic policy stratification (Almeida & Gonçalves, 2023). The other set of participants consists of individual investors acting more as gamblers (or speculators) attempting to anticipate where the other investors will peg their prices either in a rising market or a downward-trending environment, thus potentially profiting from the movement of the cryptocurrency market prices (Roza et al., 2023). The cryptocurrency market capitalization exceeds $1.5 trillion, with over 14,000 separate coins tracked that are available through over 1,000 exchanges worldwide, providing ample room for trading (CoinGecko, 2024).

Cryptocurrency investing activity exists both in traditional financial service institutions and in an ecosystem that is an alternative to mainstream investment services. Important to the growth of cryptocurrency as an investment (as well as other uses) is the access provided to the public with the creation of crypto exchanges. These are businesses that facilitate exchanging fiat currencies for cryptocurrencies, where anyone can open an account, deposit dollars, buy cryptocurrency, and do the reverse. Exchanges allow trade against other cryptocurrencies and fiat currencies, such as the dollar or yen. Fees range from .1% to .5% of transactions. Traditional brokerage firms also now provide these services (Giudici et al., 2020). The retail public can also access cryptocurrency through ATMs and other kiosk-type arrangements, paying either a fee (generally 1%) or purchasing at rates higher than exchange rates to incorporate a fee (Brown, 2023).

Hypotheses

Using 2022 data from the Survey of Household Economics and Decisionmaking we formulate the following hypotheses:

> H_1. Holding cryptocurrencies as an investment is positively associated with using other AFSs.
>
> H_2. Using cryptocurrencies to make payments is positively associated with using other AFSs.
>
> H_3. Using cryptocurrencies to send money to friends or family is positively associated with using other AFSs.

By exploring these hypotheses, pathways toward increasing access to financial services for banked and underbanked households can be supported through policy decisions and financial institution actions. This understanding will assist in relieving some of the economic burden felt by those having to use AFS services and products because of current barriers and behaviors. Similarly, greater coherence in the investment use of cryptocurrency could be the result of understanding the potentially suboptimal investment decisions (Kim et al., 2023).

The Use of Cryptocurrency as an AFS

Cryptocurrency has several attributes that make it a compelling alternative financial services product. First, cryptocurrency allows for transaction privacy (Houy et al., 2024). Privacy is possible because the value represented by the cryptocurrency is stored on a decentralized ledger, generally a blockchain, without identifiable ownership data. This storage unit is called a wallet. Value is transferred via anonymous instructions to transfer value from the sender's wallet to the receiver's. A second reason cryptocurrency is used is its perceived safety, provided the user selects a safe option suitable to their needs (Houy et al., 2024). Third, transferring value is fast and inexpensive. Fourth, cryptocurrency is not part of the traditional banking system and is thus more acceptable to those distrusting banks and bank regulators. For these and other reasons, cryptocurrency may be the financial instrument of choice for both the

sender and receiver, including for illegal transactions such as money laundering (Wronka, 2022).

Besides direct transfers of cryptocurrency between senders and receivers, cryptocurrency can be used via an intermediated transaction, such as buying an Amazon gift card with cryptocurrency, which can then be used exclusively at Amazon online for purchases. Amazon does not accept cryptocurrencies directly, but this method is essentially the same. Services such as Coinsbee.com provide this service for Amazon and many other retailers, as well as prepaid MasterCard and Visa cards (Coinsbee, 2024). Coinsbee.com will sell you a Hotels.com gift card if you want to book a hotel stay. Buy a DoorDash card to pay for your late-night meal delivery. Exchanges are available where people can buy and sell cryptocurrencies using fiat currencies such as the U.S. dollar.

Behavioral Finance Aspects of the Use of Cryptocurrencies as an AFS and Investment

Using cryptocurrency as an alternative to traditional financial instruments may be a logical, efficient, and effective transaction method and investment instrument. It also may be used based on sub-optimal decisionmaking due to behavioral finance factors. These factors describe potentially irrational financial decisions. For example, one reason for using cryptocurrency is distrust of banks (Board of Governors, 2022). If the distrust is without rational support, perhaps this decision to use cryptocurrency is irrational, and thus, the behavior of using cryptocurrency for transactions is suboptimal. Since people are generally loss-averse, a behavioral finance concept, this distrust may be based on that behavioral finance factor (Sokol-Hessner & Rutledge, 2018). The lived experiences of the unbanked and underbanked households include high overdraft fees at traditional banks. Having had to pay these fees creates avoidance behaviors that result in utilizing these AFSs even if traditional services are available (Dlugosz et al., 2021). Yes, the distrust of banks may be rational, perhaps experientially based, so it is essential not to be rash when declaring irrationality.

Herding behavior is a behavioral finance concept prevalent in investing in and using cryptocurrencies (Omane-Adjepong et al., 2021). Herding is when a person follows the crowd, taking cues from others, with no leader necessary. One reason for herding is a natural tendency to fear missing out, sometimes made into the acronym FOMO. Media attention on cryptocurrencies is intense and constant, with thirty or more articles published daily being common (Lee & Jeong, 2023). This attention attracts new participants in this market, both cryptocurrency investors and users of cryptocurrencies as an AFS.

The entry of new investors, likely less informed, coupled with the information and misinformation in the media reports, contributes to the volatility of cryptocurrency markets (Lee & Jeong, 2023). In auction markets like cryptocurrency exchanges, good news drives prices higher than fundamentals suggest, while bad news has the opposite effect. This mispricing can be attributed to behavioral finance factors such as overconfidence, recency bias, anchoring, confirmation bias, disposition effect, loss aversion, and risk aversion (Thampanya et al., 2020). Media attention can trigger another emotional response that may drive irrational behavior: narrative influence. This is a powerful influence associated with storytelling. The stories in the media encompass not only what the market is doing in terms of pricing but also the personal stories of individual winners and losers. This type of information can affect the readers' emotions and result in sub-optimal decisionmaking (Shaffer et al., 2018). Confirmation bias, where a person pays attention only to the stories that fit with their current beliefs, can lead them to make financial decisions without considering all the alternatives and consequences.

Behavioral Finance and Literacy

Financial literacy is an important variable regarding behavioral finance results. There is much discussion on how to measure financial literacy, including questions to be asked, the number of questions needed for a valid answer, and the saliency of the questions in context, among others (Ouachani et al., 2021). The SHED study used what is commonly called The Big Three questionnaire developed in 2008 (Lusardi & Mitchell, 2014) and used by many large group

studies (Ouachani et al., 2021). Financial literacy is positively correlated with financial decisions in that the more literate the individual is, the better their decisions. Better decision-making was based on more rational considerations, while worse decisions were based on less rational behaviors (Kumari, 2020). In other words, the more literate individuals were less susceptible to the behavioral finance concepts that would lead them to less optimal financial decisions.

Risk Tolerance

The volatility of cryptocurrency is high compared to many other investments (Baur & Dimpfl, 2021), so by definition, it is risky, with risk being deviance from the mean. As an asset, price fluctuations are affected by size premium, attention-driven overreaction momentum, and familiarity (Liu et al., 2022). It would seem, then, that risk tolerance, that is, an individual's susceptibility to making decisions during volatility downwards, would play a large role in participation in cryptocurrency as an investment.

Risk tolerance is measured in many ways, from self-reported (willingness to take the risk) to objective and subjective lengthy questionnaires (Omanovic & Zaimovic, 2024). Risk tolerance measurements are designed to understand how an individual views risk and risk's potentiality. Three categories of measuring instruments are prevalent: a) propensity measures, b) stated preferences, and c) revealed preferences, with all three having validated results. (Eun & Grable, 2024). However, due to behavioral finance concepts such as loss aversion, emotional responses, overconfidence, confirmation bias, recency bias, and others, what people confirm a priori is not constant with actual decisions when losses mount, or gains are excessive (Guillemette & Finke, 2014). The SHED study used self-reporting for stated preferences.

To mitigate the effects of behavioral finance factors on decisionmaking, an individual needs to take proactive steps to understand their risk perception and identify biases they may have, such as overconfidence and anchoring. This can be done through education (financial literacy) and consulting with professional financial advisors (coaching) (Almansour et al., 2023). Formal coursework has been shown to reduce behaviors such as the disposition effect, which is the tendency to hold losing investments too long and sell winning investments too early (Paraboni & da Costa, 2021).

Relationship Between AFS Use and Cryptocurrency

To discuss the relationship between the use of AFS and the use of cryptocurrency in any manner requires a dissection of the reasons people use AFS in the first place. Then, it is possible to associate the perceived benefits of cryptocurrency with the current uses of AFS. Traditional financial products and services have several drawbacks for the unbanked and underbanked, making AFSs more attractive. First, there may not be traditional banks physically or virtually convenient to the person. A prepaid debit card can be purchased and used in many locations at many times of the day or night, if not constantly. Second, the person may not be able to carry the minimum balance required at a bank for an ATM/Debit card. The person can deposit to a prepaid card when possible and carry a zero balance until they have cash. Third, the traditional payment systems contain lags that inconvenience those needing immediate access to their paychecks, thus check-cashing services. This is also true for others who need money now but will not be paid for work until next week, thus payday loans. Waiting for a tax refund may not be acceptable, so the refund anticipation loan scheme exists. It is likely that except for those transactions where the counterparty requires cryptocurrency, these AFS users will not be cryptocurrency users either for transactions or investments. They don't have money to invest, and their current AFS use is working for them. (Carmona, 2022).

Another narrative regarding AFS use is not based on inconvenience or lack of wherewithal. Instead, there is a cohort that uses AFS because, for some, many, or all transactions, they do not want to use traditional providers and instruments. Some people do not trust banks for various reasons. Others may want to avoid banks, not out of distrust, but perhaps to avoid reporting requirements or paper trails. Cryptocurrency may be an added means for transactions and investing in this case due to the privacy available and

perceived efficiency in terms of speed and cost of the transaction. Investment may be due to either intellectually sound investment allocation purposes or speculation aspects that appeal to those interested in quick wealth accumulation (Houy et al., 2024). Combining the elements of a person already disposed to using AFS for transactions with the potential investment gains, it is reasonable to consider that a person would hold wealth in cryptocurrency and use it as needed as an AFS, similar to a stock portfolio occasionally partially liquidated into their checking account for spending.

Methods

Data

This paper uses data from 2022 Survey of Household Economics and Decisionmaking (SHED). SHED is a nationally representative, when properly weighted, survey conducted by the Federal Reserve Board which measures the economic well-being of U.S. households and can help identify potential risks to their finances. We used the 2022 wave due to a more robust set of questions surveying cryptocurrencies compared to older waves of the survey. However, this limited the scope of the survey to just a cross-section. Future research would benefit from exploring longitudinal data spanning several future waves of SHED to observe how the association of cryptocurrency adoption is associated with the use of existing Alternative Financial Services over time. The full sample of the 2022 survey has a total of 11,667 respondents, of which our analysis included 9,326 respondents. Table 1 shows the summary statistics for five demographic control variables for both the full sample and our analysis sample. A two-sample T-test does show statistically significant differences between our analysis sample and the full sample. Notably, our analysis sample has more respondents who report being: male, married, white, having a four-year degree, and an older age.

Table 1. Summary Statistics for 2022 Survey of Household Decisionmaking and Analysis Samples

	2022 SHED Full Sample		Analysis Sample	
	Mean	*SE*	*Mean*	*SE*
Female	0.4892	0.0046	0.4700	0.0051**
Married	0.5771	0.0045	0.6047	0.0050 ***
White	0.6908	0.0042	0.7066	0.0047 **
Four-Year Degree	0.4304	0.0045	0.4529	0.0021***
Age	51.9671	0.1626	52.823	0.1772 ***

*Note: N of 11,667 for SHED sample & 9,326 for Analysis Sample. Samples are weighted using weights provided by the SHED. Two-Sample T-test: ** denotes statistical difference from the SHED sample mean at the 5% level of significance. *** denotes statistical difference from the SHED sample mean at the 1% level of significance. "SE" denotes Standard Error.*

Starting with a full sample of 11,667 respondents, observations were dropped for missing or incomplete responses to survey questions that were used in the model. Specifically, observations were dropped from such responses to: "What is the approximate total amount of your household's savings and investments?" (1,841 dropped), and "Where do you think your credit score falls?" (500 dropped). This left us with an analysis sample of 9,326 observations. Table 2 shows descriptive statistics for our analysis sample. In our analysis sample, only about 8.7%, 811 respondents, report holding cryptocurrency as an investment. While about 1.4%, 129 respondents, report using cryptocurrency to make a purchase and about 1.3%, 118 respondents, report using cryptocurrency to send money to friends or family. These numbers illustrate the significant difference in adoption of cryptocurrency as an alternative to conventional financial infrastructure. About 96.6% of respondents report having a checking/savings/ or money market account.

However, cryptocurrency adoption seems to be somewhat comparable to other Alternative Financial Services. About 7.7% of respondents in our analysis sample have purchased a money order from a service provided that wasn't a bank.

About 5% of respondents have cashed a check from a service provider that wasn't a bank. About 2.2% of respondents have taken out a payday loan, about 1.6% have taken out a pawnshop or auto title loan, about 0.8% have obtained a cash advance on their tax-refund and about 9.6% have paid an overdraft fee on a bank account. Appendix A contains a table detailing each variable and how they were constructed.

Table 2. Descriptive Statistics of Explanatory Variables - Analysis Samples

	Mean	***SE***
Bought or Held Cryptocurrency as an Investment	0.08696	0.0029
Used Cryptocurrency to Make a Purchase	0.0138	0.0012
Used Cryptocurrency to Send Money	0.0127	0.0012
Has a Checking/Savings/Money Market Account	0.9661	0.0019
Purchased Money Order Outside of Bank	0.0772	0.0028
Cashed Check Outside of Bank	0.0507	0.0023
Taken Out a Payday Loan	0.0216	0.0015
Taken Out a Pawnshop/Title Loan	0.0157	0.0013
Obtained a Tax Refund Advance	0.0080	0.0009
Paid an Overdraft Fee on a Bank Account	0.0959	0.0031
Willing to take Financial Risk		
0 - Not At All	0.1629	0.0038
1	0.0587	0.0024
2	0.0833	0.0029
3	0.1092	0.0032
4	0.0937	0.0030
5	0.1855	0.0040
6	0.1047	0.0032
7	0.1079	0.0032
8	0.0579	0.0024
9	0.0123	0.0011
10 – Very Willing	0.0240	0.0015
Race/Ethnicity		
White, Non-Hispanic	0.7066	0.0047
Black, Non-Hispanic	0.0986	0.0031
Other, Non-Hispanic	0.0455	0.0022
Hispanic	0.1189	0.0033
Two or More Races, Non-Hispanic	0.0303	0.0018
Female	0.4701	0.0052
Married	0.6048	0.0051
Total Savings & Investments		

Under $50,000	0.4175	0.0051
$50,000 - $99,999	0.1284	0.0035
$100,000 - $249,999	0.1403	0.0036
$250,000 - $499,999	0.1050	0.0032
$500,000 - $999,999	0.0967	0.0031
$1,000,000 or more	0.1122	0.0033
Where do You Think Your Credit Score Falls?		
Very Poor	0.0272	0.0017
Poor	0.0454	0.0022
Fair	0.1067	0.0032
Good	0.2351	0.0042
Excellent	0.5856	0.0051
Educational Attainment		
Less than High School	0.0390	0.0019
High School Diploma	0.1885	0.0039
Some College	0.3195	0.0047
Bachelor's Degree	0.4529	0.0051
Report At Doing Least Okay Financially	0.7596	0.0044
Number of Financial Literacy Questions Answered Correctly		
0	0.0714	0.0027
1	0.1327	0.0035
2	0.2630	0.0046
3	0.5328	0.0052
Employed	0.6262	0.0050
Age	52.8235	0.1771

Note: N of 9,326. Sample is weighted using weights provided by the 2022 Survey of Household Decision Making. "SE" denotes Standard Error.

Dependent Variables

The dependent variables used in our model are variables that ask the respondent about their use or ownership of cryptocurrency in the previous twelve months. First, survey question "S16_a" is a dichotomous variable that asks the question, "In the past year, have you done the following with cryptocurrency, such as Bitcoin or Ethereum? (Bought or Held as an investment.)" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0. Our second dependent variable is survey question "S16_b" which asks, "In the past year, have you done the following with cryptocurrency, such as Bitcoin or Ethereum? (Used to buy something or make a payment.)" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0.

Our final dependent variable is survey question "S16_c" which asks, "In the past year, have you done the following with cryptocurrency, such as Bitcoin or Ethereum? (Used to send money to friends or family.)" Likewise, responses of Yes are coded as a 1, while responses of "No" are coded as a 0.

Explanatory Variables

The explanatory variables consist of several variables that capture the effects of other Alternative Financial Services as well as several variables that control for other effects that may otherwise impact the association of holding cryptocurrencies and the use of AFSs.

- Survey question "BK1" asks the respondent, "Do you (and/or your spouse or partner) have a checking, savings, or money market account.)" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0.
- Survey question "BK2_a" asks the respondent, "In the past 12 months, did you (and or your spouse or partner) purchase a money order from a place other than a bank?" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0.
- Survey question "BK2_b" asks the respondent, "In the past 12 months, did you (and or your spouse or partner) cash a check at a place other than a bank?" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0.
- Survey question "BK2_c" asks the respondent, "In the past 12 months, did you (and or your spouse or partner) Take out a payday loan or payday advance?" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0.
- Survey question "BK2_d" asks the respondent, "In the past 12 months, did you (and or your spouse or partner) Take out a pawnshop loan or an auto title loan?" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0.
- Survey question "BK2_e" asks the respondent, "In the past 12 months, did you (and or your spouse or partner) obtain a tax refund advance to receive your refund faster?" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0.
- Survey question "BK2_f" asks the respondent, "In the past 12 months, did you (and or your spouse or partner) pay an overdraft fee on a bank account?" Responses of Yes are coded as a 1, while responses of "No" are coded as a 0.
- Survey question "FL0" is included in the model to proxy for the respondent's risk tolerance. FL0 is an ordinary variable ranging from 0 to 10. The question asks, "On a scale of zero to ten, where zero is not at all willing to take risk and ten is very willing to take risks, what number would you be on the scale?"
- Survey question "ppethm" is a categorical variable that asks the respondent to provide their self-reported "Race/Ethnicity". We include this in our model as a proxy to control for the cultural effects that differences in race and ethnicity may have on the adoption of cryptocurrency. Respondents can answer 1 for " White, Non-Hispanic", 2 for "Black, Non-Hispanic", 3 for "Other, Non-Hispanic", 4 for "Hispanic", or 5 for "2+ Races, Non-Hispanic".
- Survey question "ppgender" is a dichotomous variable that asks the respondent to self-report their gender. Respondents can answer 1 for "Male" or 2 for "Female". We recode this variable as 0 for "Male" respondents and 1 for "Female" respondents.
- Survey question "ppmarit5" is an ordinal variable ranging from 1 to 5. Respondents can answer 1 for "Now Married", 2 for "Widowed", 3 for "Divorced", 4 for "Separated", or 5 for "Never Married". We recoded this variable as 0 for responses 2, 3, 4, or 5. This resulted in a dichotomous variable where a value of 0 is not married and 1 is married.
- Survey question "pps0596" is an ordinal variable where respondents are asked to self-report their savings and investments on a range from 1 to 7. Respondents can answer 1 for "Less than $50,000", 2 for "$50,000 to $99,999", 3 for "$100,000 to $249,999" 4 for "$250,000 to $499,999", 5 for "$500,000 to $999,999", 6 for "$1,000,000 or more" or 7 for "Not Sure".

Responses of 7 are dropped from the sample.

- Survey question "ppfs1482" is an ordinal variable that asks the respondent to self-report where they think their credit score falls on a range from 1 to 6. Respondents can answer 1 for "very Poor", 2 for "Poor", 3 for "Fair", 4 for "Good", 5 for "Excellent", 6 for Don't Know". Responses of 6 are dropped from the sample.
- Survey question "educ_4cat" is an ordinal variable that asks the respondent to self-report their level of educational attainment. Respondents can answer 1 for "Less than a high school degree", 2 for "High school degree or GED", 3 for "Some college/technical or associate's degree", or 4 for "Bachelor's degree or more".
- Survey question "at_least_okay" is a dichotomous variable that asks the respondent to self-report their subjective financial wellbeing. The respondent can answer 1 for "Yes" or 0 for "No".

SHED includes three questions about basic financial concepts. "FL2" asks the question, "Do you think the following statement is true or false? 'Buying a single company's stock usually provides a safer return than a stock mutual fund.'" The respondent can answer 1 for "True", 2 for "False", or -2 for "Don't Know." "FL4" asks the question "Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?" the respondent can answer 1 for "More than today", 2 for "Exactly the same", or 3 for "Less than today." "FL5" asks the respondent "Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?" the respondent can answer 1 for "More than $102", 2 for "Exactly $102", 3 for "Less than $102" or -2 for "Don't Know". Using these three questions, we construct an ordinal variable that measures the respondent's total number of correct answers for all the financial literacy questions above (FL2, FL4, FL5). This variable is 0 if the respondent answered 0 questions correct, 7.14% of respondents, 1 if the respondent answered 1 question correctly, 13.27% of respondents, 2 if the respondent answered 2 questions correctly, 26.3% of respondents, and 3 if the respondent answered all three questions correctly, 53.28% of respondents.

Survey question "ppemploy" is an ordinal variable that asks the respondent to report their current employment status. Respondents can answer 1 for "Working full-time", 2 for "Working part-time", or 3 for "Not Working". We create a dichotomous variable that is coded as 1 if the respondent reported 1 on ppemoly and 0 otherwise.

Survey question "ppage" is a continuous variable that allows the respondent to enter current age.

Model

This paper examines the association between the use of alternative financial services and the intention of holding or using cryptocurrency for: investment purposes, making payments, and for using to send to friends or family. To accomplish this, we use three separate logistical regression analyses; the three resulting models are as follow:

$$I_i = \alpha_0 + \alpha_1 AFS_i + \alpha_k X_i + \varepsilon_i \quad [1.1]$$

$$P_i = \beta_0 + \beta_1 AFS_i + \beta_k X_i + \theta_i \quad [1.2]$$

$$R_i = \gamma_0 + \gamma_1 AFS_i + \gamma_k X_i + \lambda_i \quad [1.3]$$

$$I_i = \begin{cases} 1 \text{ if } I_i\ 1 > 0 \\ 0 \text{ if } I \leq 0 \end{cases}$$

$$P_i = \begin{cases} 1 \text{ if } P_i > 0 \\ 0 \text{ if } P_i \leq 0 \end{cases}$$

$$R_i = \begin{cases} 1 \text{ if } R_i > 0 \\ 0 \text{ if } R_i \leq 0 \end{cases}$$

where the latent variable, I_i; is the unobserved net benefit of holding cryptocurrency as an investment for individual i. The variable I_i is the observed dichotomous decision of individual i to hold cryptocurrency as an investment. Likewise, the latent variable, P_i; is the unobserved net benefit of using cryptocurrency to buy something or make a payment for individual i. The variable P_i is the observed dichotomous decision of individual i to use cryptocurrency to buy

something or make a payment, for individual i. The latent variable, R_i; is the unobserved net benefit of using cryptocurrency to send money to friends or family for individual i. The variable P_i is the observed dichotomous decision of individual i to use cryptocurrency to send money to friends or family, for individual i.

AFS is a matrix of the seven variables that indicate the use of alternative financial services. These variables include having a bank account, purchasing money orders from places other than a bank, cash check at places other than a bank, use of a payday loan, use of a pawnshop or title loan, use of a tax refund advance, and pay overdraft fees on a bank account. X is a matrix of other explanatory variables, which include financial literacy, credit score, risk tolerance, subjective financial wellbeing, marital status, employment status, total wealth, education, age, ethnicity, and gender.

For model 1.1, α_1 is a vector of parameters to be estimated for key explanatory variables, AFS, and α_k is a vector of parameters to be estimated for the other explanatory variables. The error term ε_i follows a normal distribution. Likewise, in model 1.2, β_1 is a vector of parameters to be estimated for key explanatory variables, AFS, and β_k is a vector of parameters to be estimated for the other explanatory variables. The error term θ_i follows a normal distribution. In model 1.3, γ_1 is a vector of parameters to be estimated for key explanatory variables, AFS, and γ_k is a vector of parameters to be estimated for the other explanatory variables. The error term λ_i follows a normal distribution. For each model, marginal effects are estimated to show associations between the explanatory variables and the observed dependent variables.

Results

This paper provides empirical evidence on how the adoption of cryptocurrency, or investment therein, is associated with using other AFSs. Table 3 summarizes the marginal effects for each logistical regression model.

Holding Cryptocurrencies as an Investment

Our results show that holding cryptocurrencies as an investment is associated with using other AFSs. Individuals who reported holding cryptocurrencies as an investment over the last 12 months had a 2.68 percent higher probability of having purchased a money order from a source other than a bank during the same duration of time than those who did not. Individuals who held cryptocurrencies as an investment also had a 3.33 percent higher probability of having taken out a payday loan in the last 12 months. Likewise, individuals who invested in cryptocurrencies also had a 4.2 percent higher probability of taking out a pawnshop or auto title loan in the last 12 months than those who did not hold cryptocurrencies as an investment. Holding cryptocurrencies as an investment was also associated with a 3.82 percent higher probability of having paid an overdraft fee on a bank account over the last 12 months.

Our results also show a relationship between risk tolerance as measured by the self-reporting variable FL0 and investing in cryptocurrency. At lower levels of risk tolerance, individuals demonstrate a modestly increased likelihood of cryptocurrency investment. Specifically, at level 2, the marginal effect is 0.0436, indicating a noticeable increase compared to those unwilling to take risks (level 0). At levels 3 and 4, marginal effects are 0.0258 and 0.0315, respectively, suggesting a gradual strengthening of the relationship. The association grows stronger as risk tolerance increases further. At level 5, the marginal effect rises to 0.0422. A marked increase occurs at level 6, where the marginal effect jumps to 0.0704. This upward trend continues, with level 7 showing a marginal effect of 0.1016. At level 8, the likelihood substantially increases, reflected by a marginal effect of 0.1244. The highest associations are observed at levels 9 and 10. Level 9 exhibits the strongest relationship, with a marginal effect of 0.167. Even at the maximum level of risk tolerance (level 10), the marginal effect remains high at 0.1221, highlighting a significant propensity among highly risk-tolerant individuals to hold cryptocurrencies as investments.

Using Cryptocurrencies as a Payment

The results for model 1.2 show a statistically significant association for several variables measuring the use of AFSs with using cryptocurrency to make a payment over the last

12 months. Using cryptocurrency to make a payment in the last 12 months was associated with a 0.9 percent higher probability of having purchased a money order from a service provider other than a bank, compared to those who didn't use crypto to make payments in the last 12 months and ceteris paribus. Using crypto as a payment was also associated with a 1.21 percent higher probability of cashing a check from a provider outside of a bank. Using crypto to make payments was associated with a 1.32 percent higher probability of obtaining an advance on an anticipated tax refund. We also find a positive association, 1.48 percent, with using crypto to make payments and paying an overdraft fee on a bank account.

We find an association with risk tolerance, although only at some of the higher levels of self-reported risk tolerance. Compared to those who report they are not at all willing to take risk, those who report a risk tolerance of 6, 8 , or 10 (very willing), were all associated with a higher probability of using crypto to make payments in the last 12 months, 1.16 percent, 2.02 percent, and 3.93 percent, respectively. Those who identify as Hispanic, had a 0.9 percent higher probability of using cryptocurrencies to make payments in the last 12 months compared to those who identified as white. Identifying as Female was associated with a 1.18 lower probability of using crypto to make payments. Those who had investments between $50,000 and $99,000 had a 1.05 percent higher probability of using crypto to make payments than those who had less than $50,000 in savings and investments, but none of the other levels of investments had a significant association. Lastly, we find age to have a negative association, 0.01 percent, and employment to have a positive association, 0.81 percent with using crypto to make payments.

Using Cryptocurrencies to Send Money

The results for model 1.3 show several statistically significant associations with the use of AFSs and using cryptocurrencies to send money to friends or family within the last 12 months. Compared to those who didn't use crypto to send money to friends or family, those who did had 0.62 higher probability of purchasing a money order from a provider other than a bank in the last 12 months. Sending crypto was also positively associated with cashing a check outside a bank by 0.86 percent. Our results show that using crypto to send money is associated with a 0.92 percent higher probability of taking out a payday loan, compared to those who didn't use crypto to send money. We find that the use crypto to send money is associated with a 2.24 percent higher probability of obtaining a tax refund advance. Further, we find sending money with crypto is associated with a 0.66 percent higher probability of having paid an overdraft fee on a bank account.

Model 1.3 shows some association with self-reported risk tolerance and sending money with crypto. Compared to those who were not at all willing to take risk, those who reported a risk tolerance of 1,5,8, and 10 all had a higher probability of using crypto to send money, 1.19 percent, 0.78 percent, 1.72 percent, and 5.05 percent, respectively. Compared to those who identified as white, those who reported being in any other racial or ethnic identification were more likely to use cryptocurrencies to send money to friends or family. Reporting being Black and non-Hispanic was associated with a 1.7 percent higher probability of using crypto to send money. Reporting being Other non-Hispanic was associated with a 1.61 percent higher probability of using crypto to send money. Reporting being Hispanic was associated with a 0.63 percent higher probability of using crypto to send money, compared to those who reported being white and non-Hispanic.

We also find associations with some levels of self-reported credit score and sending crypto to friends or family in the last 12 months. Compared to those who report that they have a very poor credit score, those who report having a poor credit score had a 2.14 percent lower probability of using crypto to send money to friends or family. While reporting having an excellent credit score was associated with a 1.89 percent lower probability of using crypto to send money, compared to those who report a very poor credit score. Lastly, we find that answering all three financial literacy questions correctly was associated with a 0.98 percent lower probability of sending money to friends or family.

Table 3. Marginal Effects of the Three Models

Independent Variable	***Marginal Effect (Standard Error)***					
	Crypto as an Investment [1.1]	(SE)	Crypto as a Payment [1.2]	(SE)	Crypto to Send Money [1.3]	(SE)
Has a Checking/Savings/Money Market Account	0.0177	0.0244	-0.0010	0.0065	-0.0077	0.0051
Purchased Money Order Outside of Bank	0.0268**	0.0123	0.009**	0.0040	0.0062*	0.0036
Cashed Check Outside of Bank	0.0182	0.0153	0.0121**	0.0043	0.0086**	0.0041
Taken Out a Payday Loan	0.0334*	0.0196	0.0035	0.0059	0.0092*	0.0053
Taken Out a Pawnshop/Title Loan	0.042*	0.0238	0.0066	0.0062	-0.0032	0.0060
Obtained a Tax Refund Advance	0.0035	0.0263	0.0132*	0.0074	0.0224***	0.0055
Paid an Overdraft Fee on a Bank Account	0.0382***	0.0104	0.0148***	0.0041	0.0066*	0.0039
Willing to take Financial Risk						
0 - Not At All (Reference)						
1	0.0217	0.0137	0.0037	0.0057	0.0119*	0.0064
2	0.0436***	0.0120	-0.0018	0.0044	0.0074	0.0053
3	0.0258**	0.0105	0.0033	0.0049	0.0036	0.0042
4	0.0315***	0.0114	-0.0005	0.0043	0.0002	0.0041
5	0.0422***	0.0093	0.0050	0.0044	0.0078*	0.0046
6	0.0704***	0.0119	0.0116*	0.0063	0.0038	0.0051
7	0.1016***	0.0136	0.0022	0.0046	0.0087	0.0061
8	0.1244***	0.0168	0.0202**	0.0084	0.0172**	0.0081
9	0.167***	0.0346	0.0376	0.0232	0.0353	0.0265
10 – Very Willing	0.1221***	0.0249	0.0393***	0.0132	0.0505***	0.0167
Race/Ethnicity						
White, Non-Hispanic						
Black, Non-Hispanic	0.0061	0.0110	0.0139	0.0055	0.017***	0.0056

Other, Non-Hispanic	0.0236*	0.0138	0.0064	0.0063	0.0161**	0.0080
Hispanic	0.0154	0.0103	0.009**	0.0042	0.0063*	0.0037
Two or More Races, Non-Hispanic	0.0236	0.0180	-0.0007	0.0051	0.0053	0.0068
Female	-0.0489***	0.0067	-0.0118***	0.0033	-0.0044	0.0029
Married	0.0006	0.0070	-0.0046	0.0033	-0.0035	0.0033
Total Savings & Investments						
Under $50,000						
$50,000 - $99,999	0.0064	0.0106	0.0105*	0.0058	0.0078	0.0054
$100,000 - $249,999	0.0088	0.0103	0.0018	0.0052	0.0021	0.0054
$250,000 - $499,999	-0.0167	0.0110	0.0045	0.0075	0.0013	0.0064
$500,000 - $999,999	-0.0158	0.0112	0.0018	0.0070	0.0059	0.0110
$1,000,000 or more	-0.0093	0.0131	0.0027	0.0063	-0.0014	0.0052
Where do You Think Your Credit Score Falls?						
Very Poor						
Poor	0.0272	0.0209	-0.0148	0.0105	-0.0214**	0.0098
Fair	0.0054	0.0169	-0.0094	0.0103	-0.0162	0.0099
Good	0.0432**	0.0174	-0.0118	0.0109	-0.0100	0.0105
Excellent	0.0448**	0.0176	-0.0161	0.0109	-0.0189*	0.0102
Educational Attainment						
Less than High School						
High School Diploma	-0.0181	0.0211	0.0016	0.0059	0.0021	0.0055
Some College	0.0296	0.0211	0.0039	0.0055	0.0035	0.0053
Bachelor's Degree	0.0307	0.0215	0.0043	0.0055	0.0023	0.0057
Report At Doing Least Okay Financially	-0.0206**	0.0087	0.0018	0.0037	-0.0032	0.0038
Number of Financial Literacy Questions Answered Correctly						
0 (Reference)						
1	0.0014	0.0139	0.0035	0.0057	0.0024	0.0062
2	0.0108	0.0132	-0.0012	0.0054	-0.0034	0.0056
3	0.0458***	0.0133	-0.0006	0.0053	-0.0098*	0.0055
Employed	0.0362***	0.0098	0.0081*	0.0001	0.0010	0.0036

Age	-0.0023***	0.0003	-0.001***	0.0043	0.0000	0.0001

*Note: 9,326 observations from the 2022 Survey of Household Decision Making. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, * denotes statistical significance at the 10% level.*

Discussion and Implications of Key Results

The results of this analysis indicate that cryptocurrencies play a role in servicing the financial needs of some consumers, particularly those who face barriers to accessing traditional banking services. The results highlight how cryptocurrencies can function as alternative financial services, particularly for individuals relying on non-traditional banking methods. This demographic often includes the unbanked and underbanked. Users of more traditional alternative financial services may also be enticed to use cryptocurrency to fulfill a need that would otherwise be fulfilled by a traditional financial institution.

Cryptocurrencies have also increasingly become popular as alternative means for financial transactions due to their decentralized nature, potential cost-effectiveness, and faster transaction times compared to traditional financial systems. Cryptocurrencies show significant potential as a cost-effective remittance solution. Baur and Dimpfl (2021) identify lower transaction fees and improved speed as key incentives driving individuals and businesses towards adopting cryptocurrencies for payments. While Yermack (2015) highlights cryptocurrencies' potential in improving payment efficiency and transparency, especially across international borders. This study indicates that minority groups, particularly Black and Hispanic individuals, are more likely to use cryptocurrencies for sending money or making payments, when compared to non-Hispanic Whites. This finding is consistent in some regards with the findings of Chatterjee and Yang (2025) who find that ethnic minorities are more inclined to utilize AFS. Traditional remittance services can be prohibitively expensive and slow, whereas cryptocurrencies can offer faster and cheaper options. The use of cryptocurrencies for remittances can reduce costs for those sending money across borders, thereby supporting the financial wellbeing of these communities. However, unlike Chatterjee and Yang (2025), who find the likelihood of the use of AFS is associated with lower objective financial literacy, we find that holding crypto as an investment is associated positively with answering all three financial literacy questions correctly. Zhang et al. (2025) find that other psychological factors may also contribute to crypto ownership as an investment.

Each of the three models appears to be influenced in varying ways by individuals' willingness to accept financial risk. Those with higher risk tolerance are more inclined to own crypto as an investment, consistent with the volatile nature of the asset class and the high uncertainty associated with potential returns. This group may be motivated by speculative opportunities or by a belief in the long-term value of digital assets. Their risk profile aligns with the behaviors of individuals seeking high-reward ventures, often without the safety nets offered by traditional investment vehicles. Three dimensions may influence the relationship between risk-taking preference and investing in a highly risky asset class.

First is financial literacy in the domain of cryptocurrency investing. A highly cryptocurrency-literate person would need knowledge of the many fundamental aspects of the currency of interest: the potential volatility, the markets, liquidity, etc. Absent adequate information and the ability to use it, this investor likely exhibits an overconfidence bias. They are investing while overestimating their knowledge and abilities. This situation begs the question, does anyone have adequate information and ability as a cryptocurrency investor? If a practitioner has clients investing in cryptocurrency, it might be prudent to ask; a discussion of the investment and its market risks is in order. However, it may be that the advisor's compliance requirements do not allow that

discussion. Or, the advisor is not competent to counsel in this area due to their lack of knowledge or ability as a cryptocurrency investor. Overconfidence leads to adverse outcomes in athletics, politics, investing, and most human activities.

Second, investors are susceptible to additional biases that affect decisionmaking. Anchoring bias occurs in many human activities where attention is focused on an initial figure. An investor in Bitcoin (BTC), for example, may have entered the market on 9/10/23 at $24,131, considering this a fair price. Another investor may have entered on 3/24/24 at $69,146 and considered that a fair price. If they exhibit anchoring bias, the two investors will likely make very different decisions about the price of BTC if today it was at $49,000, with both decisions not based on the reality of the market for BTC but based on their belief in a fair price. This anchoring bias has a role in another bias, the disposition effect. This effect is when an investor holds losers too long and sells winners too early compared to what a rational investment plan would dictate. What a loser or winner is in the investor's mind can be based on that initial anchor rather than the true rational value of the asset.

Third, investment decisions to buy, sell, or hold are based on the information available to the investor and the ability of the investor to use that information rationally. The investor may have a recency bias and be affected by confirmation bias. With BTC, for example, recency bias will cause the investor to pay more attention to what is being reported now versus the history of BTC prices and market movements. While it is common to say that the past is not a predictor of the future in investments, a well-informed investor considers history valuable information. Confirmation bias is when the investor filters information to pay attention to what confirms their beliefs and avoids contradictory information. If the media mostly says BTC is on an upswing, which the investor wants to hear, they will ignore warning signs from other reports. These two biases skew the information being processed towards irrationality and suboptimal decisionmaking.

Other biases likely play a part in the investment decisions regarding cryptocurrencies. Financial planning practitioners should proactively discover which of their clients are cryptocurrency investors. In this way, they can apply their planning knowledge and skills to overcome literacy gaps, counsel on risk-taking behaviors, integrate these investments into an overall plan, and correctly manage their clients' portfolios given the cryptocurrency investing behavior. Practitioners need to become experts in both the investment side and the behavioral aspects of cryptocurrency investing.

In contrast, using cryptocurrency for payment or sending money seems less associated with elevated financial risk tolerance. Instead, these behaviors may reflect practical concerns, such as access, affordability, and convenience. However, there is still a meaningful link to some levels of risk tolerance, suggesting that even among those using crypto for utility rather than speculation, a certain comfort with novel and less-regulated systems is necessary. These users might be more open to financial innovation and may perceive the trade-offs, such as price volatility, as acceptable in exchange for benefits like lower remittance fees or increased transaction speed.

Importantly, there is also a notable association between cryptocurrency usage and the use of alternative financial services (AFS), such as payday loans, pawnshop loans, and money orders obtained outside of banks. This connection suggests that for many users, cryptocurrency may serve as a complement to or substitute for traditional AFS. Individuals who rely on AFS often do so because of limited access to conventional banking, and their adoption of cryptocurrency may reflect a search for more accessible, affordable, or immediate financial solutions. In this way, cryptocurrencies may function as part of an informal financial ecosystem that services the needs of the unbanked and underbanked. This connection highlights the potential for crypto to address systemic gaps in financial inclusion, while also raising concerns about the vulnerability of these populations to risk and exploitation in unregulated digital markets.

The implications are far-reaching. For consumers, the connection between risk preference and crypto behavior underscores the need for

personalized financial education that accounts for individual risk profiles and financial goals. For advisors, it reinforces the importance of discussing crypto investments with clients, not just in terms of returns but also in the context of behavioral and psychological readiness. Advisors must be prepared to help clients understand how their risk preferences may influence both their motivations and decision-making processes across different forms of crypto use.

For policymakers and regulators, understanding the interplay between risk tolerance and crypto usage supports the design of more nuanced regulations that address the varying needs of different user groups. Those engaging in high-risk investment behavior may require stronger consumer protections, while users relying on crypto for payments or remittances might benefit more from improved infrastructure and safeguards against fraud or access issues.

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Appendix A

Table A1. Variable Used in the Study

Variable Type	*Variable Name*	*Description*
Dependent Variables	**S16_a**	In the past year, have you bought or held cryptocurrency as an investment? (Yes = 1, No = 0)
	S16_b	In the past year, have you used cryptocurrency to buy something or make a payment? (Yes = 1, No = 0)
	S16_c	In the past year, have you used cryptocurrency to send money to friends or family? (Yes = 1, No = 0)
Explanatory Variables	**BK1**	Do you (and/or your spouse or partner) have a checking, savings, or money market account? (Yes = 1, No = 0)
	BK2_a	In the past 12 months, did you purchase a money order from a place other than a bank? (Yes = 1, No = 0)
	BK2_b	In the past 12 months, did you cash a check at a place other than a bank? (Yes = 1, No = 0)
	BK2_c	In the past 12 months, did you take out a payday loan or payday advance? (Yes = 1, No = 0)
	BK2_d	In the past 12 months, did you take out a pawnshop loan or an auto title loan? (Yes = 1, No = 0)
	BK2_e	In the past 12 months, did you obtain a tax refund advance to receive your refund faster? (Yes = 1, No = 0)
	BK2_f	In the past 12 months, did you pay an overdraft fee on a bank account? (Yes = 1, No = 0)
	FL0	Risk tolerance (Scale: 0 = Not at all willing to take risks, 10 = Very willing to take risks)
Financial Literacy Variables	**FL2**	"Buying a single company's stock usually provides a safer return than a stock mutual fund." (1 = True, 2 = False, -2 = Don't Know)
	FL4	"If the interest rate on savings is 1% per year and inflation is 2%, how much would you be able to buy after one year?" (1 = More than today, 2 = Same, 3 = Less than today)
	FL5	"If you had $100 in a savings account at 2% interest per year, how much would you have after five years?" (1 = More than $102, 2 = Exactly $102, 3 = Less than $102, -2 = Don't Know)
	FL_Score	Number of correct financial literacy answers (0 = 0 correct, 1 = 1 correct, 2 = 2 correct, 3 = 3 correct)
Control Variables	**ppethm**	Self-reported race/ethnicity (1 = White, Non-Hispanic; 2 = Black, Non-Hispanic; 3 = Other, Non-Hispanic; 4 = Hispanic; 5 = Two or more races, Non-Hispanic)
	ppgender	Self-reported gender (0 = Male, 1 = Female)

	ppage	Respondent's age (Continuous variable)
	ppemploy	Employment status (1 = Working full-time, 0 = Otherwise)
	educ_4cat	Educational attainment (1 = Less than high school, 2 = High school degree/GED, 3 = Some college/technical/associate's degree, 4 = Bachelor's degree or higher)
	ppmarit5	Marital status (1 = Married, 0 = Not married)
	pps0596	Self-reported savings and investments (1 = Less than $50,000, 2 = $50,000 to $99,999, 3 = $100,000 to $249,999, 4 = $250,000 to $499,999, 5 = $500,000 to $999,999, 6 = $1,000,000 or more)
	ppfs1482	Self-reported credit score perception (1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Excellent)
	at-least_okay	Self-reported financial well-being (Yes = 1, No = 0)