PROFILE AND FINANCIAL BEHAVIOUR OF CRYPTO ADOPTERS – EVIDENCE FROM MACEDONIAN POPULATION SURVEY

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Abstract

Regulators and policymakers in many developing countries are facing challenges on how to create opportunities for the crypto industry to grow, but at the same time protect investors and consumers. This study aims to better understand the demographic and socio-economic characteristics of crypto adopters and their financial behavior. Our study advances the knowledge within an array of recent contributions to the token economy and covers the geographical and contextual research gaps through survey data from a developing country in South Eastern Europe. We use descriptive statistics and chi-square analysis and we find that Macedonian crypto-adopters are more men of younger age, employed, with higher education and living in their own apartments in an urban area, and are mainly passive investors. We compare the findings with studies from other countries to provide valuable insights for policymakers and regulators.

Keywords: *Crypto-adopters, cryptocurrencies, financial behavior, demographic profile, socio-economic profile*

JEL classiffication: *G20, G40, G41*

1. Introduction

On May 13th, 2022 an article titled "The week that shock crypto" was published in Financial Times. The crypto market lost approximately 600 billion dollars in the second week of May 2022. Bitcoin slumped below $30,000 for the first time since July 2021 and the value of some cryptocurrencies such as Terra and Luna slid to zero. The article brings to light how hedge fund rock star Mike Novogratz in early January 2022 tweeted a picture image of a wolf howling at the moon and a banner saying "Luna" referencing a cryptocurrency then trading at $78. "By the start of April 2022 Luna peaked at $116 after being snapped up by buyers including enthusiastic retail investors" (Chipolina and Martin 2022). But in the third week of May 2022 Luna lost it all and Terra, a sister token, collapsed in value, despite being designed to track the value of the US

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dollar (Chipolina and Martin 2022). Moreover, changes in the crypto market are happening at high speed, as evidenced by the recent bankruptcy of FTX, a cryptocurrency trading firm (Elder and Scaggs 2022).

Although the adoption of cryptocurrencies by the general public is still quite scanty, crypto mania is a global trend that we are all experiencing, and every day, people throw large amounts of money into crypto expecting to seize the opportunity when they hear about dramatic returns due to price volatility. According to Wątorek et al. (2021) crypto market in the last couple of years grew to the level of the middle-size stock exchange market. However, many in the financial world in advanced economies view cryptocurrencies with distrust, seeing them as the territory of passionate „crypto bros" and a speculative and highly volatile fad that can only end badly (Wheatley and Klasa 2021). On the other hand, there is evidence that crypto is quietly establishing deeper roots in the developing world. Cryptocurrency use is quickly becoming a part of everyday life, particularly in countries with a history of financial instability or where the barriers to traditional financial goods such as bank accounts are very strong (Wheatley and Klasa 2021).

Palvia et al. (2021) emphasize the relevance of contextual reality in doing research, stating that having the just U.S. and a few regional studies available in the literature limits our comprehension of the worldwide range of technology concerns. This approach poses a significant risk of stakeholders in other countries adopting the American or European results and recommendations incorrectly, resulting in actions that are suboptimal or harmful to a variety of stakeholders (Palvia et al. 2021). Despite the tremendous growth of the crypto market, it is still quite unknown why people buy cryptocurrencies (Martin, Chrysochou, and Strong 2022), especially in developing countries where crypto investing is not sufficiently studied. Hence, our research aim is to understand better the crypto-adopters by studying the demographics and motives for crypto investing. "Understanding where and why cryptocurrencies are used, and by whom, helps regulators to assess the field of tension between the protection of investors and the facilitation of innovation, and allows businesses to assess how cryptocurrencies might affect them" (Steinmetz et al. 2021, p. 2). To the best of our knowledge, this is the first study that delves more deeply into cryptocurrency ownership from the population in North Macedonia. Our study contributes to an array of recent contributions to the token economy based on survey data. We believe that our study is one of the rare studies reporting on the characteristics and financial behavior of crypto-adopters in a developing country.

Cryptocurrency adopters are more risk tolerant and hold risky portfolios (Lammer, Hanspal, and Hackethal 2020). Mills and Nower (2019) point out the anonymity characteristic of cryptocurrencies that facilitates risk-taking activities over the Internet such as gambling. In that direction, according to past research, internet users use cryptos to hide their online gambling activity (Gainsbury and Blaszczynski 2017; Orsolini et al. 2017). Cryptocurrency trading overlaps with trading with high-risk stocks, due to its volatility (Wilmoth 2018) with depression and anxiety being the main predictors of frequent crypto trading (Grall-Bronnec et al. 2017). Moreover, Griffiths (2018) views 'crypto-trading addiction' as a form of gambling addiction and a sub-type of online day trading addiction.

Further, we believe that it is important to understand more deeply what drives people's behavior to invest in cryptocurrencies, and what are the potentially damaging effects of crypto-assets adoption on people's behavior (Levkov 2022). After the first crypto purchase, an average cryptocurrency investor increases trading activity (Lammer, Hanspal, and Hackethal 2020). Cryptocurrencies' frequent trading is strongly associated with problem gambling severity (Mills and Nower 2019). On the other hand, according to a recent study by Watanapongvanich et al. (2021) financially literate people are less likely to gamble. When it comes to a developing country such as The Republic of North Macedonia, with an increased poverty rate compared to most of the countries in the region (Sharlamanov and Petrusheva 2022), and a lack of financial literacy of the population that eventually leads to the less stable economy (REF 2018) it is important to gain insight into the profile of active and passive crypto investors having in mind the pro-risk orientation of crypto investors (Lammer, Hanspal, and Hackethal 2020).

Hence, the reasons to better understand the financial behavior of cryptocurrency adopters are manyfold looking from the perspective of a developing country struggling to provide a better quality of life for its citizens. One of the many important reasons is to protect the savings and investments of its citizens from potential hazard losses. As relatively little is known about the profile of cryptocurrency adopters and their motives, our paper aims to shed light on some pertinent issues by answering the following research questions:

1. What are the most common demographic and socio-economic characteristics of cryptocurrency adopters in a developing country like North Macedonia?
2. How knowledgeable are crypto-adopters about cryptocurrencies and blockchain technology and how does their knowledge affect their financial behavior?

3. Are there any major disparities in the financial behavior of crypto-adopters between men and women?
4. What data reveal about Macedonian crypto-adopters in comparison to crypto survey data from more developed countries?

2. Theoretical background

2.1. Crypto asset markets - attractiveness, risk, and volatility

Even though the first cryptocurrency Bitcoin was introduced in 2009, the crypto-assets market is still relatively new and not entirely understood (Kim, Sarin, and Virdi 2018; Boxer and Thompson 2020; Hackethal et al. 2021) partially because of the large variation in its market valuation (Demertzis and Wolf 2018). Bitcoin was partially introduced as a response to the global financial crisis of 2008-2010 (Wątorek et al. 2021). Crypto assets are often called cryptocurrencies (Demertzis and Wolf 2018; Gerritsen, Lugtigheid, and Walther 2022). According to Kim, Sarin, and Virdi (2018), cryptocurrency is an inapplicable title, due to its volatile nature, making it difficult to represent metrics of value and cost of goods. Furthermore, Söderberg (2018) states that no single definition of crypto assets can be applied. However, cryptocurrency can be explained as a digital asset secured by a technology called blockchain that allows peer-to-peer transactions (Kim, Sarin, and Virdi 2018) or as digital units, created and transferred among investors, through cryptography (Söderberg 2018). Volatility as an evident characteristic of the crypto assets market due to price shifts is a result of investor sentiment (Boxer and Thompson 2020; Stix 2019; Bonaparte 2021) and attracts investors to cryptocurrencies (Urquhart 2018; Hackethal et al. 2021). The dramatic price rise of the largest cryptocurrency Bitcoin value (Gerritsen, Lugtigheid, and Walther 2022) was a key event in 2017 that draw attention to crypto-assets and cryptocurrencies in the eyes of a wider audience (Kim, Sarin, and Virdi 2018; Boxer and Thompson 2020).

Another event put crypto-assets markets at the center of attention in the scientific community and investors as well. Ever since Facebook announced the introduction of Libra cryptocurrency in 2019 there has been a shift in scientists' and investors' perceptions regarding cryptocurrency use from mainly to store and save value to a viewpoint where crypto assets are facilitating day-to-day transactions as everyday payment tools (Fujiki 2020; 2021). Crypto investors benefit

from including Bitcoin in their investment portfolio when considering liquidity (Gerritsen, Lugtigheid, and Walther 2022). Understanding the characteristics of crypto investors is of great value for the future development of crypto-assets markets (Hackethal et al. 2021). Despite being a topic of interest to a vast number of scientists and researchers (Fujiki 2020; 2021; Bonaparte 2021; Stix 2020; 2021; Henry et al. 2019; Halaburda et al. 2020), due to the anonyms nature of crypto assets markets and cryptocurrencies, it is a challenge for the researcher to conduct empirical research (Hackethal et al. 2021).

In a developing country like North Macedonia, there are various challenges for innovations in the financial system strongly related to fragile institutions, corruption, and money laundering. Along with the explosion of interest in cryptocurrency, the high volatility of crypto market prices put individual investors face a very high risk of losing their own financial stability. Hence, various state institutions, tax authorities, and central banks in many countries should be very careful in allowing cryptocurrencies without first securing the financial system. Nevertheless, it seems like this crypto-mania has caught the attention and become very attractive to some statesmen. The most vivid example is the government of El Salvador whose crypto enthusiast president, Nayib Bukele, introduced bitcoin as legal tender in 2021. President Bukele claimed that accepting Bitcoin could bring unbanked citizens into the economy and enable easier cross-border payments, although critics including IMF called this move irresponsible and very risky. But in May 2022, although the crypto market is crashing, president Nayib Bukele stocked up on more of the cryptocurrency, making the government's most recent purchase of 500 bitcoins at an average price of $30,744 each (Chipolina and Martin 2022). Playing against the market is always a dangerous investing strategy, especially when using public funds and putting your country's financial stability at risk.

2.2. Who are crypto investors? - Demographic and socio-economic characteristics

Bonaparte (2021) investigates who owns cryptocurrencies indicating that crypto ownership varies by generation and crypto investors are male, millennials, with college degrees, pessimistic, social, certain about income, financially literate, and own stocks. Other studies indicate that the ownership of cryptocurrencies is mostly associated with younger age, higher education, and living in urban areas or major cities

(Wciom 2019). Exton and Doidge (2018) found that in Europe, the probability of owning cryptocurrency is higher for males than for females, and it is greatest for 25–34-year-olds. Similarly, Laboure and Reid (2020) found that in France, Italy, Germany, and the UK, the rate of ownership among the youngest age group (19-34) is at least twice as high as for 35–54-year-olds. Fujiki (2020) conducted research on Japanese owners and the results indicate that crypto-asset owners are male, under 30 years old, with higher income, over-confident about financial literacy, obtain financial information from mass media, and tend to use non-cash payment methods (Fujiki 2021). Furthermore, according to the same study (Fujiki 2020), crypto assets owners can be analyzed and divided into four heterogeneous groups based on their level of crypto assets understanding, how profitable are their investments in crypto assets, their holdings of conventional risky financial assets, and their adoption of non-cash payment methods.

Crypto asset owners tend to hoard cash (Fujiki, 2021). Furthermore, average crypto asset owners, mostly young and male, are tech-affine and use their crypto assets for investment purposes rather than as a means of facilitating daily actions due to price shifts (Fujiki 2020; 2021; Henry et al. 2019; Stix 2020; 2021). Different countries yield different characteristics of crypto asset owners when it comes to financial literacy. Accordingly, the study of Henry et al. (2019) points out the lower level of financial knowledge of Canadian crypto asset owners. On the contrary, Austrian crypto asset owners are financially literate (Stix 2019) so as are the Japanese crypto asset owners (Fujiki 2021). Hackethal et al. (2021) found that cryptocurrency investors are active traders with risky portfolios and invest in stocks with high media sentiment.

Despite the solid base of past research investigating crypto assets by focusing on characteristics and differences between owners and nonowners (Fujiki 2020; 2021; Halaburda et al. 2020; Henry et al. 2019; Stix 2019), there is a lack of research focusing on characteristics of crypto asset owners from developing countries across the globe. Our research endeavor tends to fill that gap and add value to the growing literature around this topic by investigating and analyzing the characteristics of crypto asset owners in North Macedonia. The latest crypto market downturn in May 2022, to a large extent, suggests that instead of forging a path toward building a new, decentralized financial system, cryptocurrencies are likely destined to remain get-rich-quick bets for highly risk-tolerant investors (Chipolina and Martin 2022). Therefore, small and fragile developing countries need to be very aware of their crypto adopters and familiar with their crypto population.

2.3. Hypothesis development

The aim of this research study is to provide a deeper and better understanding of the financial behavior and demographic and socio-economic profile of crypto investors in a developing country. To better understand the financial behavior of crypto-adopters we developed and tested the following research hypotheses H1-H11.

Real-world investors are classified as active and passive investors (Garleanu and Pedersen 2022). While active investors are focused, study the stocks and invest in positive stocks, passive ones just buy everything in the toy stock market regardless of the potential of the stocks (Capocci and Zhang 2001). Warren, Stevens, and McConkey (1990) devoted research to developing lifestyle and demographic profiles of investors based on the types of investors (heavy-active and light–passive investors) indicating that educational level is a good predictor of the type of investors. Boxer and Thomson (2020) researched active cryptocurrency investors and the respondents to their survey were male, mostly in the age range of 25-34 years. Kristjanpoller and Olson (2015) examined the effect of financial knowledge on the choice of active or passive investment and found that people with more income and more financial knowledge were more likely to actively manage their retirement funds. Wang (2009) investigating the interplay of financial knowledge and risk-taking found that gender emerges as an important factor that differentiates investors' levels of objective knowledge, subjective knowledge, and risk-taking. Further, participants who felt fairly knowledgeable about their investments sought less contact with their investment professionals (Hung, Clancy, and Dominitz 2011). Hence, building on the theoretical insight gained from the previous studies and our research questions we propose the following hypotheses (H1-H7).

H1: There is a significant association between the level of knowledge about cryptocurrencies and the type of investor.

H2: There is a significant association between the type of investors and their education level.

H3: There is a significant association between the level of knowledge about blockchain technology and the type of investor.

H4: There is a significant association between gender and level of knowledge about blockchain technology.

H5: There is a significant association between gender and the level of knowledge about cryptocurrencies.

H6: There is a significant association between the level of knowledge about cryptocurrencies and asking for investment advice.

H7: There is a significant association between the level of knowledge about blockchain technology and asking for investment advice.

Active investing in cryptocurrencies is a strategy that involves ongoing buying and selling in a highly volatile market. Hence, we believe that active investors are more prone to be proactive in searching for information and monitoring prices frequently than passive investors. Frequent trading on a highly volatile market requires a regular update of cryptocurrency price information. Without that constant attention, active crypto investors would not be able to make trading decisions confronted with the highly volatile market fluctuations of the crypto market. Further, Robichaud et al. (2002) emphasize that research has shown that there is a significant gender difference in the worry report of women and men, with women often reporting more worry than men regarding the intolerance of uncertainty. Ricciardi (2008) apart from providing evidence from gray literature and studies, call for more researchers to explore whether women reveal greater degrees of a worry than their male counterparts for different categories of financial services and investment products. To the best of our knowledge, we think that this study is the first study testing the gender differences in the degree of wariness regarding the volatility of crypto prices. We further theorize that having a greater level of worry about the potential price drop of cryptocurrencies would probably press women more to frequent monitoring of cryptocurrency prices.

H8: There is a significant association between the type of investors and the frequency of monitoring cryptocurrencies' prices.

H9: There is a significant association between gender and the level of wariness regarding the volatility of cryptocurrency prices.

H10: There is a significant association between the level of wariness and the frequency of monitoring cryptocurrency prices.

H11: There is a significant association between gender and the frequency of monitoring cryptocurrencies' prices.

3. Research context, method and data

3.1. Research context

The Republic of North Macedonia is a small country located in Southeast Europe on the Balkan Peninsula. The latest Census conducted in 2021, reveals a 1.836.713 total resident population (State Statistical Office of the Republic of North Macedonia 2021a) with a Gross Domestic Product per capita of 6,863 U.S. dollars (International Monetary Fund 2022). According to the estimated data of the State Statistical Office of the Republic of North Macedonia (2021b), the growth rate of the Gross Domestic Product (GDP) in the fourth quarter of 2021 is 2.3% and the largest increase was registered in several sectors, including the Information and Communication sector with an increase of 5.3%. Out of the total population, 83.7% of the households had access to the Internet at home (State Statistical Office of the Republic of North Macedonia 2021c) and 1.13% of the population, or more precisely 23,639 individuals are crypto owners in the Republic of North Macedonia (Triple A 2021). Transactions with crypto assets in the Republic of North Macedonia are not regulated by any law including the Law on Foreign Exchange Operations (and its bylaws) meaning they are not illegal but currently the process is not regulated at all (National Bank of the Republic of North Macedonia 2022).

3.2. Method and data collection

Data for the study have been collected through an online questionnaire distributed to crypto adopters in the Republic of North Macedonia during the period August – to October 2021. A total set of 127 responses were collected and after data screening and cleaning procedures, the effective number of 122 responses was subject to further analysis. The total number of survey questions was forty-one. The survey instrument consisted of questions regarding the demographic characteristics of respondents and the financial behavior of crypto-adopters regarding cryptocurrency trading. The questions in the survey were adopted and adjusted from OECD (2019), OECD Consumer Insights Survey on Cryptoassets - A questionnaire to explore consumers' attitudes, behaviors, and experiences (www.oecd.org/finance/2019-cryptoassets-in-asia.pdf, accessed in July 2021). The link from the online survey was posted on several Facebook fan pages in North Macedonia focused on crypto investing with

upfront approval from the fan page administrator. The list of the Facebook groups where the survey was posted online are:

(1) https://www.facebook.com/groups/ CryptoMacedonia/permalink/1468886246829317/
(2) https://www.facebook.com/groups/ cryptorevolucija/permalink/217618716948780/
(3) https://www.facebook.com/groups/ cryptostef/?ref=share
(4) https://www.facebook.com/groups/ 137886980224476/permalink/776742483005586/

First, we conducted a descriptive analysis of the collected data mainly to depict crypto adopters' demographic and socio-economic characteristics. Second, we use the Chi-square analysis, to test the proposed hypothesis H1-H11 to better understand the financial and investment behavior of crypto adopters and to address the research questions formulated in the introduction.

4. Data analysis and result

4.1. Demographics and socio-economic characteristics of crypto-assets adopters

In the following section, we present the results from descriptive statistics mainly in four tables 1-4. The data in the respective tables are organized into four categories 1) Demographic and socio-economic characteristics 2) Familiarity with technology and cryptocurrencies 3) Financial behavior of Macedonian crypto

Table 1. Demographic and socio-economic characteristics of crypto-assets adopters

1) Gender	a. Male 82.8% b. Female 11.2%
2) Age	a. Young adult 55.7% b. Middle age 40.2% c. Old adult 4.1%
3) Educational level	a. Elementary school 2.5% b. High school 18.9% c. BSc 53.3% d. Master 18.0% e. Ph.D. 2.5% f. Other (junior college, academy) 4.9%
4) Profession	a. Economist 34.4% b. Engineer 19.7% c. Software developer 14.8% d. Doctor 2.5% e. Lawyer 7.4% f. Professor (education) 23.8% g. Other 17.5%
5) Employment status	a. Full-time employee 79.6% b. Part-time employee 14.7% c. Unemployed 5.7%
6) Average monthly income	a. 0-250 EUR 10.7% b. 251-500 EUR 26.2% c. 501-1000 EUR 29.5% d. 1001-1500 EUR 13.1% e. 1501-2000 EUR 3.3% f. Above 2000 EUR 17.2%
7) Housing arrangement	a. Own house/apartment 86.9% b. Rent house/apartment 6.6% c. Do not rent nor own house/apartment (e.g., living with parents/relatives) 6.6%
8) Living area	a. City (urban area) 87.6% b. Suburban 6.2% c. Village (rural area) 6.2%

adopters and 4) Trust and risk perception of cryptocurrencies. The results of the remaining questions from the survey are presented within the text of the article.

Regarding demographic and socio-economic characteristics (Table 1) crypto investors are predominantly male and young adults between 19-34 years old. They mostly have finished undergraduate studies, with a professional background in economics, are employed with an average monthly income of 501-1500 EUR, and live in an urban area in their own house/apartment.

To better understand the financial behavior of crypto adopters and to address our research questions we present the data in Table 2 about how knowledgeable and how familiar crypto investors with cryptocurrencies and blockchain technology are and whether they seek advice when they make their investment decisions. The results in Table 2 show that almost half of the crypto adopters consider themselves highly knowledgeable in working with computers, but they consider themselves significantly less familiar with blockchain technology and cryptocurrencies. Regarding seeking advice, more than half of crypto adopters reported that seek advice when they invest in cryptocurrencies and most of them seek advice from an expert in blockchain technology or related technologies. What is very interesting is that although

learning how to invest in cryptocurrencies and trading in the crypto market requires some time, most crypto investors do not consider this as a strong barrier to further investing in the crypto market.

In Table 3 we present the results from descriptive statistics regarding the financial behavior of crypto adopters. Analyzing investment characteristics, we can say that crypto investors, being mostly passive, usually invest smaller amounts (1000-5000 EUR), probably due to lower-income levels and the high volatility of the crypto market. Almost two-thirds of crypto adopters acquired their cryptocurrencies by purchasing on an online platform with the primary motive to provide inheritance, diversify an investment portfolio and make money quickly. More than half of crypto adopters used their savings to buy cryptocurrencies as the primary source for investment, and they plan to buy more cryptocurrencies in the next 12 months investing not more than 1000-5000 EUR. It is interesting to notice that more than half of crypto adopters reported that they do nothing when the price of their cryptocurrencies fell below the price they paid. This can be an indicator to a large extent that crypto adopters can afford to lose their invested money and choose to wait and hope that the price of their cryptocurrencies will rise again. Regarding crypto intensity behavior investigated through the frequency of

Table 2. Familiarity with technology and cryptocurrencies

1) How knowledgeable you are about working with computers and software?	a. Extremely knowledgeable 49.2% b. Somewhat knowledgeable 42.6% c. Not very knowledgeable 6.6% d. Not at all knowledgeable 1.6%
2) How familiar are you with blockchain technology?	a. Very much familiar 38.5% b. To some extent 41.8% c. Very little 7.4% d. Not at all familiar 12.3%
3) How well do you think you understand cryptocurrencies?	a. Very well 41.8% b. To some extent 42.6% c. Very little 12.3% d. Not at all 3.3%
4) Did you seek advice from someone when you invested in cryptocurrencies?	a. Yes 43.3% b. No 56.7%
5) Who gave you the advice?	a. Professional adviser e.g., financial adviser or accountant 7.4% b. Expert in blockchain technology or related technologies 51.9% c. Family member 18.5% d. Friend 7.4% e. Internet (social media, blogs, forums) 7.4% f. Work colleague 7.4% g. Other 7.4%
6) Does the required time to learn how to invest in crypto demotivate you from further investment in crypto?	a. Yes 19.6% b. No 80.4%

monitoring cryptocurrencies' prices, almost two-thirds of respondents reported that they check the prices once a day. Most crypto adopters don't mine cryptocurrencies, nor plan to do that in the near future.

The results from surveying crypto adopters in North Macedonia show that almost one in every two crypto-adopters consider stocks to be equally risky or even more risky to invest in than cryptocurrencies. As expected, crypto investors in the Republic of North Macedonia believe that Bitcoin and Ethereum are the best and most secure cryptocurrencies for investment. More than two-thirds of surveyed crypto-adopters

Table 3. Financial behaviour of Macedonian crypto adopters

1) Are you a passive investor or an active trader?	a. Passive investor 63.9% b. Active trader 36.1% c. Neither
2) How did you acquire digital or cryptocurrencies?	a. Bought on an online platform 63.1% b. Mind them 16.4% c. Received them in payment for goods or services 3.3% d. 3.3% e. Transferred from family or friends 3.3% f. Other 13.1%
3) Why did you become a digital/cryptocurrency holder?	a. Make money quickly 19.7% b. Use as a means of payment for online purchases 3.3% c. Provide an inheritance 23.0% d. Diversify overall investment portfolio 24.6% e. To support initiatives built on blockchain technology 10.7% f. Other 18.9%
4) How often do you check the prices of cryptocurrencies on the crypto market?	a. Very often, almost every hour 15.6% b. Once a day 58.2% c. Once a week 12.3% d. Rarely 4.9% e. Never 9.0%
5) Besides buying, do you mine cryptocurrencies?	a. Yes 28.9% b. No 71.1%
6) How you paid for acquiring the cryptocurrencies?	a. Savings 52.5% b. Borrowed from friends or family 0.8% c. From the monthly budget 24.6% d. A new loan from a financial institution 2.5% e. Sold (some of) my assets or investments 2.5% f. Other 17.2%
7) What did you do when the price of your cryptocurrencies fell below the price you paid?	a. Bought more of those cryptocurrencies 4.9% b. Sold those cryptocurrencies 42.6% c. I did not take any action 52.5%
8) Thinking about the next 12 months, how likely are you to	a. Buy more of the cryptocurrencies you already hold 35.2% b. Buy different cryptocurrencies 38.5% c. Sell or spend some of your cryptocurrencies 8.2% d. Sell or spend all of your cryptocurrencies 3.3% e. None 14.8%
9) If you invest in cryptocurrencies in the future the amount would be	a. Bellow 100 EUR 6.6% b. From 101-1000 EUR 23.8% c. From 1001-5000 EUR 31.1% d. From 5001-20000 EUR 19.7% e. From 20001-100000 EUR 4.9% f. Above 100001 8.2% g. I would never again invest in cryptocurrencies 5.7%
10) Do you plan to mine cryptocurrencies in near future?	a. Yes 37.7% b. No 62.3%

Table 4. Trust and risk perception of crypto adopters

1) What is riskier for investing?	a. Stocks 18.0% b. Cryptocurrencies 52.5% c. Equally risky in both 29.5%
2) Which of the following statements best describe you	a. I am prepared to risk my own money to invest in cryptocurrencies 32.8% b. I am satisfied with my present financial situation 18.9% c. I tend to live for today and let tomorrow take care of itself 2.5% d. I am well informed about financial matters 23.0% e. I enjoy learning about new ways of using technology 17.2% d. Neither 5.7%
3) Based on your opinion, what is the safest and best cryptocurrency for investing?	a. Bitcoin 50% b. Ethereum 25.4% c. Ripple 3.3% d. ADA 2.5% e. Other 10.7% f. None 8.2%
4) To what extent were you worried about your future financial security when the price of your cryptocurrencies fell below the price you paid?	a. Not worried at all 68.0% b. Slightly worried 26.3% c. Very worried 5.7%
5) Can you afford to lose the money you have invested in cryptocurrencies?	a. Yes 82.7% b. No 17.3%
6) Which do you trust more?	a. The bitcoin blockchain 84.4% b. Record keeping protocols and cybersecurity at large banks 15.6%

reported that they can afford to lose their money invested in cryptocurrencies. Further, every four in five crypto-adopters reported that they can afford to lose their money invested in cryptocurrencies, and two-thirds of them are not worried at all about their future financial security if they enter the loss domain with their crypto-investment. A significantly larger number of crypto-adopters (84.4%) have higher trust in the bitcoin blockchain than in record-keeping protocols and cybersecurity at large banks.

The survey of Macedonian crypto adopters revealed some additional interesting information regarding their perception and financial behavior. Most crypto-adopters became familiar with cryptocurrencies through the Internet and almost half of the crypto-adopters consider the prices of crypto-adopters to be undervalued. One-third of crypto-adopters would invest in the near future 1000-5000 EUR in buying different cryptocurrencies from the ones they own at the moment. The regulation of cryptocurrencies by the government or enabling their use in banks and ATMs as physical currencies will not increase the interest of crypto investors. However, as crypto investors believe that cryptocurrencies protect their privacy more than banks and institutions, they expect in the next 10 years cryptocurrencies to be widely accepted and used as a means of payment.

4.2. Hypotheses testing

We perform a chi-square test of independence to examine the relationships proposed in hypotheses H1-H11. For the chi-square test Hair et al. (2010) recommends that the sample size should be at least five times as many observations as the number of variables to be analyzed. Accordingly, we can confirm that the sample size in this research study exceeds the minimum level recommended by Hair et al. (2010). The results from testing the hypotheses H1-H11 are given in table 5.

A significant relationship is confirmed in all tested hypotheses except in hypotheses H2 and H8. A chi-square test of independence showed that crypto-adopters who are more familiar with blockchain technology and cryptocurrencies are more likely to be active investors (H1 and H3). Further, results showed that women are disproportionally less familiar with blockchain technology and cryptocurrencies, and crypto-adopters who are more knowledgeable about blockchain technology and cryptocurrencies more rarely seek advice for investing compared to less knowledgeable crypto-adopters (H4-H7). The results from testing the hypotheses also reveal that women are more worried than men not entering the loss domain as a result of prices dropping below the level

Table 5. Chi-square test results

Hypothesis	Chi-Square Value	p-Value	Results
H1	11.74	0.008**	Accept
H2	10.67	0.058ns	Reject
H3	13.85	0.003**	Accept
H4	16.31	0.001**	Accept
H5	11.62	0.009**	Accept
H6	11.75	0.008**	Accept
H7	16.31	0.000***	Accept
H8	6.65	0.155ns	Reject
H9	8.26	0.016*	Accept
H10	24.71	0.002**	Accept
H11	16.79	0.002**	Accept

Notes: ns = non-significant, *p < 0.05; **p < 0.01; ***p < 0.001.

when the cryptocurrencies were bought (H9). This higher wariness of women results in more frequent monitoring of the prices on the crypto market and in general as more worried crypto-adopters manifest more frequent monitoring of cryptocurrencies prices (H10-H11). The type of investor (active vs passive) did not play a significant role in the frequency of monitoring prices meaning that the intensity of the behavior of crypto adopters is not determined by their role as a type of investor (H8). In the end, we did not confirm the relationship between the type of investors and their education level (H2).

5. Discusion

The results obtained in this study through descriptive analysis and testing of the hypotheses hold valuable insights for a better understanding of the demographic and socioeconomic characteristics of crypto-adopters and their financial behavior in a developing country. Although there is a significant number of studies investigating crypto-adopters in developed countries, we think that more inquiry is needed to discover their characteristics and financial behavior in developing countries. To answer the research questions stated in the introduction, in this section we discuss the profile of crypto-adopters, explain more thoroughly the confirmed association between their characteristics and we compare the results obtained in our study with recent studies of crypto-adopters in other countries.

The results from our survey reveal that a significant majority of crypto-adopters in North Macedonia are males and young adults between the ages of 19 and 34 with finished undergraduate studies, employed and with an average monthly income of 501-1500 EUR, live in their own home or apartment in an urban area. Our results are in line with findings from other studies confirming that men tend to invest more in cryptocurrencies than women (Auer and Tercero-Lucas 2021; Wciom 2019; Fujiki 2021; Stix 2020) and that ownership of cryptocurrencies is mostly associated with younger age, higher education and living in the urban area or major cities (Wciom 2019). Exton and Doidge (2018) found that in Europe, the probability of owning cryptocurrency is higher for males than for females, and it is greatest for 25–34-year-olds. Similarly, Laboure and Reid (2020) found that in France, Italy, Germany, and the UK, the rate of ownership among the youngest age group (19-34) is at least twice as high as for 35–54-year-olds.

Like the findings of Steinmetz et al. (2021) who found a strong correlation between knowledge about both cryptocurrency and blockchain technology, and the male gender, we discovered that women are disproportionally less familiar with blockchain technology and cryptocurrencies. Regarding income level, it is reasonable to expect significant differences in income level between the crypto-adopters coming from developing countries versus crypto-adopters from highly developed. When it comes to seeking help and advice, our data sample showed that more than half of crypto adopters seek advice when they invest in cryptocurrencies conversely to the findings of Hackethal et al. (2021) who found that crypto-adopters use advice only sparsely and that most crypto-adopters are do-it-yourself (DIY) investors. We think that this

difference may be due to a different method of investigation because in our study we asked crypto-adopters through a survey whether they seek advice, while Hackethal et al. (2021) analyzed data about the use of banking services as investment advice e.g., via telephone, or fully automatic solutions (robo-advice).

Our findings indicate that Macedonian crypto-adopters are mainly passive investors and the demand for cryptocurrencies is highly driven by a motive to provide inheritance, diversify an investment portfolio and make money quickly. Risk diversification preference is in line with the study of Zaimović and Arnaut-Berilo (2014) who point out the investors' preference of having an investment portfolio in securities for a risk-reduction effect. Stix (2021) found that intentions to adopt cryptocurrencies are strongly affected by profit expectations and the FCA (Financial Conduct Authority) in 2019 reported results from a survey that most British respondents stated that the most common reasons to buy refer to the investment as a gamble portfolio diversification and the expectation of quick gains. Blandin et al. (2020) indicate that user activity varies significantly across and within regions and their estimate is that in September 2020 around 40% of all crypto adopters in North America and Europe are considered active meaning that the rest of 60% are passive investors. Half of the surveyed Macedonian crypto-adopters considered investing in cryptocurrencies equally risky or less risky than investing in stocks, while Exton and Doidge (2018) in a survey of 15 countries found that crypto adopters considered investing in cryptocurrencies riskier for investment purposes than stock markets, government bonds, real estate, gold, and cash. We believe that crypto-adopters in more developed countries such as those countries covered in the survey of Exton and Doidge (2018) are more involved in stocks-trading than crypto-adopters in developing countries. Having more experience in trading with both types of assets crypto-adopters from more developed countries can better compare the level of risk when they invest in both assets.

Steinmetz et al. (2021) found through empirical analysis that a major driver of ownership is knowledge about cryptocurrencies, mediated by trust, while Stix (2020) found that distrust in banks or conventional currencies is not found to be a decisive factor for (intended) ownership. Nevertheless, the results from our study showed that a significantly larger number of crypto-adopters have higher trust in the bitcoin blockchain than in record-keeping protocols and cybersecurity at large banks. The crypto intensity behavior of Macedonian crypto-adopters measured by the frequency of monitoring cryptocurrencies'

prices is significantly higher compared to the study of Delfabbro, King, and Williams (2021). The results from our study showed that two-thirds of respondents reported that they check the prices once a day, while in the study of Delfabbro, King, and Williams (2021) close to half of the respondents reported that they check the prices once a month. The results from the study of Delfabbro, King, and Williams (2021) show that close to one in five crypto-adopters check the prices once a day while in our study two in three crypto-adopters check the prices once a day.

More than half of surveyed Macedonian crypto adopters reported that the price drop of cryptocurrencies is not something that worries them and usually the vast majority of them do nothing in such cases, probably expecting a future comeback with rising prices. Also, most of the crypto-adopters stated that they can afford to lose their invested money, which is in line with the study of Ante et al. (2020) who found that most German retail investors do not appear to take excessive financial and social risks when buying cryptocurrency since even a total loss of the investment would not threaten their existence. They further indicate that the comparatively low stakes may indicate a general awareness that crypto-assets entail serious risk. We think that the same is true for Macedonian crypto-adopters.

Through testing the hypotheses, we discovered that Macedonian male crypto-adopters are more familiar with blockchain technology and cryptocurrencies and are more likely to be active investors than women. Boxer and Thomson (2020) conducted research on active cryptocurrency investors and the most of respondents to their survey were male. Findings from our study reveal that women crypto-adopters are more worried than men when the crypto-market has a downturn and prices drop below the price paid for acquiring the crypto-currencies. Further, the results from chi-square testing showed that women crypto-adopters are more worried than men, and thus are more involved in frequent monitoring of the prices on the crypto market. Auer and David Tercero-Lucas (2021) indicate that women tend to be more risk-averse than men when it comes to holding risky assets and there are significant differences across genders in the use of FinTech. We think that one important contribution of our study is the discovery that women are passive investors in cryptocurrencies, more crypto-intense in a sense of monitoring crypto prices, and more worried crypto-adopters than men. To the best of our knowledge, we think that this study is the first study testing the gender differences in the degree of wariness regarding the volatility of crypto prices.

6. Research limitations

"Data from online surveys is inherently biased because participation in an online panel necessitates a certain level of technical knowledge" (Steinmetz et al. 2021, p. 16). Although we usually consider someone who has a limited understanding and experience of using the internet to be part of the internet population, he is unlikely to be part of an online panel (Steinmetz et al. 2021). Hence, similar to all other studies based on online surveys our work may be impaired by the underrepresentation of inexperienced internet users in the online survey we employed. "Conversely, tech-savvy internet users, who are more likely to be exposed to the topic of cryptocurrency, may be over-represented" (Steinmetz et al. 2021, p. 16).

Further, although our study contributes to the recent body of knowledge built through crypto survey data, it has inherent limitations that warrant caution in the interpretation of the results. The first and most important constraint is the relatively low number of crypto-adopters who participated in the survey. To obtain more reliable results, either a larger sample of survey respondents or a different sampling procedure is required. An alternative could be non-random sampling procedures like respondent-driven sampling proposed by Stix (2020). Finally, a subjective interpretation of survey data can be also a limitation of the study. The high volatility and dynamic changes in the crypto market strongly impact and change the perception of crypto-adopters which might undermine some of the findings in our study considering the current state of the crypto market. The data are collected from a small country in South-East Europe and they are highly constrained by its socio-political, cultural, and economic context therefore, the generalization of these results, especially to other countries, should be made with caution.

7. Conclusion

In this paper, we sought to explore and compare the demographic and socio-economic characteristics of crypto adopters and their financial behavior in one developing country and to compare with findings from other countries. We believe that our study is one of the rare studies reporting on the characteristics and financial behavior of crypto-adopters in a developing country. Our study contributes to an array of recent contributions to the token economy based on survey data. We used an online survey to collect data from Macedonian crypto-adopters in the period August-October 2021. We analyze the collected data with descriptive statistics and a chi-square test of independence to test the relationships stated in the proposed hypotheses.

The findings from this survey hold valuable insights for a better understanding of the demographic and socio-economic structure, and the financial behavior of crypto-adopters of one developing country in comparison to other countries. It is important to understand more deeply who are crypto-adopters in developing countries and what drives them to invest in cryptocurrencies.

Findings from our study revealed that Macedonian crypto-adopters are more men of younger age, employed, with an average income of 501-1500 EUR with higher education, and living in their own apartments in an urban area. We further found that women are disproportionally less familiar with blockchain technology and cryptocurrencies and that women are more worried about losses in investing in cryptocurrencies and at the same time they manifest higher crypto-intensity behavior through more frequent monitoring of crypto-prices. The data from our sample revealed a strong gender gap in investing in cryptocurrencies. Macedonian crypto-adopters are mainly passive investors who seek advice for investing and their demand for cryptocurrencies is highly driven by a motive to provide inheritance, diversify an investment portfolio and make money quickly. Most of them do not mine and do not intend to mine cryptocurrencies in near future. Half of the surveyed Macedonian crypto-adopters considered investing in cryptocurrencies equally risky or less risky than investing in stocks and a significantly larger number of crypto-adopters have higher trust in bitcoin blockchain than record-keeping protocols and cybersecurity at large banks.

References

Ante, L., Fiedler, I., Meduna, M., and Steinmetz., F. 2020. Returns from investing in cryptocurrency: evidence from German individual investors. Blockchain Research Lab Working Paper Series No. 6.

Auer, R., and Tercero-Lucas, D. 2021. Distrust or speculation? The socioeconomic drivers of US cryptocurrency investments. BIS Working Papers. https://www.bis.org/publ/work951.pdf (accessed November, 2021).

Blandin, A., Pieters, G.C., Wu, Y., Dek,, A., Eisermann, T., Njoki, D., and Taylor, S. 2020. 3rd global cryptoasset benchmarking study. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3700822 (accessed November, 2021).

Bonaparte, Y. 2021. On the Portfolio Choice of Crypto Asset Class: Meet the Gentlemen Investors. https://

papers.ssrn.com/sol3/papers.cfm?abstract_id=3829275 (accessed December, 2021).

Boxer, M., and Thompson., N. 2020. Herd Behaviour in Cryptocurrency Market. Paper presented at the Australasian Conference on Information Systems, Wellington.

Capocci, A., and Zhang., Y.-C. 2001. Market ecology of active and passive investors. Physica A: Statistical Mechanics and Its Applications 298 (3-4): 488–498.

Chipolina, S., and Martin. 2022. Ownership, uses and perceptions of cryptocurrency: Results from a population survey. Financial Times. https://www.ft.com/content/3e0a65bb-a953-433a-819e-ff29de847336 (accessed August, 2022).

Delfabbro, P., King, D.L., and Williams, J. 2021. The psychology of cryptocurrency trading: Risk and protective factors. Journal of behavioral addictions 10 (2): 201-207.

Demertzis, M., and Wolff, G.B. 2018. The economic potential and risks of crypto assets: is a regulatory framework needed?. Policy contridution (14): 1–14.

Elder, B., and Scaggs, A. 2022. The FTX bankruptcy filing in full. Financial Times. https://www.ft.com/content/c236d6f9-da5a-4da7-8dc8-5cd450dfe39d (accessed November 18, 2022).

Exton, J., and Doidge, F. 2018. Cracking the Code on Cryptocurrency - ING Bank. ING International Survey Mobile Banking. https://think.ing.com/reports/cracking-the-code-on-cryptocurrency/ (accessed May, 2022).

FCA. 2019. Cryptoassets: Ownership and attitudes in the UK – Consumer Survey Research Report. Financial Conduct Authority. Pub ref: 005940. https://www.fca.org.uk/publication/research/cryptoassets-ownership-attitudes-uk-cons umer-survey-research-report.pdf (accessed May, 2021).

Fujiki, H. 2020. Who adopts crypto assets in Japan? Evidence from the 2019 financial literacy survey. Journal of the Japanese and International Economies 58: 1-20.

Fujiki, H. 2021. Crypto asset ownership, financial literacy, and investment experience. APPLIED ECONOMICS 53 (39): 4560–4581.

Gainsbury, S.M., and Blaszczynski, A. 2017. How blockchain and cryptocurrency technology could revolutionize online gambling. Gaming Law Review 21 (7): 482–492.

Garleanu, N., and Pedersen, L.H. 2022. Active and passive investing: Understanding Samuelson's dictum. The Review of Asset Pricing Studies 12 (2): 389-446.

Gerritsen, D. F., Lugtigheid, R. A., and Walther, T. 2022. Can bitcoin investors profit from predictions by crypto experts?. Finance Research Letters 46: 102266.

Grall-Bronnec, M., Sauvaget, A., Boutin, C., Bulteau, S., Jiménez-Murcia, S., Fernández Aranda, F., Challet-Bouju, G., and Caillon, J. 2017. Excessive trading, a gambling disorder in its own right? A case study on a French disordered gamblers cohort. Addictive behaviors 64: 340-348.

Griffiths, M.D. 2018. Hot topics in gambling: Gambling blocking apps, loot boxes, and 'crypto trading addiction'. Online Gambling Lawyer 17 (7): 9-11.

Hackethal, A., Hanspal, T., Lammer, D., and Rink, K. 2019. The Characteristics and Portfolio Behavior of Bitcoin Investors: Evidence from Indirect Cryptocurrency Investments. Forthcoming, Review of Finance, SAFE Working Paper 277.

Hair, J.F., Black, W.C., Balin, B.J., and Anderson, R.E. 2010. Multivariate data analysis. New York: Maxwell Macmillan International Editions.

Halaburda, H., Haeringer, G., Gans, J.S., and Gandal, N. 2020. The microeconomics of cryptocurrencies. National Bureau of Economic Research. No. w27477.

Henry, C.S., Huynh, K.P., Nicholls, G., and Nicholson, M.W. 2019. Bitcoin Omnibus survey: awareness and usage. Staff Discussion Paper 2019-10. Ottawa: Bank of Canada.

Hung, A.A., Clancy, N., and Dominitz, J. 2011. Investor knowledge and experience with investment advisers and broker-dealers. Financial literacy: Implications for retirement security and the financial marketplace: 116-144.

International Monetary Fund. 2022. World Economic Outlook Database. https://www.imf.org/en/Publications/WEO/weo-database/2022/April/select-subjects?c=962 (accessed May 6, 2022).

Kim, S., Sarin, A., and Virdi, D. 2018. Crypto-Assets Unencrypted. Journal Of Investment Management 16 (2): 99–129.

Kristjanpoller, W. D., and Olson, J.E. 2015. The effect of financial knowledge and demographic variables on passive and active investment in Chile's pension plan. Journal of Pension Economics & Finance 14 (3): 293-314.

Laboure, M., and Reid, J. 2020. Digital currencies: The ultimate hard power tool, part III. Deutsche Bank Research. https://www.dbresearch.com/PROD/RPS_EN-PROD/PROD0000000000504589/The_Future_of_Payments_-_Part_III__Digital_Currenc.pdf?undefined&realload=SSgs8Y/k~mZWUATm7ldyZQLc/7TWua27Gz/2dv6l~g5hxYfDFhKJH8GxTFGbitVY (accessed November, 2021).

Lammer, D.M., Hanspal, T., and Hackethal, A. 2020. Who are the Bitcoin investors? Evidence from indirect cryptocurrency investments. No. 277. SAFE Working Paper.

Levkov, N. 2022. To Buy Or Not To Buy Crypto – Cognitive Reflection, Temporal Discounting, And Risk Preference In Crypto Assets Adoption. Paper presented at ECIS 2022 Research-in-Progress Papers 62, Timisoara, June.

Martin, B.A., Chrysochou, P., and Strong, C. 2022. Crypto freedom! Effects of trait reactance and regulation content on intention to buy cryptocurrency. Personality and Individual Differences, 194: 111659.

Mills, D.J., and Nower, L. 2019. Preliminary findings on cryptocurrency trading among regular gamblers: A new

risk for problem gambling?. Addictive Behaviors 92: 136–140.

National Bank of the Republic of North Macedonia. 2022. https://www.nbrm.mk/ns-newsarticle-dali-e-legalno-vlozuvaneto-vo-kripto-sredstva-vo-stranstvo-i-kakov-tretman-imaat-ovie-transakcii-vo-platniot-promet-so-stranstvo-en.nspx (accessed May 6, 2022).

OECD. 2019. OECD Consumer Insights Survey on Cryptoassets. A questionnaire to explore consumers' attitudes, behaviours and experiences. www.oecd.org/finance/2019-cryptoassets-in-asia.pdf (accessed July, 2021).

Orsolini, L., Papanti, D., Corkery, J., and Schifano, F. 2017. An insight into the deep web; why it matters for addiction psychiatry?. Human Psychopharmacology 32 (3): 1–7.

Palvia, P., Ghosh, J., Jacks, T., and Serenko, A. 2021. Information technology issues and challenges of the globe: the world IT project. Information & Management. 58 (8): 103545.

REF, TO. 2018. Macedonia. https://www.romaeducationfund.org/wp-content/uploads/2018/07/onepager_mk_eng.pdf (accessed May 6, 2022).

Ricciardi, V. 2008. The Psychology of Risk: The Behavioral Finance Perspective. In Handbook of Finance: Volume 2: Investment Management And Financial Management edited by Frank J. Fabozzi, 85–111. Hoboken, N.J, John Wiley & Sons.

Robichaud, M., Dugas, M.J., and Conway, M. 2003. Gender differences in worry and associated cognitive-behavioral variables. Journal of anxiety disorders 17 (5): 501-516.

Sharlamanov, K., and Petrusheva, K.M. 2022. Poverty as a Social Phenomenon in the Republic of North Macedonia. Social Security in the Balkans 2: 62-83.

Söderberg, G. 2018. Are Bitcoin and other crypto-assets money?. Economic Commentaries 5: 14.

State Statistical Office of the Republic of North Macedonia. 2021a. https://popis2021.stat.gov.mk/default.aspx# (accessed May 6, 2022).

State Statistical Office of the Republic of North Macedonia. 2021b. Gross Domestic Product, fourth quarter of 2021. https://www.stat.gov.mk/pdf/2022/3.1.22.03_mk.pdf (accessed May 6, 2022).

State Statistical Office of the Republic of North Macedonia. 2021c. Usage of information and communication technologies in households and by individuals. https://www.stat.gov.mk/pdf/2021/8.1.21.38_mk.pdf (accessed May 6, 2022).

Steinmetz, F., von Meduna, M., Ante, L., and Fiedler, I. 2021. Ownership, uses and perceptions of cryptocurrency: Results from a population survey. Technological Forecasting and Social Change 173: 121073.

Stix, H. 2019. Ownership and purchase intention of crypto assets—Survey results. Working Paper 226. Oesterreichische Nationalbank.

Stix, H. 2020. Which factors drive consumers to adopt crypto-assets? Results from an Austrian survey. Paper presented at European money and finance forum, Issue no. 180.

Stix, H. 2021. Ownership and Purchase Intention of Crypto assets—Survey Results. Empirica 48 (1): 65–99.

Triple A, 2021. Cryptocurrency across the world. https://triple-a.io/crypto-ownership-data/ (accessed May 6, 2022).

Urquhart, A. 2018. What causes the attention of Bitcoin?. Economics Letters 166: 40–44.

Wang, A. 2009. Interplay of investors' financial knowledge and risk taking. The journal of behavioral finance 10 (4): 204-213.

Warren, W.E., Stevens, R.E., and McConkey, C.W. 1990. Using demographic lifestyle analysis to segment individual investors. Journal of Financial Analysis 46: 74-77.

Watanapongvanich, S., Binnagan, P., Putthinun, P., Khan, M.S.R., and Kadoya, Y. 2021. Financial literacy and gambling behavior: evidence from Japan. Journal of Gambling Studies 37 (2): 445-465.

Wątorek, M., Drożdż, S., Kwapień, J., Minati, L., Oświęcimka, P., and Stanuszek, M. 2021. Multiscale characteristics of the emerging global cryptocurrency market. Physics Reports 901: 1–82.

Wciom. 2019. In SCryptocurrencies: after the hype. https://wciom.ru/index.php?id=236&uid=9646 (accessed December, 2021).

Wheatley, J., and Klasa, A. 2021. Cryptocurrencies: developing countries provide fertile ground. Financial Times. https://www.ft.com/content/1ea829ed-5dde-4f6e-be11-99392bdc0788 (accessed December, 2021).

Wilmoth, J. 2018. Cryptocurrency derivatives platform LedgerX will launch ether options: Report. CCN.com. https://www.ccn.com/cryptocurrency-derivatives-platform-ledgerx-will-launch-ether-options-report/ (accessed May 13, 2022).

Zaimović, A. and Arnaut-Berilo, A. 2014. RISK DIVERSIFICATION BETWEEN STOCK MARKETSIN GERMANY AND BOSNIA AND HERZEGOVINA. South East European Journal of Economics and Business- Special Issue ICES Conference 9 (1): 30-36.