

TRENDS IN

PAYMENT TECHNOLOGY

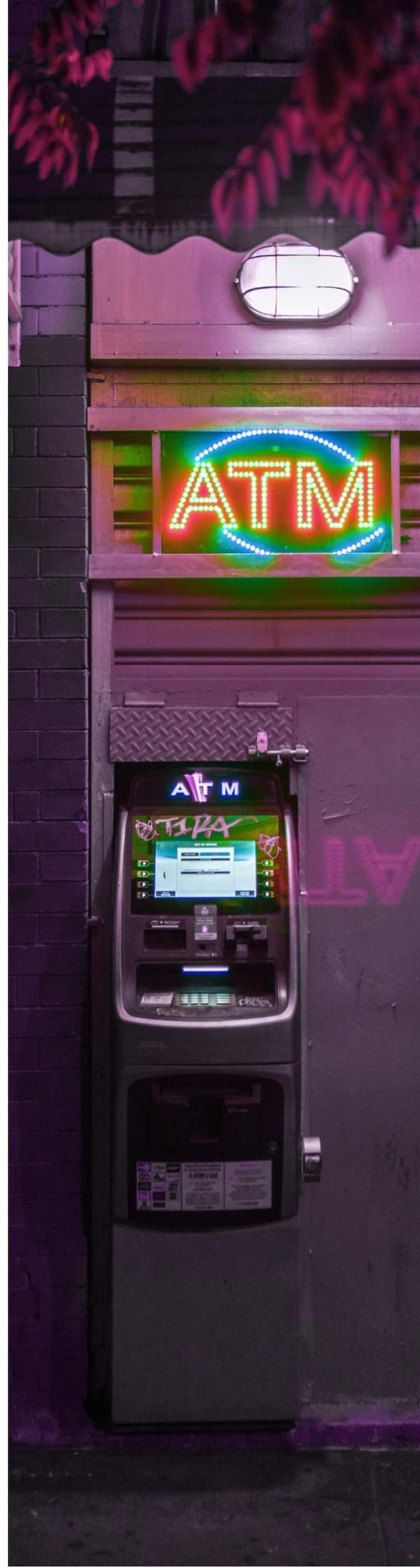
REPORT BY EMMA DAHL



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EXECUTIVE SUMMARY

“ Remarkably, credit cards and app-based transactions still only make up a small portion of the total transaction value in the US ”

Ten years ago, if two friends split a bill at dinner, one would pay and the other would give them cash (or more likely an I-owe-you that would never be paid back). But payment technology has changed markedly in the last 10 years. Now, everyone simply pulls out their phones, divides up the bill, and uses an app to send each other money.

Non-cash payment technologies have evolved substantially in the past century. 100 years ago, cash and checks were the major forms of payment used in the US. Now, most payments happen through credit cards and other non-cash mechanisms. Non-cash transactions have experienced substantial growth and are projected to continue growing steadily in the US. While the US has a lower growth rate of non-cash transactions than less developed countries, it also has a higher total rate of transactions than these countries. European countries tend to have faster growth in terms of non-cash transactions due to a more flexible banking system than the US, which in the US is slowed by both legal regulations and legacy payment infrastructure for checks and credit cards. A lack of such infrastructure in other countries makes the leapfrog to electronic payments more convenient than in the US. Cryptocurrencies such as bitcoin, while promising, don't offer enough stability currently to make accurate predictions in terms of their future in non-cash transactions.

Remarkably, credit card and app-based transactions still only make up a small portion of the total transaction value in the US. While transactions with credit cards and mobile apps makes up a large portion of transactions in the US, the value of these transactions is dwarfed by the fewer-in-number but larger-in-value transactions through systems such as Fedwire and CHIPS.

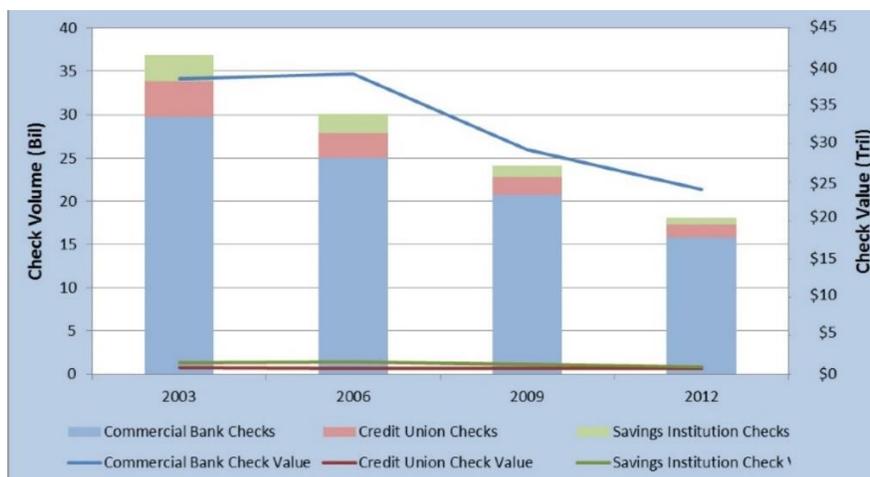
This report first addresses past trends for transactions, namely through cash, check, and credit card. Then, it discusses non-cash and app-based transactions, and the prospectus for these types of transactions. Finally, this report will touch on cryptocurrencies as they relate to the future of non-cash transactions, and the size of credit card and app transfer payments in comparison to the total volume of payments in the US.

CASH AND CHECKS

Traditionally, cash has been the most- used method of payment and is still popular in many developing countries. In South America, for example, only 45% of people even have a bank account ¹. While precious materials such as gold have been used as currency since 600 AD, paper money didn't come into play until the 1600's. For large- scale transactions, paper money was more convenient to use, and was more easily created than metal coin. The advent of paper money was accompanied by an expansion of the banking system. These new banks were more responsive to consumer and business needs.

Checks emerged shortly after cash, offering businessmen and traders a safer alternative than carrying around large sums of money. While checks were a more secure means of transferring money than using hard cash, they still raised both security and logistical issues, given the sheer number of paper slips that had to be exchanged between banks. This paved the way for clearing houses, which summed the amount of money owed between banks and settled the differences, rather than processing each check individually. Checks as a form of payment peaked in 1995 with around 49.5 billion checks being processed that year ². The use of checks has decreased substantially since its heyday in the 90's, with most of these checks being commercial in nature. Between 2015-2016, the volume of checks declined 3.6% and the average value of checks declined 3.7% ³. Figure 1 from the Federal Reserve Bank of Philadelphia demonstrates this downward trend. Businesses also prefer to receive payment through methods other than checks given the high cost of processing. A 2017 survey estimated that the average cost to businesses of processing a check is \$5.91 ⁴. The World Payment Report suggests that checks are becoming a US- only phenomenon, with nearly 75% of checks in 2016 being cashed in the US ⁵.

FIGURE 1: CHECK VOLUME AND VALUE



CREDIT CARDS

“ Debit cards currently make up the majority of payment transactions in the US and overtook checks in the late 2000's ”

The first credit card wasn't used until 1946, although store specific cards were used from the 1920's. Stores issued charge cards to incentivize customer loyalty and provide frequent shoppers with a more convenient means of paying. Credit card use grew as the cards were more widely accepted at a variety of retailers. Although retailers incur a small fee for processing cards, the wide use of cards makes cash-only businesses less appealing to consumers. Debit cards currently make up the majority of payment transactions in the US and overtook checks in the

late 2000's, as illustrated below by figure 2. While credit cards were easier to use than writing checks, they also lent themselves to overspending. The average American now owns 3.4 credit cards, and average household credit card debt works out to around \$16,000 per family ⁶.

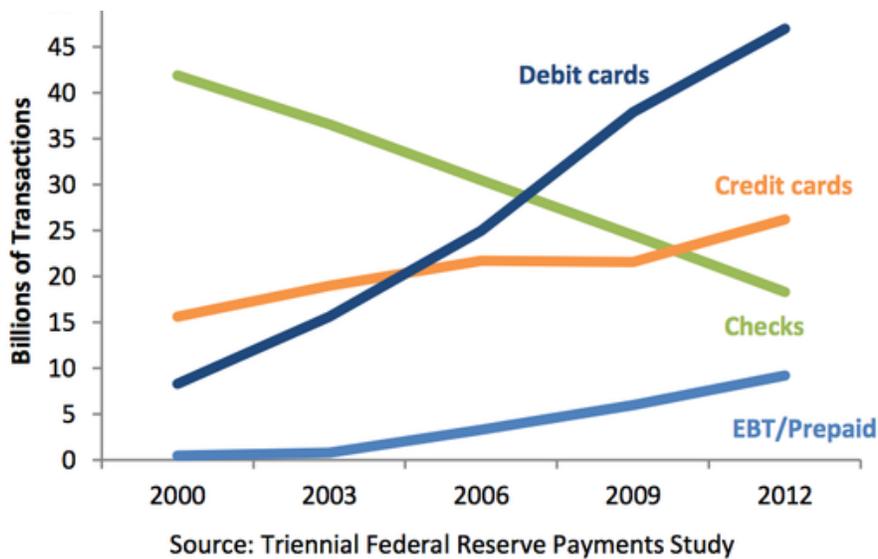


FIGURE 2: NUMBER OF TRANSACTIONS BY PAYMENT INSTRUMENT

MOBILE TRANSFERS

“ The mobile penetration rate, number of smartphones, and the cost of data in a country play a very important role in determining the success of digitalization efforts. ”

While payment through credit cards offers the advantage of being accepted at the vast majority of retailers, their downfall is in the difficulty of transferring money for non-business transactions. This left a market gap that is being filled by mobile wallet and mobile payment apps that allow peer-to-peer (P2P) transactions. E-wallets are a suite of applications that allow individuals to transfer money to both businesses and peers on their phones via usernames, QR codes, or bank info (to name a few). P2P transfer apps such as PayPal and Venmo have experienced significant growth in the past few years and are predicted to continue growing steadily.

Venmo alone is accountable for moving over \$1 billion each month, however the average transaction value is only \$2, making the company unprofitable. Venmo is also not regulated by the Consumer Financial Protection Bureau, leaving it more open to fraud than other forms of payment. While the high volume but low transaction amount has made apps like Venmo unprofitable in the short run, these P2P apps are also expected to grow substantially in the next several years. One estimate suggests usage of P2P apps will grow from 69 million in 2017 to 126 million by 2020 ⁷. As the World Payments Report describes, “growth is being driven by advances in mobile technology and a variety of regional factors. The mobile penetration rate, number of smartphones, and the cost of data in a country play a very important role in determining the success of digitalization efforts. All of these factors combined can affect the rate of proliferation of e-wallets in a country” ⁵.

The price of one gigabyte (Gb) of data compared to per capita gross national income (GNI) is a popular indicator for potential growth in non-cash payments. The price of one Gb of data in the US, for example, is \$12.37 which is 0.002% of per capita GNI ⁸. This data price-to-income rate in some African countries can be as high as 15% of per capita GNI, and costs in South American countries appear to range between 1-6% ⁹. Higher data prices make use of mobile payment apps less prevalent, slowing the potential growth of non-cash transactions in these countries.

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QR codes are another popular electronic payment mechanism more common in developing countries because it allows merchants to operate without purchasing a point-of-sales machine. Customers simply use an app to scan a QR code that a vendor displays and can then send money directly to the vendor’s account. While various e-wallet apps such as QR payment scanners have seen success thus far, their growth depends on not being

slowed by regulation. Part of what has prevented a wider spread of such apps in the US is (1) strict banking regulations and (2) an already entrenched payment system that leaves less room for emerging technology.

PAYMENT TRENDS

“ Although growth in developed nations is slower, they also conduct the majority of non-cash transactions. ”

Payment apps such as Venmo and Paypal are processed through Automated Clearing Houses (ACH), a network designed for processing high quantity- low volume transactions. The volume of these ACH transactions have increased markedly in the past few years. Between 2012 and 2016, the volume of private ACH transactions increased from 7.82 billion transactions to 9.15 billion transactions (an increase of 15%), and the total value of private ACH transactions increased from \$17.31 trillion to \$21.72 trillion (an increase of nearly 21%)¹⁰. For comparison, US GDP in 2016 was 18.6 trillion. While ACH payments do include P2P transactions such as Venmo and PayPal, the category covers a wide range of both credit transfers (retail payments and business-to-business transactions) and direct debit payments (such as payments on mortgages, loans, and other regular payments).

While the US has certainly experienced growth in non-cash transactions, the largest growth rate has been in Emerging Asia, Central Europe, the Middle East, and Africa⁵. Mature markets such as North America and Europe also experienced growth but at the lower rate of 7.1%. The overall 2018 growth rate for non-cash transactions of 10.1% was nearly 10% greater than had been anticipated by the same report of the previous year. Faster growth in developing nations is reflective of technological leapfrogging, compared to countries like the US where legacy payment systems such as credit cards have been established and widely used for the last half century.

Although growth in developed nations is slower, they also conduct the majority of non-cash transactions, as illustrated by figure 3. The US also makes a great deal of non-cash transactions per inhabitant, most recently measured at 459.6 non-cash transactions per inhabitant in 2016. The US was second only to Sweden with 461.5 non-cash transactions per inhabitant⁵.

“ Faster growth in developing nations is reflective of technological leapfrogging ”

“ One of the main reasons for an expansion in non-cash transactions is a growth in the percentage of young people ”

Given the above data and estimates, it appears that non-cash transactions in the US will continue to grow at a steady rate. The World Payments Report suggests that this rate is around 5% ⁵, and research from global law firm Paul Hastings indicates that the total value of non-cash transactions in the US will have increased 36% between 2016 and 2026 ¹¹. The World Payments Report states that one of the main reasons for an expansion in non-cash transactions is a growth in the percentage of young people in the populations of developing countries. This trend is not consistent in developed nations, as the percent of elderly people in the US is projected to grow from 16% to 23% by 2060 ¹².

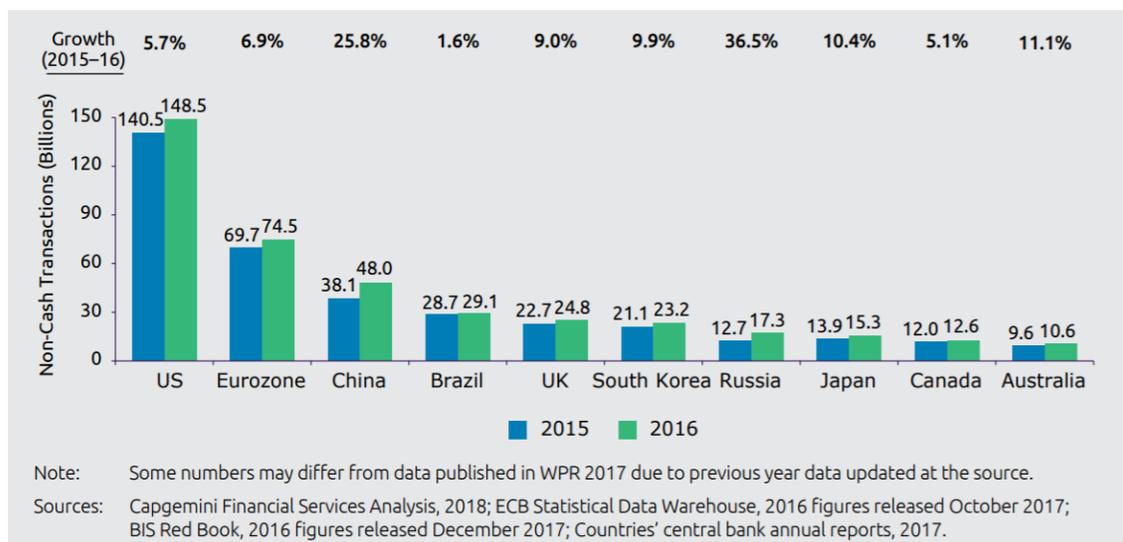


FIGURE 3: NUMBER OF NON-CASH TRANSACTIONS IN THE TOP 10 MARKETS, 2015-2016

CRYPTOCURRENCIES

“ Making predictions about the future of crypto at this point would be purely speculative ”

Cryptocurrencies raise another question about non-cash payments- perhaps the future of payments isn't just a suite of apps for a phone, but rather an entirely digital currency. Without ruling out crypto entirely, there are some major issues with the early-phase currencies that will need to be addressed before they will be able to function as an independent currency in the marketplace. Because currencies like bitcoin aren't attached to any one economy, regulating their value can be difficult. High fluctuation in any currency creates inconsistency for both consumers and businesses and can make both day-to-day operations and long-run investments more challenging and expensive. For example, in late 2017, one bitcoin was worth nearly \$20,000 but had dropped to less than \$3,200 by late 2018. Small price changes in a currency are normal, but consistent high-level changes simply make the currency unlikely to be used for day-to-day transactions.

While crypto has some kinks that need to be worked out, it's not to say that the currencies don't have a long-run prospectus in the non-cash payments game. Making predictions about the future of crypto at this point would be purely speculative but is a subject that should certainly be revisited.

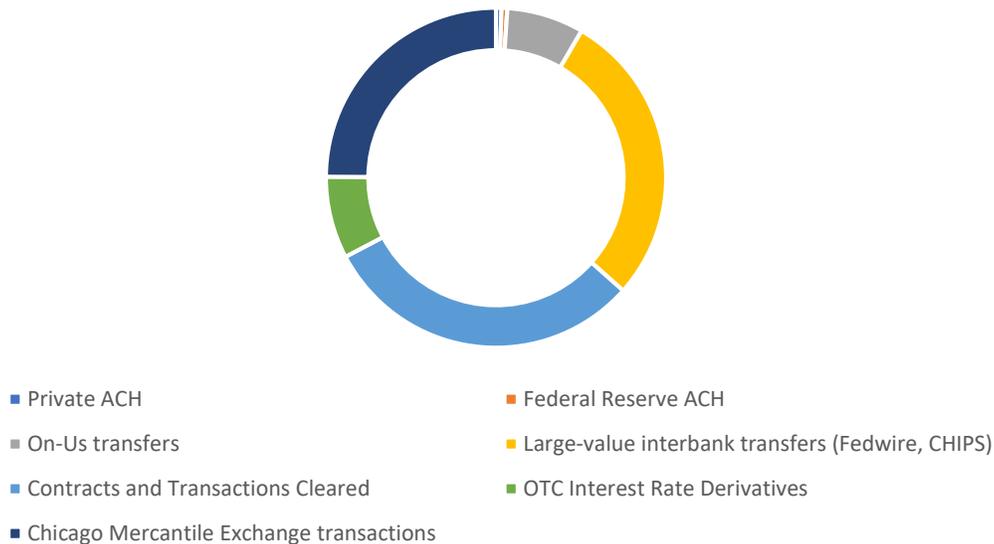
TOTAL VOLUME OF TRANSACTIONS

“ Large value transactions are much smaller in quantity, but their huge value dwarfs the day-to-day purchases that most consumers make ”

Looking at the growth of specific payment mechanisms such as Venmo can certainly put a face to non-cash payments, but in the grand scheme, these types of payments make up only a small portion of the total volume of transactions that take place in the US economy each year. In 2016, the Bank for International Settlements reported that there were \$21.7 trillion of private automated clearinghouse (ACH) transactions- ACH transactions include credit card transactions as well as mobile transactions through apps. The federal reserve processed another \$22 trillion of ACH transactions, and on top of this there were around \$294 trillion of ACH

transactions within individual banks (sometimes called “on-us” transactions”) ¹⁰. To put this in perspective, the total volume of transactions in the US economy has been estimated to be in excess of \$4 quadrillion each year, or \$4,000 trillion ¹³. The ACH payments that this report has addressed are represented in the tiny (almost invisible) blue slice at the top of figure 4. As earlier mentioned, these large value transactions are much smaller in quantity, but their huge value dwarfs the day-to-day purchases that most consumers make.

FIGURE 4: US NON-CASH PAYMENTS



CONCLUSION and bio

The makeup of transactions in the US has changed substantially in the last half century. While payment apps like Venmo and PayPal would appear to be a large portion of payments given how often consumers use them, they in fact are only a small sliver of the total transaction value that happens in the US economy each year. Most transactions come from low quantity- high value transfers for various pooled retirement vehicles, but this can come as a surprise because they are carried out by investment firms rather than individual consumers. Although the growing base of mobile transactions and cryptocurrency offers the potential for a wider transaction tax base, these transactions are only drops in the sea.

The comparative size of these other transactions can be difficult to conceptualize. Transactions on Venmo, for example, average \$2- an amount low enough to make the platform unprofitable. Meanwhile, the Fixed Income Clearing Corporation (FICC), a clearing house for various investment products, clears transactions with an average value of over \$22 million. Although these transactions are massive in size, they are also invisible to most Americans, given that these transactions are generally carried out by an investment company on behalf of their clients. While many Americans have retirement investments, a small tax on these transactions would have little-to-no impact. Transactions on mobile platforms like Venmo have a constant churn of money, but retirement investments are longer term and this low velocity reduces the overall tax paid in a given period.

Countries across the world have used taxes on financial transactions to raise revenues. Intuitively lawmakers may lean towards taxing those transactions they are familiar with- bank deposits, person-to-person transfers, and person-to-business transfers, but in order to raise a meaningful sum of money, such a tax would need to be broad-ranging enough to include payments from a wide range of sources. Base-broadening creates the opportunity to reduce tax rates markedly and therefore reduce the impact on each individual transaction.



bio

Emma has worked as an analyst for the Financial Freedom Bill for the past two years. In addition to writing reports, she produces other supportive research and, on occasion, performs miracles. She holds a BA in Economics from Colorado State University and will pursue a master's in Business Analytics and Big Data in the fall at IE Madrid. In her free time, she enjoys dancing salsa and traveling.

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