

1. Introduction

Since its inception (Nakamoto, 2008), Bitcoin has garnered increasing attention amid large swings in its price, or exchange rate with the U.S. dollar. Figure 1 illustrates Bitcoin's short and volatile history by plotting its price along with one potential proxy for consumer awareness of Bitcoin over time, the number of Google search hits in the United States on the term "Bitcoin."¹ By this measure, some consumers likely began to become aware of Bitcoin by mid-2011, about two years after it was made operational, and intensity of searching for Bitcoin surged again in early 2013 and early 2014. Search intensity is highly correlated ($\rho = .80$) with price movements, a result that suggests early awareness of Bitcoin primarily may have been related to its store of value and speculative investment activity. Wide swings in Bitcoin value often are attributed to allegations of criminal activity, as well as actual and threatened regulatory intervention.

In contrast, the original Bitcoin developers designed the system primarily to be a "peer-to-peer" (or person-to-person) online electronic cash system that did not require a trusted third party, such as a bank, to clear and settle the payments. Instead, it uses complex cryptographic blockchain technology that securely validates transactions but also protects users' identities and the transaction history of each bitcoin better than other electronic money and means of payment. Reliance on an exclusively electronic network and improved security, along with a lack of direct user fees, was alleged to make Bitcoin a potentially low-cost, attractive option for end-users to make payments. Furthermore, Bitcoin originators extolled its value to the public as an attractive alternative to sovereign currency, which is subject to a potential inflation tax, by designing the Bitcoin system to cap out at a maximum number of coins in circulation.

It is probably too early to assess whether the foothold gained thus far by Bitcoin will even last, much less grow to an economically significant magnitude. Certainly, its price volatility inhibits demand by risk averse agents. However, the future of Bitcoin (a payment system, capital "B") most likely depends crucially on the extent to which bitcoin (a private currency, lowercase "b") achieves its original objective of being used by consumers and accepted by merchants and consumers as payment for goods and services.

¹The Google search intensity is an index for which units of measurement are not available.

Thus far, the hard evidence on use of bitcoins as a means of payment by consumers is rather limited. Considerable data are readily available from the Internet on the supply, market values, and transaction use (in volume and value) of bitcoin.² [Badev and Chen \(2014\)](#) provide an in-depth analysis of these data and conclude that less than half of all bitcoins in circulation are used for transactions of low value (less than \$100), most of which are associated with gambling or perhaps other “vices” but data offer no identifying information about the actual payer and payee. [Polasik et al. \(2015\)](#) provides interesting evidence about merchants and their acceptance of bitcoin for payment from a recent international survey, but it does not contain identifying information about the actual consumers who paid merchants with bitcoins.

To best of our knowledge, this paper provides the first nationally representative evidence on consumer adoption and use of Bitcoin and its competitors, labeled virtual currencies (to be defined later).³ We use data from the annual (2008-2015) Survey of Consumer Payment Choice (SCPC) from the Federal Reserve Bank of Boston to estimate the diffusion of virtual currencies among U.S. consumers. The SCPC collects data on the adoption and use of all bank accounts and payment instruments for a longitudinal panel of consumers, as well as consumer preferences and assessments of those instruments. In 2014, the SCPC added questions about Bitcoin and other virtual currencies, which were supplemented by additional surveys during 2015. A key advantage of our analysis is that the SCPC contains comprehensive information on consumers’ payment behavior. These data not only characterize the types of consumers who adopt and use virtual currencies, but also to investigate their reasons for doing so (or not) and their adoption and use of other payment instruments, especially cash and debit cards (closest substitutes) and payment practices (in-person versus online).

As of October 2015, still less than half (47 percent) of all U.S. consumers had heard of (were aware of) any virtual currency, up from about 39 percent the year before. Among consumers who are aware of virtual currencies, nearly nine in ten of them report being “slightly” or “not at all” familiar with them. In October 2014, nearly 4 percent of all consumers (or nearly 10 percent of those

²Web link for data here

³Another recent study by [CoinDesk \(2015\)](#) reports demographic features of Bitcoin users from their deposit accounts and transactions, but it is a proprietary study that does not reveal details about its statistical and sampling properties.

aware of virtual currency) misidentified the general term “other virtual currency” as referring to things that are not virtual currencies (e.g., sovereign currencies, PayPal, and other payment services). A majority of virtual currency owners were not able to consistently and accurately report the number of coins and dollar values of their virtual currency holdings.

In light of low awareness and familiarity with virtual currency, and its inherent challenges, it is not surprising that at most 1-1/2 percent of U.S. consumers (about 3 percent of aware consumers) have ever owned (adopted) any type of virtual currency. Even fewer consumers currently own it because some had discarded what amounts they previously had owned. Nevertheless, most consumer adopters have used their virtual currency to make a payment in the past year to a person (most common), merchant, or both. This result suggests that Bitcoin and other virtual currencies are not being held exclusively for investment but also for their originally intended function as an electronic-cash means of payment.

Awareness, adoption, and use of virtual currencies are correlated with various demographic and economic characteristics of consumers. Consumers who are male, white, and high income or highly educated are more likely to be aware of virtual currency than consumers without these characteristics. Conditional on awareness, however, a typical Bitcoin owner (adopter) is more likely to be a younger, non-white male with lower education who expects Bitcoin to appreciate. Self-reported reasons for adopting virtual currency are dominated by payment-related issues, although interest in new technologies and investment are also important; distrust of the government, banks, and related concerns are less often cited. Non-adopters cite many different reasons about equally frequently. Younger and lower-income consumers tend to use virtual currency more.

Some econometric results suggest that consumers view virtual currency at least partly as a means of payment. For example, those who have adopted a larger number of other payment instruments—indicating a preference for many payment options—are more likely to be aware of virtual currency, own it, and use it. Furthermore, consumers who use debit cards and prepaid cards relatively more often are less likely to adopt and use bitcoin, perhaps because these cards also are electronic alternatives to cash and relatively close substitutes for virtual currency. And

consumers' main reasons for adopting virtual currency, most of which are related to payments, are important determinants of their propensity to use virtual currency for payments.

Modeling consumer holdings of virtual currency, in dollar values or coins, is more difficult. Few consumer demographic and economic characteristics are correlated with holdings of virtual currency. In contrast, many of these variables are significant determinants of cash holdings. One potential reason for the poor explanation of virtual currency holdings relative to cash holdings is measurement error in virtual currency values. Many survey respondents do not report estimates of their holdings of virtual currency coins and dollar values that are consistent with market exchange rates of the currency with U.S. dollars at the time of their survey.

The remainder of the paper proceeds as follows. Section 2 defines terms and concepts, then briefly reviews the literature on virtual currency. Section 3 describes the data and Section 4 reports empirical results from the surveys. Section 5 lays out the motivation and specification of the econometric models, and Section 6 contains the estimation results. Section 7 offers conclusions.

2. Bitcoin and virtual currency

2.1 Terminology and concepts

Although related predecessors existed at the time, the publication of Nakamoto (2008) and establishment of the Bitcoin system a year later are credited with popularizing the concept we call "virtual currency." As is often the case with innovations, the early stages of development of Bitcoin and other virtual currencies has been characterized by a lack of consensus about terminology and definitions. So, before reviewing the academic literature, we offer some perspective on these fundamentals and explain our choice of terminology.⁴ These issues also are central to consumers' ability to understand the survey questions about virtual currency asked in the SCPC.

The title of Nakamoto (2008), "Bitcoin: A Peer-to-Peer Electronic Cash System," provides a starting point for discussion. A central focus of that paper is creating a network ("system") for people to pay other people ("peer-to-peer," or P2P) using an online only ("electronic") form of cash that does not require a financial intermediary. This proposal advances a form of private payment

⁴We thank Hanna Halaburda for suggesting the need for this discussion.

instrument or money that differs from sovereign currency but has characteristics similar to cash—especially relative privacy or anonymity for the payer and payee. Nakamoto proposed relying on cryptographic proof instead of a trusted third-party, such as a depository or other financial institution, to verify transactions via a public ledger that tracks and records all transactions, which all members of the system can read and verify as correct.

Economists and other experts who study Bitcoin and similar currencies have proposed a number of terms to refer to these types of currencies. The ECB ([European Central Bank, 2012](#)) first proposed the term “virtual currency” (see especially Table 1, “A money matrix”); [Greene and Shy \(2014\)](#), among others, also used this terminology. A more recent report from the Bank for International Settlements (BIS 2015) favored the term “digital currency,” with digital intended as synonymous with “electronic,” but the BIS acknowledged essential interchangeability of that term with virtual currency (see BIS footnote 2). The ECB emphasized the fact that digital currency is a broader term that can also be applied to electronic forms of sovereign currencies like the U.S. dollar, such as a debit card or the Automated Clearing House (ACH). Furthermore, in all countries, digital sovereign currency can be transformed into physical currency (cash, or coins and notes), whereas virtual currency conveys the notion that it remains digital and cannot be converted to the physical realm. For this reason, we prefer virtual currency.

Alone, both terms (virtual or digital) are imperfect short-hand descriptors because they do not adequately reflect all important characteristics of these currencies. For example, neither one explicitly reflects the cryptographic security, which is why some prefer the term “cryptocurrency.” Yet not all virtual or digital currencies are based on cryptography. Also, neither term reflects ownership of the currency (public or private), even though the expected returns vary dramatically, or the intrinsic value (fiat or asset-backed), even though it varies considerably as well. The ECB classification provides a related but different distinction: regulated versus unregulated, which was informative in 2012 but is no longer true for Bitcoin, if not other virtual currencies. However, none of the preceding concepts adequately highlights the economically important distinctions between public (government) versus private ownership of money, asset-backed versus fiat money, types fiat—government declaration (sovereign currency) versus private social consensus/democracy

(Bitcoin)—and types of clearing and settlement (centralized versus decentralized). A comprehensive and accurate terminology for “virtual currency” requires so many adjectives that it would be unwieldy.

This discussion highlights the fact that Bitcoin and other virtual currencies can be classified by along multiple dimensions, so there is ambiguity about how Bitcoin works as well as how to think about what it is. This ambiguity is even more severe among the general public of consumers and respondents to surveys. Therefore, the SCPC uses multiple terms (virtual currency, digital currency, and cryptocurrency) to stimulate respondent recall and recognition in hopes of communicating clearly and reaching all consumers. We further asked respondents specifically about Bitcoin, which is likely the most common “brand name,” and then a short list of the most popular competitors to Bitcoin (e.g., Ripple and Dogecoin), to maximize respondent understanding. Nevertheless, if economists have not proposed and settled on a consensus term, it is likely that many consumers may be confused about the concept as well.

2.2 Literature review

As of March 2015, about two-thirds (14 million) of the intended long-run supply of bitcoins had been distributed worldwide, held in 109 million accounts and used for 62.5 million total transactions or about 200,000 per day, according to [Böhme et al. \(2015\)](#). Most attention toward Bitcoin has focused on its exchange rate with the U.S. dollar, which has exhibited breathtaking swings over short periods of time. It reached a peak of about \$1,400 in 2013 (market capitalization of \$12 billion, equal to 4.5 percent of the U.S. money stock M1) before falling back to \$200-450 during the past year (market capitalization of \$3-6.5 billion).

During its relatively short life, Bitcoin and other virtual currencies have struggled to gain credibility with the general public for many reasons. Perhaps foremost, virtual currencies are hard to understand because they are new, unfamiliar, and technologically complex relative to existing means of payment. A good example is the excellent primer by [Velde \(2013\)](#), which provides the technical mechanics of of Bitcoin. The overview of virtual currency schemes by [European Central Bank \(2012\)](#) also demonstrates the extent of complexity and need for careful classification and taxonomy of monetary and technological ideas. Even consumers who may have heard of Bitcoin or

other virtual currencies via the media are unlikely to be familiar with the basic mechanics, much less experts in the cryptographic and blockchain technology underlying them.

A second barrier to adoption and use of virtual currency is that it is risky to hold because its exchange rate with sovereign currencies, like the U.S. dollar, is extremely volatile and less likely to be demanded by risk-averse consumers. Several recent studies have examined virtual currency as an asset and its pricing, such as [Glaser et al. \(2014\)](#), [Hencic and Gouriroux \(2015\)](#), [Donier and Bouchaud \(2015\)](#), [Dwyer \(2015\)](#), and [Bolt and van Oordt \(2015\)](#). As a result, new depository institutions such as Circle and Coinbase have emerged that offer services to manage the principle and exchange risk associated with these currencies.

Like many volatile new assets, Bitcoin has attracted considerable speculative investment while its financial infrastructure was being developed, as well as fraud, theft, and related activity causing financial losses for some owners. One of Bitcoin's key advantages—cryptographic security based on blockchain technology—is alleged to have attracted criminal and terrorist payment activity that requires anonymity in financial transactions. All of these challenges increasingly have motivated governments to regulate, restrict, or even ban virtual currencies, which have buffeted the value of Bitcoin further and hindered its goal of becoming a viable alternative to official government currencies.

Nevertheless, Bitcoin's rise to prominence naturally has attracted market competition. Since Bitcoin's value peaked in 2013, about 700 diverse other virtual currencies have emerged to compete in the market for private digital money characterized by cryptographic security. [Figure 2](#) shows this competitive response, measured as the number of other different virtual currencies that have emerged, though some have already failed and exited. That number roughly mirrors the S-shaped diffusion of Bitcoin awareness, measured by cumulative Google search intensity, with a lag of about one year. The response also reflects typical of industry dynamics in general as well as for those based on electronic networks, as described in [Halaburda and Gandal \(2014\)](#) and [Möser and Böhme \(2015\)](#). Bitcoin still dominates the industry with more than 90 percent of the industry's market capitalization, and the currencies vary widely in their essential characteristics. Some competitors may have been created primarily to score short-term speculative profits rather

than make payments but others are making serious efforts build other digital payment systems, such as Ripple's meta network on which Bitcoin and other currencies (sovereign or virtual) could be used.

Virtual currency poses fascinating questions about its potential role as a form of private money, a concept unfamiliar to modern U.S. consumers. Economists disagree about whether Bitcoin and other virtual currencies exhibit the core features of money (store of value, unit of account, and medium of exchange) despite being supplied by the private sector.⁵ The U.S. Internal Revenue Service (IRS) ruled that virtual currency is not a "currency" per se but property, on which capital gains taxes must be paid. Thus, virtual currency is an asset (store of value) but one with an expected return that so far has been unusually volatile for money. Like most government money today, virtual currencies have no intrinsic value but rather a fiat declaration and promise to sustain its usability. For Bitcoin, the fiat emerges from the democratic social consensus of the open-source community that owns, regulates, and operates the system, but it does not have any legal or public authority. Virtual currencies are very divisible and precise (16 decimal places) units of account (typically a "coin") with variable exchange rates against the U.S. dollar similar to those of foreign sovereign currencies. Finally, virtual currencies such as Bitcoin are designed to serve as a medium of exchange—a form of payment instrument—that can be used at relatively low social cost and (so far) little or no transaction cost for either the payer or payee.

The emergence of the virtual currency market has stimulated attempts to develop cryptographic versions of official government currencies. MintChip tried to develop a virtual currency for the Canadian dollar but suspended operations in 2015. IBM, JP Morgan Chase, and Tibado are among the private companies developing virtual currencies based on U.S. dollars. David Andolfatto (Federal Reserve Bank of St. Louis) has argued the merits of a government-sponsored cryptocurrency, which he called "Fedcoin."⁶ The Bank of England is studying the virtual currency phenomenon as well.⁷

Naturally, in light of all these developments research is beginning to examine how virtual

⁵For example, *Lo and Wang (2014)* argue that Bitcoin is not money.

⁶<http://andolfatto.blogspot.com/2015/02/fedcoin-on-desirability-of-government.html>.

⁷<http://www.bankofengland.co.uk/banknotes/Pages/digitalcurrencies/default.aspx>

currency is being disseminated and used by agents in the economy. The closest study to our paper is [CoinDesk \(2015\)](#), which reports demographic characteristics of consumers who hold and use Bitcoin with data from their accounts at Coinbase, a firm that manages virtual currency deposits. Other studies that also examine consumers use of Bitcoin include [Tsanidis et al. \(2015\)](#), [Saito \(2015\)](#), and [Christin \(2013\)](#). For merchants, [Polasik et al. \(2015\)](#) report the results of an international survey of Bitcoin acceptance and the fraction of Bitcoin sales among merchants who accept.

3. Data

We use data from the Survey of Consumer Payment Choice (SCPC) produced by the Federal Reserve Bank of Boston to report statistics and estimate econometric models. Questions about Bitcoin and other virtual currencies were first added to the 2014 SCPC, then expanded in subsequent surveys. The 2014 and 2015 SCPC were implemented with four samples during three periods between October 2014 and December 2015 (15 months). [Table 1](#) summarizes the surveys.

3.1 Survey of Consumer Payment Choice (SCPC)

The SCPC is an annual survey (2008-2015) of approximately 2,000 U.S. consumers that measures adoption of bank and other transaction accounts, as well as adoption and use of payment instruments, including cash. Questions also are asked about consumers's preferences and assessments, household financial responsibility, economic conditions, and a wide range of demographics. Each year except 2008, the SCPC includes about 2,000 respondents, many of whom are repeat participants and form an unbalanced longitudinal panel. Aggregate survey results are weighted to match the U.S. population as measured by the Current Population Survey. See [Schuh and Stavins \(2012, 2014\)](#) for more details.⁸

The SCPC is a voluntary Internet-based survey. Respondents are invited from groups of panelists that have been recruited from the general population to take surveys and receive a modest financial reward (\$20 for completing the SCPC). Despite being voluntary, survey participation reaches 90 percent of the target sample size within a few weeks. Each questionnaire is adminis-

⁸The questionnaires, survey data, documentation, and publications are available at <http://www.bostonfed.org/economic/cprc/data-resources.htm>.

tered online (only) and takes about a half hour for the median respondent, but can take twice as long for some. Respondents are asked to report their banking, payment, and financial information based on their memory recall, which is aided by definitions, survey questions, and questionnaire design. Respondents are allowed to consult their financial records if they choose, though most do not. Respondents may view some questions as sensitive, such as how much cash they have (dollar value), but item non-response is remarkably low (usually less than 5 percent).

Three potential sample selection issues may arise when implementing the SCPC. First, for samples drawn from ongoing panels of survey respondents, consumers who like to do surveys (and become experienced at doing so) may have unobserved characteristics that are correlated with payment behavior. Second, for Internet (online only) surveys like the SCPC, representative samples may include respondents who are not familiar or comfortable with computers and the Internet and less likely to participate, although most survey vendors take extra effort to provide the technology and customer support to minimize this effect. Finally, consumers who are most interested in holding and using Bitcoin or other virtual currencies may place relatively high value on privacy and anonymity, so they may be less likely to respond to the SCPC questions. If so, our results may underestimate adoption and use of virtual currency, and may also be unrepresentative of the holdings and types of use.

3.2 Survey samples

The 2014 and 2015 SCPC were implemented with respondents drawn from four sampling frames during three periods. The first is the American Life Panel (ALP) from the RAND Corporation, the source for the 2008-2014 SCPC.⁹ The second is the Understanding America Study (UAS) from the University of Southern California, the source for the 2014-2015 SCPC.¹⁰ The official annual SCPC is in the field during the fourth quarter each year. In 2014, the SCPC was implemented with both the ALP and UAS to have overlapping samples for the transition from ALP to UAS, and thus its sample (3,047) is larger than in other years. By and large, the ALP and UAS have similar composition and characteristics but different advantages and disadvantages.

⁹<https://alpdata.rand.org/>

¹⁰<https://uasdata.usc.edu/>

The limited sizes of the ALP (about 5,500) and UAS (2,500) required the use of two other sampling frames. The adoption rate of virtual currency by U.S. consumers is so low (1 percent or less) that these sampling frames yield samples of adopters that are far too small to do statistically precise analysis. Consequently, we enlisted Qualtrics to draw a targeted over-samples of virtual currency adopters and to administer the SCPC to them.¹¹ Qualtrics works with many partners who maintain, or have access to, a much larger number of panelists and potential respondents, which makes it more suitable to oversampling. In July 2015, an oversample of 611 respondents took the 2014 questionnaire; in the fourth quarter of 2015, an oversample of 31 respondents took the 2015 questionnaire.¹² A fourth sampling frame is from GfK Knowledge Networks, which provided about 500 additional respondents for the official annual 2015 SCPC to supplement a shortfall in UAS respondents.¹³

An important difference among sampling frames is the ability to represent the U.S. population. The ALP, UAS, and GfK are designed to produce subsamples that are approximately representative of U.S. consumers. Their panel recruitment methodologies are relatively well-known so proper sample weights can be constructed to match estimates from the Current Population Survey.¹⁴ In contrast, the statistical properties of the full sample of respondents available to Qualtrics is unknown and unlikely to be representative of the U.S. population. In general, participation rates are lower and item non-response rates are higher for the Qualtrics sample. Furthermore, the recruitment of Qualtrics respondents is less well understood and monitored than in the other three panels. Qualtrics respondents also receive considerably lower incentive pay (typically \$5 or even less) than respondents in the other three panels (\$20 for the SCPC).

3.3 Questions about virtual currency

Unlike most aspects of traditional money and payments, few consumers are very familiar with Bitcoin and other virtual currencies, so conducting surveys about them is considerably more challenging than other questions in the SCPC. Most consumers have heard of cash, checks, credit

¹¹<https://www.qualtrics.com/>

¹²The second oversample was supposed to produce 125 virtual currency holders from Qualtrics but fell short.

¹³<http://www.knowledgenetworks.com/ganp/>

¹⁴For more information about the CPS, see <https://www.census.gov/programs-surveys/cps.html>.

cards, and even online banking bill payment (OBBP), and they are generally familiar with them even if they don't have them, so it is relatively easy to ask questions like, "Do you have a credit card"? But one cannot ask the same question about Bitcoin successfully without first asking whether the respondent knows what Bitcoin is and then probing the degree to which they are familiar with it.

Most of the main SCPC questions and structure were essentially the same between 2014 and 2015, and generally quite similar to that in questionnaires from prior years. In contrast, questions about Bitcoin and virtual currency were very preliminary and lacking much experience, so they changed and expanded across the periods and samples as summarized in Table 1.¹⁵ References to the 2014 SCPC or 2015 SCPC only pertain to the main questions, which stayed the same. The official 2014 SCPC (fall 2014) included the fewest virtual currency questions and the official 2015 SCPC (fall 2015) had the most. The two questionnaires implemented with oversamples had different virtual currency questions from the official SCPC versions. The July 2015 oversample (Qualtrics) used the official 2014 SCPC but had more and different virtual currency questions. The fall 2015 oversample (Qualtrics) had the same virtual currency questions as the official 2015 SCPC but different screening questions.

3.3.1 Initial screening

An important difference in the virtual currency survey questions arises between those in the official SCPCs (fall 2014 and fall 2015 with ALP, UAS, and GfK) and those in the oversample SCPCs (July 2015 and fall 2015 with Qualtrics). The official SCPCs are administered to a random sample of respondents drawn from the (known) sampling frame, in which case all respondents are expected to answer all survey questions. However, the oversample SCPCs must first perform an initial screening to identify virtual currency adopters, and then ask those adopters (only) to answer all survey questions—except virtual currency adoption, which has already been answered.

The distinction is summarized in the bottom half of Table 1. The virtual currency section of the official SCPCs begins with a question about the respondent's knowledge, or awareness, of Bitcoin

¹⁵See APPENDIX TABLE 13 for a detailed list of the survey questions. An "X" indicates that the question was included in each of the four questionnaires and samples.

and other virtual currencies: “Have you heard of...[type of virtual currency].” Respondents who answered “yes” are defined to be “aware” of the respective virtual currency. The types are Bitcoin and other, where the latter is divided into a list top 5 currencies based on market value and a generic “other” category.¹⁶ In all cases, the respondent is asked to specify the actual name of the “other” currencies as a test of whether they understand accurately the concept of virtual (or digital or crypto) currency. Answers such as “PayPal,” or “ApplePay” are flagged as invalid.

In contrast, the oversample SCPCs asks a very large number of respondents one screening question about ownership of virtual currency: “Do you have (or have you ever had)...[type of virtual currency].” Respondents who answer “yes” then are asked to complete the entire SCPC. Unfortunately, the pre-screening questions for the Qualtrics oversamples made it infeasible to ask awareness questions because only one question could be asked in the screening and it was current ownership (excluding prior ownership and discarding) of any virtual currency. For this reason, the oversamples use a longer list of other virtual currencies, the top 14 by market value, to maximize cognition and recall.¹⁷

The advantage to prescreening for oversampling is that it obtains a large number of virtual currency adoptors more cost-effectively than the official SCPC because it is not necessary to survey a much larger number of non-adoptors. The disadvantage is that prescreening does not permit measurement of awareness and identification of a subsample that can be trusted to answer virtual currency questions reliably. Nevertheless, awareness doesn’t necessarily indicate familiarity, or expertise, with virtual currency. So, the 2015 SCPC oversample survey asked respondents who were aware of virtual currency to report their degree of familiarity with it rated on a qualitative 1 to 5 scale.

3.3.2 Implications for sample properties

The prescreening of virtual currency adoptors in the SCPC oversamples has implications for the properties of the oversample itself, and of the official SCPC sample pooled with the oversample.

¹⁶We added a specific list of top currencies in 2015 because the frequency of error in the “other” category was high in the 2014 SCPC open-ended question that asked respondents to specify the other currencies. The top 5 other were Ripple, Litecoin, Dash, Stellar, and Dogecoin.

¹⁷The top 14 other virtual currencies included the top 5 mentioned previously plus Bitshares, Nxt, BanxShares, Peercoin, MaidSafeCoin, NameCoin, ByteCoin, Monero, BlackCoin.

It is not possible to estimate the aggregate rates of awareness or adoption for the oversample, for two reasons. Practically speaking, we cannot estimate awareness from the oversamples because they only include adopters and we do not have responses from non-adopters or consumers who have never heard about virtual currency. More importantly, Qualtrics does not provide sufficient information about its universe of respondents and how that universe relates to the full U.S. population. Therefore, we cannot construct sampling weights that would ensure proper representation of the U.S. population.

However, respondents in the SCPC oversamples may be combined with those in the official SCPC sample provided the oversampled respondents are reweighted to account for the fact that the pooled sample has a greater share of virtual currency adopters than in the population. Depending on the demographic composition of the oversample, it may also be necessary to reweight the oversample to maintain the demographic composition of the official SCPC sample with regard to virtual currency adopters because the latter should be representative of all U.S. adopters. For example, if the official SCPC sample estimates that 60 percent of virtual currency adopters are male but the SCPC oversample only has 30 percent males, then the sampling weights for male respondents in the SCPC oversample have to be reweighted to increase the male representation in the oversample to match that of the official sample.

3.3.3 Other questions

All versions of the SCPC implemented during 2014-2015 asked basic questions about adoption, holdings, and use of virtual currencies (Bitcoin and other). However, each new implementation of the SCPC during this period included some improvements to existing virtual currency questions and additional questions. Both types of adjustments were made based on analyses of the previous questions to address problems and to enhance understanding of the initial 2014 SCPC results.

Each SCPC questionnaire asked about current adoption (“Do you have...[type of virtual currency]”) and historical adoption (If not, “Have you ever had...[type of virtual currency]”) because holdings of virtual currency, like cash, can be depleted completely through spending and must be replenished. The later questionnaires also asked adopters of virtual currency to list their primary and second reasons for owning it and non-adopters or their primary and secondary reasons for

not owning it. If accurate, these reported reasons can be used to evaluate econometric inference about adoption.

In addition to asking about the discrete margin of adoption, the SCPC also asked adopters how much virtual currency they had (owned) measured by the number of coins and the U.S. dollar-equivalent value of their holdings. Having estimates of both the coins and dollar values of virtual currency provides an opportunity to test the accuracy of the respondent's answers by comparing the implied exchange rate (dollars/coins) to actual market data on virtual currency prices for the day of the survey. For Bitcoin, approximately 79 percent of respondents reported both the number of coins and dollar value.¹⁸ However, even with estimates of coins and value, deviations of the implied exchange rate from the actual rate because the valuation error could be due to recall error or to miscalculation/misunderstanding. To help sort between these interpretations, respondents to the official and oversample SCPCs in 2015 were asked whether they used web sites or their financial records to assist them in reporting estimates of coins, dollar values, or both.

The SCPC also asked adopters whether they had used virtual currency to make a payment or transaction and, if so, what types of payments and transactions they made. Respondents were asked whether they made a payment to buy goods and services during the past month and, if not, during the past 12 months. If they made a payment, respondents were asked whether they paid a person, merchant, or both types of agents. Respondents who paid a merchant were asked to list up to three merchants (by name); respondents who paid a person were not asked to identify the person for obvious reasons. Unfortunately, the questions about payees did not clearly identify or rule out the case of payments made to buy new coins for investment purposes. Respondent who made payments also were asked to estimate how many virtual currency payments they made in the past month or 12 months for comparison with estimates from the rest of the SCPC of the number of payments made by all other payment instruments.

Finally, respondents were asked about their expectations and assessments. The SCPC asked respondents to forecast the qualitative expected change in the virtual currency price (dollars/coin) over the next week, month, and year. The expectations can be compared with actual changes over

¹⁸Another 11 percent reported only coins, 2 percent reported only dollar values, and 8 percent reported neither (conditional on reported having adopted Bitcoin).

time to evaluate consumers' forecast errors for the value of virtual currency. For the July 2015 oversample only, respondents were asked to assess the characteristics of virtual currency, such as cost, convenience, security, etc. Although these assessments have proven helpful in explaining consumer payment choices, the assessment questions are relatively long and costly to include.

4. Survey results

This section reports the results of the 2014-2015 SCPC and oversample questions about virtual currency in tabular and graphical formats. All tables report weighted estimates that reflect aggregate U.S. consumer activity, typically in terms of percentage shares of U.S. consumers or means and medians of U.S. consumers.

4.1 Diffusion of virtual currency

We characterize the degree to which both information and adoption of virtual currencies has diffused throughout the U.S. economy using data on Internet search activity and the 2014-2015 SCPC data. We assume search intensity proxies for information accumulation, as described earlier in Figure 2. In principle, then, we can treat awareness of other virtual currencies the same way as awareness of Bitcoin, although there are many more of them and each is much less well known than Bitcoin. Likewise, we assume adoption of virtual currencies will follow a similar diffusion pattern.

Seven years after Nakamoto (2008), still less than half of U.S. consumers (43.0 percent) were aware of any virtual currency by October 2015, up from 39.5 percent in October 2014, as shown in Table 2. Perhaps not surprisingly, the vast majority of consumers who are aware of virtual currency are aware of Bitcoin; fewer consumers are aware of other virtual currencies. Note that the individual estimates of awareness for Bitcoin and other virtual currencies do not sum to the total virtual currency number because some respondents were aware of both Bitcoin and other virtual currencies. However, awareness of other virtual currencies increased more, from 1.1 percent (adjusted for erroneous answers) in 2014 to 6.6 percent in 2015.

Not everyone aware of virtual currency is intimately familiar with the complicated new tech-

nology. Table 2 also shows that 87 percent of respondents to the 2015 SCPC reported being “not at all” or “slightly” familiar with virtual currency. Thus, our discrete measure of awareness (aware versus not aware) overlooks important variation in the extent to which consumers actually understand virtual currency—many are aware but don’t really understand. In the future, it may be better to measure the specific degree of consumer’s understanding of virtual currency.

Another sign that consumers lack full and accurate information about virtual currency is found in the row of Table 2 labeled “incorrectly identified,” which shows that nearly three-quarters of the 2014 respondents (2.9 percent of 4.0=2.9+1.1 percent) who said they were aware of “other” virtual currencies incorrectly identified them.¹⁹ Some respondents correctly named virtual currencies, even the closed-loop Linden Dollar, which is quite different from Bitcoin and other open-loop virtual currencies. Other respondents, however, mistook online payments (PayPal, Google Wallet, etc.), sovereign currencies (such as the Euro, Peso, etc.), and other things for virtual currency. Henceforth, we exclude these erroneous responses from definitions of awareness, adoption, and other measures from our analysis.

Table 3 shows that adoption of virtual currency by U.S. consumers is quite low.²⁰ The table reports estimates for the official SCPC without the oversample (“No OS”) and for the pooled official and oversample (“With OS”). In 2014, about one-half of one percent of respondents (0.52 percent) had virtual currency at the time of the survey, which we call current adoption; excluding the oversample, more of them had Bitcoin (0.45 percent) than other virtual currencies (.16 percent). About one-third of one percent of respondents (0.32 percent) had previously owned virtual currency but discarded it for some reason. Thus, closer to 1 percent of respondents (0.84 percent) had ever owned virtual currency. Adoption of virtual in 2015 was still relatively low but it increased considerably compared to the previous year. About 1 percent of consumers (0.87 to 1.08 percent) had virtual currency in 2015, and historical adoption reached about 1-1/2 percent (1.42 percent).

¹⁹Although the proportion of erroneous responses declined in 2015 to 1.2 percent out of 7.8 percent, some of this decline likely is attributable to improvements in the survey methodology of the question. Unlike 2014, the SCPC respondents in 2015 were given a list of top other virtual currencies before being asked an open-ended question about other ones.

²⁰Note that the estimates are for all consumers, including those who were not aware of virtual currency. A reasonable case may be made for measuring adoption as a percentage of only consumers who are aware of virtual currency, which would slightly more than double the estimates of adoption as a percentage of all consumers.

Even with limited data available, it is feasible to crudely estimate the pace of diffusion of information about virtual currency in the United States. Given our two observations on awareness (October of 2014 and 2015) and a reliable estimate of the initial condition (zero percent of the population prior to the Bitcoin paper in October 2008), we use the Bass (1969) diffusion model to fit and forecast Bitcoin awareness. Figure 3 plots the estimated process, which suggests that it may take a total of 15 years (2008 to 2023) to reach nearly complete awareness of Bitcoin in the United States.

As background for our econometric analysis of consumer adoption of virtual currency (later), it is instructive to consider respondents' self-reported reasons for adopting or not adopting virtual currencies, which appear in Table 4. The results suggest that many consumers who adopt virtual currencies are doing so for reasons related to making payments, and payment-related reasons increased in importance between 2014 and 2015. In 2014, about one-quarter of respondents cited interest in new technologies, and another quarter cited financial investment, as their primary reason for adopting. Still, one-third cited payments as their primary reason, and half cited it as their secondary reason. Interestingly, distrust in banks, the government, or the U.S. dollar was relatively unimportant. A year later (2015), however, two-thirds of respondents cited payments as their primary reason.

Reasons for not adopting virtual currency are more diverse. Roughly one out of six respondents (13 to 19 percent) cited one of six different primary reasons for not adopting characterized roughly as follows: 1) difficult to understand; 2) not easy to use; 3) not accepted for payment often; 4) exchange rate risk; 5) lack of government guarantee; and 6) other payment methods are satisfactory. Such a broad array of barriers to adoption suggests that adoption may likely continue to increase slowly for some time.

The reported interest of consumers in adopting virtual currency for payments-related reasons is supported by our finding that many virtual currency adopters used it to make a payment recently, as shown in Table 5. Among respondents who had adopted virtual currency in the official SCPC samples, nearly half of them (45.7 percent) had used it in 2014 to make a payment during the past 12 months, and in 2015 about 90 percent (38.0 percent versus 42.6 percent) of annual users

had also used it within the past month. Interestingly, the nontrivial shares of consumers making payments with other virtual currencies is not much less than the shares doing so with bitcoins. The incidence of use is considerably higher in the July 2015 oversample but may be less reliable. Note again, however, that these estimates of virtual currency payments may include some financial payments associated with investment activity because the underlying data do not precisely separate out financial and nonfinancial payments.

4.2 Expected bitcoin prices

A key issue for consumers' decision to adopt virtual currency is their formation of expectations of future exchange rates (prices), which is the expected return on the principal value of their virtual currency holdings.²¹ In 2015, the SCPC asked respondents for their qualitative (decrease, stay the same, or increase) expectation of the price of bitcoin (exchange rate between U.S. dollars and bitcoins) over the next week, month, and year. The Survey asked these expectation questions only of respondents who were aware of Bitcoin.²²

There is a marked, though perhaps not surprising, difference in expectations between adopters and non-adopters of virtual currency, as shown in Table 6. Well more than half of non-adopters expect the exchange rate to stay the same, with a reasonably distribution of expected increases and decreases, though slightly more seeing a decline. In sharp contrast, a large majority of Bitcoin and non-Bitcoin adopters expect the exchange rate to stay the same, at worst, but most expect the exchange rate to increase at all horizons. These results suggest that price expectations are likely to be an important determinant of adoption of virtual currency.

Sufficient time has passed since the surveys were conducted to be able to assess the accuracy of the reported price expectations. To this end, we constructed a qualitative measure of forecast errors for each respondent using actual bitcoin prices. Because the expectations data are qualitative (1 to 5 scale, from "decrease a lot" to "increase a lot"), it is necessary to convert quantitative bitcoin prices into five analogous categories. This exercise necessarily requires a subjective assessment of

²¹Consumers likely care about the volatility of prices too, but the SCPC did not include estimates of expected volatility. Formation of expectations of future exchange rates also is related to consumer awareness and familiarity with virtual currency, and financial literacy more broadly.

²²The SCPC did not measure price expectations for other virtual currencies there are so many, the adoption rates and holdings of each much more limited than bitcoin, and we have insufficient data to provide a meaningful analysis.

the cutoffs between “a lot,” “some,” and “about the same.”²³ Having discretized the actual prices, we construct qualitative forecast errors by subtracting the reported expectations from the actual prices. After rebasing the original categories to a range of $[-2, 2]$, the range of forecast errors is $[-4, 4]$.

Figure 4 plots the distributions of bitcoin price expectation errors for the week and month horizons; errors for annual expectations are not available yet. The data indicate that bitcoin adopters tend to have relatively accurate price forecasts, though perhaps slightly optimistic, but non-adopters tend to underestimate bitcoin prices—especially at the one-month horizon. As with other volatile asset prices, it is probably unreasonable to expect accurate forecasts at very short horizons such as one week. The one-month results may be more reliable, therefore, but the one-year forecast errors likely will shed greater light on the efficacy of consumers’ forecasts.

4.3 Holdings of Virtual Currency

The 2014–2015 SCPC asked all current adopters of virtual currency to estimate the amounts of their holdings, which are reported in Table 7. Unfortunately, these results shows signs that there may be significant measurement error in the responses. There are some very large, possibly implausible estimates, especially in the July 2015 oversample. Furthermore, the estimates vary widely across time, samples, data adjustments, and other factors.

Consequently, we recommend focusing attention on Table 8, an alternative summary of virtual currency holdings that omits some respondents and omits or imputes data for some individual responses. A key part of the screening relies on evaluating the implied exchange rate between bitcoins and the U.S. dollar, which is evident in the relative accuracy reported at the bottom of the table. By and large the bitcoin estimates show median holdings of about \$150 to \$400, and mean holdings that are generally less than \$5,000. However, we are still working on evaluating these challenging data and urge much caution in citing or interpreting the estimates.

²³We use volatility in the actual bitcoin price during the time period corresponding to the expectations horizon to judgmentally determine the cutoffs. In future drafts of the paper, we will formalize this specification and assess its robustness.

5. Econometric models

This section provides motivation for the econometric models and presents the details of their specifications. The material in this section is very preliminary and incomplete, and may not match exactly the latest regression results reported in Tables 9-12. The model descriptions are primarily textual; equations will be provided in future drafts.

5.1 Awareness and familiarity

The sample for awareness regressions includes all respondents from the 2014-2015 official SCPC and both oversamples. There is no reason to restrict the sample to exclude respondents because we seek to model the determinants of awareness among the entire U.S. population. Respondents from the two oversamples have been reweighted, however, to adjust for demographic differences in the respective subsample from the official (representative) SCPC sample. The sample for the familiarity regressions are limited to all respondents who indicated being aware of virtual currency only because awareness is a prerequisite for familiarity with virtual currency.

To determine the types of consumers who are more likely to be aware of virtual currency, we use a dummy variable for awareness (aware = 1, otherwise = 0) to run logit regressions and estimate the latent probability of being aware of Bitcoin or other virtual currencies (excluding erroneous responses).

To determine the types of consumers who more familiar with virtual currency, we use the degree of familiarity (1 to 5 scale) to run OLS regressions and estimate the effects of consumer characteristics on familiarity with virtual currency.

5.2 Expectation formation

The sample for the price expectation regressions is restricted to the subsample of respondents who are aware of virtual currency only. It is particularly important to obtain forecasts from both adopters and non-adopters of virtual currency, as well as for those with little and much familiarity with the concept.

To determine the types of consumers who have more optimistic price expectations, we use the

degree of optimism (-2 to 2 scale) to run OLS regressions and estimate the effects of consumer characteristics on virtual currency price expectations at each horizon (week, month, year).

5.3 Adoption and use

Next we model the ownership, or adoption, of virtual currency by consumers. To do so, we restrict our population of study to consumers who are aware of virtual currency only. Consumers who do not know that virtual currency exists cannot be expected to have made a rational (fully informed) decision to adopt it or not, of course. However, we do not take account of the degree of familiarity with virtual currency in these regressions.

There are at least two potential ways to model demand for virtual currency, depending on whether it is viewed as money or not. If we ignore the monetary aspect of virtual currency, we can follow the literature on adoption of payment instruments and treat the decision as a discrete choice and estimate the latent probability of adoption using logit regressions.²⁴

For the subsample of respondents who have adopted virtual currencies, we can model their use of them on both extensive and intensive margins. Regarding the former, we model the incidence of using virtual currency (extensive margin) as a discrete decision and estimate the latent probability of use with logit regressions. These results provide an estimate of the extent to which consumers hold virtual currency just for investment purposes or for payments as well.

To determine the types of consumers who are more likely to adopt virtual currency (among those who are aware of it), we use a dummy variable for adoption (adopt = 1, otherwise = 0) to run logit regressions and estimate the latent probability of adopting virtual currency of any type, and individually for Bitcoin and other virtual currencies.

To determine the types of adopters who are more likely to make payments with virtual currency, we use a dummy variable for incidence of use (use = 1, otherwise = 0) to run logit regressions and estimate the latent probability of paying with Bitcoin or other virtual currencies.

In future drafts, we will also follow the literature on consumer payment choice cited earlier and model the virtual currency share of consumer payments (intensive margin) using OLS regressions. These regressions include consumers' assessments of virtual currency characteristics

²⁴For examples of this approach, see [Schuh and Stavins \(2010, 2012, 2015\)](#) and the references therein.

(cost, convenience, security, etc.), relative to the characteristics of other payment instruments, as explanatory variables; for details, see [Schuh and Stavins \(2010\)](#).

5.4 Money demand

Alternatively, if we assume that virtual currency is private money, it may be more appropriate to specify a model of the demand for money in terms of the dollar value of holdings. Absent a structural model of money demand that distinguishes between sovereign and private currencies, we follow the traditional literature that uses reduced-form econometric models in the spirit of [Baumol \(1952\)](#) and [Tobin \(1956\)](#); in particular, we adopt a specification similar to [Briglevics and Schuh \(2013\)](#), which also uses SCPC data to estimate the demand for U.S. currency (or “cash”). To begin, we use the same reduced form model for the (log) value of virtual currency holdings, even though virtual currency is far from universally accepted like cash is.

One key difference between the demand for sovereign and virtual currencies is their opportunity costs. Demand for sovereign currency depends on the nominal interest rate—a real interest rate and expected inflation (the devaluation of the currency)—available to holder of sovereign currency because it must be withdrawn from a bank account in advance. For this measure, we can use interest provided on bank checking or savings accounts, or short-term investments like money market mutual funds. However, banks are not able to hold or transmit virtual currencies because their cryptographic security prevents them from complying with the Bank Secrecy Act (1970), which requires adherence to anti-money laundering (AML) and know-your-customer (KYC) regulations.

New types of depository institutions have emerged to hold virtual currency stocks (e.g., Coinbase, Circle, etc.), but so far they do not fractionally reserve balances and issue loans to earn interest. However, there appear to be some innovative ways of earning interest on Bitcoins, such as margin trading exchanges.²⁵ Demand for virtual currency depends on exchange (or principal) risk due to its floating exchange rate with the U.S. dollar. Therefore, expectations of future exchange rates (the “price” of virtual currency) should influence the demand for virtual currency in

²⁵See “How to Earn Interest on Bitcoin 5 Different Ways,” *Cryptorials*, June 27, 2015, <http://cryptorials.io/how-to-earn-interest-on-bitcoin-5-different-ways/>

a way that it does not influence the demand for sovereign currency.

6. Estimation results

This section reports the estimation results for the econometric models described in the preceding section. We estimate each regression model using a sample of data that is designed appropriately for the availability and limitations of the data stemming from the survey methodology, as described in the previous section and reported in each regression table.

6.1 Awareness and familiarity

Table 9 reports regression results for models of awareness of Bitcoin and other virtual currencies (separately), and for familiarity with Bitcoin (only). Coefficients from the awareness regressions are the marginal effects from the logit estimation (coefficient times 100 is the percentage point effect on the probability of being aware). Coefficients from the familiarity regressions are OLS estimates of the effect of a one-unit increase in familiarity on a five-point scale. Parameter estimates for the Bitcoin awareness regressions are generally much larger (in absolute value) and much more significant than the estimates for other virtual currency awareness.²⁶

Consumers aware of Bitcoin are much more likely to be highly educated (college or post-graduate), have higher income and wealth, and white or male; those with larger household sizes are less likely. Conditional on these characteristics, age is not a very significant or economically large determinant of awareness. Consumers with other high-tech experience—adopters of PayPal or Google Wallet and customers of Internet banks—also are much more likely to be aware of Bitcoin. Furthermore, the greater the number of other payment instruments consumers have adopted the more likely they are to be aware of Bitcoin.

Conditional on awareness, consumers who are younger, male, have higher education, and are experienced with high-tech are more likely to be familiar with Bitcoin. Familiarity is declining in age, and increasing more as age increases. Controlling for these characteristics, consumers who have adopted a GPR prepaid card are much more likely to be familiar Bitcoin. This result

²⁶Qualitatively, the estimates for awareness of other virtual currency are roughly similar to those for awareness of Bitcoin. However, given their small size and imprecision we will not discuss them in detail.

might reflect the fact that GPR prepaid cards are about the closest substitute to Bitcoin of all other payment instruments backed with the U.S. dollar.

6.2 Expectation formation

Table 10 reports regression results for models of Bitcoin price expectations over the next week, month, and year. Coefficients are OLS estimates of the effect of a one-unit increase in familiarity on a five-point scale. The models are only modestly successful in explaining formation of consumers' price expectations (R-squared of only 8-10 percent), and few estimates are consistent and significant across the forecast horizons.

Consumers who are in the oldest age group and highest income group tend to have lower forecasts of the changes in Bitcoin prices, although consumers with higher net worth relative to income tend to have much more optimistic expectations. For some reason, consumers who have higher cash shares of payments and who have adopted GPR prepaid cards also have more optimistic expectations, particularly for the month and year horizons. It is unclear why consumers who use Bitcoin substitutes relatively more would tend to have optimistic price expectations.

6.3 Adoption and use

Table 11 reports regression results for models of adoption of Bitcoin and other virtual currencies (separately), and of the incidence of use of both (separately as well). Coefficients from both the adoption and use regressions are the marginal effects from the logit estimation (coefficient times 100 is the percentage point effect on the probability of adopting or using). The models of both adoption and use tend to be relatively successful, with R-squareds of 30-66 percent. Coefficient estimates for models of adoption of Bitcoin and other virtual currencies are quite similar in magnitude and significance, but less so for the models of use.

Consumers with more optimistic expectations of the future prices of virtually currency are more likely to adopt virtual currencies. The coefficient estimates are highly statistically significant for all horizons and generally uniform across virtual currencies. (Expectations one month ahead are the difference from expectations for one week ahead; similarly for one year ahead.)

Conditional on their price expectations, consumers who are younger, male, and experienced

with high-tech (PayPal and Google Wallet) are more likely to adopt virtual currencies, while consumers with higher education are less likely to adopt them. Consumers with more other payment instruments are more likely to add yet another one by adopting virtual currency. And consumers who have high shares of debit card payments or have adopted a GPR prepaid card are less likely to adopt virtual currency, presumably because they are relatively content with these alternatives.

Among those who have adopted virtual currencies, consumers who are younger are more likely to use virtual currency to make payments and those who have higher income are less likely to use them. Consumers who have more other payment instruments are more likely to use virtual currency, perhaps because they own many instruments for use in various contexts and virtual currencies fills a particular need in some circumstances. However, consumers with relative high shares of debit card payments are much less likely to use virtual currency. This last result is perhaps the strongest of any—the marginal effects are 24-28 percent. It may reflect a close substitutability between debit cards and virtual currency for payment, which both are forms of electronic payment, albeit with different types of money (sovereign versus private, respectively). Nearly all of the self-reported reasons for adopting virtual currency also are significant determinants of the incidence of use of virtual currency.

6.4 Money demand

Table 12 reports regression results for reduced-form models of the demand for the log values of Bitcoin and cash holdings. Coefficients are the actual or semi elasticities with respect to the explanatory variables. The models are modestly successful in explaining demand for both types of money, with R-squareds of about 15-16 percent. However, the vast majority of coefficient estimates for Bitcoin are not statistically significant whereas the coefficient estimates for cash are mostly significant. This result may be an artifact of the smaller sample size for Bitcoin because the Bitcoin coefficient estimates are relative similar in magnitude to those for cash.

The only common significant result is that consumers who are male hold larger amounts of both Bitcoin and cash. Consumers who are older and higher income also hold more cash, as do those with high-tech experience (PayPal and Google Wallet). However, the interest rate variables that proxy for opportunity cost have significant but counterintuitive estimates that are puzzling.

These regression results are the most preliminary and should be interpreted with much caution.

7. Conclusions

This paper provides very preliminary empirical and econometric results that characterize U.S. consumers' experience with Bitcoin and other virtual currencies. The evidence is based on a respected, nationally representative survey that measures consumer adoption and use of all major U.S. payment instruments. The data and analysis are not complete and all results should be viewed circumspectly. Nevertheless, at this stage several basic results emerge that appear to be robust.

First, information about Bitcoin and other virtual currencies still had only reached about half of the U.S. adult population by the end of 2015, and it may take another decade before the vast majority of consumers are aware. Moreover, most consumers who are aware of virtual currencies report being largely unfamiliar with them, and even those who own them exhibit errors in reporting their holdings. Men and consumers with high income and education appear to be more aware of virtual currencies. In any case, incomplete and imperfect information about virtual currencies contributes to their limited dissemination in the U.S. economy.

Second, adoption of Bitcoin and other virtual currencies is quite low even among consumers who are aware of them. This finding suggests that virtual currencies still do not appeal to many consumers enough to obtain, hold and use them. One key exception is that consumers who expect virtual currencies to appreciate in value are much more likely to demand them. This result may suggest that consumers demand virtual currencies primarily as a financial investment rather than as a payment instrument. At the very least, high volatility in virtual currency values may be limiting consumers' demand for them.

Third, among those consumers who own virtual currency there appears to be considerable use of them to make payments for goods and services and to other consumers, roughly in equal proportions. This finding raises further questions about the extreme view that virtual currencies are merely speculative investment, especially given the relatively limited acceptance for payments among merchants and, presumably, consumers thus far.

Table 1: Description of surveys.

	2014		2015	
	SCPC	Oversample	SCPC	Oversample
Respondents	3,047	611	1,933	31
Time period of implementation	Oct-Dec, 2014	Jul, 2015	Oct-Dec, 2015	Oct-Dec, 2015
Vendor	UAS, ALP	Qualtrics	UAS, GFK	Qualtrics
Awareness	<i>Have you heard of: Bitcoin? Other (specify)?</i>	na	<i>Have you heard of: Bitcoin? Top 5? Other (specify)? How familiar are you: With Bitcoin?</i>	<i>Have you heard of: Bitcoin? Top 5? Other (specify)? How familiar are you: With Bitcoin?</i>
Adoption	<i>If aware, do you have (or have you had): Bitcoin? Other?</i>	<i>If aware, do you have (or have you had): Bitcoin? Top 14?</i>	<i>If aware, do you have (or have you had): Bitcoin? Top 14?</i>	<i>If aware, do you have (or have you had): Bitcoin? Top 14?</i>
Other questions	Holdings (1) Use (1)	Holdings (1) Records (1) Use (7) Reasons (2) Expectations (1) Assessments (1)	Holdings (1) Records (1) Use (7) Reasons (3) Expectations (1)	Holdings (1) Records (1) Use (7) Reasons (3) Expectations (1)

Table 2: Virtual currency awareness and familiarity.

Virtual Currencies Awareness and Familiarity
Percentage of consumers.

	2014 SCPC	2015 SCPC
Awareness.....	39.5	43.0
Bitcoin.....	39.5	40.6
Other virtual currency*.....	1.1	6.6
<i>Incorrectly identified.....</i>	<i>2.9</i>	<i>1.2</i>
<i>Other payment services (eg. Apple, Paypal, Google Wallet).</i>	<i>1.1</i>	<i>0.5</i>
<i>Sovereign Currencies (eg. Euro, Pesos, Pound).....</i>	<i>0.9</i>	<i>0.3</i>
<i>Cannot remember/other.....</i>	<i>0.4</i>	<i>0.1</i>
Familiarity with Bitcoin (among those that are aware).....	na	100.0
Not at all familiar.....	na	57.3
Slightly familiar.....	na	27.5
Somewhat familiar.....	na	9.1
Moderately familiar.....	na	4.9
Extremely familiar.....	na	1.2

* Excluding incorrectly identified. Correctly identified VCs include Dogecoin, Litecoin, Linden dollars, Ripple, Namecoin, Eucador, game based coins, Isracoin, Darkcoin, Blackcoin, BAMstorm and Feathercoin.

Table 3: Virtual currency adoption.

Virtual Currencies Adoption
Percentage of consumers.

	2014 SCPC		2015 SCPC	
	No OS	With OS	No OS	With OS
Current adoption.....	0.52	0.52	0.87	1.08
Bitcoin.....	0.47	0.45	0.43	0.87
Other virtual currency*.....	0.16	0.43	0.44	0.52
<i>Incorrectly identified.....</i>	<i>0.37</i>	na	na	na
Historical adoption.....	0.84	0.84	1.42	1.42
Bitcoin.....	0.71	0.69	0.87	1.17
Other virtual currency*.....	0.24	0.51	0.54	0.77
<i>Incorrectly identified.....</i>	<i>0.75</i>	na	na	na
Discarding.....	0.32	0.32	0.54	0.34
Bitcoin.....	0.24	0.24	0.44	0.29
Other virtual currency*.....	0.07	0.07	0.10	0.25
<i>Incorrectly identified.....</i>	<i>0.38</i>	na	na	na

* Excluding incorrectly identified.

Table 4: Reasons for owning and not owning virtual currency.

Reasons for owning and not owning virtual currency

Percentage of adopters.

	2014 SCPC, OS only		2015 SCPC, with OS	
	Primary	Secondary	Primary	Secondary
Why Virtual Currency.....	100.0	100.0	100.0	100.0
I am interested in new technologies.....	25.4	17.6	8.0	0.0
It is an investment.....	23.9	15.9	0.0	29.4
Payments.....	33.7	52.2	63.5	51.4
I use it to buy goods and services in the United States.....	9.7	12.8	0.0	14.8
It allows me to make payments anonymously.....	14.8	20.7	15.9	19.5
I use it to make remittances or other international payments.....	1.6	7.3	26.5	9.0
It uses secure blockchain technology to prevent loss and fraud.....	7.6	11.4	21.1	8.1
Distrust.....	11.4	14.1	0.0	3.1
I do not trust banks.....	8.1	5.6	0.0	0.0
I do not trust the government or U.S. dollar.....	3.3	8.4	0.0	3.1
Other.....	5.6	0.2	28.5	16.1
Why Not Virtual Currency.....	na	na	100.0	na
I do not understand the technology.....	na	na	17.8	na
Not accepted for payment very often.....	na	na	15.9	na
My current payment methods meet all of my needs.....	na	na	14.4	na
The U.S. dollar value of the virtual currency varies too much.....	na	na	15.1	na
It is not guaranteed by the U.S. government.....	na	na	12.9	na
It is not easy to acquire or use.....	na	na	18.7	na
Other.....	na	na	5.2	na

Table 5: Incidence of use and payee for virtual currency.

Incidence of use and payee for virtual currency

Percentage of adopters. SCPC Tables 19-27.

Incidence of use and payee	2014 SCPC		2015 SCPC
	Oct	Jul 2015	Oct
Used in last 12 months.....	45.7	75.1	42.6
Bitcoin.....	39.8	79.9	46.1
Other virtual currency*.....	31.6	64.4	49.6
Used in last month.....	na	72.5	38.0
Bitcoin.....	na	74.5	40.4
Other virtual currency.....	na	55.7	49.6
Payee			
Merchant.....	na	40.0	52.0
Person.....	na	58.2	42.7
Both.....	na	24.7	39.4

* Excluding incorrectly identified

Table 6: Expectations of Bitcoin exchange value.

Expectations of Bitcoin exchange value

2015. Percentage of Bitcoin Adopters, VC Adopters who do not own Bitcoins, VC Non-adopters, as noted.

	Decrease a lot	Decrease some	Stay about the same	Increase some	Increase a lot
Bitcoin (week)					
Bitcoin Adopters.....	10.8	5.0	39.9	25.8	18.5
VC Adopters (no Bitcoin)....	21.8	16.7	35.3	16.9	9.3
VC Non-adopters.....	5.6	9.1	80.4	4.4	0.5
Bitcoin (month)					
Bitcoin Adopters.....	4.0	10.9	32.7	34.8	17.7
VC Adopters (no Bitcoin)....	9.8	19.8	38.6	16.8	14.9
VC Non-adopters.....	5.6	13.4	70.9	9.4	0.6
Bitcoin (year)					
Bitcoin Adopters.....	4.9	5.8	27.5	33.1	28.6
VC Adopters (no Bitcoin)....	12.4	8.0	45.1	20.3	14.2
VC Non-adopters.....	10.8	15.5	57.6	13.3	2.7

* Includes the 2014 SCPC Oversample (Jul 2015) and the 2015 SCPC

Table 7: Virtual currency holdings.

Virtual Currency Holdings

Dollars or coins per adopter, as specified. SCPC Tables 14-15.

	2014 SCPC				2015 SCPC			
	No OS		With OS		No OS		With OS	
Coins	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Number of coins owned.....	8	75	10	52149	56	191	5	298
Bitcoin.....	7	74	3	1440	1	91	1	294
Other virtual currency*.....	1	1	11	62035	100	276	20	101
<i>Incorrectly identified.....</i>	<i>20</i>	<i>112</i>						
Dollar Value								
Value of virtual currency owned (owner estimate).....	1500	1551	338	97983	10	125	777	2900
Bitcoin.....	500	1638	200	3782	100	109	600	1589
Other virtual currency*.....	30	553	42	105657	0	136	1500	3075
<i>Incorrectly identified.....</i>	<i>30</i>	<i>29</i>						
Value of coins owned (official exchange rate)**.....			1542	967063				
Bitcoin.....	2510	25345	1246	691029	387	29184	387	89262
Other virtual currency*.....			3	125				
<i>Incorrectly identified.....</i>								
Value of VC owned (official exchange rate, best)***....			600	8455				
Bitcoin.....			616	9684	387	21474	387	6834
Other virtual currency*.....			5	272				
<i>Incorrectly identified.....</i>								
Addendum								
Implied reported exchange rates.....								
Bitcoin.....	333	193	13	407256	244	254	600	4627
% Exchange rate error.....								
Bitcoin.....	-9	-45	-96	129865	0	-12	55	1767

* Excluding incorrectly identified.

** In oversample, includes only those that used a reference for number of coins.

*** The criteria for "best" includes: (i) owner estimates of value with records, (ii) owner estimates of coins with records, converted using the official exchange rate, (iii) if no records were used, owner estimates of value if exchange rate error is less than 10%. If exchange rate error were greater than 10% and the owner used records for both value and coins, the observation is not kept. Finally, values were truncated at the 98th percentile.

Table 8: Virtual currency holdings, screened sample.

Virtual Currency Holdings

Dollars or coins per adopter, as specified. SCPC Tables 14-15.

Coins	2014 SCPC				2015 SCPC			
	No OS		With OS		No OS		With OS	
	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Number of coins owned.....	8	6	3	134460	100	294	100	239
Bitcoin.....	7	5	1	27	56	85	56	75
Other virtual currency*.....	1	1	3	202024	897	521	897	521
<i>Incorrectly identified.....</i>	<i>0</i>	<i>0</i>						
Dollar Value								
Value of virtual currency owned (owner estimate).....	250	910	297	2352	100	221	444	4596
Bitcoin.....	250	892	292	2432	100	147	385	7475
Other virtual currency*.....	30	553	56	1456	444	276	444	276
<i>Incorrectly identified.....</i>	<i>0</i>	<i>0</i>						
Value of coins owned (official exchange rate)**.....			802	2583				
Bitcoin.....	2510	1737	317	18502	20209	28075	20209	23218
Other virtual currency*.....			18	127				
<i>Incorrectly identified.....</i>								
Value of VC owned (official exchange rate, best)***....			317	4426				
Bitcoin.....			319	6345	20209	28075	20209	23172
Other virtual currency*.....			15	363				
<i>Incorrectly identified.....</i>								
Addendum								
Implied reported exchange rates.....								
Bitcoin.....	372	357	286	289	244	286	249	268
% Exchange rate error.....								
Bitcoin.....	8	1	-9	-9	0	0	-1	-1

* Excluding incorrectly identified.

** In oversample, includes only those that used a reference for number of coins.

*** The criteria for "best" includes: (i) owner estimates of value with records, (ii) owner estimates of coins with records, converted using the official exchange rate, (iii) if no records were used, owner estimates of value if exchange rate error is less than 10%. If exchange rate error were greater than 10% and the owner used records for both value and coins, the observation is not kept. Finally, values were truncated at the 98th percentile.

Table 9: Awareness and familiarity with virtual currencies.

	Awareness		Familiarity
	Bitcoin	Other VCs	Bitcoin
age	-0.00383	-0.00227**	-0.0392***
agesq (x 1000)	0.0478*	0.0146	0.262**
edu_c_pgs	0.141***	0.00330	0.118*
hh_size	-0.0347***	-0.00436**	-0.0402*
white	0.0937***	-0.00520	-0.0133
male	0.179***	0.0309***	0.317***
inc_lt25	-0.0922***	-0.00807	0.0676
inc_2549	-0.0321	-0.00382	-0.120
inc_7599	0.0896***	0.00141	-0.0713
inc_gt100	0.117***	0.00907	0.0910
num_otherpi_adopt	0.0320***	0.00375*	0.00509
paypal_adopt	0.112***	0.00922	0.137**
googlewallet_adopt	0.193***	0.0402***	0.483***
csh_sh	0.0191	-0.000653	-0.0486
dc_sh	-0.0456*	-0.00323	0.137
gpr_adopt	0.0123	0.00624	0.177***
online_retail_sh	-0.0559	0.0687***	0.151
internet_bank	0.154**	0.0146	0.0963
networth_income, winsorized .01	1.974***	-0.461	3.742
y2015	0.221***	0.0710***	
uas	-0.196***	-0.0290**	
gfk	-0.152**	-0.0152	0.269***
Constant			2.432***
Observations	4490	4523	825
(Pseudo-)Rsquared	.16	.2	.15

Sample: 2014 and 2015 SCPC with oversample.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: OLS on Expectations (-2 to 2 scale), Weighted.

	Week	Month	Year
age_u25	-0.105	0.0201	0.305*
age_2534	-0.0290	-0.00222	0.0765
age_4554	-0.139	-0.161*	-0.103
age_5564	-0.100	-0.111	-0.0254
age_o65	-0.247**	-0.243**	-0.216*
edu_c_pgs	-0.0663	0.0565	0.0756
hh_size	-0.0827***	-0.0106	-0.0344
white	-0.0457	-0.00656	-0.0182
male	0.0344	0.0384	-0.0243
inc_lt25	-0.0893	-0.0105	0.0657
inc_2549	-0.0651	-0.0471	-0.0200
inc_7599	-0.0392	-0.105	-0.0655
inc_gt100	-0.110	-0.209***	-0.242**
num_otherpi_adopt	0.0348	0.0137	-0.00368
paypal_adopt	0.0520	0.0165	0.0605
googlewallet_adopt	0.291**	0.190	0.0524
csh_sh	0.0596	0.353**	0.366*
dc_sh	-0.0364	0.109	0.223
gpr_adopt	0.114*	0.142**	0.256***
networth_income, winsorized .01	0.662	8.670*	15.65***
y2015	-0.307**	-0.542***	-0.915***
gfk	0	0.0586	0.0661
Constant	0.330	0.315	0.664**
Observations	1132	1325	1321
Rsquared	.08	.08	.1
Mean	.111	.137	.209
SD	.898	.881	1.074

Sample: 2014 SCPC oversample and 2015 SCPC with oversample.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Adoption and incidence of use of virtual currency, Weighted.

	Adoption		Use	
	Bitcoin	Other VCs	Bitcoin	Other VCs
expectations_week	0.0383***	0.0235***		
expectations_week_month	0.0313***	0.0270***		
expectations_month_year	0.0146***	0.00895***		
age_u25	0.0727***	0.0401***	0.106**	0.0423
age_2534	0.0169	0.0107*	0.0938**	-0.0671
age_4554	-0.00176	-0.00582	-0.0422	-0.0395
age_5564	-0.0455**	-0.0117	-0.0996	0.0934
age_o65	-0.0872***	-0.0263**	-0.0282	-0.426**
edu_c_pgs	-0.0402***	-0.0225***	-0.0401	0.0185
hh_size	0.00547	0.00853***	0.0259***	-0.00204
white	-0.0288***	-0.00601	-0.0160	0.0189
male	0.0210**	0.0133***	0.0421	0.0336
inc_lt25	0.0242	0.0281***	-0.0669	-0.100
inc_2549	0.00232	0.0236***	-0.0636	-0.109
inc_7599	0.0221	0.00833	-0.0973**	-0.0284
inc_gt100	0.0171	0.0185**	-0.115**	-0.0267
investing_res	0.00856*	0.000324	0.0477***	0.0118
num_otherpi_adopt	0.0194***	0.0143***	0.0583***	0.122***
paypal_adopt	0.0253**	0.00562	-0.0232	-0.0515
googlewallet_adopt	0.0449***	0.0324***	0.130***	0.00796
csh_sh	-0.0116	-0.0174	-0.0279	-0.0229
dc_sh	-0.0612***	-0.0578***	-0.276***	-0.243*
gpr_adopt	-0.0377***	-0.0510***	-0.0599	0
networth_income, winsorized .01	2.053***	-0.682**	-5.342***	1.772
whyvc_buygands			0.167***	0.113*
whyvc_remitintl			0.170***	0.246***
whyvc_anonymous			0.114***	0.262***
whyvc_investment			0.0951**	0.118**
whyvc_blockchain			0.133***	0.0673
whyvc_notrustinbanks			0.135**	0.115
whyvc_notrustingovt			0.0418	0.274***
Observations	1125	1125	504	440
Pseudo R-squared	.55	.66	.52	.3
N Positive	547	500	425	338

Marginal effects

Sample: 2014 SCPC oversample and 2015 SCPC with oversample.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

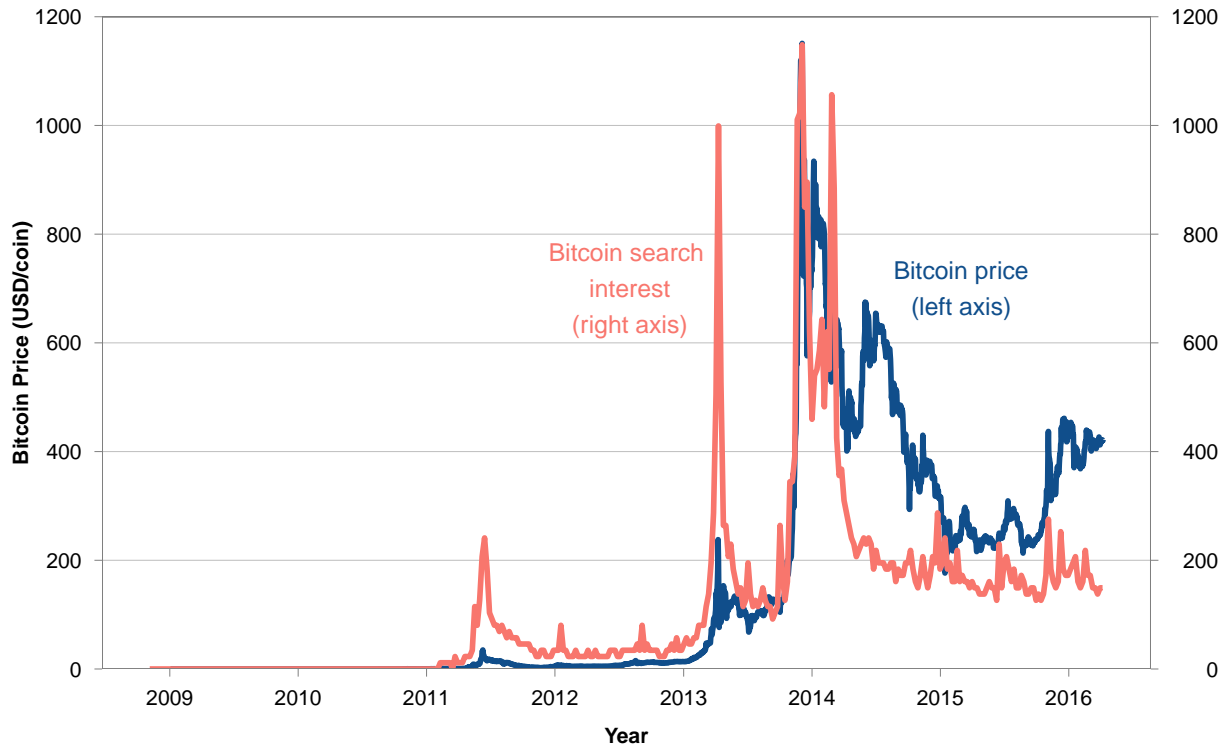
Table 12: OLS on log value of bitcoin and cash holdings.

	Bitcoin best, screened	Bitcoin best	Cash holdings
expectations_week	0.661	0.192	
expectations_week_month	0.655	0.241	
expectations_month_year	-0.147	-0.179	
chk_pays_int	1.291	-0.383	0.544***
log_chk_intXchk_pays_int	0.300	0.117	0.0986***
sav_pays_int	-2.236	-0.0510	0.272**
log_sav_intXsav_pays_int	-0.110	0.0598	0.0519*
age_u25	0.738	0.0741	0.0692
age_2534	1.661**	0.511	0.0573
age_4554	2.312	0.827	0.0351
age_5564	-4.191*	0.726	0.432***
age_o65	4.200***	1.198	0.604***
edu_c_pgs	1.650	0.152	-0.0483
hh_size	0.133	-0.0104	0.0340
white	0.719	0.0818	-0.00994
male	0.417	0.997***	0.379***
inc_lt25	0.323	-0.862	-0.750***
inc_2549	-0.172	-0.0527	-0.389***
inc_7599	-0.0534	-0.285	0.106
inc_gt100	-0.244	0.119	0.319***
investing_res	0.464	0.209	0.0888***
num_otherpi_adopt	0.0739	0.131	0.0525*
paypal_adopt	3.357**	0.462	0.182***
googlewallet_adopt	-0.375	0.0141	0.364***
csh_sh	-0.0527	0.520	1.611***
dc_sh	-1.770	-0.672	-0.733***
gpr_adopt	0.632	-0.420	-0.0358
networth_income, winsorized .01	47.07	6.125	16.91***
Constant	-0.474	3.782**	3.018***
Observations	49	286	3151
Rsquared	.79	.15	.16
Mean	6.564	6.346	6.346
SD	2.335	2.666	2.666

Sample: 2014 SCPC oversample and 2015 SCPC with oversample.

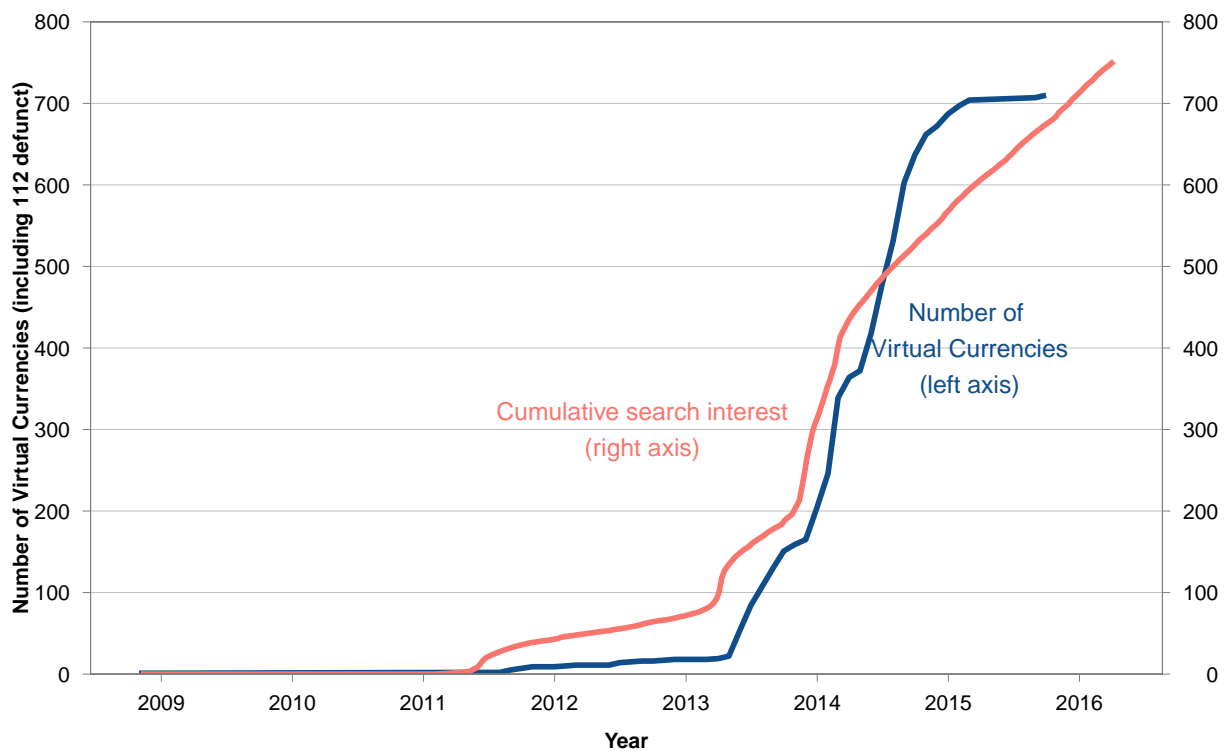
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 1: Bitcoin price and search interest (Google trends).



Note: Bitcoin search interest is based on US Google Trends, scaled to overlay with prices.

Figure 2: Number of virtual currencies and cumulative search interest.



Note: Cumulative search interest is based on US Google Trends for Bitcoin, scaled to overlay with number of coins.

Figure 3: Bitcoin awareness in a diffusion model.

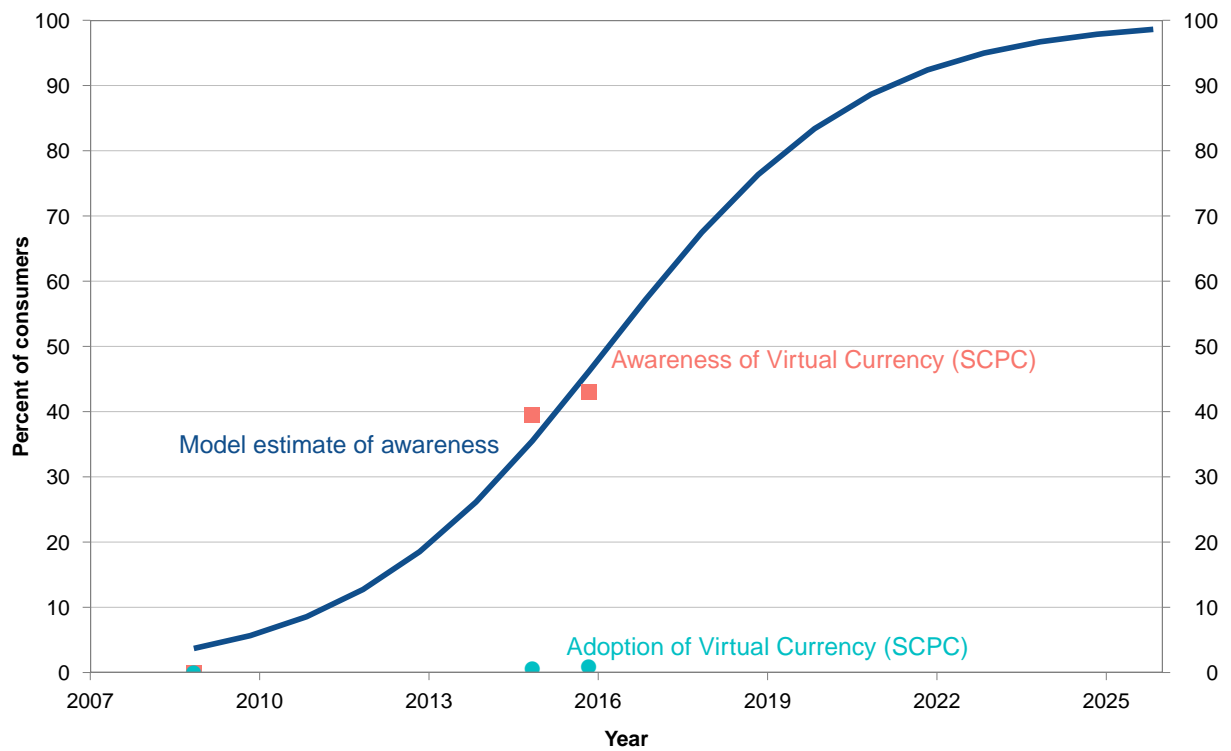


Figure 4: Actual vs Expected Bitcoin prices, using .05 and .1 as cut-offs for week and .1 and .2 as cut-offs for month.

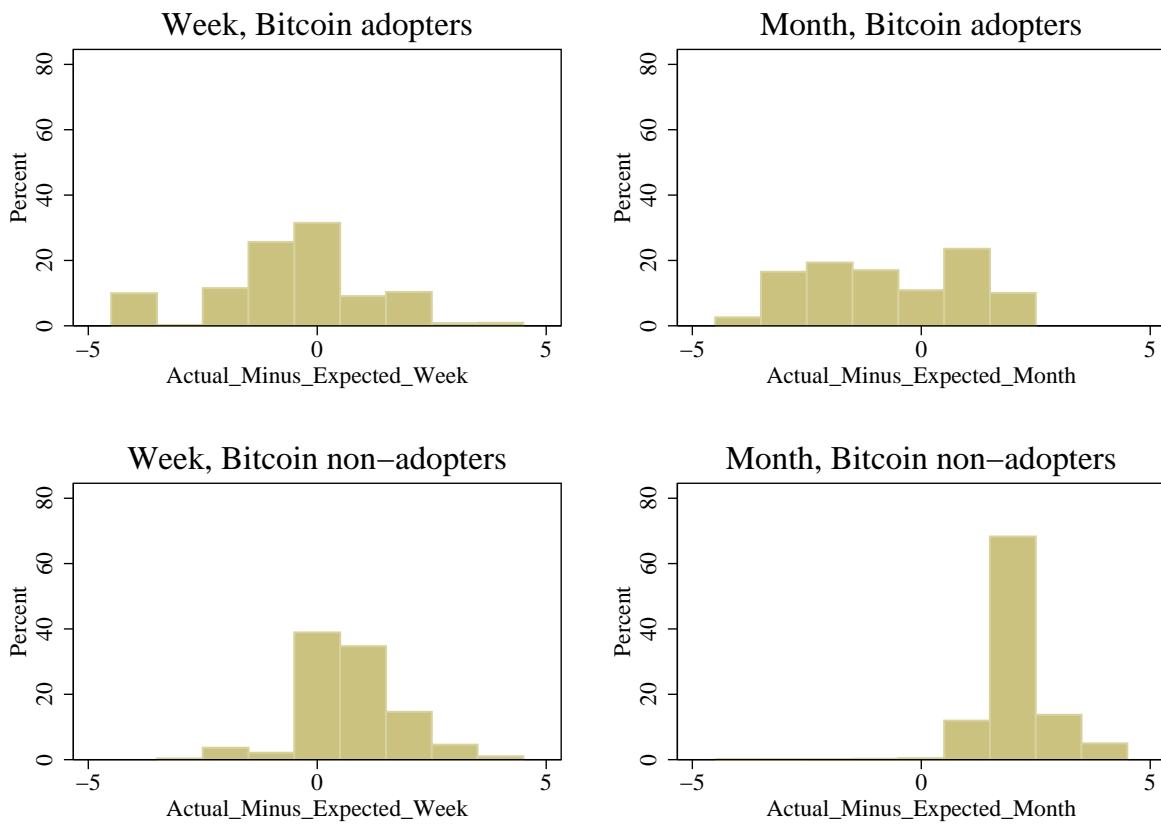


Table 13: Virtual currency questions in the 2014 SCPC (Oct), 2014 SCPC oversample (OS, Jul 2015), and 2015 SCPC (official and oversample, Oct 2015).

	2014		2015
	SCPC	OS	SCPC/OS
Awareness			
Have you heard of Bitcoin?	X		X
Have you heard of any other virtual currencies [Top 5]?			X
Have you heard of any other virtual currency? (if yes, please specify)	X		X
How familiar are you with Bitcoin and how it works?			X
Adoption (conditional on awareness)			
Do you have or own any Bitcoin?	X	X	X
Do you have or own any of these other virtual currencies? [Top 5]			X
Do you have or own any of these other virtual currencies? [Top 14]		X	
Do you have or own any other virtual currencies?	X		
Historical adoption (conditional on awareness)			
Have you ever had or owned any of these virtual currencies? [Bitcoin]	X		X
Have you ever had or owned any of these virtual currencies? [Top 5]			X
Have you ever had or owned any of these virtual currencies? [Other VCs]	X		
Reasons for (non-)adoption (conditional on (non-)adoption)			
What is the main reason that you do not own any virtual currency?			X
Please tell us your primary reason for owning virtual currency [9 options]		X	X
Please tell us your secondary reason for owning virtual currency [9 options]		X	X
Amount owned (conditional on adoption)			
How much virtual currency do you have or own? [coins, USD equivalent; Bitcoin, other]	X	X	X
Did you have to refer to records or websites to know the number of coins or the equivalent value in U.S. dollars?		X	X
Incidence and frequency of use (conditional on adoption)			
In the past 30 days, have you used virtual currency to make a payment or transaction? [Bitcoin, other]		X	X
In the past 12 months, have you used virtual currency to make a payment or transaction? [Bitcoin, other]	X	X	X
In the past 30 days, how many payments did you make using a virtual currency? [Bitcoin, other]		X	X
In the past 12 months, how many payments do you make using a virtual currency? [Bitcoin, other]		X	X
Location of use (conditional on adoption)			
Have you used virtual currency to pay a merchant (store, company, or other business)?		X	X
(If yes) Please list up to three merchants you have paid using virtual currency.		X	X
Have you used virtual currency to pay a person (somebody who is not a merchant)?		X	X
Price expectations and assessments (conditional on awareness)			
How do you expect the value of one bitcoin to change over the following time periods. [week, month, year]		X	X
Assessments of bitcoin/virtual currency [security, acceptance, cost, convenience, getting & setting up, payment records] ⁴⁴		X	

Table 14: Description of independent variables.

Variable	Description
age	Age of respondent
agesq	Age of respondent squared
age_u25	Indicator variable for age of respondent <25
age_2534	Indicator variable for age of respondent >= 25 and <= 34
age_4554	Indicator variable for age of respondent >= 45 and <= 54
age_5564	Indicator variable for age of respondent >= 55 and <= 64
age_o65	Indicator variable for age of respondent >= 65
edu_c_pgs	Indicator variable for education of respondent at the college or post-grad level
hh_size	Respondent household size
white	Indicator variable for respondent race (white)
male	Indicator variable for respondent gender (male)
inc_lt25	Indicator variable for respondent family income <\$25k
inc_2549	Indicator variable for respondent family income >=\$25k and <=49k
inc_7599	Indicator variable for respondent family income >=\$75k and <=99k
inc_gt100	Indicator variable for respondent family income >=\$100k
num_otherpi_adopt	The respondent's number of non-VC payment instruments (out of 9)
paypal_adopt	Indicator variable for whether the respondent adopts PayPal
googlewallet_adopt	Indicator variable for whether the respondent adopts Google Wallet
csh_sh	The share of respondent's cash payments by number
dc_sh	The share of respondent's debit card payments by number
gpr_adopt	Indicator variable for whether the respondent adopted a general purpose reloadable (GPR) prepaid card
online_retail_share	The share of respondent's online retail payments by number
internet_bank	Indicator variable for whether the respondent's primary checking account is an internet bank or not
networth_income	Ratio of networth to income, divided by 1,000
y2015, uas, gfk	Indicator variable for the year 2015, uas, gfk samples
expectations_week_num	Respondent's expectations of Bitcoin exchange rate growth/decline over the next week (1-5)
expectations_month_num	Respondent's expectations of Bitcoin exchange rate growth/decline over the next month (1-5)
expectations_year_num	Respondent's expectations of Bitcoin exchange rate growth/decline over the next year (1-5)
investing_res	A 1-5 self-reported measure of the respondent's investment responsibility within household
whyvc_buygands	Primary reason for adopting VC is buying goods and services
whyvc_remitintl	Primary reason for adopting VC is international remittances
whyvc_anonymous	Primary reason for adopting VC is anonymity
whyvc_investment	Primary reason for adopting VC is investment
whyvc_blockchain	Primary reason for adopting VC is interest in blockchain technology
whyvc_notrustinbanks	Primary reason for adopting VC is no trust in banks
whyvc_notrustingovt	Primary reason for adopting VC is no trust in government or US dollar

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