

What is Money? Evidence from Introducing Digital Currency to a Barter Community

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Abstract

I analyze how digital currency issuance by a private online platform affected the volume of trade in a large barter community in Toronto. The community initially banned cash, but subsequently introduced a digital token that could be transferred among users and redeemed at designated local stores for retail goods. Using comprehensive transactions data, I show that a large monetary expansion persistently increased transaction volume by 70% by enabling monetized trade. However, when token redemption was suddenly halted at a subset of stores, a run on the token ensued and transaction volume fell. The findings are consistent with a search-theoretic model wherein money functions as a medium of exchange.

Keywords: barter, money, medium of exchange

JEL: E42, E52, E65

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1 Introduction

Economists have long believed that money performs an essential role in society by overcoming the problem of double coincidence of wants in a barter economy.¹ A large class of search-theoretic models inaugurated by [Kiyotaki and Wright \(1989, 1993\)](#) formalizes this notion and is widely used to analyze monetary phenomena.² Although these models have been studied in lab experiments (e.g. [Duffy and Ochs 1999, 2002](#)), there is very little research that tests them by studying barter in the field. Since evidence is scarce, some scholars have even suggested that the barter economy is an imagined construct with no real-life counterpart ([Wray 2004; Graeber 2011](#)).³

Although barter is rare, both barter and private currencies are known to emerge during severe economic crises, such as the 1930s Great Depression and the 2002 Argentine Crisis ([Fisher 1934; Pearson 2003; Poggioli 2011](#)). In recent economic downturns, bartering communities with thousands of members popped up on online forums such as Facebook and Nextdoor to help people trade necessities without cash ([Lerman 2020; Shilton 2020](#)). The focus of this study is one of these communities, named Bunz. The Bunz community arranged barter trades through a dedicated mobile app platform and later launched its own digital currency. This paper uses comprehensive transactions data obtained from the platform to describe their transition from barter to fiat money.

Participants of the Bunz community were primarily young millennial adults in Toronto who traded second-hand items such as clothing, accessories, plants, and groceries. The community forbade cash transactions for ideological reasons, so the platform’s roughly ten thousand daily active users initially had to barter in order to complete trades. The platform subsequently introduced a digital token, named BTZ, that could be transferred among users and redeemed at designated local stores for retail goods at a fixed exchange rate. In this paper, I focus on the effects of digital token issuance on the volume of trade. To measure the volume of trade, I count the ratings that users provide for each other upon trade completion, which are available both before and after the

¹In the parlance of [Hahn \(1973\)](#), money is essential if more desirable outcomes are feasible when money is available. Economists generally believe that the essential function of money is its role as a medium of exchange ([Adam Smith 1776](#), chap. 4; [Jevons 1875; Ostroy and Starr 1974; Townsend 1980; Kiyotaki and Wright 1993](#)).

²[Ostroy and Starr \(1990\)](#), [Lagos, Rocheteau and Wright \(2017\)](#), and [Rocheteau and Nosal \(2017\)](#) provide surveys of the theoretical literature that either preceded or built upon these seminal papers.

³Summarizing a large literature in history and anthropology, [Caroline Humphrey \(1985\)](#) wrote that “no example of a barter economy, pure and simple, has ever been described, let alone the emergence from it of money.”

introduction of the token.

The analysis begins with predictions derived from the [Kiyotaki-Wright \(1993\)](#) model of money as a medium of exchange. This theoretical framework closely resembles the empirical setting and features a large population of agents who randomly meet pairwise over time and decide whether to trade. Money is assumed to have no intrinsic value, but agents may choose to accept one unit of money in exchange for one unit of a commodity when there is a lack of double coincidence of wants. Two testable predictions arise. First, if agents are willing to accept money and barter is difficult, an increase in the money supply from zero raises transaction volume and welfare by enabling more money-mediated trade. Second, if money supply is positive but agents suddenly become less willing to accept money, transaction volume and welfare falls.

In the second step of the analysis, I test whether unanticipated increases in money supply raised transaction volume in the Bunz barter economy. There were two waves of monetary expansion. First, the platform endowed all active app users with some units of the token when the token was introduced in April 2018. Second, the platform quintupled token supply by greatly increasing currency issuance to users in September and October 2018. Since app usage was stable prior to the introduction of the digital token, I use an interrupted time series design to estimate the effects of monetary expansion on transaction volume.

The data show that monetary expansion dramatically increased total transaction volume. The first and smaller wave of token issuance did not detectably change the transaction volume among app users. However, the second and much larger wave of token issuance led to a roughly 70 percent increase in peer-to-peer in-person transactions. The increase in transaction volume persisted for almost a year, even after token issuance was reduced and token supply stabilized.

Consistent with the theoretical framework, the rise in transaction volume is entirely explained by the emergence of token-mediated trade alongside barter exchange. In fact, monetary expansion did not detectably change the volume of barter transactions. The total number of goods traded in Bunz economy therefore necessarily increased. This increase is not explained by alternative mechanisms such as the arrival of new users or increased supply of goods on the platform. The token price also remained anchored at the fixed exchange rate, which validates the model's assumption that the exchange value of money is fixed. These results, when interpreted through the lens of

the model, imply that monetary expansion increased total consumption and welfare in the Bunz economy by overcoming the problem of double coincidence.

In the final step of the analysis, I test whether a sudden reduction in token acceptance reduced transaction volume. In September 2019, the platform abruptly and unexpectedly announced that tokens would no longer be redeemable except at coffee shops and restaurants. This decision was prompted by cash flow difficulties and can be interpreted through the lens of the theoretical framework as an exogenous reduction in token acceptance by a set of participants in the economy.

Partial cessation of token redemption immediately reduced the willingness of Bunz users to accept the token. An interrupted time series design reveals that the share of items posted with a token price immediately and sharply fell by roughly 8 percentage points from an initial level of 35 percent. Token redemption also immediately increased after the announcement, as users rushed to coffee shops and restaurants to spend down token balances. However, the money supply did not significantly drop, suggesting that the difficulty of redeeming large quantities of tokens for small-valued and perishable items like food and coffee helped to stem currency outflow.

As predicted by the theoretical framework, transaction volume began to fall after the announcement and was roughly 25 percent lower a month thereafter. Contrary to the framework, however, both barter and token-mediated transactions substantially fell, suggesting that the negative effects of the currency crisis was not limited to token-mediated trade. The reduction in transaction volume is likely to be partly driven by a reduction in the number of users and supply of goods on the platform, since the number of items posted on the platform also substantially fell.

The contribution of this paper is to document a transition from barter to fiat money in the field using comprehensive transactions data. In this process, I use several natural experiments to test the [Kiyotaki-Wright \(1993\)](#) model of money as a medium of exchange. A large theoretical literature has built upon their search-theoretic approach to money (see surveys by [Lagos, Rocheteau and Wright 2017](#); [Rocheteau and Nosal 2017](#)). Search-theoretic theories have also been tested in the laboratory ([Brown 1996](#); [Duffy and Ochs 1999, 2002](#); [Duffy and Puzzello 2014](#)). However, quantitative micro-evidence from the field is exceedingly rare. [Colacelli and Blackburn \(2009\)](#) present evidence from the Argentine Crisis that participating in private fiat-issuing exchange clubs increased individual consumption. Their evidence, however, does not directly indicate whether the

use of money increased consumption because of its function as a medium of exchange.

In addition to analyzing the function of money, this paper studies the origins of monetized exchange. One school of thought suggests that money arises spontaneously to lubricate the market (Menger 1892). Along these lines, Radford (1945) describes the spontaneous emergence of cigarettes as money in a prisoners-of-war camp. However, the transition from barter to money has been shown in both search-theoretic models and lab experiments to require coordination by a subset of agents in the economy (Ritter 1995; Duffy and Ochs 1999).⁴ Consistent with the latter theory, the emergence of money in the Bunz community was not spontaneous. It required the promise of token redemption to ensure that a set of local stores were willing to accept tokens in exchange for commodities. When the platform reneged on its promise, monetized exchange eventually disappeared.

In studying monetary theories through empirical observation of a subeconomy, this paper follows Sweeney and Sweeney (1977), who document that a recession of baby-sitting in a co-op on the US Capitol Hill was averted through expanding the supply of scrip (see also Krugman 1998). By measuring the effects of platform money issuance on the Bunz economy, this paper relates to an active literature that tests for the effects of monetary policy on macroeconomic output (e.g., Romer and Romer 2004; Nakamura and Steinsson 2018). By studying a currency crisis triggered by reduced token redemption, this paper relates to a large literature on currency pegs, runs, and capital controls (e.g., Eichengreen, Rose and Wyplosz 1994, 1995).⁵

Finally, this paper relates to recent studies on payment technology. First, an active literature shows that increased availability of payment means raises individual consumption (Jack and Suri 2014; Xu, Ghose and Xiao 2019; Alvarez and Argente 2020a,b). Second, a rapidly growing literature studies the recent rise of platform-issued currencies, cryptocurrencies, and stablecoins (e.g.,

⁴Relatedly, the state theory of money, first advanced by Knapp (1924) and further developed by Lerner (1947), argues that money is a creature of the state because its value derives from its issuance and acceptance by a government rather than spontaneously through relations of exchange. The related credit theory of money, first advanced by Mitchell-Innes (1913, 1914), argues that money and credit are essentially the same thing. These two theories are featured prominently by recent books such as Martin (2013) and have influenced the development of modern monetary theory (Mitchell, Wray and Watts 2019; Kelton 2020).

⁵One strand of this literature considers how macroeconomic factors can cause a currency to trade at prices discounted from the pegged value (Eichengreen, Rose and Wyplosz 1994; Engel and West 2005; Gabaix and Maggiori 2015; Itskhoki and Mukhin Forthcoming). Another strand focuses on the collapse of pegged exchange rates due to inadequate central bank reserves and speculative attacks that are potentially self-fulfilling (Krugman 1979; Obstfeld 1986; Eichengreen, Rose and Wyplosz 1995; Morris and Shin 1998; Chamley 2003).

You and Rogoff 2019; Sockin and Xiong 2020; Lyons and Viswanath-Natraj 2020). This paper contributes to these literatures by showing that digital currency issuance by an online platform increased consumption in a setting with significant transaction frictions. However, the Bunz experience also suggests that private digital currency issuance may bring about increased risk of financial instability, as emphasized by Gorton and Zhang (2021) among many others.

The paper proceeds as follows. Section 2 describes the setting and data. Section 3 provides a theoretical framework. Section 4 documents the effects of monetary expansion. Section 5 analyzes the effects of reduced token acceptance. Section 6 concludes.

2 Background

2.1 History of the Bunz Community

The barter community Bunz began in 2013 as a Facebook group, created “to make city living easier for a cohort of millennials who graduated into a post-recession labour market and felt squeezed by precarious employment, stagnant wages and the soaring cost of living” (McIntyre 2019). During its early days, community members would publish posts indicating that they were either in search of some item or were looking to get rid of some other item. Interested members would write back and offer to trade. Initially known as “Bumz”, the community was highly popular among cash-constrained young adults in Toronto, who often posted funny commentary about local happenings in addition to items they wished to trade. The community grew rapidly between 2013 and 2016. Due to this growth, roughly 200 Facebook groups were created, each dedicated to trading different types of items and discussion of different topics, some with thousands or even tens of thousands of members.

In early 2016, the community leaders decided to migrate the community’s trading activities to a dedicated mobile app. The app’s interface was designed specifically to enable users to post, search, and message each other about items to trade. The app had in fact been independently developed by a separate company (Shuffl Inc.) and had functionality similar to other apps that later emerged, like Facebook Marketplace. However, the app lacked users. The migration of Bunz community members onto the app therefore benefited both parties. It provided the app with a

significant user base, while the community benefited from improved trading experiences. But the merger also created a long-standing ideological divide within the community. The app developers (henceforth, “Bunz HQ”) were interested in growing the user base beyond the initial community and eventually profiting from the app, while the community leaders, who continued to administer the Facebook discussion groups on a voluntary basis, wanted to preserve the anti-capitalist ethos of the community.⁶

2.2 Trading Mechanics on the Bunz Platform

Because of its anti-capitalist spirit, the Bunz community had one big rule: no cash. Instead, users were to transact through “true trades,” i.e. barter (see Bunz FAQ in the Appendix). Bunz HQ enforced this ban by taking down any item postings that requested cash, and the ban on cash was by and large observed by the app’s users. Interviews with app users in May 2019 revealed a range of opinions about the ban on cash transactions among users. Many interviewees, especially those who were involved in the administration of the Facebook groups, expressed strong agreement with the cash ban. However, at least one frequent seller admitted that they prefer transacting in cash and sometimes to tried to gently steer buyers towards paying in cash.

Figure 1 Panel (a) shows photos of the mobile app in 2017, before the introduction of its digital token, BTZ.⁷ The left panel shows the app home screen, where the users can browse or search for items to trade. The right panel shows an example of a posted item on the app, which typically included a photo, a description, as well as the location of the seller. In addition, all users maintained a public profile, which displays a short description of the user’s trading interests and an “ISO” (in search of) list, which indicates what types of items that user would be willing to accept in exchange for items that she posts. The items that the user that has posted for sale is also shown in the profile.

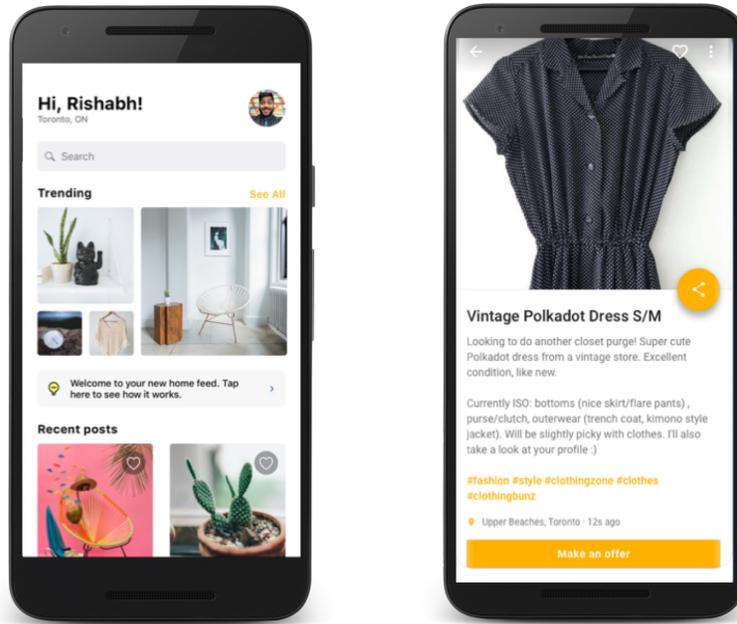
Figure 2 shows examples of typical in-app interactions taken from a local newspaper article that provided trading tips for Bunz users (Kaur 2017). In the app, when a user comes across an item she liked, she would click a button to send an offer message to the seller, asking if he would

⁶A fascinating article by McIntyre (2019), published in *The Logic*, provides a detailed and colorful account of the history of this merger, as well as useful context for the launch of BTZ and subsequent currency crisis.

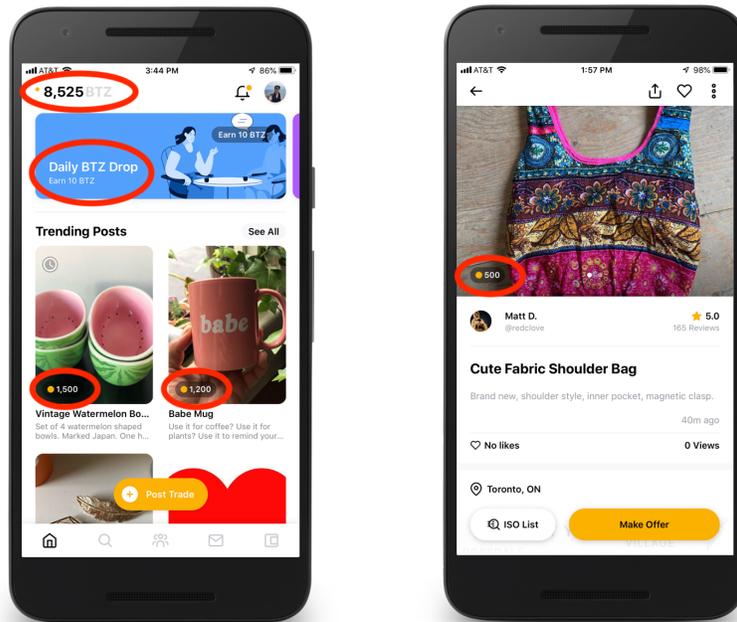
⁷These images are taken from a blog post from Bunz. <https://blog.bunz.com/back-to-bunz-basics-dbcef3810c8e> More information about the app’s early days is available at: <https://rishabh.ca/work/bunz>

Figure 1: App interface

(a) Before BTZ introduction



(b) After BTZ introduction



Source: Panel (a) is from an official blog post by Bunz, published on September 1, 2017. Panel (b) is taken by the author on June 18, 2019, with red circles added.

be interested in any item that she posted (“Anything in mine?”). He would then browse her profile and message back to indicate whether there was any such item. If a possible trade was found, then the two would then message to arrange a time and location to meet. In the message screen, users are prompted to rate each other once they complete a trade.

Due to the ban on cash, the need for double coincidence of wants posed an impediment to transactions on the Bunz app. As shown in Figure 2, example messages show that transactions frequently failed because the buyer did not have an item that the seller desired. Interviews with users reveal that when a lack of double coincidence occurred, sellers often offered to complete the transaction through alternative payments as beer, gift cards, and transit tokens. However, these objects had limited circulation within the Bunz economy, since these objects were typically procured by the buyer immediately before a transaction and directly consumed or used by the seller soon after the transaction. For example, traders would sometimes meet at a local liquor so that the buyer could procure the necessary alcoholic means of payment on the spot. At other times, buyers would procure a gift card from a store right before meeting a seller for a transaction. These offers were also occasionally rejected in favor of a “true trade” by users who prefer to barter.

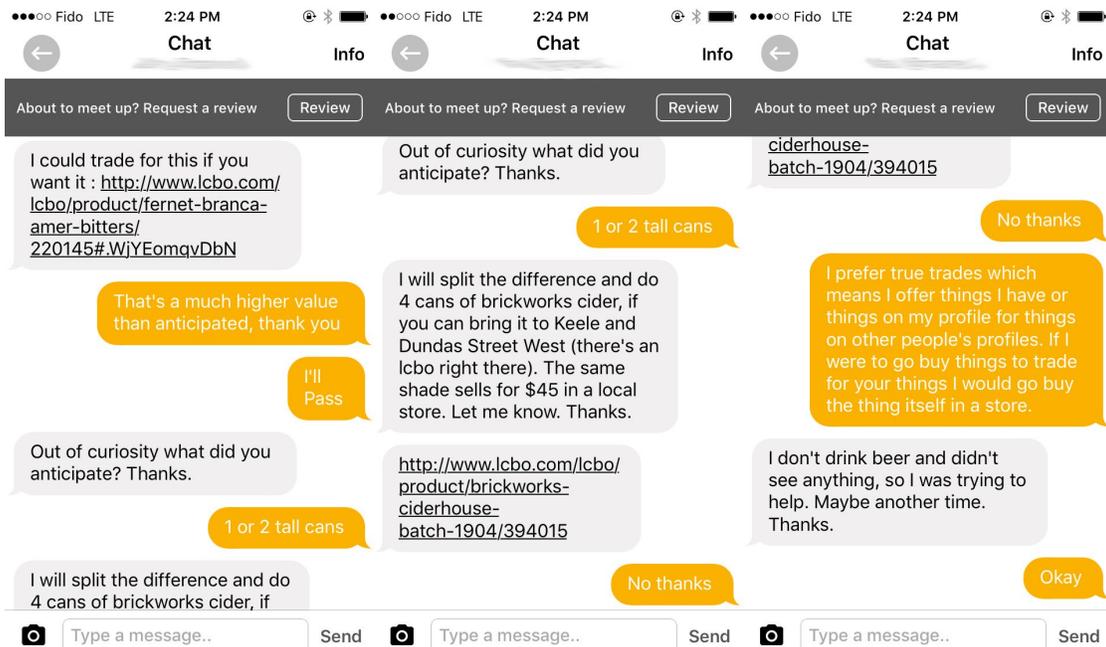
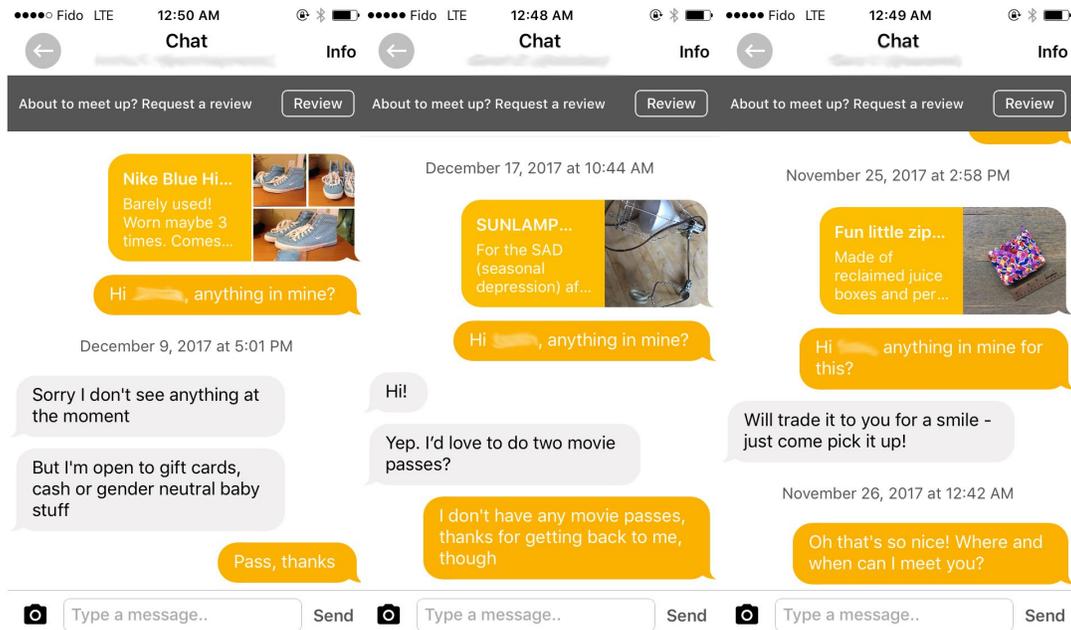
Repeated interactions in the Bunz economy were exceedingly rare. Traders who met through the Bunz app were largely strangers who would not meet again. Exchange was almost always bilateral and simultaneous.⁸ Traders were incentivized against opportunistic behavior such as no-shows and scams by a system where users could publicly rate and review each other after they agreed to trade.

2.3 Introduction of BTZ

In April 2018, Bunz HQ introduced a new app feature, BTZ, which was marketed as “a brand new digital currency.” The stated purpose of BTZ was to facilitate trade within the app, and the new feature was designed such that it was easy to transfer these tokens from user to user. At the time

⁸Credit among Bunz users was very rare. On occasion after the introduction of BTZ, users may receive get advance digital payments as deposit or because they anticipate their cellular data to be wonky at the trading location. Users may also receive slightly deferred payment, when a new user cannot remember their digital wallet PIN, or when a repeat user who is low on BTZ but can deliver BTZ later after another imminent trade that has already been arranged. However, other than these very short-term credit arrangements, credit among Bunz users was not known. This absence of credit and banking in the Bunz economy is a departure from the macroeconomy that allows me to focus on the role of money as a medium of exchange.

Figure 2: Examples of in-app interactions



Source: Article from a weekly local free newspaper providing tips for Bunz traders, published on December 28, 2017 (Kaur 2017).

of BTZ introduction, each user was endowed with 1000 BTZ upon wallet activation. In addition to receiving BTZ from other users, users could earn extra BTZ directly from the app through the “Daily BTZ Drop” by opening the app and answering a survey. The goal of “Daily BTZ Drop” was to increase user traffic and BTZ adoption in the app. Users could also earn more BTZ by inviting friends to join the app or posting new items.

To promote the token and to ensure price stability, Bunz HQ created the “Shop Local” program, which allowed users to purchase goods using BTZ at partner local stores around Toronto, such as coffee shops, at a fixed exchange rate of 100 BTZ to 1 Canadian dollar (CAD).⁹ After accepting BTZ payments, the owners of local stores could then redeem BTZ for cash from Bunz HQ at the same fixed exchange rate. Other than token redemption through the Shop Local program, users could neither buy nor sell BTZ for cash in the Bunz app. As such, the total supply of tokens on the app was strictly determined by token issuance by the app and token redemption by users at local stores.

Figure 1 Panel (b) shows photos of the mobile app after the introduction of its digital token, BTZ. On the top left of the home screen is the user’s BTZ balance. In the center, users were prompted to participate in the “Daily BTZ Drop”. Each item could now be posted with a BTZ price. BTZ could also be transferred among users by tapping on buttons on another user’s profile or by scanning another user’s QR code. All of these features were introduced in an major app update in April 2018.

2.4 Data and Descriptive Statistics

Bunz HQ provided timestamped data for all item postings and descriptions, all user ratings, and meta-data on user messages, including indicators for offer messages. Detailed data on all BTZ transactions following its introduction are also available, including timestamps, BTZ amount, as well as the identities of the sender and receiver. An additional source of information is the “Daily BTZ Drop” surveys, which were conducted daily and for which answers were required before users received the daily issuance of BTZ from Bunz HQ.

The Bunz user base consisted primarily of young college-educated adults, as shown in Ap-

⁹In 2018, the average exchange rate was 1 CAD to 0.77 USD.

pendix Figure A1. Roughly 75 percent of BTZ Drop survey respondents reported to be between 18 and 34 years old. More than half reported to have completed a university degree at the bachelors or higher level. Users also exhibit a wide range of annual incomes. While roughly 27 percent of users reported annual incomes of less than \$20,000, nearly 40 percent reported annual incomes higher than \$50,000.

A small fraction of users account for a large share of completed in-person transactions on the platform. In March 2018, 4,243 users completed 17,284 transactions. The 569 users with the most transactions account for half of these transactions. The top 118 users account for 20% of these transactions.

3 Theoretical Framework

This section derives predictions from the [Kiyotaki-Wright \(1993\)](#) model of money as a medium of exchange. Even though subsequent models relaxes some of its assumptions, this canonical model best matches key features of the Bunz economy. There are two testable predictions. First, if barter is difficult and agents are willing to accept money, an increase in the money supply from zero raises transaction volume by enabling more money-mediated trade. Second, if the money supply is nonzero, a decline in the number of agents willing to accept money reduces transaction volume.

3.1 Setup

Consider a unit mass of infinitely-lived agents who produce, trade, and consume commodities. Consumption of a unit of a commodity yields utility U . However, agents cannot consume their own product. Furthermore, agents are able to consume a random agent's product only with probability $x \in (0, 1)$. Initially, fraction $M \in [0, 1]$ of agents are endowed with one unit of money, while $(1 - M)$ are endowed with one real commodity. Both money and commodities can be stored at zero cost. However, money can never be consumed. Following consumption of a commodity, an agent produces one unit of a commodity instantaneously.

An agent who holds an inconsumable commodity looks for an agent with whom to trade. Agents randomly meet pairwise at Poisson rate β . With probability x^2 , the pair has “double coin-

“double coincidence of wants,” so they are able to consume each other’s commodity. Whenever a commodity is traded, a transactions cost ε is incurred, where $0 < \varepsilon < U$, so agents who are indifferent between two commodities never trade. The transactions cost of accepting money is zero. Exchange takes place if and only if mutually acceptable.

Agents choose strategies for deciding when to accept various commodities and money in order to maximize their expected discounted utility from consumption net of transactions, taking as given the strategies of others. Let π denote probability a trader accepts money in exchange for a commodity. We solve for the symmetric steady-state Nash equilibrium.

The model’s setup matches many features of the Bunz setting. Consistent with the model, the goods traded on the Bunz platform are highly heterogeneous, the matching of traders through the app is frictional, and the wants of traders are often exhibit lack of double coincidence, as documented in the previous section.

For tractability but in a departure from realism, the model assumes that if money trades, it must trade one-for-one against a commodity. The implied exchange value of money is therefore fixed whenever it is used for trade. Even though this indivisibility assumption is relaxed in subsequent models (e.g. [Lagos and Wright 2005](#)), it is reasonable in the Bunz context, since the BTZ token is redeemable at a fixed exchange rate, and as shown below, the perceived BTZ price remains anchored at that rate throughout the monetary expansion. By contrast, existing models with divisible money have flexible token prices and are therefore inappropriate for the Bunz setting.¹⁰

The model also assumes that the Bunz community is a closed economy. This assumption comes at some expense of realism, since Bunz users are also regular participants in the urban Canadian cash economy. However, it is justified for two reasons. First, many of the used personal possessions traded on the Bunz platform are not easily bought or sold in physical stores or other online platforms. As such, both the consumption and supply of goods on the platform are imperfect substitutes for consumption and supply elsewhere. Second, the conversion of BTZ tokens into Canadian dollars is highly frictional. For this reason, capital outflow from the Bunz economy is limited.

¹⁰Models with divisible money are also typically difficult to characterize without assumptions such as transfers within families or a periodic centralized market that generate a degenerate distribution of money holdings ([Trejos and Wright 1995](#); [Shi 1997](#); [Lagos and Wright 2005](#); [Rocheteau and Wright 2005](#); [Molico 2006](#)). These assumptions do not match the Bunz setting, where such transfers are not possible.

3.2 Testable Predictions

There are three Nash equilibria in this model: (1) a non-monetary equilibrium, where $\pi = 0$; (2) a mixed-monetary equilibrium, where $\pi = x$; and (3) a pure-monetary equilibrium, where $\pi = 1$. The symmetric mixed-strategy equilibrium can be reinterpreted as a non-symmetric pure-strategy equilibrium, where fraction x of agents accept money with probability one and the remainder accept it with probability zero.

In equilibrium, all agents either hold one unit of money or one unit of commodity. Agents who hold commodities complete a barter exchange with other commodity traders at rate $(1 - M)\beta x^2$, and complete an exchange with agents who hold money at rate $M\beta x\pi$.

Transaction volume is

$$T = \beta(1 - M) \left[Mx\pi + \frac{1}{2}(1 - M)x^2 \right].$$

Aggregate consumption is

$$\varphi = \beta(1 - M) [Mx\pi + (1 - M)x^2].$$

The ex ante expected utility of all agents is

$$W = \frac{1}{r}(U - \varepsilon)\varphi,$$

where r is the rate of time preference.

How do transaction volume, consumption, and welfare vary with M and π ? First consider a monetary expansion in the pure-monetary equilibrium where $\pi = 1$. If barter is sufficiently difficult (i.e. $x < 1/2$), then increasing M away from zero persistently increases transaction volume, aggregate consumption, and ex ante welfare. In other words, money is non-neutral.

Next compare consumption and welfare in the three equilibria. The pure-monetary equilibrium where all agents accept money yields the highest transaction volume, aggregate consumption, and ex ante expected utility for agents. The non-monetary equilibrium where no agents accept money yields the lowest transaction volume, aggregate consumption and ex ante expected utility. In other

words, money is essential.

The two testable implications of the model are:

Prediction 1. *If money is accepted by agents, barter is difficult, and the initial money supply is small, then monetary expansion increases transaction volume by enabling more money-mediated trade.*

Prediction 2. *If money supply is nonzero and fewer agents are willing to accept money as a consequence of movement from one equilibrium to another, then transaction volume falls.*

The next two sections test the above predictions using natural experiments in the Bunz economy. Section 4 tests whether an unexpected monetary expansion persistently increased transaction volume. Section 5 tests whether transaction volume fell when Bunz HQ partially halted its token redemption program and therefore unexpectedly and exogenously reduced the willingness of a subset of agents to accept tokens.

4 Effects of Monetary Expansion

In this section, I test whether monetary expansion increased transaction volume, as predicted by the theoretical framework. First, I document that Bunz HQ dramatically increased token issuance in September 2018, resulting in a fivefold monetary expansion. I then show that this expansion caused the total number of peer-to-peer transactions completed to persistently increase by roughly 70%. Consistent with the theory, this rise is entirely accounted for by the emergence of token-mediated trade.

4.1 Trends in Token Supply

There were two waves of token issuance in the history of Bunz. The first wave came in April 2018 (Week 15), when the token was first introduced and any user who activated the wallet received 1000 BTZ (equivalent to 10 CAD). The second wave occurred in September and October 2018 (Weeks 36-42), when Bunz HQ increased the amount of Daily BTZ Drop to 100 BTZ per day from 10 BTZ per day, in hopes of increasing use of the token. Bunz HQ then realized that the

resulting pace of token redemption would be financially unsustainable. After roughly eight weeks of increased token issuance, the app slowed the metaphorical printing presses and reverted back to Daily BTZ Drops of 10 BTZ per day.

Figure 3 Panel (a) shows trend in weekly token issuance and redemptions. The orange line plots the trend in weekly sum of tokens issued by Bunz HQ to users, excluding local stores and Bunz employees. As mentioned in Section 2, the “Daily BTZ Drop”, wherein some quantity of the token was transferred from Bunz HQ to a user after the user answered a survey question each, was the primary method for Bunz HQ to change the amount of the token in circulation. The “Daily BTZ Drop” is highly similar to the idea of a “helicopter drop” in monetary economics (Friedman 1969; Bernanke 2002), wherein cash were directly added to the bank accounts of all citizens, as if dropped from a helicopter overnight.

The blue line plots token redemption per week, as measured by BTZ transferred to local stores. In May 2018, there was a wave of token redemption after the first wave of token issuance, as users flocked to affiliated local stores to use tokens to purchase goods. In October to December 2018, there was another wave of heightened token redemption, after the second wave of token issuance. However, after Christmas Day that year, BTZ redemption fell again.

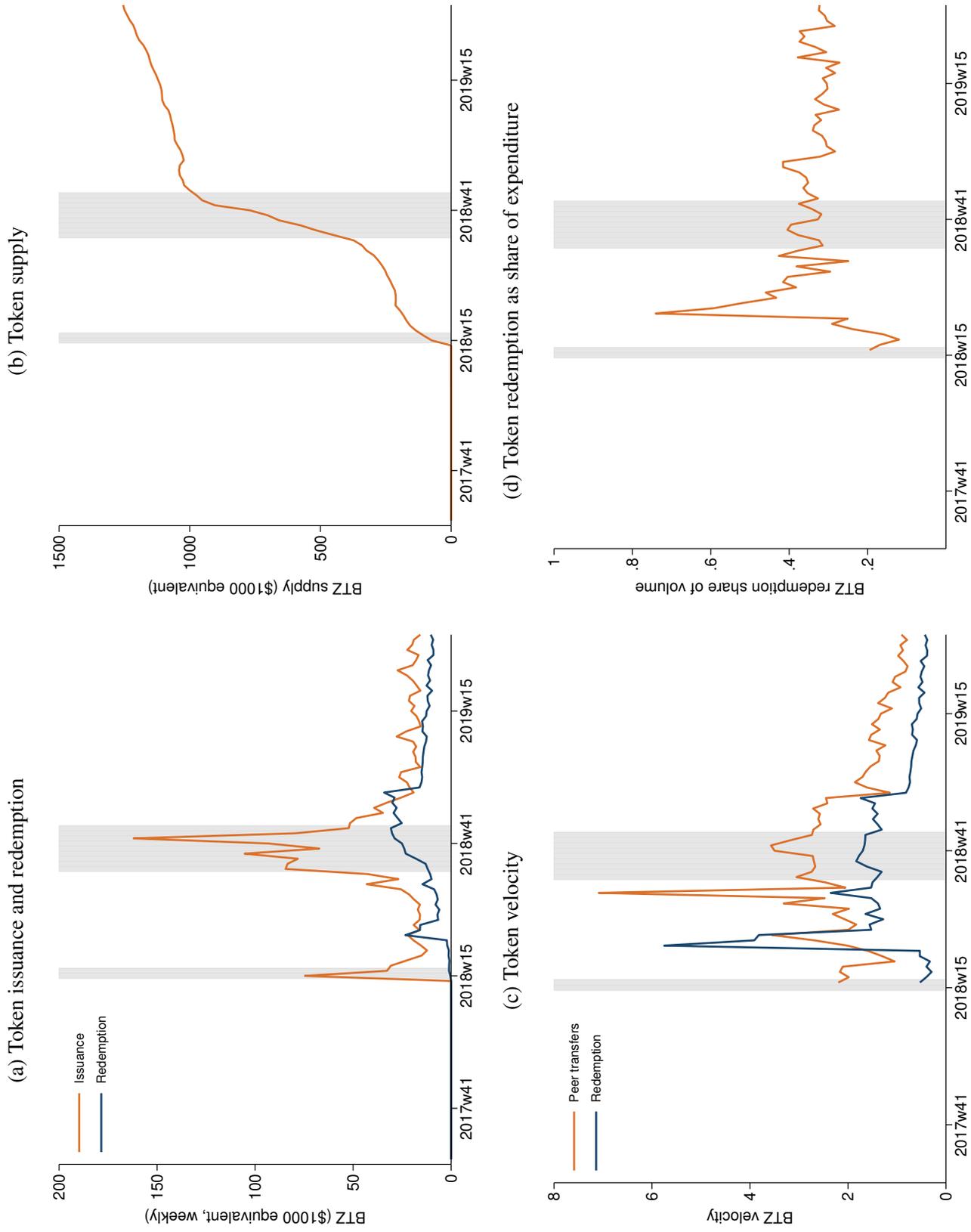
Panel (b) plots the total supply of tokens in circulation, calculated as the cumulative sum of BTZ issued minus the cumulative sum of BTZ redeemed. After the first wave of monetary expansion in April and May 2018, the total value of token in circulation stabilized at roughly 20 million BTZ (equivalent to 0.2 million CAD). BTZ supply then grew rapidly in September 2018 due to increased token issuance, but was stabilized after November 2018 at a level of roughly 100 million BTZ (equivalent to 1 million CAD). In other words, the second monetary expansion increased total token supply by about five times.

4.2 Trends in Token Use

The fivefold monetary expansion did not significantly change the patterns of token use.

Panel (c) plots the weekly volume of peer-to-peer token transfers (in orange) and token redemption at local stores by users (in blue), both divided by the total circulating BTZ supply and multiplied by the number of weeks in a year. Both before and after the second wave of monetary

Figure 3: Token activity before and after monetary expansions



Notes: Panel (a) shows the weekly trend in BTZ issuance, the total amount of tokens sent from Bunz directly to users, and BTZ redemption, total amount of tokens sent from users to local stores. Panel (b) shows BTZ supply, the cumulative sum of BTZ issued minus the cumulative sum of BTZ redeemed. Panel (c) shows weekly BTZ redemption and peer transfer divided by the total BTZ supply. Panel (d) shows the ratio of weekly BTZ redemptions as share of weekly BTZ expenditure. All numbers are denominated in the Canadian dollar (CAD) at the fixed exchange rate: 1 CAD = 100 BTZ. Gray bars indicate the first and second wave of monetary expansion.

expansion, tokens changed hands between users slightly less than three times per year. The analogous rate at which users went to local stores to spend down a unit of available token was roughly 1.7 per year. This was also unchanging throughout the expansion. Redemption and transfers per token supply, however, fell much later around Christmas of 2018, about two months after the end of the monetary expansion. Users therefore became more likely to hold rather than use the token some period after token issuance significantly slowed.

Panel (d) plots the weekly volume of token redemption at local stores by users as a fraction of total expenditure by users, which includes both peer transfers and redemption. Except for some volatility during the initial months after the token was introduced, the share of token expenditure used for redemption remained remarkably stable around 35 percent throughout the second monetary expansion and for the remaining year after. Since the rate of redemption is indicative of confidence in the token, the stable trend suggests that beliefs about the value of the token did not substantially change during the monetary expansion.

4.3 Effect of Monetary Expansion on Token Price

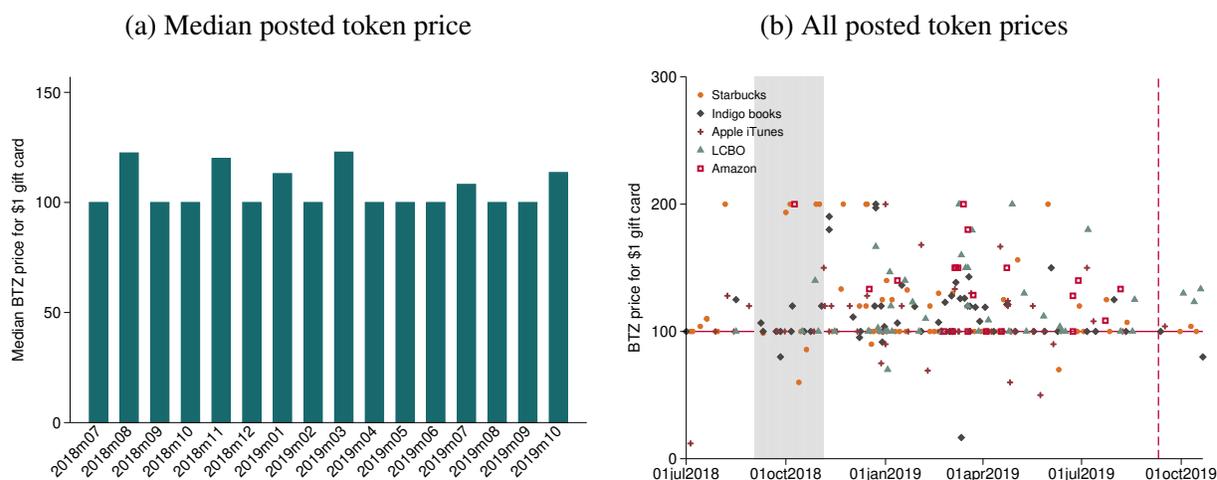
Despite the large monetary expansion, the token price also remained anchored at the fixed exchange rate of the token redemption program.

To measure the token price as perceived by users in the app, I use item postings for store gift cards that are frequently transacted on the platform and take the ratio of their posted BTZ price and their dollar-denominated face value.¹¹ Since BTZ were not freely exchangeable with other currencies, but rather redeemable at a fixed exchange rate through good purchases at local stores, this measure provides the best available proxy for the BTZ token price as perceived by users in the app.

Figure 4 shows the effect of monetary expansion on token price. Panel (a) shows the median posted exchange rate for gift cards by month, which hovered unchangingly from July 2018 until May 2019 around the official fixed exchange of 100 BTZ to 1 CAD. Panel (b) plots all available relative token price from gift card posting over time. This plot shows that there was considerable

¹¹Specifically, I focus on gift cards for five large sellers that are frequently sold in the app: Starbucks Coffee, Indigo Books and Music (a Canadian bookstore chain), Apple iTunes, LCBO (the Canadian government-run liquor retailer), and Amazon.

Figure 4: Effect of monetary expansion on token price



Source: The sample is all posted gift cards issued by Starbucks, Indigo books, Apple iTunes, LCBO, and Amazon with an associated BTZ value and a discernible gift card value in the post title or description. Panel (a) shows the median exchange rate for each month. Panel (b) plots every posted gift card as a dot.

dispersion in gift card exchange rates, as might be expected in an app where exchange is subject to search frictions. For a large fraction of gift cards, however, the posted token prices were exactly 100 BTZ to 1 CAD, the official exchange rate for token acceptance at local stores.

4.4 Effect of Monetary Expansion on Transaction Volume

Monetary expansion, however, dramatically and persistently increased in-person transaction volume arranged through the app.

To measure the volume of goods exchanged on the battering app, I count the number of user ratings. This measure is the closest available proxy for total trade volume, since barter transactions are not associated with any prices, the goods traded on the app are highly heterogeneous, and exchange is typically arranged through in-app messages. Since users almost always provide a rating for their transaction partner upon the completion of a trade, this measure is likely to be highly predictive of the number of completed trades, even though it is likely an underestimate. Furthermore, these data are available both before and after the introduction of BTZ, whereas token transactions are only available after token introduction.

Figure 5 Panel (a) plots the effects of monetary expansion on the number of peer-to-peer trans-

actions per week, as measured by user ratings. Note, first, that total peer-to-peer transaction volume was remarkably unchanging in the two years before the introduction of BTZ. Throughout, the number of user ratings per week hovered close to roughly 1700, the average between Week 12 of 2016 and Week 35 of 2018, as shown by the dashed line. The introduction of BTZ in April 2018 also had little effect on transaction activity. If anything, there was a small dip in completed transactions following April 2018. This dip is likely to be driven seasonal trends, since a dip of similar magnitude is seen during the year before.¹²

Following the expansion of money supply in September 2018, however, there was a large increase in the number of transactions completed. Remarkably, this increase was not only large, but persistent. As shown in the figure, the average number of completed peer-to-peer transactions per week between Week 44 of 2018 to Week 30 of 2019 was roughly 2800, which was 68 percent higher than the pre-expansion average.

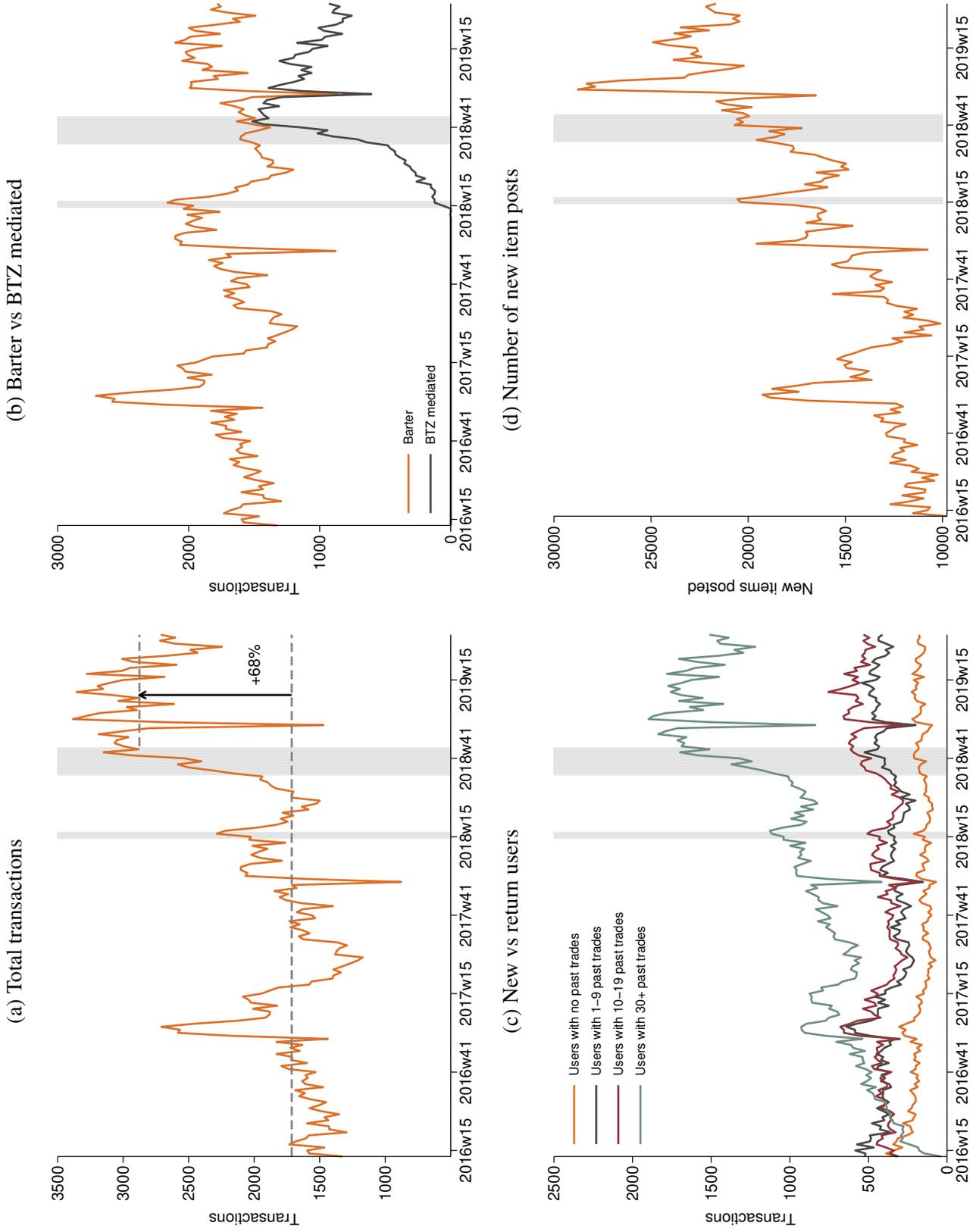
4.5 What Drove the Increase in Transaction Volume?

Consistent with the theoretical framework, the increase in transaction volume is entirely explained by the emergence of token-mediated transactions. Other potential drivers such as the arrival of new users or new goods do not appear to be important. Interpreted through the lens of the theoretical framework, the findings of this section suggest that monetary expansion persistently increased consumption and welfare in the Bunz economy.

Figure 5 Panel (b) decomposes the number of transactions into barter and token-mediated transactions. A transaction is classified to be token-mediated if a token transfer occurred between the same pair of users within 7 days of the transaction as measured by the user ratings. Remarkably, monetary expansion did not change the level of barter transactions. Rather, the rise in transaction volume is entirely accounted for by the emergence of token-mediated transactions. These token-mediated trades began to emerge almost immediately following BTZ introduction, but substantially grew during the monetary expansion. Since the volume of barter exchange did not fall while token-mediated exchange grew, the total number of goods traded in Bunz economy necessarily increased.

¹²Figure 9, Panel (b) shows that a similar dip occurred in the year after too.

Figure 5: Effect of monetary expansion on transaction activities



Notes: Figure shows the weekly trend in (a) the number of peer-to-peer transactions as measured by user reviews, (b) the number of transactions decomposed by whether a token transfer occurred between the same user pair within 7 days, (c) the number of peer-to-peer transactions decomposed by prior trades of the user, as measured by the reviewer's number of past reviews in the week prior to the review, and (d) the number of new items posted in the app. Gray bars indicate the first and second wave of monetary expansion.

Panel (c) shows that the increase in transaction volume was not driven by an increase in first-time traders, but rather by seasoned traders with at least 10 transactions prior.

Panel (d) shows that the increase in transaction volume was also not driven by changes in the supply of new items. Although the number of new items posted on the platform increased after the monetary expansion, this increase was gradual, while the increase in the number of complete transactions was immediate. This suggests that monetary expansion raised transaction volume immediately, which then had a follow-on effect of encouraging sellers to increase their supply of goods to the Bunz economy.¹³

4.6 Relationship to Theory

To briefly summarize, the fivefold monetary expansion on the app platform had no impact on the token price, but caused the total number of peer-to-peer transactions completed to persistently increase by roughly 70%. This increase was neither driven by new users nor new supply of items on the platform, but is explained entirely by the emergence of token-mediated exchange.

What economic theories are consistent with these findings? As described in Section 3, [Kiyotaki and Wright \(1993\)](#) provide a model where the exchange value of the token is fixed and the lack of double coincidence prevents trade. In this model, monetary expansion can persistently increase not only consumption, but also the number of transactions and the share of transactions mediated by money, as confirmed in the data.

Models that feature flexible prices, however, cannot easily explain the observed patterns. For example, later search-theoretic models of money where token prices are flexible feature monetary non-neutrality in the short run after a monetary expansion, but money is neutral in the long run, since monetary expansion leads to inflation ([Trejos and Wright 1995](#); [Shi 1997](#); [Lagos and Wright 2005](#); [Molico 2006](#)). Since we observe a persistent effect of monetary expansion and no inflation, these models do not explain the data.

Models that feature sticky prices without monetary frictions can explain the observed rise in consumption, but they do not explain the emergence of monetized exchange alongside barter in

¹³The composition of item categories that were posted and requested was also stable over time, as shown in Appendix Figure A3. This suggests that monetary expansion did not significantly alter the types of goods that were being transacted, even as it altered the volume of trade.

the Bunz economy. For example, in a cash-in-advance model with a fixed token price, monetary expansion raises consumption by persistently expanding the budget set of agents.¹⁴ However, the model generates no prediction on the effects of monetary expansion on the number of transactions and the share of transactions mediated by money, and hence cannot rationalize all of the observed patterns.

5 Effects of Reduced Redemption

The theoretical framework in Section 3 predicted that a reduction in the willingness of users to accept tokens would decrease the volume of trade and aggregate welfare. To test this prediction, this section describes a currency crisis that occurred in September 2019, a year after the monetary expansion considered in the previous section. I first recount the sequence of events leading Bunz HQ to partially halt token redemption. I then show how their announcement led to a spike in token redemption and reduced both barter and token-mediated trade on the platform.

5.1 Timeline of Events

After introducing BTZ, Bunz HQ worked on developing other new features to drive user and revenue growth, including introducing a community discussion feature and selling in-app advertising. As 2019 progressed, however, Bunz HQ's financial position became increasingly untenable. There were roughly 18 employees on its payroll, token redemption continued to drain its coffers, and its budding advertising sales were insufficient to offset the cash outflow. Though Bunz HQ worked to raise funds, it soon became clear that neither new investment nor an acquisition was forthcoming (Galang 2019).

On September 9, 2019, Bunz HQ abruptly announced that tokens would henceforth only be redeemable at local partner stores selling coffee or food. Figure 6 shows the letter that Bunz HQ sent to partner businesses that were part of the Shop Local program. The letter said, "Effectively

¹⁴A similar prediction arises in models of an open economy with sticky prices and frictional currency convertibility. For example, consider an open economy with a pegged currency with capital controls (e.g. Calvo 1981). Monetary expansion would lead to a trade imbalance that lowers the money supply slowly back to its original level, with consumption rising during this transition.

Figure 6: Letter to Shop Local Partners

Dear Makers and Shop Local Businesses –

I send this email with a heavy heart, as we could not have become the platform we are without the love and support from each and every single one of you.

After a deep dive into our company priorities, Bunz will only be running the Shop Local Program revolving around food and coffee, as this is where our focus will be moving forward.

Effective immediately, you will no longer be able to accept BTZ and convert them into CAD currency.

We will be locking your wallets, and everyone will be paid up to September 10th inclusive, so please don't worry about any revenue that you brought in through the program as we will be settling your account with you and removing you from the application.

If you have any questions or concerns, please don't hesitate to reach out. I will be by within the week to come and collect the Bunz assets in your possession, so please do not throw them away!

Notes: Email from Bunz to Shop Local partners announcing immediate cessation of token redemption except for coffee shops and restaurants. Taken from item post by Alisa Yao on September 10, 2019.

immediately, you will no longer be able to accept BTZ and convert them into CAD currency. We will be locking your wallets, and everyone will be paid up to September 10th inclusive."

Shocked and disgruntled, Shop Local partners took to announcing these changes on the app to the wider Bunz community, criticizing Bunz HQ for the abruptness of the decision, their lack of transparency, and their renegeing on a promise to provide a 30-day notice of changes to the Shop Local program. One wrote, "While I respect their decision to end the program, more notice would have been nice. This was literally [zero] notice and not professional. I now have customers that can no longer support me on this platform, many who saved BTZ for months. And now their BTZ is no longer of use to them."

The next day, Bunz HQ provided an update to the broader community in a blog post. The post confirmed that it would no longer accept BTZ except at coffee shops and restaurants. Apologizing for "any inconvenience and disappointment this may have caused", the blog post went on to explain

that Bunz HQ also had to make the difficult decision to lay off 15 employees that same day.¹⁵

The turmoil resulting from the sudden partial cessation of token redemption was widely reported by local newspapers. One article emphasized the disappointment of users, some of whom had been saving up their BTZ for bike repairs, records and other large purchases (Posadzki 2019).¹⁶ Another reported that Bunz's Facebook community was especially furious (McIntyre 2019). A group of Facebook administrators announced online that they would sever their affiliation with Bunz and rename their Facebook groups as "PALZ", writing, "Today, we would like to reclaim our communities. We would like to bring Bunz back to what it once was. We want our groups to remember why they exist. We do not want to profit. We do not want your app sign-ups. We do not want you to buy into an online currency that will let you down."¹⁷

There was an immediate loss of confidence in the token among app users. Figure 7 shows user profiles and item posts about ten days after the scaling back of the Shop Local program. Many users had stopped accepting BTZ for trades, with one users writing that "I don't accept BTZ anymore due to uncertainty. I believe BTZ & BUNZ will cease to exist shortly." Another wrote, "I'm paused on BTZ for now, until we get some stability." Yet another wrote, "I will only be doing TRUE TRADES from now on. I no longer believe that BTZ is a sustainable form of currency because of the lack of choices that the users have, and the fluctuating rate at which they are rewarded."

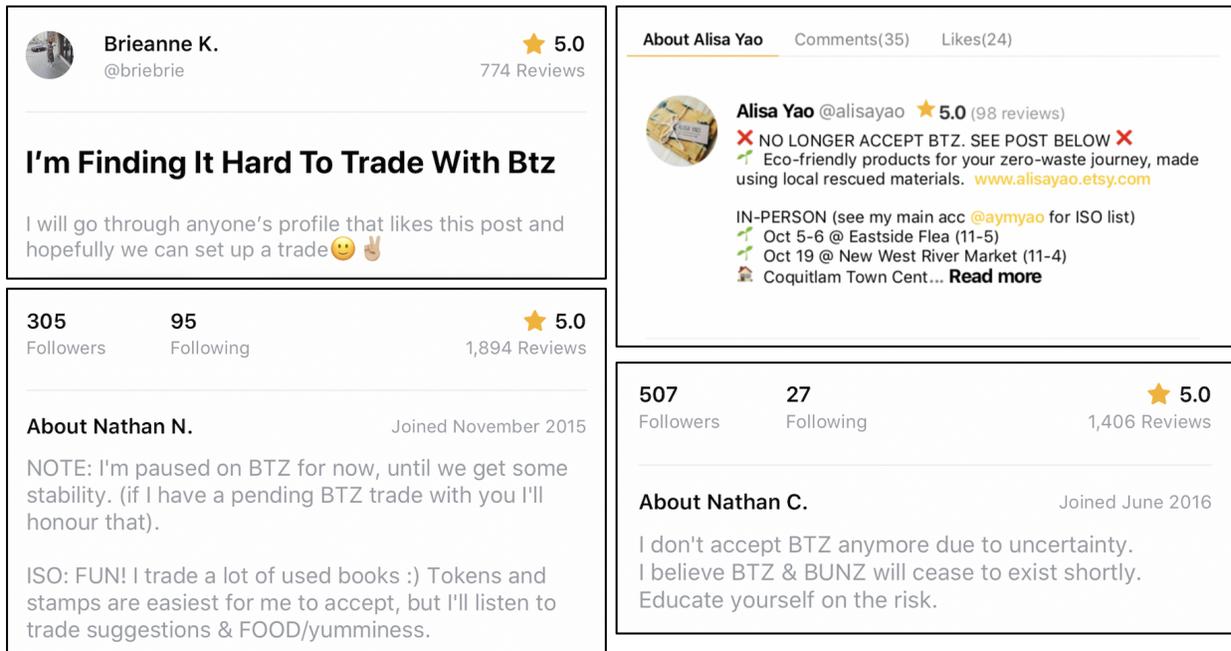
In an interview on October 18, 2019, a frequent seller of used books on the app confirmed that there was tremendous uncertainty about the value of BTZ after the announcement. Like many other app users, he stopped accepting BTZ immediately after the announcement. He then rapidly spent down his stock of tokens at local restaurants by "eating like a king". Two weeks after, however, he realized that BTZ now traded among users at a discount. Since Bunz HQ still redeemed tokens at restaurants at the same fixed exchange rate, this made it profitable for him to accept BTZ again. At the time of the interview, he was willing to accept BTZ at a 10-15% discount from other users in

¹⁵See Appendix for the full text of this blog post. The digital wallets of employees were also suddenly locked (Galang 2019).

¹⁶An administrator for several Bunz-related Facebook groups, for example, was quoted to say that the announcement "'felt like a punch in the gut.' She had amassed roughly \$600 worth of BTZ, and treated her stockpile as a sort of safety net, in case she ran out of money and needed to buy something for her two-year-old son. 'Now, it's worthless,' She said. 'He doesn't drink coffee'" (Posadzki 2019).

¹⁷See Appendix for the full text of this statement.

Figure 7: Response to Scaling Back of Shop Local program



Notes: Item posts and user profiles after partial cessation of Shop Local program on September 10, captured by author on September 23, 2019.

exchange for books, but would immediately redeem the tokens for food at token-accepting stores. This way he maintained only a very small balance of tokens in his wallet and thus minimized his exposure to the risk that the token might become worthless if the Shop Local program ceased altogether.¹⁸

5.2 Effects of Currency Crisis on Token Redemption and Supply

The data confirm that the partial cessation of token redemption undermined confidence in the currency among users. There was an immediate increase in token redemption at local stores, despite no change in token issuance. However, this amounted to only a small reduction in the nominal value of the token supply.

Figure 8 shows token issuance, use, and supply before and after the currency crisis. To smooth over daily fluctuations over the course of a week, I plot the 7-day moving average in dark. The daily value is shown in light. The red dash line marks the date of the partial cessation of the Shop

¹⁸See the Appendix for a transcript of this interview.

Local program, namely, September 10, 2019, which triggered the currency crisis.

The maroon line in Panel (a) plots the trend in the total amount of tokens sent from Bunz directly to users. Before the crisis, token issuance was largely stable, except for a brief spike on 13 August, 2019, which was driven by unusual and likely fraudulent activity by a small number of users.¹⁹ Other than this spike, token issuance was essentially unchanged immediately before and after the currency crisis. Therefore, changes in token issuance were not a concomitant driver of changes in user behavior.

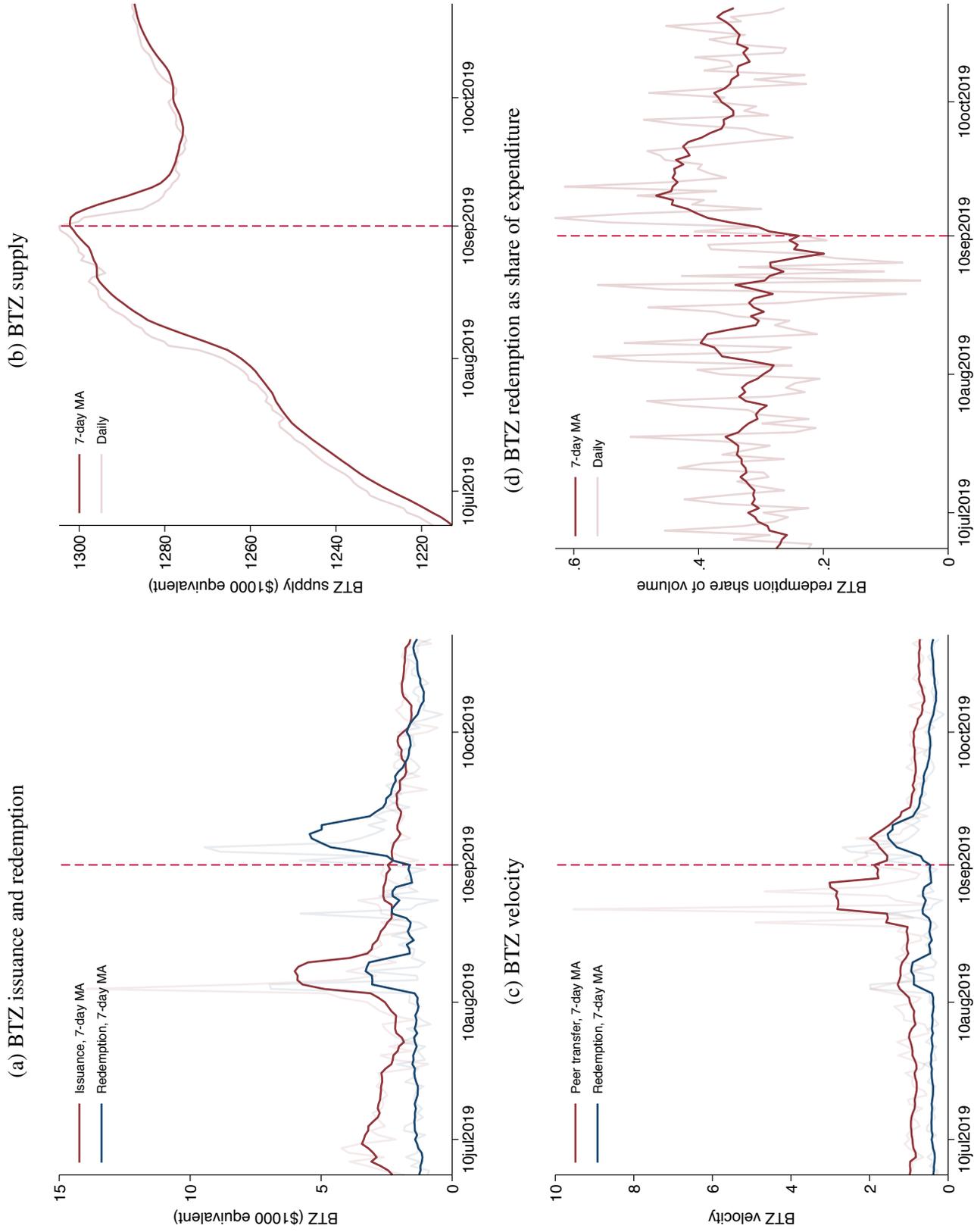
The blue line plots the trend in total amount of tokens redeemed by users through the Shop Local program. Before the crisis, token redemption was largely stable, except for two brief spikes that were driven by unusual activity by a small number of users.²⁰ Immediately after September 10, however, there was a large increase in BTZ redemption that lasted several days. BTZ redemption continued to be elevated above the pre-crisis level for almost two weeks, and never fell much below the pre-crisis level for the remaining month and a half of available data. The fact that token redemption remained at the pre-crisis level despite the drastically reduced Shop Local program implies that users were redeeming tokens much more heavily at the remaining token-accepting stores.

Panel (b) plots the trend in token supply, calculated as the cumulative sum of BTZ issued minus the cumulative sum of BTZ redeemed. Before the crisis, the BTZ supply was steadily increasing, since the token issuance exceeded redemption. Immediately after the announcement, token supply fell. As shown above, this reduction is driven by a sharp increase in token redemption and no change in token issuance. Even though this reduction was sharp, its magnitude was in fact quite small relative to the total token supply. This likely reflects the fact that Bunz's sudden restriction of token redemption to small-value and perishable items at coffee shops and restaurants made it much more difficult for token holders to spend down their tokens. Since the perceived token price

¹⁹The spike in BTZ issuance on 13 August reflects fraudulent activity wherein some user created numerous accounts and then immediately redeemed these BTZ through the Shop Local program. The data show a sudden increase in new user sign-ups and referrals, which were rewarded by Bunz HQ with 1000 BTZ and 500 BTZ, respectively. There was coincidentally a sudden increase in token redemption at four local stores from these same accounts on the same day and the day after.

²⁰The spike in token redemption on 13 and 14 August are driven by fraudulent activity (see previous footnote). The spike on 30 August is due to a large redemption of 304778 BTZ by a single user. By contrast, the increase in token redemption after 10 September was neither specific to a small number of stores nor a small number of users.

Figure 8: Token activity before and after currency crisis



Notes: Panel (a) shows the trend in BTZ issuance, the total amount of tokens sent from Bunz directly to users, and BTZ redemption, total amount of tokens sent from users to local stores. Panel (b) shows BTZ supply, the cumulative sum of BTZ issued minus the cumulative sum of BTZ redeemed. Panel (c) shows BTZ redemption and peer transfer divided by the total BTZ supply. Panel (d) shows the ratio of BTZ redemptions as share of BTZ expenditure. The dark lines show the 7-day moving average, while the light lines show the daily trend. The red dashed line indicates September 10, the day of partial cessation of Shop Local program. The pre-crisis spikes in issuance and redemption reflect unusual activity by a small number of users (see text for details).

was widely reported to have fallen during the crisis, the real value of total token supply must have fallen more than shown in the figure.

Panel (c) plots the daily volume of peer-to-peer token transfers (in maroon) and token redemption at local stores by users (in blue), both divided by the total circulating BTZ supply and multiplied by the number of days in a year. The figure shows that there were initially around one transfer per circulating token per year and roughly 0.5 redemptions per circulating token per year. However, spikes occurred on several days during the three weeks leading up to the crisis, once again driven by unusual activity by a small number of users. Both BTZ transfers and redemption then rose immediately upon the announcement, before gradually falling back towards the baseline level over the subsequent two weeks.

Panel (d) plots the daily volume of token redemption at local stores by users as a fraction of total expenditure by users, which includes both peer transfers and redemption. Immediately after the announcement, redemption sharply rose relative to the volume of token transfers. This relative rise in redemption suggests that beliefs about the long-run viability of the token substantially deteriorated. This lasted a few weeks, before the redemption share returned to the pre-crisis level. However, since the number of token-redeeming stores had become substantially smaller, users were therefore persistently more likely to redeem at the continuing store after the crisis.

The effect of the currency crisis on the token price, however, is difficult to quantify. Although interviews suggest that the token traded at a discount following the crisis, this effect is not large enough to be picked up by the exchange rate computed using the very limited number of gift cards posted on the platform in the immediate aftermath of the currency crisis, as shown in Figure 4.

5.3 Effect of Currency Crisis on Transaction Volume

After the partial cessation of the Shop Local program, transaction volume in the Bunz economy immediately began to fall. This confirms the prediction of the theoretical framework in Section 3.

Figure 9 Panel (a) shows the trend in the number of peer-to-peer transactions, as measured by user ratings. This number was largely stable around 400 transactions per day prior to the currency crisis. However, it began to decline immediately after the crisis, falling eventually to roughly 300 transactions per day about a month later. This finding suggests that the partial cessation of the

Shop Local program not only affected confidence in the token, but also had real consequences on the volume of trade in the Bunz community.

Perhaps surprisingly, however, both barter and token-mediated trade fell. Figure 9 Panel (b) shows that this reduction in completed transactions coincided with a decline in number of peer-to-peer BTZ transfers. While the number of BTZ transfers hovered around 300 per day prior to the crisis. Immediately after the announcement, the number began to fall with a clear trend break around the date of the announcement, reaching roughly 200 transfers per day a month later. This finding confirms that the partial cessation of the Shop Local program negatively affected confidence in the token and resulted in reduction in the circulation of the token.

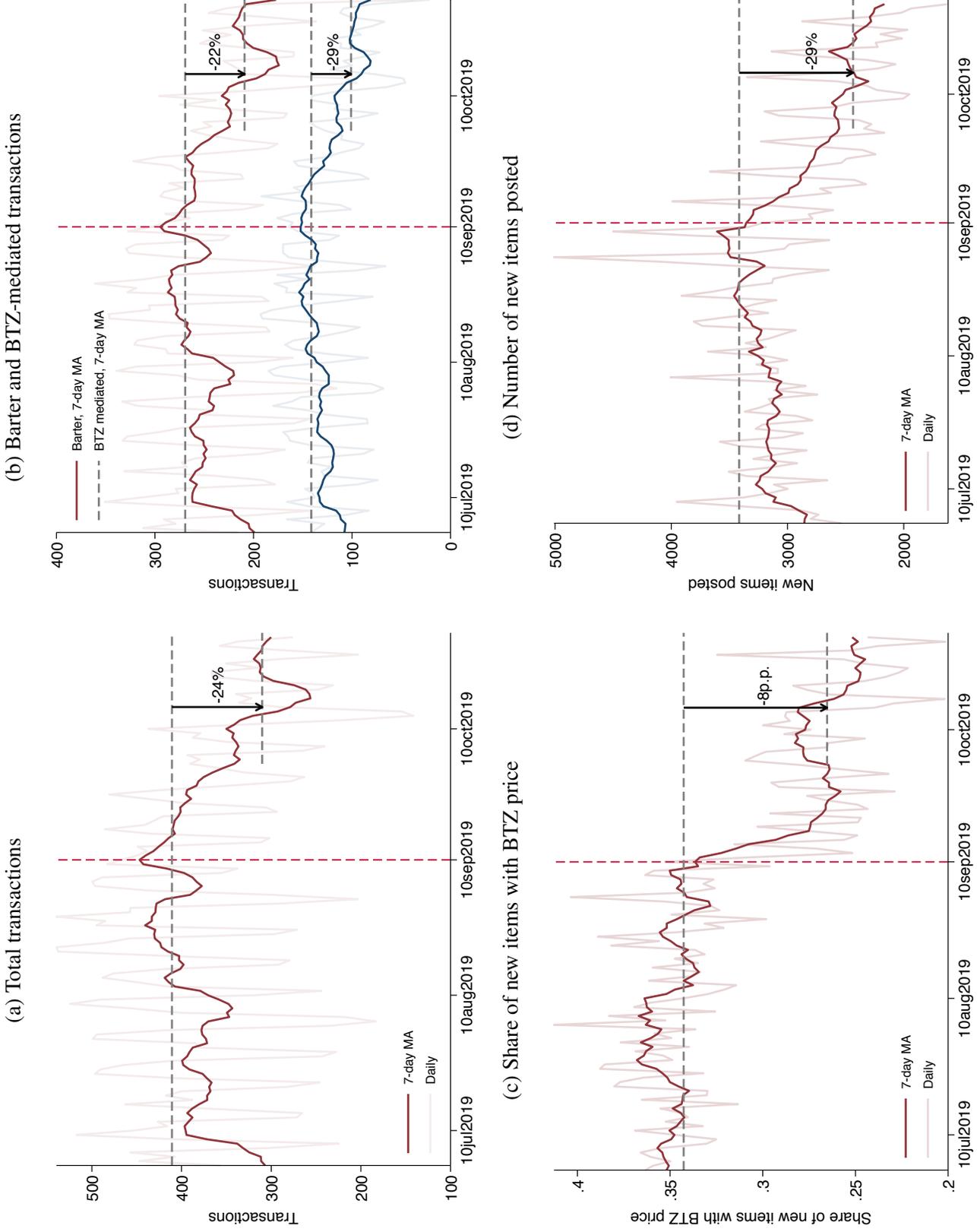
Why did the transaction volume fall? Panel (c) shows that the share of new items with a posted BTZ price sharply fell after the partial cessation of the Shop Local program. During the two months before the crisis, the share of new items with a posted BTZ price hovered around 35 percent. However, after the crisis, the share immediately plunged to roughly 27 percent. In other words, there was an immediate reduction in the willingness of sellers to accept BTZ after the partial cessation of the Shop Local program.

The drop in barter trade may be explained instead by a reduction in the supply of new items posted on the platform, as displayed in Panel (d). Before the crisis, the number of new items posted per day hovered around 3300. This number sharply began to fall after the date of the crisis, reaching roughly 2500 a month later. In other words, the partial cessation of the Shop Local program led some sellers to significantly reduce their activity on the platform.

5.4 Relationship to Theory

What models explain the observed effects? The reduction in the willingness to accept BTZ by both the platform and the users can be interpreted through the lens of [Kiyotaki and Wright \(1993\)](#) as a shift from one equilibrium to another. The theoretical framework therefore can explain the reduction in transaction volume. However, the model predicts that only token-mediated exchange should fall. Instead, the data show that barter also fell. This fall is most likely related to reduced supply of goods on the platform and exit of users due to anger over the platform's decision to halt token redemption. Therefore, an additional margin of adjustment not available in the theoretical

Figure 9: Effect of currency crisis on transaction activity



Notes: Figure shows the trend in (a) the number of peer-to-peer transactions as measured by user reviews, (b) the number of transactions decomposed by whether a token transfer occurred between the same user pair within 7 days, (c) the share of new items with a posted BTZ price, and (d) the number of new items posted in the app. The dark lines show the 7-day moving average, while the light lines show the daily trend. The red dashed line indicates September 10, the day of partial cessation of Shop Local program.

framework, such as departure of users from the Bunz platform, is needed to explain the data.

Models without individual choice over whether to accept money have greater difficulty explaining the findings above. For example, cash-in-advance and money-in-the-utility models have no predictions about the effects of reduced token acceptance on transaction volume. In these models, monetary policy affects consumption purely through the money supply. As shown above, the nominal money supply did not substantially change as a consequence of reduced token acceptance. The token price, as measured using the posted BTZ price of store gift cards, also did not detectably change. However, it is possible that the token transacted a lower price without affecting the posted price of gift cards, so these models are not fully rejected by the data.

5.5 Aftermath and Post Mortem

Even with its scaled down Shop Local program, Bunz HQ continued to suffer large cash outlays from token redemption. In early 2020, the Shop Local program was fully halted. Having laid off almost all of its employees, Bunz's CEO departed from the company and only one employee, the Bunz community manager, remained. Management of the app was transferred to one of the company's investors, who continued to operate the app by selling in-app digital advertising.

In spite of these changes, as well as the splintering of the Facebook community, bartering activity on the app continued. As of June 2021, there was still a steady stream of new items being posted on the platform every day. However, the app now showed a banner ad at the bottom of almost every page. It was also exceedingly rare for items to still be posted with a BTZ price. Once while using the app, I encountered a user who was willing to accept BTZ in exchange for a used book. But upon further investigation, I learned that this was because he had hoped to give the item to someone who could use it, since "BTZ right now has \$0 value," he told me.

Could BTZ have survived as a medium of exchange had Bunz HQ taken a different set of actions? With hindsight, it is clear that the BTZ token faltered because Bunz HQ lacked a viable revenue model to sustain its cash outflows from token redemption. Its decision to invest heavily in a community discussion feature that ultimately generated little revenue and the slow pace of revenue growth from advertising contributed to the quick demise of BTZ.

In addition to selling advertisements, a potential source of revenue is for Bunz HQ to sell or

lend tokens to users. Interviews with community members revealed that in fact there was considerable residual demand for tokens after it began to circulate, since there were not enough tokens in circulation to mediate all trades. As a consequence, users frequently waited to accumulate BTZ in order to complete transactions. Instead of issuing redeemable tokens for free through helicopter drops to users, selling or lending token to users after the currency began to circulate may have been a more profitable business strategy.

6 Conclusion

Many economic theories emphasize the function of money as a medium of exchange. As formally shown by [Kiyotaki and Wright \(1993\)](#) among others, money may have no intrinsic value, but it can solve the problem of double coincidence in barter trade so long as a sufficient number of agents are willing to accept money for commodities in equilibrium. To date, however, there is remarkably little evidence from the field on this topic. In this paper, I ask: does the introduction of money in a contemporary barter economy affect the volume of trade as predicted by the [Kiyotaki-Wright \(1993\)](#) model? I answer this question by using comprehensive transaction data to quantify how introducing a digital currency affected transactions in the Bunz community in Toronto.

Natural experiments in the Bunz economy provide empirical validation for two predictions of [Kiyotaki and Wright \(1993\)](#). First, a large expansion of the token supply sharply and persistently raised transaction volume in the barter economy by enabling more money-mediated exchange. Second, a sudden reduction in the willingness of agents in the economy to accept the token significantly reduced transaction volume. These two facts cannot be explained by models that ignore the microfoundations of money. Together, they confirm that money improves welfare by serving as a medium of exchange.

Contrary to [Kiyotaki and Wright \(1993\)](#), however, the Bunz currency crisis was not the mirror image of its monetary expansions. The monetary expansion increased token-mediated trade without affecting barter, but the currency crisis reduced both. The chaos, uncertainty, and mistrust unleashed by the currency crisis therefore had broader negative effects on the Bunz economy beyond harming monetized exchange.

Furthermore, consistent with theoretical results by Ritter (1995), fiat money did not emerge in the Bunz economy spontaneously. The creation and sustenance of monetized exchange required centralized coordination, and in particular, the promise of token redemption by the platform. When the platform reneged on its promise of token redemption, Bunz users became less willing to accept the token and monetized exchange eventually disappeared.

Bunz's colorful history also illustrates how the contingent actions and ideologies of key institutional agents help create, shape, and sometimes destroy monetized exchange. The interest and ideology of the platform, for example, collided with that of its users, some of whom preferred barter over monetized trade. Infuriated by broken promises, some users banded together to challenge the platform's legitimacy. Close engagement of monetary theory with historical and institutional fact is therefore recommended.

Finally, this paper showcases how research on emergent digital currencies combining economic theory, transaction-level microdata, and quasi-experimental methods can help transform the study of monetary economics from a theoretical pursuit into an empirical science. Further insights from studying digital currencies in the field await future work.

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A Bunz FAQ (April 6, 2016)

BUNZ TRADING ZONE : FAQ

Updated 4/29/16

WHAT IS THE BUNZ TRADING ZONE:

It's a cashless trading zone, inhabited by a community of barterers.
"I'll trade you my bag of sour keys for your bar of soap."

What is Bunz for?

To get what you want for what you have and connect with your community.

Do you have rules?

We only have one BIG RULE: NO CASH IN THE ZONE.

What we do have are guidelines/etiquette, some of which are learned through trades, many are in the Community Guidelines (which you should read!) and some are below in the answers.

How do I Bunz?

Posts take two forms:

- 1) Either you have something to get rid of, which you describe and/or post a photo of, or make a service offer, and then you post what you'd like (ideally) in return.
- 2) You post something you're looking for (ISO = "In Search Of", or "I'm Seeking Out") and either suggest what you may have to offer in exchange or say "Name your trade".
- 3) **The BEST AND MOST EFFICIENT WAY TO BUNZ IS THROUGH THE APP.** We built it for that purpose alone! It's available on iOS, Android and on the web at www.bunz.com use invite code 777 777

An **ISO** can literally be anything, but something important to keep in mind about **VALUE**:

-Something that someone is getting rid of might still be valuable to them, either in cash or emotional value. It's not wrong to want equal dollar value for something, but then be explicit about that in your post. Please also consider that material goods depreciate in value, quickly.

People are looking for deals, so give them! You'll get them in return, pinky swear. PAY IT FORWARD, BUNZ!! On the flip side, you might try to lowball a trade, like offering 2 tokens for an iPhone. Not likely to go through, but you can always try.

So, the solution for both is: be realistic. Nobody is going to give you a PS4 for your stained + broken chair, so get creative and offer combos! You need a vacuum? Offer tokens AND beer AND cheese!

Either way, we really like a concept floated by our community called **#TRUETRADES:**

The #true trades principle is simple: it's when the person looking to get rid of something is willing to take something you already have around (as opposed to buying things just to trade with) - on principal of paying things forward and being a good bun. You'll sometimes see posts tagged this way, and that's what it means.

Where can I trade?

As long as you and the other person agree on a place, you can trade anywhere in the city. Many Bunz will include the neighbourhoods they live / work in somewhere in their posts so that others get a sense of how far they will be traveling for the exchange. If you do set up a trade with someone on the other side of town, we recommend picking a midway point that works for both of you. TTC Stations are a great, safe place to meet.

Many people are more than happy to do trades from their homes, but for those who may not be comfortable giving out their address, we have been partnering up with local coffee shops and bars around Toronto to create actual [Bunz Trading Zones!](#) These places are all run by Bunz and will have your back! There's 7 now but there will be dozens by the fall, stay tuned as our listings grow, and check out the [Bunz blog](#) for featured zones:

What are common trade 'currencies', if we can't use cash?

The most common currencies in the zone is booze, TTC tokens, houseplants and consumables.

What's a consumable?

Things you consume - food mostly, but may include things like toiletries.

I lost my bike or pet! Can I post it here?

Sure. But if you get it back, please update the thread and celebrate your reunion with the group.

Someone broke my heart! Can I post ISO good vibes and pictures of cats?

No, please don't. It clogs up the feed and there's Bunz Helping Zone for things like that.

A bun flaked on me like a day-old croissant! I want to yell about it!

Well, the trading zone isn't the best place for that. It happens. People forget, things come up, people miscommunicate, etc.

It helps to BE FIRM with times and places and make sure you're on the same page. It happens to everyone, and it's rarely malicious flakey-ness. In the [app](#), we have the 'review' feature which helps keeps people accountable to each other.

Hey, where'd my post go?

Probably deleted because it didn't have a place in the zone. Please read the Community Standards document to see where you may have gone wrong. Maybe explore the BUNZ MULTIVERSE and you can find a better home for your post.

Is there a list of groups in the BUNZ MULTIVERSE?

YEP: [HERE!](#) There are also many 'secret' groups which you can learn about by just engaging with the community - there's a zone for everything!

Can I make a new Bunz group for whatever I want?

Short answer: We kindly ask you **not to**. There's over 100 Bunz groups, and chances are that one exists for what you want - ask about it in BTZ, or in Helping Zone. If you think a niche or geographic area is being underserved, please message an admin!

How can I make my BunzLyfe EVEN BETTER?

Get social with us!! Come to events, meet-ups and trade parties. Follow us on Twitter @ [bunztradingzone](#) / Instagram @ [bunztradingzone](#) / Snapchat @bunztradingzone

**Bottom line: trade culture is fun, exciting and addictive.
Be the best Bunz you can be! Trade right, and your life will
improve, 100% guaranteed.**

B Bunz blog post (September 10, 2019)

Bunz,

As you may have noticed, yesterday we had to make the very difficult decision to reduce the merchants and makers who accept BTZ to just coffee and food. We are sorry for any inconvenience and disappointment this may have caused and want to keep you informed as to why we had to make this decision.

Trying new ideas is really hard. There are very few examples of companies that have attempted to share their revenue with its community like Bunz. We are still learning and adjusting the platform as we learn more about how it's used. This requires us to make hard choices at times and this, unfortunately, was one of them. This change to the program is not an ideal outcome and we are sorry for any difficulty this may cause to individuals, merchants, and the community. As a start up trying to do things differently, this was a necessary change we had to make on short notice for sustainability reasons.

In addition to this, we made another difficult decision today that allows us to sustain Bunz and BTZ going forward. This was having to say goodbye to 15 members of our team. This decision was equally difficult because a number of us have been working on Bunz since day one. I'm sad to see them go, but also know they have great things ahead of them.

The reality we face is that it's expensive to build and maintain a platform that hundreds of thousands of people use every day. It gets more expensive when you try to ensure those people see material benefits from using it. Reducing the merchant list was necessary to continue Bunz and BTZ for the community. We believe that these changes put us in the best position possible to allow you continue to use BTZ day-to-day.

Having said all this, we've still achieved something amazing over the last 14 months — since first launching BTZ. Our community of users and local businesses have earned and spent over \$1.4 million because of this program. This is something we can all be proud of.

As a result of these decisions, we are able to continue to make Bunz and BTZ a community-focused platform in a more sustainable way. We admire our community for caring so much — you are the reason why Bunz exists and the reason we get up every day to try and change who benefits from platforms.

To the merchants and makers we've had to part ways with, we appreciate everything we achieved together through the Shop Local program and we wish you nothing but success.

Thank you for your understanding.

Sascha + Bunz HQ

C Palz statement (September 11, 2019)

Hey everyone,

Former Bunz Admins here. We wanted to reach out to our community(ies) and talk a little bit about what happened today.

Here's a background:

- Yesterday, September 11th, Bunz HQ announced that its BTZ (in-app currency) would no longer be accepted by vendors or makers that are not coffee shops, restaurants, or bars.
 - This means that small businesses that relied on BTZ to bring in new business, or even vendors who started facilitating their goods and services through the Bunz app and by accepting BTZ as a form of currency, are now out of luck.
 - These vendors and makers were not informed about these changes within the appropriate time frame which, as per their contracts, was to be informed of any changes within two weeks.
 - As a result, makers specifically have now been shut out of the previous Bunz app/BTZ system of trade and had no time to inform consumers of this change. They haven't only lost potential customers and clients, but have also lost income streams that are crucial to the survival of small businesses in Toronto.
- On top of changes to BTZ, Bunz announced that they have fired 15 of their staff. We estimate that this is approximately three-quarters of people whose livelihood depended on the Bunz brand.

Here's what we have to say about it:

- Makers, innovators, artists, creatives, activists, advocates, and regular, everyday people are the backbone of what was once the Bunz community. We all came together several years ago as people who believed in the value of the little things. The value of a half-eaten pizza, an old cassette tape, a joint, a tall boy, a jar of spaghetti. Most of us didn't have much money, and none of us had the means to create apps, or profit off of our relationships with one another.
- Monetizing our communities completely contradicts the barter system that birthed the Bunz lifestyle, as well as the anti-capitalist practices that have shaped our collective communities.
- Today, we would like to reclaim our communities. We would like to bring Bunz back to what it once was. We want our groups to remember why they exist. We do not want to profit. We do not want your app sign-ups. We do not want you to buy into an online currency that will let you down.
- By returning Bunz to its original form, as a pushback against the absolute exhaustion—financial, emotional, and physical—that goes hand in hand with living in cities that are dynamic, fast-paced, expensive, and ever-changing.
- We fundamentally love our communities. As admins of Bunz, and the people who have spearheaded the growth of our communities, and of the app alongside you all, we have a vested interest in your wellbeing. Only your wellbeing. No app sign-ups, no growth, no “buy-

in," only genuine human connections and a commitment to kindness, compassion, and community-building.

With all that said and done, we want to introduce *Palz*, a collective comprised of former Bunz admins who believe in something bigger than profit.

Our groups will stay the same, our values will stay the same with a commitment to hearing from you, a commitment to existing outside of the scope of trademarks, corporations, advertisements, and the monetization of human connections. We hope that this new chapter can sustain our community's health, growth, and compassion.

With Love,
Your Palz

D Interviews with a frequent user

First interview: May 28, 2019

On May 28, 2019, the Bunz staff introduced me to a self-described "power user," who specialized in trading vintage books and had completed more than a thousand trades on the platform. Because of his deep engagement with the app, he had many insights about the mechanics of trade on the app. His observations therefore provide useful context for understanding the quantitative results in this paper. For this reason, I provide a partial transcript of the interview, which is reconstructed from handwritten notes and reorganized for clarity.

Author: How did you learn about Bunz?

User: I learned about it from Reddit. I've been on Bunz for four years now. I started when Bunz was still entirely on Facebook. I started trading because my friends had to give away their book collections, so I had two libraries to get rid of.

Author: How is the app different from the Facebook groups?

User: The Facebook groups are more chatty. The app provides a more durable posting. I can optimize for search visibility and time my posts. When app was new, about half of the trades in the community happened on Facebook, so sometimes I would post on both. Now 90% of trades happen on the app. I don't post on Facebook for transactions anymore. I post on Facebook only for discussion.

Author: What do you trade on Bunz? Do you face competition on the platform?

User: I focus on vintage books. Books that don't have ISBN codes, hence cannot be fulfilled by Amazon (FBA). I source books from garage sales, library sales, Craigslist, and other platforms. I don't really have any competition on the platform. I'm the only "predator" bookseller on Bunz platform. My real competition is mass market book sellers like Amazon. I cannot make that much money on Bunz because of competition from FBA.

Author: Why you do trade on Bunz?

User: Here are my options: Bunz, doUser, or sell. I enjoy trading on Bunz, much more so than Craigslist. I can have conversations with the people I trade with. There is a feeling of community.

Author: How often do you trade?

User: I complete on average 2 trades per day. This is much more than most users, for sure. The value of trade is \$3-25 per transaction. This is on the low end for users. Each day, I post 3 or 4 sets of books. There are many subcommunities on Bunz trading different things. The clothing subcommunity is totally different from books, for example.

Author: Do you have repeat customers?

User: Yea sometimes, up to 4-5 transactions. Sometimes I'd message them to market products.

Author: Do you prefer certain currencies?

User: BTZ and tokens are preferred. BTZ are useful, but it is like a hot potato. I also take cash or food. Sometimes, I'll take books to use as currency at a later date or sell them to used book store. I put hints into postings as to what is wanted (BTZ and token). I take BTZ for probably a third to a half of my transactions. The main thing is I want something that holds value. Gift cards are not personally useful for me, and I don't want to flip it for a loss. For BTZ, there is default risk. You don't want to accumulate it, so pass it around like a hot potato. The problem with BTZ is there's no exchange anywhere.

Author: Who pays in BTZ?

User: Two types: New users. They get a free book from opening a new Bunz wallet. Also heavy users who accumulate and then use BTZ.

Author: What do you do with your BTZ?

User: If I've accumulated BTZ, I mostly spend it down by eating at local merchants.

Author: How do trades happen?

User: About half of the time, the first message I get from an interested buyer is "I'll give you X tokens or X BTZ." The other half of the time, the first message I get is "I'm interested." I'll respond with "What can you offer?" I'll scan their profiles, but 90% of the time I'll steer towards BTZ or token. There are important breakpoints in conversation, where a buyer might drop out, such as when arranging a location. I don't typically negotiate much, since books are pretty low value.

Author: Do you choose whom to trade with / care about buyer reviews or reputation?

User: Reviews are not a super informative signal of buyer reliability. Many people will not review informatively. Number of reviews is more likely to be a reliable signal. For users with <20 reviews, I'll take a different approach. I'm less flexible and won't travel to trade. The main issue is flakiness and ghosting.

Author: Do you ever receive delayed payments or payments in advance?

User: Majority of time, trades are simultaneous. Occasionally, I may get advanced payment as deposit or because cellular data is wonky. Occasionally, I get deferred payment. Sometimes it's a new user who can't remember PIN, or bad cell data; sometimes it's repeat user who is low on cash but can deliver BTZ later (pre-arranged before meeting). I'm usually nice and forgiving to new users because I want to be a good representative for the platform. Bunz's "Have fun" ethos is important to me. Building a good platform requires building a good culture: If everyone on the platform is nice, eventually you will be nice as well. I'm not sure you can replicate this culture anywhere else. Cool people were participating on Bunz at its start. That matters a lot.

Author: Has the introduction of BTZ changed the platform over time?

User: The original demographic was impoverished art students. Trades that are unequal in value were part of the appeal of Bunz. The lack of double coincidence of wants was a real thing. People can get lucky with a deep discount occasionally. This feels like magic. The introduction of BTZ cut

down on this “magic.” It’s not as fun anymore. Over time, people on the platform care much more about monetary value of items. They moved more towards a Craigslist view of the world. After introduction of BTZ, frictions are lower, so margins are lower, but I make this up with volume.

Second interview: October 18, 2019

About five weeks after the currency crisis, I spoke with User to hear his perspective. Below is a transcript of the interview, which is reconstructed from handwritten notes and reorganized for clarity.

Author: Tell me what happened.

User: It was about a month ago now. It was like a very little miniature demonstration of what a crisis of confidence in a currency looks like. It was like Venezuela trying to impose capital controls on spending. You could almost predict what would happen.

From the users’ perspective, there was a reduction of the scope of the Shop Local program. The change was that you can now only redeem at restaurants instead of the full set of merchants. This was seen as a serious reduction in the utility of BTZ. Coupled with the layoffs, this change put into people’s minds the question of the viability of the whole operation. This is something, apparently, many people had not considered. A large majority of users had never thought about the underlying financials and economics of what’s going on.

A lot of the outrage is understandable but also manufactured. A lot of people had balances of BTZ, and were saving up for some service. For example, tattoos. Some lady saved up a hundred dollars for wedding gifts but could no longer buy those items. The CEO had commented that they would commit to a 30 days notice, but they did not do so. People discovered at the shops. The merchants just got this notice that their relationship was terminated. Not ideal management. But they needed to close the gate before everyone went running for the exit.

What’s interesting is they have continued to operate restaurants. There still was a rush to the exit. I’ve been eating like a king. At some point, these BTZ may become valueless. So people are driven to spend.

Things have kind of stabilized now. BTZ are still being accepted at the reduced number of merchant. There were interesting effects on liquidity of BTZ. Lots of people stopped accepting BTZ. But at the same time there’s a weird little force in the other direction. If you were to accept BTZ, then transactions are temporarily really fluid.

Author: How were you personally affected?

User: I’ve managed my BTZ very well, so it wasn’t so bad. I held only about a hundred dollars of BTZ at the time. Others may be in a different economic strata too. For a period of time, I stopped taking BTZ. Took a trip away for two weeks. I’ve turned on the tap again now. Started about a week ago. Balance is low enough that I don’t care about the risk. It is a fortuitous coincidence: I

always spent my BTZ mostly by eating. So I'm still able to cash out in the same way. And actually, trading is easier now, since people really want to get rid of their BTZ.

Author: Has the nominal BTZ price of books gone up?

User: Yes! Absolutely. There is a premium. People are just making up whatever premium for the risk. I'll add on 10-15%. What's the actual risk premium is quite unclear. No one knows what the risk is.

Author: At what price of BTZ did trade after the announcement?

User: Immediately someone decided to profit off of this situation. They tried to sell TTC tokens at a rate of 10 to 1. The reaction to that post was very interesting. Lots of people reacted negatively to it, saying he was profiteering from the situation. But this is hypocritical because they themselves are no longer taking BTZ. They would say: Capitalism is terrible. And they piled on this guy. Somehow he crossed a social norm.

There is premium for taking BTZ, but market consensus regarding the exchange rate has not occurred. There's no public record of trades. You cannot look up a price. So the valuation of BTZ is opaque. You can see the posted prices, so you don't know what the final trades are.

Author: Did your personal transaction volume change?

User: Things were somewhat unchanged for me, since I sell books. For larger value items, liquidity is more impaired. For trading with someone who might have been willing to take BTZ before, you would now have to use a different currency. Some people are still taking BTZ, but the premia are all over the place. Some even at face value. But immediately, 50% of sellers stopped taking BTZ.

Author: Have people left the platform?

User: Yes. The noisiest departures were for ideological reasons. This is related to the historical genesis of the Bunz community, which has a communist/hippie mindset, utopian ideals. So the Facebook groups decided to disassociate with Bunz. Renamed themselves to PALZ. Whether this will affect the trading on the app, I don't know.

Author: Were most people on the app aware of what happened to the Shop Local program?

User: It was widely known because there are people who stopped taking BTZ. You see this on people's profiles and in the messages. It's unfortunate, because the currency was operating smoothly. Adoption was pretty decent. Currency was circulating before it "leaked" out through people like me. The problem in fact is more that people could not get BTZ readily. Even if someone wanted a thousand dollars of BTZ, they could not get it. There was a liquidity crunch in the other direction.

Author: Have sentiments shifted in the month after the initial shock?

User: Things have settled down. More people accepting BTZ and risk premia is now lower. All the outraged people have just left. The only people left are the pragmatic people and newbies who don't know better. They think platform still works, so I'll post my armchair here. People have

short memories. But overall confidence in the currency is still low because no one knows whether they can continue to operate the shop local program. Nobody knows what their runway is. For sure, trade volume has decreased.

It could also be good for the platform to get rid of the ideologues. A lot of emotions flying around. They have a certain mental model for how the company should behave, but the company sort of had to do what they had to do. They chose not to shut down. Bunz is still perfectly usable in terms of functionality. Shop Local still operates. It's effectively like going back to launch time. They started out at just a handful of coffee shops. But the perception has now changed. Lots of cynical people knew this was going to happen.

Author: Do you know how the Shop local merchants were affected?

User: Merchants were redeemed up to some date. Everybody was made whole. They didn't receive their 30 days notice. If accepting BTZ had been part of your sales/marketing, e.g. 10% more sales due to accepting BTZ, then suddenly there's a revenue decrease. Negative is future cash flow is shut off. Negative reputation effects of that.

Some restaurants stopped accepting BTZ as well. Over the course of history, restaurants and stores have joined and left, but this was never a problem. There was a lot of confusion in terms of what was happening. IQ foods was still taking BTZ, but they temporarily froze on taking BTZ. But presumably this uncertainty was resolved and they began to take BTZ again.

Author: Is the pressure of money flowing out through redemption still the same?

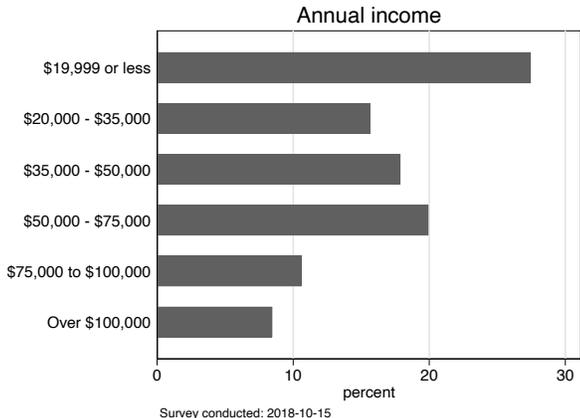
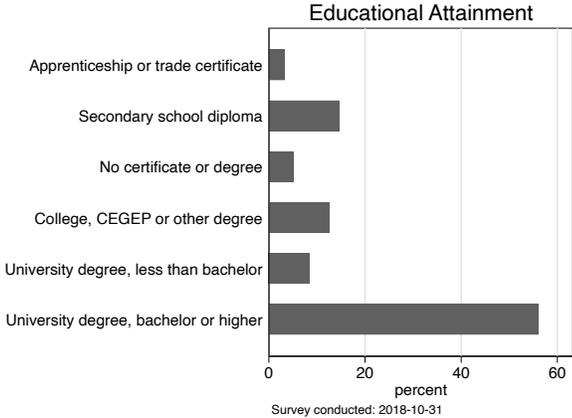
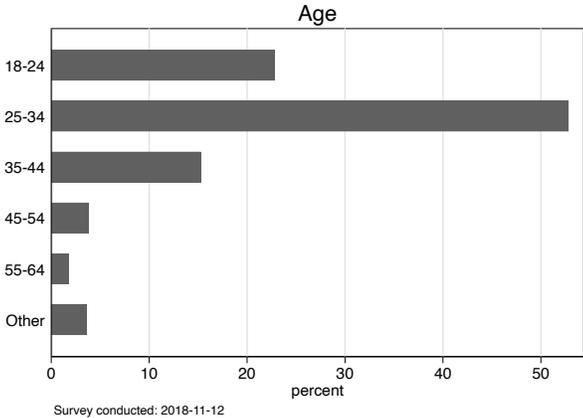
User: It is definitely harder to spend a thousand dollars at once if the value is coffee.

Author: Do you know what Bunz HQ's plans for the future are?

User: Listing BTZ on an exchange seemed like a long-term intention, like they would eventually allow the currency to float. But it ended up working more like corporate loyalty points. People are still using it because its convenient to do so. But this much more limited now. Rumors are the pause was driven by a failure to find financing. They could take the code and re-brand, try to launch elsewhere. There is no news, so nobody knows where the company is.

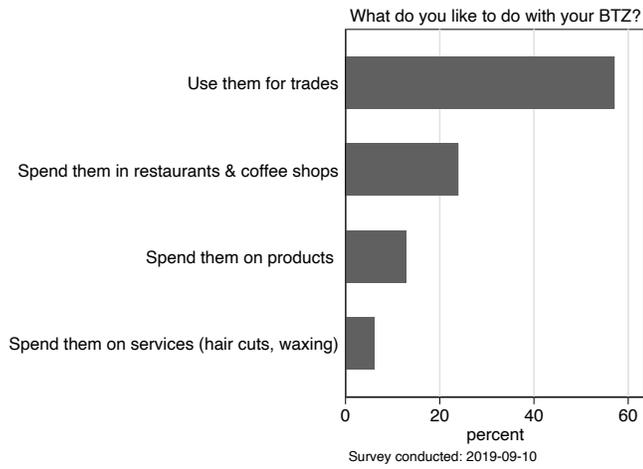
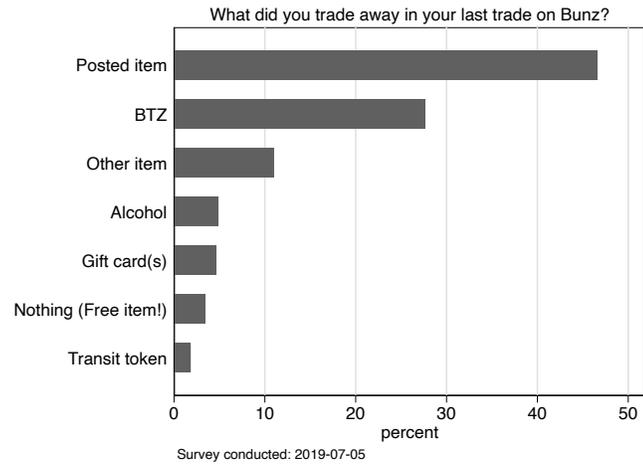
E Additional figures

Figure A1: User demographics: Survey responses



Source: User response from BTZ drop survey.

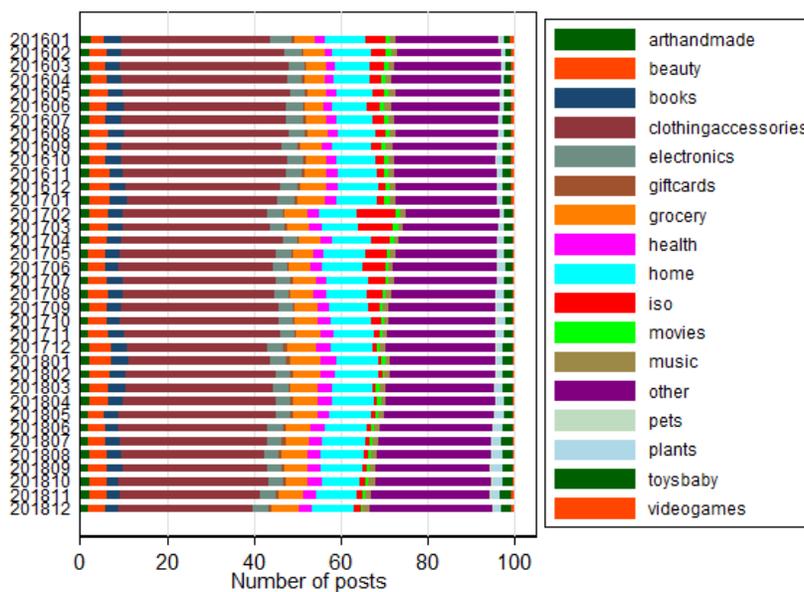
Figure A2: BTZ usage: Survey responses



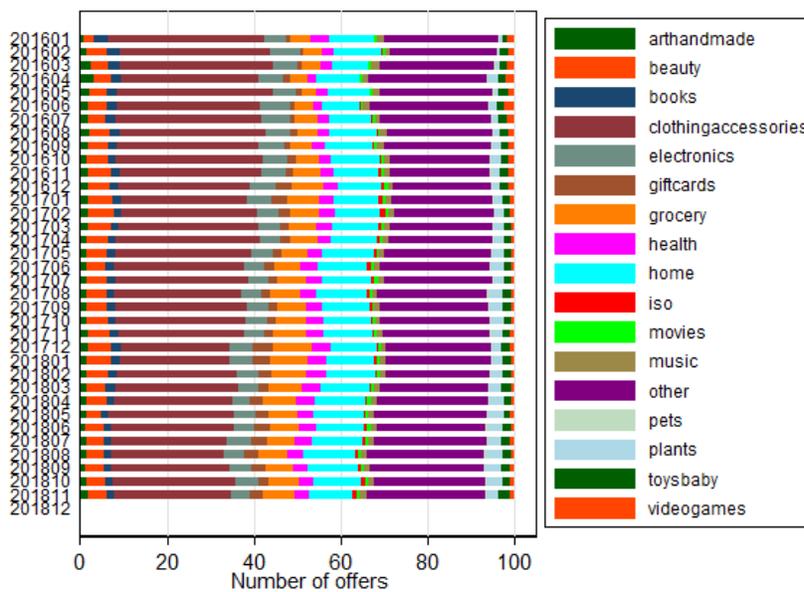
Source: User response from BTZ drop survey. Users who report having never traded are excluded from Panel (a)..

Figure A3: Composition of items on the platform

(a) Items posted

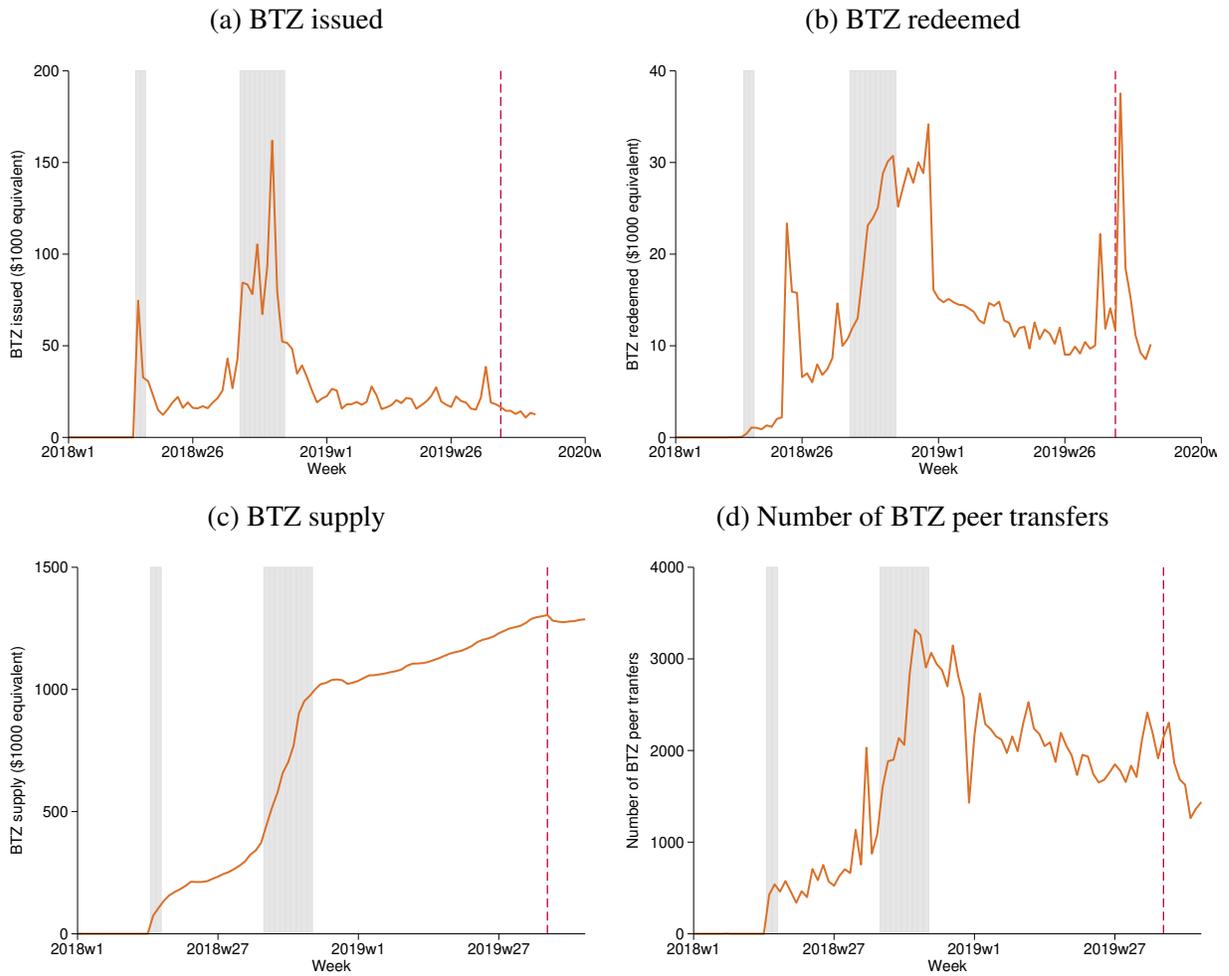


(b) Offer messages received



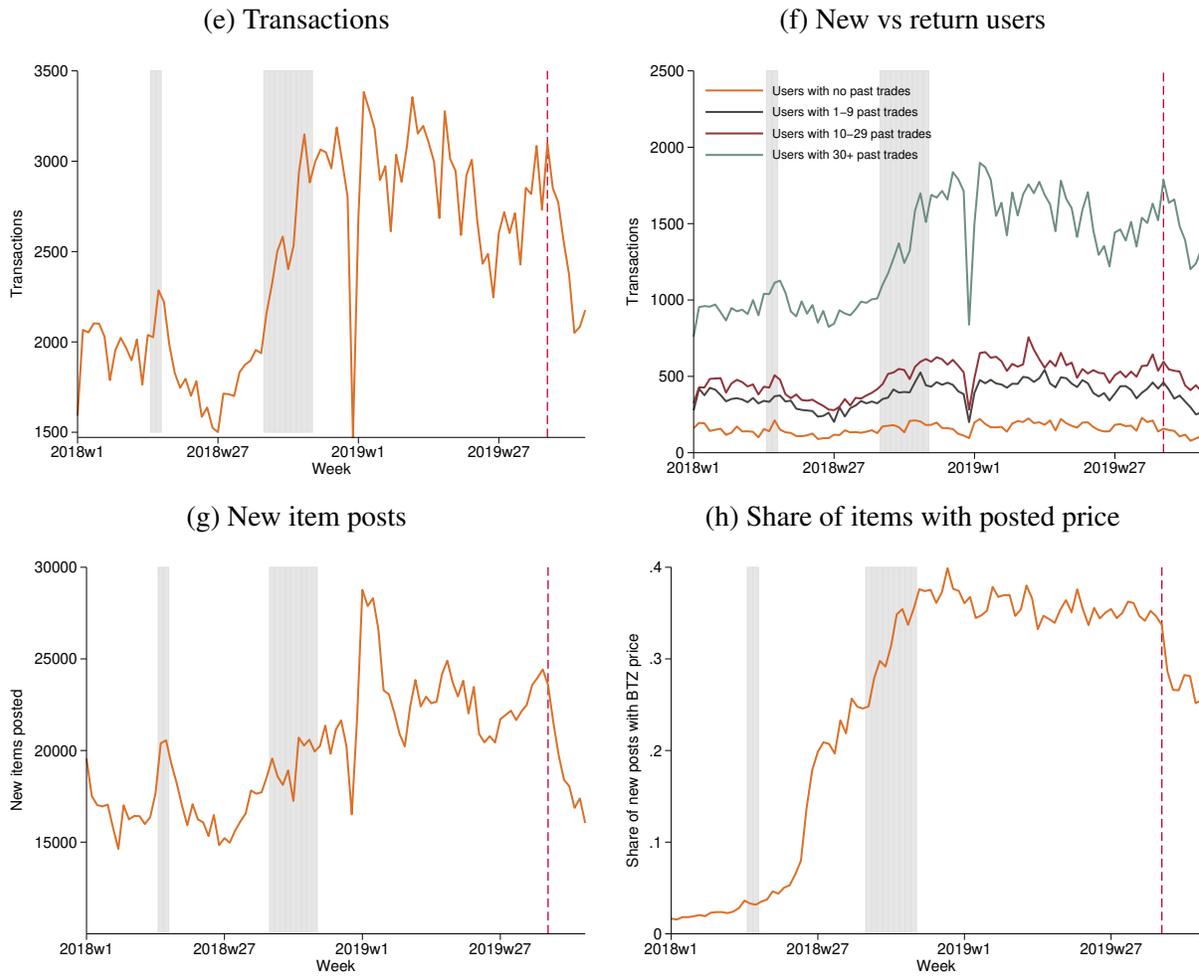
Notes: Figure plots the distribution of item categories that (a) were posted and (b) was associated with an offer message.

Figure A4: The currency run in long-run perspective



Notes: Figure shows the weekly trend in (a) BTZ issuance, (b) BTZ redemption, (c) BTZ supply, and (d) the number of peer-to-peer BTZ transfers. The red dashed line indicates the week before Bunz ceased to redeem tokens from a subset of stores.

Figure A4: The currency run in long-run perspective (cont'd)



Notes: Figure shows the weekly trend in (e) number of peer-to-peer transactions (as measured by user reviews), (f) number of peer-to-peer transactions (as measured by user reviews) decomposed by prior trades of the user (as measured by the reviewer's number of past reviews in the week prior to the review), (g) the number of new items posted in the app, and (h) the share of items posted with an BTZ price (as of November 1, 2019). The red dashed line indicates the week before Bunz ceased to redeem tokens from a subset of stores.