



Cash App vs. Venmo

A Look Inside America's Most Popular
Consumer Finance Applications

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SUMMARY:

Popularized in China, digital wallets are becoming ubiquitous globally. PayPal's Venmo and Square's Cash App¹ are attracting tens of millions of customers and evolving from peer-to-peer payment applications into diversified platforms that offer many inexpensive consumer finance products and better access than banks do today.

In this white paper, we present original research on Venmo and Cash App, enabled importantly by Venmo's public API data. In 2024, we expect more than 220 million digital wallet users in the US which, if valued like bank customers at maturity today, could represent an \$800 billion opportunity in the US equity market.

What is a Digital Wallet?

ARK defines digital wallets as smartphone-enabled financial ecosystems that provide access to a variety of services including wealth management, insurance, instant payments, and cryptoassets.

¹ At the time of this white paper, certain of ARK Investment Management LLC's client portfolios hold positions in the equity security of these companies. This is not a recommendation in relation to any named securities and no warranty or guarantee is provided. Any references to particular securities are for illustrative purposes only. Please note Disclosures at the end of this paper.



I. Introduction: The Venmo API

A Brief History of Venmo

Venmo is the largest peer-to-peer payment application and digital wallet in the US.² It came to life in 2009 after a brainstorming session between roommates at the University of Pennsylvania, Iqram Magdon-Ismael and Andrew Kortina. Iqram forgot his wallet in Philadelphia, so Andrew had to cover his expenses for their weekend trip to New York City. Sitting at a bar with their Blackberry mobile phones, they tried to figure out if they could create an easier way for Iqram to repay Andrew than writing out and mailing a \$250 check. Both had mobile phones. Everybody had mobile phones. Why not send money via SMS?

Iqram and Andrew, the founders of Venmo, were not alone in brainstorming this topic. Ten years earlier, PayPal asked the same question and answered it by enabling users to exchange money via email.³ Then, Venmo envisioned a similar application in the era of mobile phones. In October 2009, Venmo's Executive Summary read: "The shift to mobile payments requires a service that captures the subtle gestures involved in everyday cash exchanges. Venmo enables anyone with a mobile device to send and receive payments via text messages, creating a dialogue between buyers and sellers".⁴ From the beginning, Venmo wanted to take the awkwardness away from IOUs by "maintaining social nuances along with the ability to make payments" and taking "the stress out of exchanging money". Venmo's founders also foresaw the network effects that Venmo would create: "The ubiquity of cellphones plus Venmo's magic will create an impenetrable network effect, making Venmo the preferred way to pay for everything". Venmo launched its first smartphone application in 2012 with the slogan, "Make and share payments. Connect with people, send money for free and cash out to any bank overnight," once again emphasizing the social aspect of the application.

Financial reality soon hit. After raising Angel and \$5 million Series A rounds, Venmo learned the hard way how much financing it would take to scale its application. With few viable monetization options in sight in August 2012, Venmo sold out to Braintree, a company also backed by venture capital firm Accel, "two weeks before [it] was about to go bankrupt", according to Co-Founder Iqram Magdon-Ismael.⁵ In September 2014, Accel found its liquidity event for both companies when PayPal acquired Braintree.

² "Big Ideas 2020." ARK Investment Management LLC, ark-invest.com/big-ideas-2020. (Pages 67 - 73).

³ Cochrane, Matthew. "The Complete PayPal Stock History." *The Motley Fool, The Motley Fool*, 29 Apr. 2019, www.fool.com/investing/complete-paypal-stock-history.aspx.

⁴ "Origins of Venmo." Kortina.nyc, kortina.nyc/essays/origins-of-venmo/.

⁵ Magdon-Ismael, Iqram, co-Founder Venmo. "Columbia Entrepreneurship, Innovation, and Design. 17, May 2016, <https://www.youtube.com/watch?v=flpfXld90Oo&t=1s>.



Since then, Venmo has scaled to tens of millions of users and expanded its product offering from peer-to-peer payments to a debit card with rewards,⁶ merchant offerings with Venmo Pay,⁷ brand partnerships,⁸ an upcoming credit card,⁹ and possibly QR code payments.¹⁰ Venmo now is moving closer to the “Grand Vision” formulated in one of its early pitch decks: to “enable anyone to accept payments for anything, anytime.”¹¹

Venmo's Public API

True to its social mission statement, Venmo added a payment feed to its application. In their Venmo apps, users can see transactions between and among friends and strangers. Unless they opt out proactively, users themselves share their own transactions with the public. The feed is available not only in the Venmo app but also in a public API.

Venmo's ‘public by default’ settings and its public API have attracted the attention not only of programmers but also civil right groups and regulators.¹² In 2018, a Media Fellow at the Mozilla foundation published ‘Public By Default’ about activity on Venmo in 2017.¹³ The project summarizes transactions, detailing those of six users and highlighting information derived about their personal lives such as where they live and shop for groceries. In 2019, a similar project¹⁴ sparked another media outcry¹⁵ about the alleged lack of privacy on Venmo's platform.

Venmo finds itself in somewhat of a dilemma, as conceding to civil right groups could mean sacrificing its most valuable asset: the data generated by user engagement. Without the feed, users might not remember to repay their friends. That said, the ‘public by default’ setting could continue to attract media scrutiny and unsettle Venmo's user base. While in the spotlight for some time now, media attention on Venmo's public API has focused on privacy.

This paper focuses on Venmo's API from a data-driven perspective followed by an analysis of Cash App's growth.

6 Team Venmo April 21. “Venmo Rewards.” Venmo, help.venmo.com/hc/en-us/articles/360034178134-Venmo-Rewards.

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8 Fingas, Jon. “Pepsi's Loyalty Program Puts Cash in Your Venmo Account.” Engadget, 18 Feb. 2020, www.engadget.com/2019/09/12/pepsi-pepcoin-paypal-venmo-program.

9 Rooney, Kate. “PayPal Is Launching a Venmo Credit Card to Help Monetize the Payment App.” CNBC, CNBC, 17 Oct. 2019, www.cnbc.com/2019/10/17/paypals-venmo-is-launching-a-credit-card.html.

10 Friedrich, Maximilian. “Venmo Is Likely to Launch QR Code Payments at Merchants’ If You Look inside Your PayPal App or Your Venmo App, You Will See Prominently Displayed a Scan Capability or the Ability to Show Your Own QR Code to Be Scanned by Merchants.” Hinted at in 2019: <https://t.co/kV0hEV9iz5>.” Twitter, Twitter, 30 Jan. 2020, twitter.com/mfriedrichARK/status/1222880065463164928.

11 “Origins of Venmo.” Kortina.nyc, kortina.nyc/essays/origins-of-venmo/.

12 FairFeb, Lesley. “Venmo Settlement Addresses Availability of Funds, Privacy Practices, and GLB.” Federal Trade Commission, 11 Mar. 2019, www.ftc.gov/news-events/blogs/business-blog/2018/02/venmo-settlement-addresses-availability-funds-privacy.

13 “Public By Default.” Venmo Stories of 2017, publicbydefault.fyi/#about.

14 Whittaker, Zack. “Millions of Venmo Transactions Scraped in Warning over Privacy Settings.” TechCrunch, TechCrunch, 16 June 2019, techcrunch.com/2019/06/16/millions-venmo-transactions-scraped/.

15 Cole, Samantha. “Venmo Is Still Exposing Your Connections to Everyone You Know.” Vice, 28 Aug. 2019, www.vice.com/en_us/article/evjxqa/venmo-letter-eff-mozilla-public-by-default-settings.



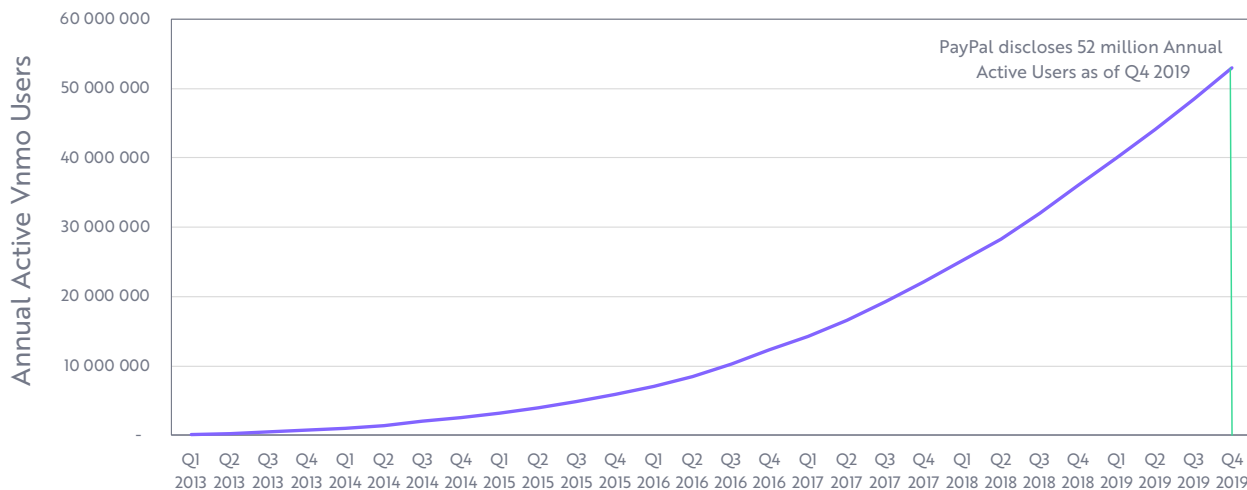
II. Analysis of the Venmo API

User and Transaction Growth

Disclaimer: The following analysis utilizes data from the Venmo API, a third-party source ARK believes the source to be reliable. However, ARK does not guarantee the accuracy or completeness of any information obtained from any third party.

Our analysis of the API suggests that, since its inception in 2009 and its wide-scale roll-out in 2012, more than 73 million users - or more than a quarter of the US population over the age of 18 - have signed up for a Venmo account.¹⁶ As of year-end 2019, Venmo had more than 52 million annual active users,¹⁷ up more than 12 million, or 30%, in the nine months since PayPal's last disclosed 40 million in March 2019.¹⁸

**Figure 1: Annual Active Venmo Users
(Q1 2013 - Q4 2019)**



Source: ARK Investment Management LLC; Estimates derived from Venmo's API

Venmo's API shows an uptick in signups in late summer as colleges start the new school year, as shown in the chart below. Each year, roughly 20% of new Venmo users sign up in August and September. Presumably, freshmen face and offer social pressure to download the app as they split tabs for meals and utility bills and perhaps as they invite their parents onto the platform to send monthly allowances. Venmo has taken advantage of this network effect by pitching its debit card with 5% rewards to new college-aged users.

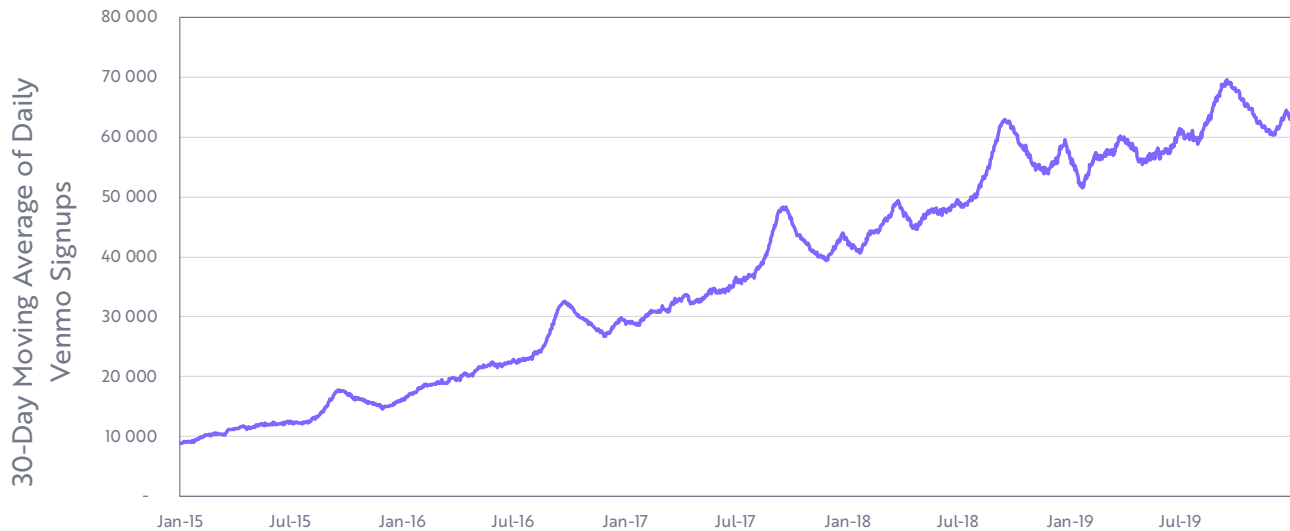
¹⁶ "U.S. Census Bureau QuickFacts: United States." Census Bureau QuickFacts, www.census.gov/quickfacts/fact/table/US/PST045218.

¹⁷ "PayPal Reports Fourth Quarter and Full Year 2019 Results." PayPal, Inc., investor.paypal-corp.com/news-releases/news-release-details/paypal-reports-fourth-quarter-and-full-year-2019-results.

¹⁸ "U.S. Census Bureau QuickFacts: United States." Census Bureau QuickFacts, www.census.gov/quickfacts/fact/table/US/PST045218.



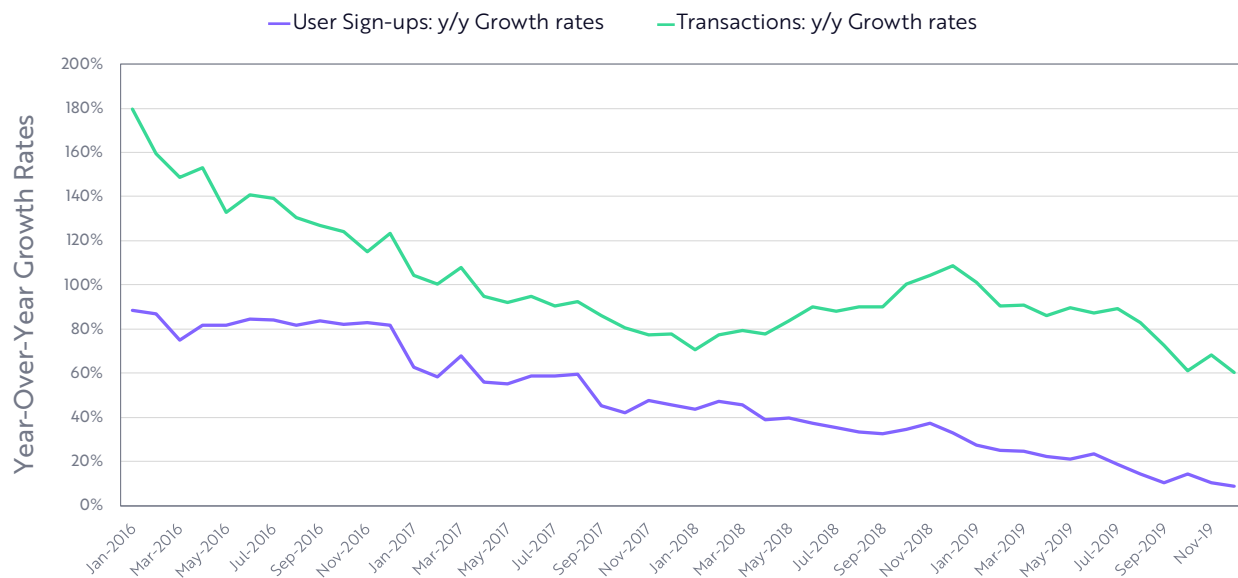
Figure 2: 30-Day Moving Average of Daily Venmo Signups (1/1/15 - 12/31/19)



Source: ARK Investment Management LLC; Estimates derived from Venmo's API

That said, in the three years from year-end 2016 to year-end 2019, Venmo's user growth slowed from more than 80% to less than 10% on a year-over-year basis, as shown below. This paper presents our analysis of this sharp deceleration in growth and offers an explanation.

Figure 3: Year-Over-Year Growth Rates (y/y): Venmo Signups and Venmo Transactions



Source: ARK Investment Management LLC; Estimates derived from Venmo's API

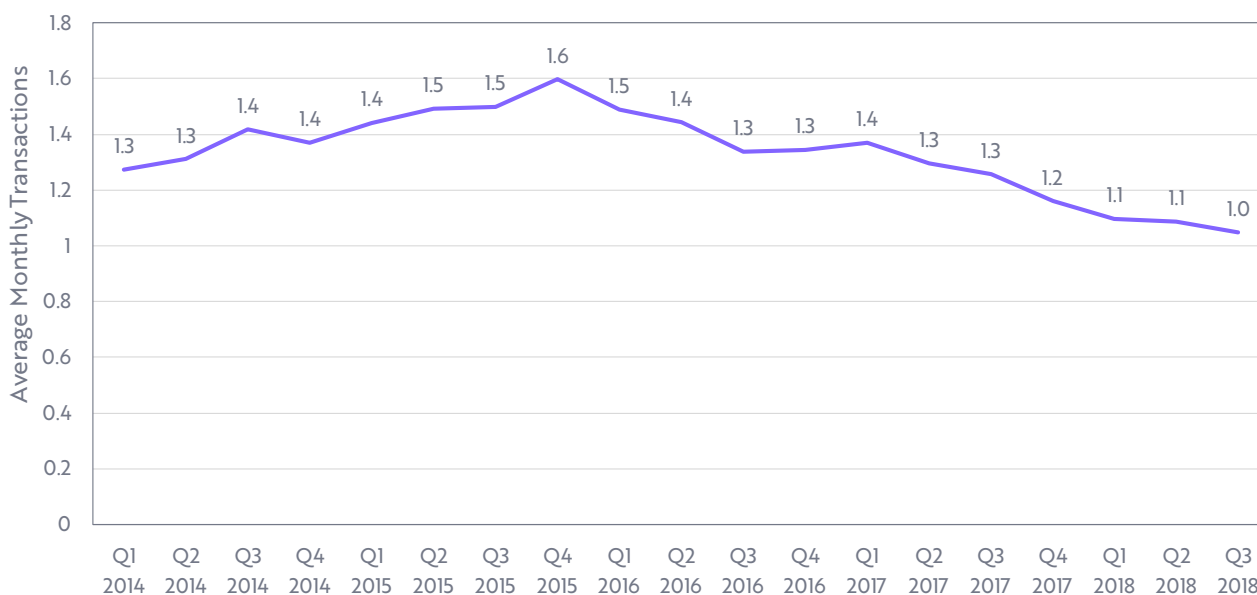


Despite the falloff in its user growth, Venmo's peer-to-peer transactions have increased consistently since 2016. After more than doubling from 10 million to 23 million in the year ended December 2016, the number of monthly transactions hit 140 million in December 2019. During those three years, transaction growth, as shown above, hovered between 80% and 100% on a year-over-year basis before decelerating to a record low 60% last December.

Cohort Analysis

To understand this dynamic, we extracted the transaction history of 4,713 Venmo users who signed up between August 2009 and October 2019 and categorized their 400,000+ transactions into quarterly cohorts. The chart below depicts the average monthly transaction value for each cohort relative to the others during their first 12 months of activity. According to the data, users who signed up for Venmo during the fourth quarter of 2015 transacted 60% more per month on average during their first 12 months than those who signed up during the third quarter of 2018. The decline in transaction activity after 2015 mirrors the weakness in Venmo's user growth during the same time.

Figure 4: Average Monthly Transactions Over 12 Months After Signup, by Total Cohort Users (Quarterly Cohorts, 4-Quarter Moving Average)



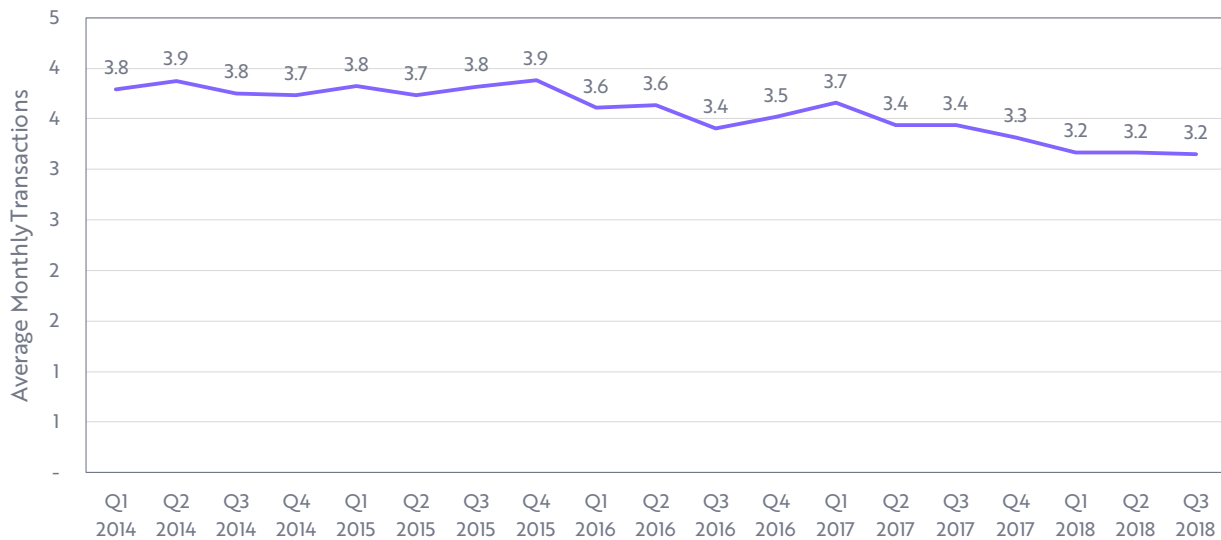
Source: ARK Investment Management LLC; Estimates derived from Venmo's API

Mitigating the impact of this weakness on Venmo's revenue growth has been the number of "active" users in each cohort: based on the users who transacted at least once per month, "Active Cohort Users", cohort Q3'18 transacted only 21% less frequently per month than cohort Q4'15, as shown below, opposed to 60% less across the total cohort sample which includes users who since



have left the Venmo platform. In other words, the slowdown in average monthly transactions appears to be related more to user churn that happened after 2015 and 2016.

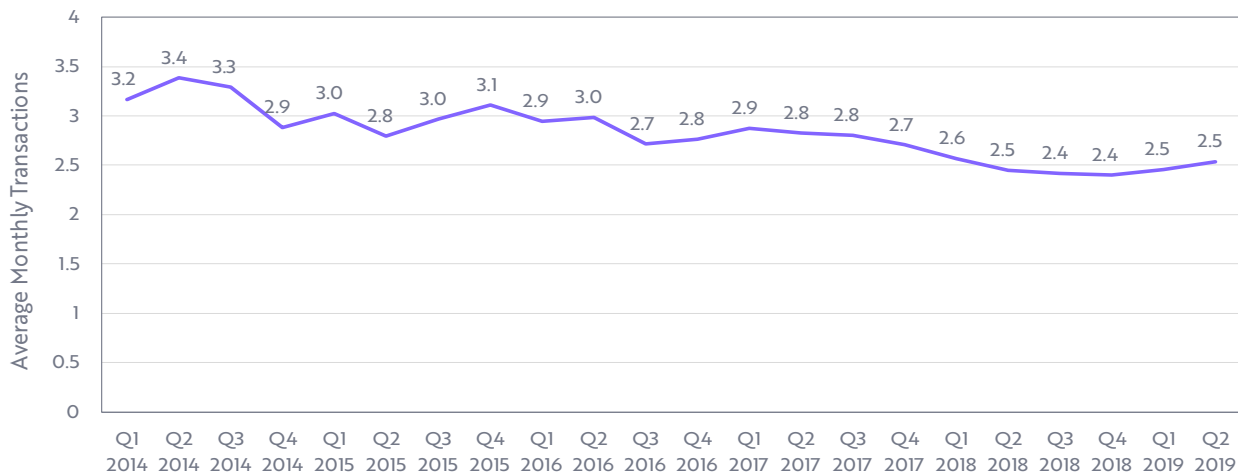
Figure 5: Average Monthly Transactions Over 12 Months After Signup by Active Cohort Users (Quarterly Cohorts, 4-Quarter Moving Average)



Source: ARK Investment Management LLC; Estimates derived from Venmo's API

Over shorter term time horizons as measured by a three-month moving average, post-Q3'18 cohorts have been transacting more often per month, though seasonal factors could be at work. That said, such "seasonality" was not present in 2017 or 2018, suggesting that Venmo could be enjoying an uptick in user engagement for cohorts in 2018 and 2019.

Figure 6: Average Monthly Transaction Over 3 Months After Signup by Active Cohort Users (Quarterly Cohorts, 4-Quarter Moving Average)

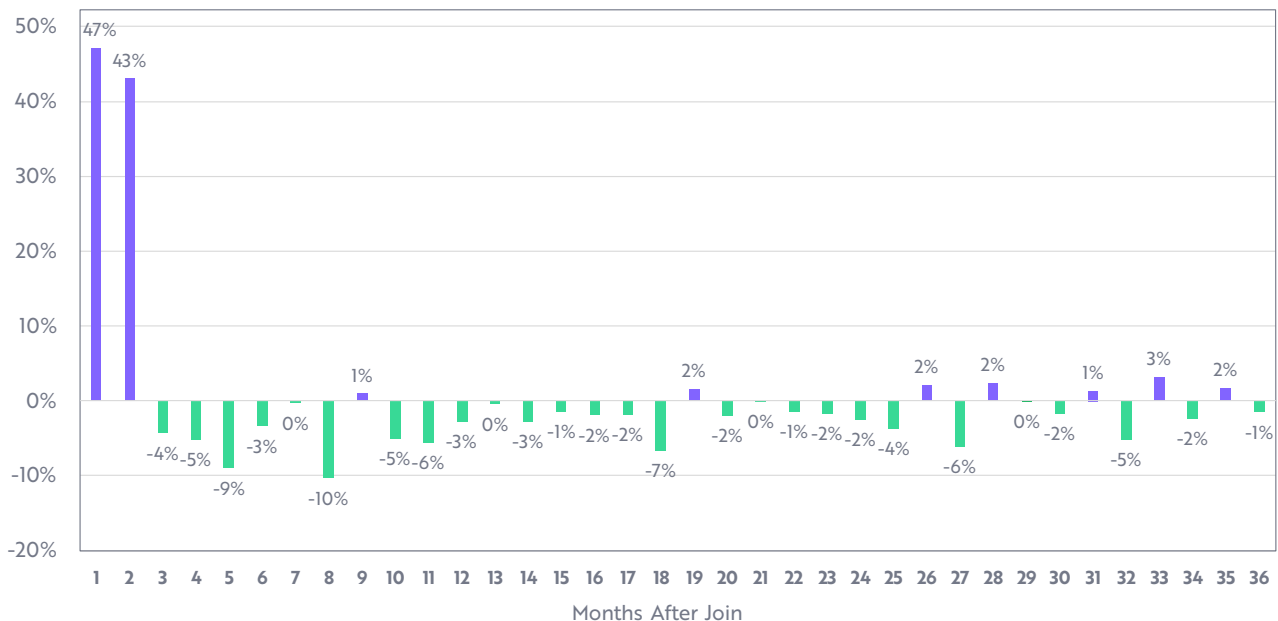


Source: ARK Investment Management LLC; Estimates derived from Venmo's API



Interestingly, churn rates suggest that Venmo users return to the platform even if they have been dormant for months or years. The chart below compares over 36 months the number of cohort users making transactions in each month to the number of cohort users of the same cohort transacting in the previous month. Churn occurs when the number of transacting users in a given month is lower than in the previous month. As shown below, while 47% and 43% of users churned in the first two months after they signed up, on average the Q1'13 to Q3'16 cohorts re-engaged in 28 out of 36 months, or more than 75% of the time. Despite their weaker retention and transaction rates, even recent cohorts engage regularly during their first 12 months on Venmo.

Figure 7: Venmo: Average Month-on-Month Churn Rate (Of Quarterly Cohorts Q1 2012 - Q3 2016)



Source: ARK Investment Management LLC; Estimates derived from Venmo's API

Strong re-engagement suggests that Venmo's peer-to-peer payments network is healthy. Some people don't use the app for months or longer until another user requests payment for some social engagement, which we believe is Venmo's primary competitive advantage relative to other consumer finance products except for Square's Cash App, as we will discuss later. Once opened, for example, budgeting apps often get little return use, while auto-pay often ends the return to a credit card app. For peer-to-peer applications, however, transactions left unreimbursed become a social and uncomfortable liability.

In sum, as corroborated by the chart below, churn rose after 2015 and, until recently, has been falling since the fourth quarter of 2018. We believe the Q3-cohort in each year may perform better than others because college students return to campus in August and September.



Figure 8: Implied Monthly Churn Rate (3-Month Moving Average)

	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019	2019
1	41%	47%	33%	42%	40%	44%	36%	40%	37%	43%	35%	39%	41%	40%	36%	44%	40%	41%	41%	34%	35%	35%
2	34%	42%	27%	36%	31%	35%	28%	34%	33%	38%	28%	33%	36%	33%	34%	36%	37%	40%	37%	30%	33%	
3	27%	33%	21%	26%	23%	24%	21%	24%	24%	28%	23%	24%	27%	25%	25%	28%	28%	32%	27%	23%	25%	
4	23%	23%	17%	22%	19%	19%	17%	17%	19%	21%	18%	19%	22%	21%	21%	23%	22%	25%	21%	18%	20%	
5	20%	18%	13%	18%	17%	16%	14%	14%	17%	17%	15%	15%	19%	17%	16%	19%	18%	19%	17%	15%		
6	16%	15%	11%	15%	14%	14%	12%	12%	15%	15%	12%	13%	16%	15%	14%	16%	15%	15%	15%	13%		
7	14%	14%	9%	13%	11%	12%	10%	10%	13%	13%	11%	12%	13%	14%	11%	14%	13%	13%	13%	12%		
8	11%	12%	8%	11%	10%	10%	9%	9%	11%	12%	9%	11%	10%	13%	10%	12%	12%	12%	11%			
9	10%	10%	7%	10%	9%	8%	8%	8%	9%	10%	8%	9%	9%	12%	9%	11%	11%	11%	10%			
10	8%	9%	6%	8%	8%	7%	7%	7%	8%	9%	7%	7%	9%	10%	8%	9%	10%	10%	9%			
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16	4%	5%	3%	5%	4%	4%	4%	4%	4%	5%	5%	5%	6%	5%	5%	6%	6%					
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19	4%	4%	3%	4%	4%	4%	3%	3%	4%	5%	4%	4%	5%	4%	4%	4%	5%					
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35	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%					
36	2%	2%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%					

Source: ARK Investment Management LLC; Estimates derived from Venmo's API

Ten years after its inception, Venmo appears to be a healthy peer-to-peer payments network that seems to be overcoming the higher churn and lower transaction frequency associated with its 2017 and 2018 cohorts, for now at least.

That said, why did its 2016, 2017 and 2018 cohorts perform so poorly? Our research suggests that Venmo's main competitor - Square's Cash App - is behind the answer.

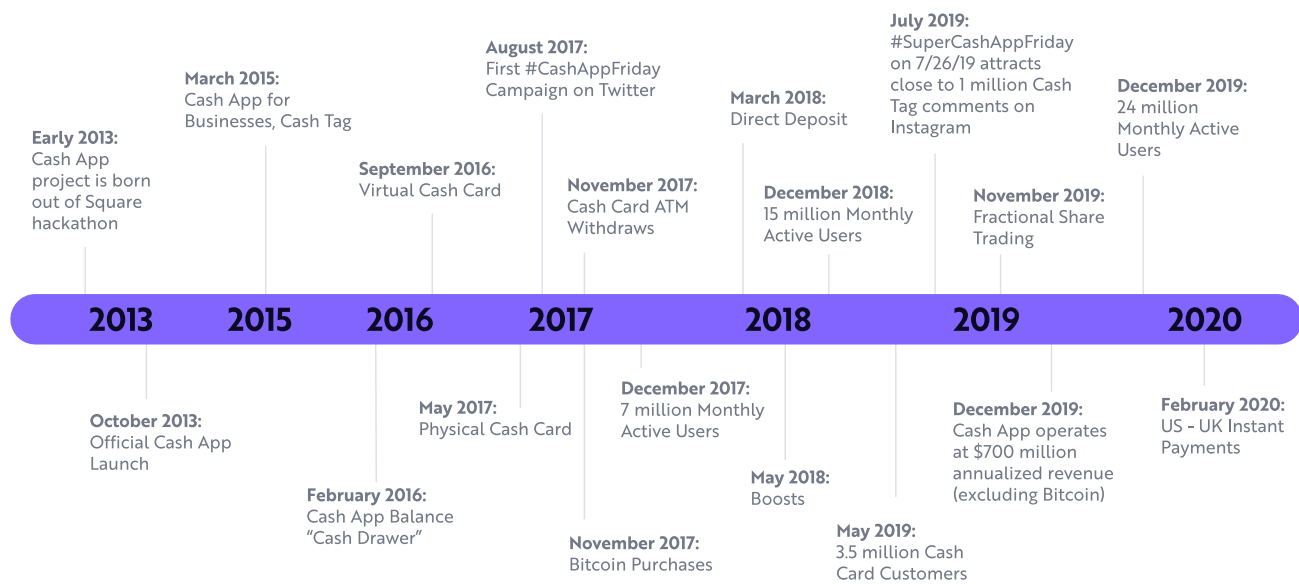


III. The Rise of Cash App

Cash App is the second largest peer-to-peer payment application and digital wallet in the US. Initially a side project born out of a Square hackathon, today the Cash App is one of Square's most important assets, contributing roughly 12.5% to its revenue.¹⁹ Operated like a startup, Cash App has a distinct culture but enjoys the benefits of Square's global scale.

Square is in a unique position because it manages two payments ecosystems: millions of merchants on its Point-of-Sale (POS) hardware and software, and tens of millions of consumers on the Cash App. It has been scaling both networks, perhaps with plans to merge them and provide value-add synergies to both Cash App users and Square merchants. Strategically, Square could be aiming for the holy grail of payments: a closed-loop payments system that cuts out intermediaries, giving it a larger share of the economics and the ability to cross-sell services between and among consumers and merchants without the friction associated with more traditional payments ecosystems.

Figure 9: Square Cash App Product History



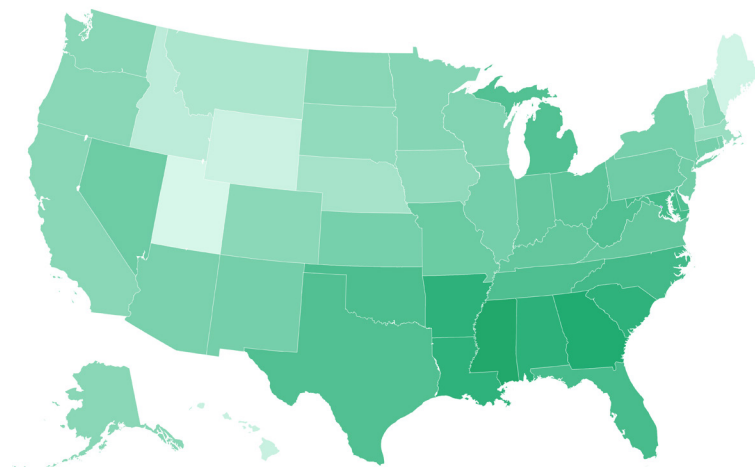
Source: ARK Investment Management LLC, 2020

¹⁹ https://s21.q4cdn.com/114365585/files/doc_financials/2019/Q3/2019-Q3-Securityholder-Letter-Square.pdf, excluding Bitcoin sales.



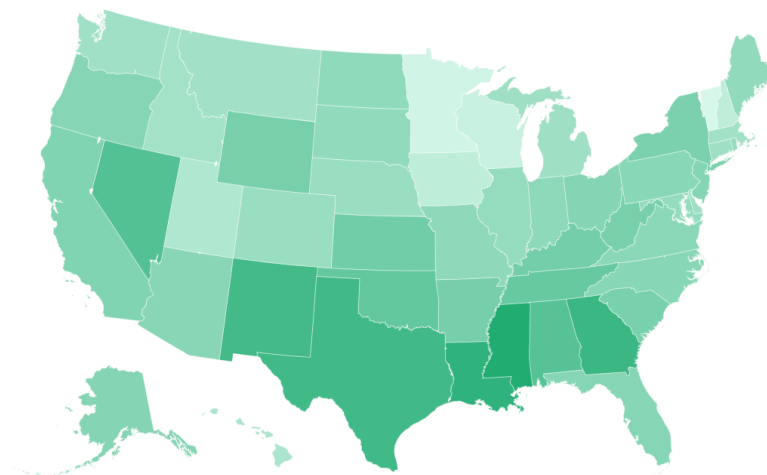
Los Angeles and New York are fairly new to Square's Cash App, as both were early adopters of Venmo or Zelle, a multi-bank-owned peer-to-peer payments channel. The Cash App's US geographic concentration is in the south. In 2018, several reports highlighted that Square's Cash App was especially popular with low-income consumers in cities like Atlanta where unbanked rates are high.²⁰ Jack Dorsey, Square's CEO, explained the reason, "People are using [the Cash App] as their primary banking account, and in some cases it's their only bank account." Our research supports Dorsey's observation. Comparing the FDIC's unbanked rates and Google Search Trends for Square's Cash App, the geographic overlap is striking, as shown below. The Cash App dominates the southern states where unbanked rates are highest.

Figure 10: Google Trends: Cash App Search Interest by State (August 2019)



Source: ARK Investment Management LLC, Google Trends, FDIC (2017)

Figure 11: FDIC: Rate of Unbanked or Underbanked Population by State (2017)



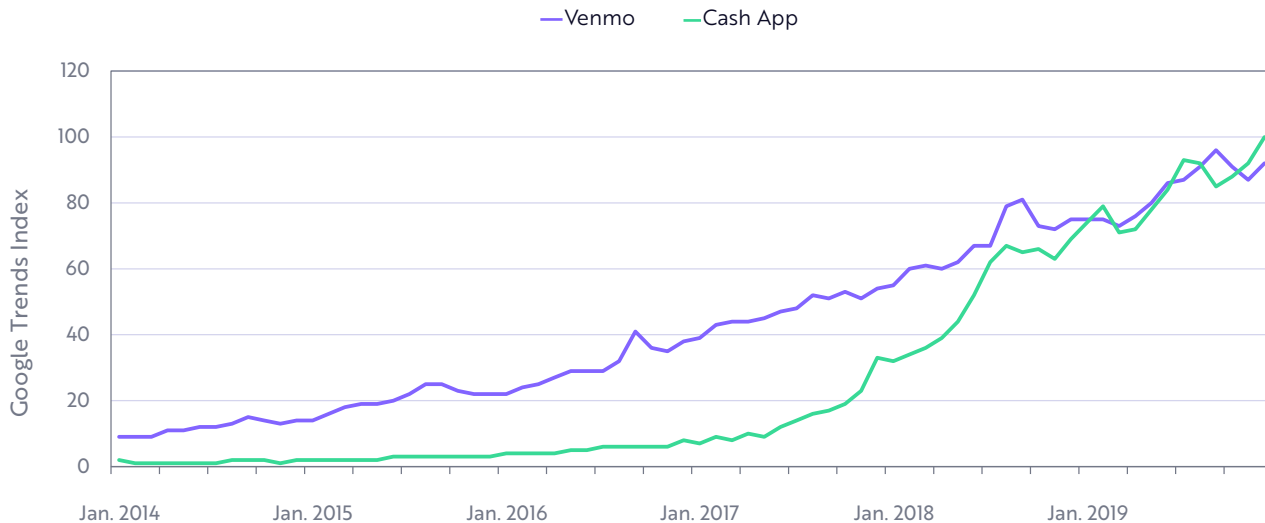
Source: ARK Investment Management LLC, Google Trends, FDIC (2017)

²⁰ Rooney, Kate. "Square Stumbles into the Banking Business." CNBC, CNBC, 18 May 2018, www.cnbc.com/2018/05/18/square-stumbles-into-the-banking-business.html.



While it had early success in the south, the Cash App is extending its reach and gaining traction relative to Venmo, as shown below. Targeting different demographics and geographies, it is sponsoring podcasts like Artificial Intelligence with Lex Fridman,²¹ the Joe Rogan Experience²² and even e-sports teams.²³

**Figure 12: Cash App vs. Venmo Google Trends
(1/1/14 - 12/31/19)**



Source: ARK Investment Management LLC, Google Trends

Thanks to viral marketing strategies that have increased user engagement, Cash App enjoyed explosive growth during 2017 and early 2018, as shown in the chart above. In 2017, it launched the Cash Card, enabling ATM withdrawals and bitcoin trading, as well as its first #CashAppFriday marketing campaign. Each #CashAppFriday, users can enter their \$cashtag, which is their Cash App username, on Twitter or Instagram, effectively applying to receive money from the Cash App team.

Some #CashAppFriday campaigns have attracted almost one million comments on Instagram and Twitter combined.²⁴ For a more in-depth analysis of Cash App's marketing strategy, please see our

21 Strang, Gilbert. "Linear Algebra, Deep Learning, Teaching, and MIT OpenCourseWare, AI Podcast." 25, Nov. 2019. <https://www.youtube.com/watch?v=IEZPfmGCEk0&t=716s>.

22 "Joe Rogan Experience Podcast Sponsors & Promo Codes." JRE Library, 17 Apr. 2020, jrelibrary.com/articles/joe-rogan-experience-podcast-sponsors-promo-codes/.

23 Keefer, John. "100 Thieves Reveals Content House Sponsor Cash App, Adds Influencer CouRage." The Esports Observer - Home of Essential Esports Business News and Insights, 29 May 2019, esportsoobserver.com/100-thieves-sponsor-cash-app/.

24 Person, and ProfilePage. "Cash App on Instagram: 'It's #SuperCashAppFriday and We're Giving Away \$50,000 in Cash and Bitcoin. To Enter, Repost This Video and Tag Us, Then Leave a Comment...'" Instagram, www.instagram.com/p/BOYtsGnAFyv/; App, Cash. "It's #SuperCashAppFriday, We're Giving Away \$50K in Cash and BTC. RT with Your \$Cashtag to Enter. You Could Win \$100, \$500, or Even 1 Whole Bitcoin. For Luck, Tag a Bitcoin Believer. Follow @CashApp to Qualify. No Purc Nec. Void Where Proh. Rules: <https://t.co/P3knshma0s> Pic. twitter.com/STEB5kmukl." Twitter, Twitter, 26 July 2019, twitter.com/CashApp/status/1154786105318883333.



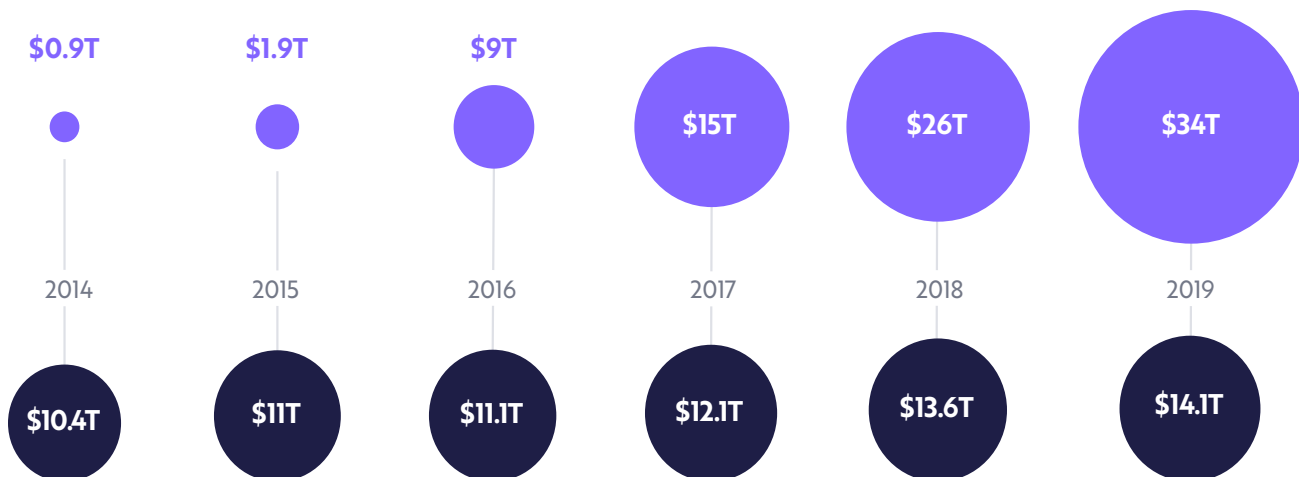
previous blog on the topic.²⁵ The success of these Cash App campaigns could explain much of the weakness in Venmo's 2016, 2017 and 2018 cohorts. Cash App intensified its marketing campaigns, released new products, and expanded its user demographics.

IV. Digital Wallets in the US: An \$800 Billion Opportunity

In China, digital wallets are ubiquitous. Together Alipay and WeChat Pay control approximately 95% of the Chinese third-party mobile payments market. During the past seven years, Alipay alone has scaled to more than 900 million users.^{26,27} Together they offer not only peer-to-peer and QR code payments, but also access to investment products, credit, and commercial services. Moreover, WeChat dedicates only half of its user interface to financial services, as the other half focuses on commercial services like ride-hailing and e-commerce.²⁸

As displayed in the chart below, the volume of mobile payments in China has exploded more than 30-fold in just five years, from roughly \$1 trillion, or less than 10% of GDP, in 2014 to an estimated \$34 trillion, nearly three times the size of China's GDP in 2019.

Figure 13: China's Mobile Payment Transactions vs. China's GDP



Source: ARK Investment Management LLC, World Bank, iResearch.

25 Friedrich, Max. "Square's Cash App Twitter Marketing Strategy Attracts Customers." ARK Investment Management, Max Friedrich, ARK Analyst https://ark-invest.com/Wp-Content/Uploads/2020/01/ARK-Invest_Logo.Png, 27 June 2019, ark-invest.com/research/squares-cash-app-twitter.

26 Hongru. China's Third-Party Mobile Payment Transactions Rose 22.6% in Q2 2019, www.iresearchchina.com/content/details7_58033.html.

27 "2019 Investor Day." Alibaba Group, www.alibabagroup.com/en/ir/investorday.

28 "Big Ideas 2019." ARK Investment Management LLC, ark-invest.com/big-ideas-2019.



Today, digital wallets span the globe: LINE Pay and PayPay in Japan, Grab Pay in South East Asia, MercadoPago in South America, Venmo and Cash App in the US, and many more. In fact, in the US and perhaps elsewhere, strong network effects are enabling digital wallets to scale faster than social media did in its early days, as shown below. Mobile peer-to-peer payments are penetrating different age groups in the US in half the time that social media did 10 years ago. For both social media and peer-to-peer payment applications, the utility of the networks increases as an exponential function of the total number of people on the network.²⁹ For peer-to-peer payments though, these network effects could prove stronger than for social media: while Venmo or Cash App users have a financial incentive to invite their parents or even grandparents onto the platforms, they probably wouldn't have encouraged them to follow their Instagram accounts.

Figure 14: Mobile Peer-to-Peer Payment Adoption in the US (2017 - 2018)

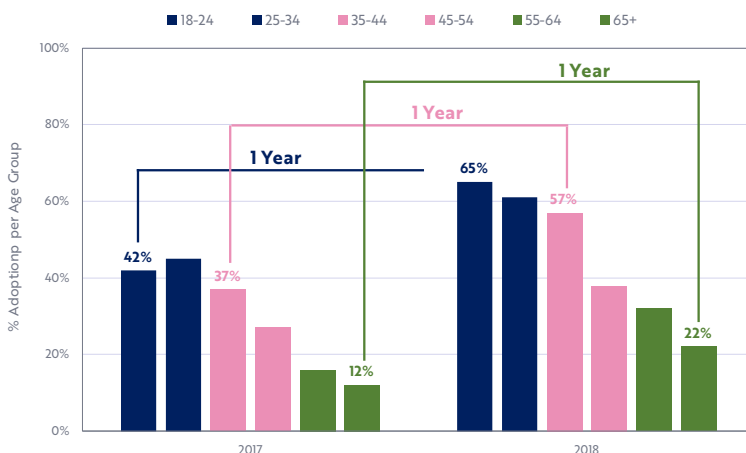
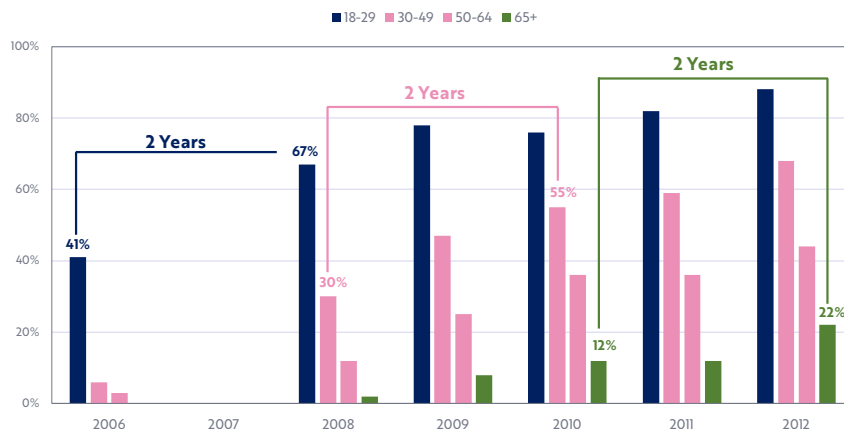


Figure 15: Social Media Adoption in the US (2006 - 2012)



Source: ARK Investment Management LLC, TYSS, Pew Research.

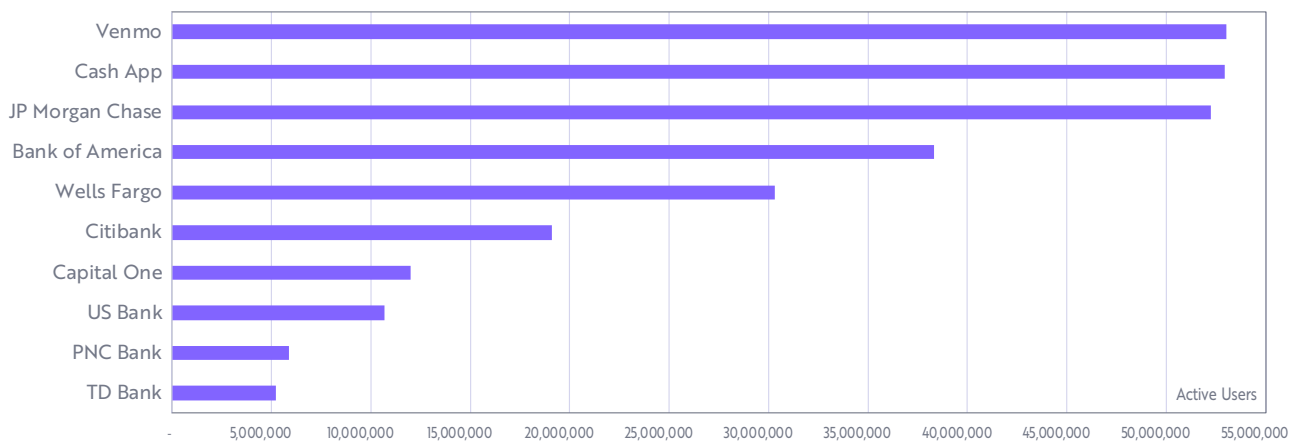
²⁹ Metcalfe's law states that the utility of a communications networks scales proportionally to the square of the number of nodes.



Unsurprisingly, digital wallets are enjoying strong adoption among both consumers and merchants, taking share from other payments methods. According to Bank of America's Small Business Payments Spotlight 2019, digital wallet payments grew 41% at a compound annual rate between 2017 and 2019, while those on credit cards increased 13% and those on debit cards, in cash, and by checks declined.³⁰

Indeed, as measured by active digital users, Venmo and Cash App have become the two largest financial institutions in the US, according to our research and as shown below. Most significant in differentiating between the success of digital wallets and traditional banks are customer acquisition costs (CACs). As illustrated in previous research, to acquire a new customer banks spend up to \$1,500, more than seventy times the \$20 that digital wallets spend, primarily because they lack organic peer-to-peer payment network effects.³¹ Customer acquisition costs have a significant impact on the lifetime value of a customer. Importantly, low CACs enable digital wallets to bank the unbanked who typically are unprofitable for and unattractive to traditional banks.³²

Figure 16: Top 10 Mobile Consumer Finance Application in the US by Active Users (2019)



Source: Estimate of Annual Active Users for Venmo, Bank of America, Cash App, Citibank, Capital One, US Bank, PNC Bank, TD Bank. Estimate of Quarterly Active Users for JPMorgan Chase, Wells Fargo. This is not a recommendation in relation to any named securities and no warranty or guarantee is provided. Any references to particular securities are for illustrative purposes only. Source: ARK Investment Management LLC, 2020. Company information and ARK estimates. Estimate of Annual Active Users for Venmo, Bank of America, Cash App, Citibank, Capital One, US Bank, PNC Bank, TD Bank.

30 "Adapt to Changes in Customer Payment Behavior." Bank of America Merchant Services, merch.bankofamerica.com/small-business/resources/small-business-payments-spotlight/.
 31 Yarasuri, Bhavana. "Digital Wallets Are Taking Share From Traditional Bank Branches." ARK Investment Management, Bhavana Yarasuri, ARK Analyst https://ark-invest.com/Wp-Content/Uploads/2020/01/ARK-Invest_Logo.Png, 18 Apr. 2019, ark-invest.com/research/digital-wallets.
 32 Friedrich, Max. "Digital Wallet Companies Can Bank the Unbanked, Traditional Banks Can't." ARK Investment Management, Max Friedrich, ARK Analyst https://ark-invest.com/Wp-Content/Uploads/2020/01/ARK-Invest_Logo.Png, 6 June 2019, ark-invest.com/research/digital-wallet-companies.

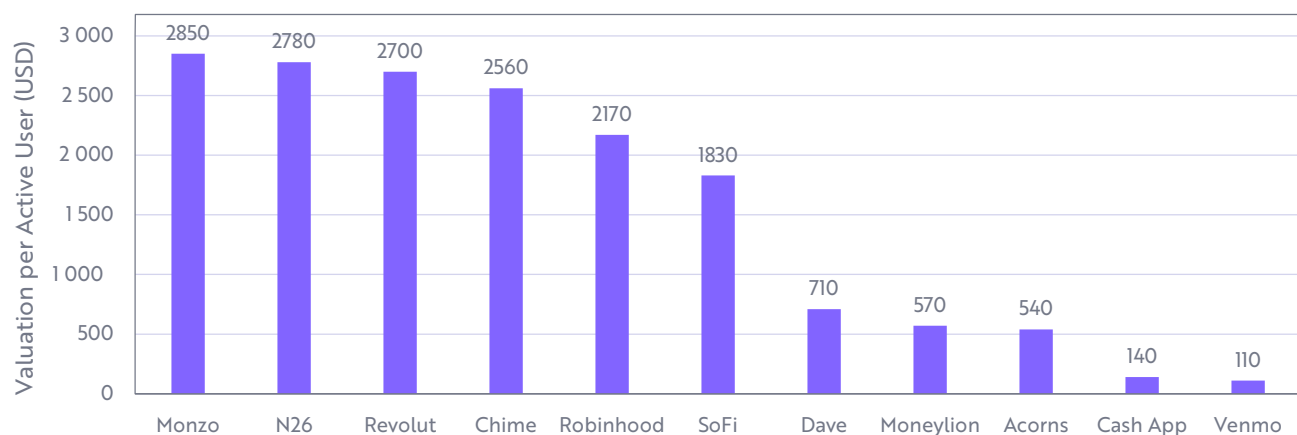


The Rise of Challenger Banks

Challenger banks are the other new kid on the banking block. Dozens of these startups offer checking accounts and debit cards in Europe and the US. In the US, empowered by the Durbin Amendment, challenger banks build their businesses through partnerships with small-town FDIC-insured banks and with infrastructure providers such as SynapseFI or Galileo Financial Technologies. Passed in the aftermath of the Global Financial Crisis as part of the Dodd-Frank Act, the Durbin Amendment allows small banks with assets below \$10 billion to charge interchange fees on debit card transactions that are higher than those at larger banks. The issuing banks, infrastructure providers, and challenger banks share fees, with challenger banks often taking as much as 100 basis points per transaction.

Challenger banks have raised billions of dollars in the few past years.³³ Their investors seem to be betting on a number of factors: first, that the Durbin Amendment will remain intact even as the Trump Administration rails against the Dodd Frank Act; second, that challenger banks will diversify into more profitable services such as lending; and, third, that customer loyalty will be strong even in the face of more VC-funded competitors offering better bargains. Moreover, according to industry sources, their CACs range from \$50 to \$500, depending on their organic growth, above the \$20 for digital wallets. Even with fairly low CACs, however, challenger banks seem to be experiencing “challenges” in retaining users. In conversations with industry sources, we have learned that only 20-40% of their users are active on a monthly basis, suggesting that venture capital funds are valuing some challenger banks at more than \$2,000 per active user, as shown below.

Figure 17: Private Fintech Startups and Digital Wallets: Valuation per Active User (USD)



Source: ARK Investment Management LLC, 2020. Company Information, ARK Estimates. For Cash App and Venmo using Square's and PayPal's price-to-sales multiple applied to estimated Cash App and Venmo revenue and divided by ARK's MAU (Monthly Active Users) estimate. For private Fintechs using last valuation divided by ARK's MAU estimate. | Representative Retail Banks: ARK Estimates based on JP Morgan Chase, Wells Fargo, US Bank, PNC Bank, Bank of America 2018 Annual Reports. This is not a recommendation in relation to any named securities and no warranty or guarantee is provided. Any references to particular securities are for illustrative purposes only.

33 "Global Fintech Report Q3 2019." CB Insights Research, www.cbinsights.com/research/report/fintech-trends-q3-2019/.



The public market seems to be valuing Cash App and Venmo at \$140 and \$110 per monthly active user (MAU), respectively, based on Square's and PayPal's price-to-sales multiples and our estimates of Cash App's and Venmo's MAUs. In other words, investors are valuing the prospective cash flow of a Cash App user at less than one tenth that of a Monzo³⁴ user. Some investors argue that Monzo and other challenger banks offer core banking products like deposits and debit cards while Cash App and Venmo are peer-to-peer payment platforms and should be valued differently. We disagree. First, Cash App does offer direct deposits and debit cards in partnership with an FDIC insured bank, much like the challenger banks do in the US.³⁵ Moreover, while Cash App does derive a large percent of its revenue from instant-transfer fees to and from user bank accounts,

Cash Card interchange revenue already should be its second largest revenue stream. Moreover, while Cash App does derive a large percent of its revenue from instant-transfer fees to and from user bank accounts, the Cash App has seven revenue streams,³⁶ while some features remain unmonetized to drive user engagement, at least for now. Most challenger banks rely only on interchange revenues and, in Europe, which has capped interchange rates, on membership fees.

In our view, besides more diversified revenue streams, Venmo and Cash App have another important advantage over challenger banks: network effects. As peer-to-peer networks, Venmo and Cash App have attracted users loyal to their platforms, as illustrated by our engagement and re-engagement analysis. If for no other reason than to avoid unpleasant interactions, users can be lured back to these platforms by friends and family requesting repayment for an evening out on the town, even after months and years of inactivity.

Challenger banks do not enjoy this dynamic. Most of their users have traditional bank accounts³⁷ and may not be using challenger banks as their primary deposit accounts. In the US, for example, the largest challenger bank, Chime, added 1.5 million new users during the three months ended December 2019,³⁸ but only 450,000 direct deposit users during the three months ended November. In other words, only 30% of the new 'users'³⁹ opened direct deposit accounts.

³⁴ Monzo is a UK challenger bank.

³⁵ PayPal lays out Venmo's product road map less aggressively than Square does with Cash App. We believe PayPal does so because it wants to protect its relationship with regulators and financial services providers but is aware of the value of Venmo. Recent product launches and announcements (Venmo Payouts, Venmo Card rewards, Venmo Credit Card, Venmo QR-code payments network) point towards the strategic direction PayPal is taking with Venmo, which is that of a Digital Wallet.

³⁶ Transcripts, SA. "Square, Inc. (SQ) CEO Jack Dorsey on Q4 2019 Results - Earnings Call Transcript." Seeking Alpha, Seeking Alpha, 27 Feb. 2020, seekingalpha.com/article/4327582-square-inc-sq-ceo-jack-dorsey-on-q4-2019-results-earnings-call-transcript.

³⁷ FT Alphaville, ftalphaville.ft.com/2019/12/18/1576674529000/Fintech-users-just-can-t-get-enough-of-traditional-banks/.

³⁸ Chime reported 5 million users in early September 2019 and 6.5 million in early December 2019.

Son, Hugh. "Digital Bank Chime Quadruples Valuation in Less than a Year to \$5.8 Billion as It Takes on Megabanks." CNBC, CNBC, 6 Dec. 2019, www.cnbc.com/2019/12/05/chime-quadruples-valuation-to-5point8-billion-as-it-raises-500-million.html. Dillet, Romain. "Chime Now Has 5 Million Customers and Introduces Overdraft Alternative." TechCrunch, TechCrunch, 4 Sept. 2019, techcrunch.com/2019/09/04/chime-now-has-5-million-customers-and-introduces-overdraft-alternative/.

³⁹ hugh_son. "Digital Bank Chime Quadruples Valuation in Less than a Year to \$5.8 Billion as It Takes on Megabanks." CNBC, CNBC, 6 Dec. 2019, www.cnbc.com/2019/12/05/chime-quadruples-valuation-to-5point8-billion-as-it-raises-500-million.html.

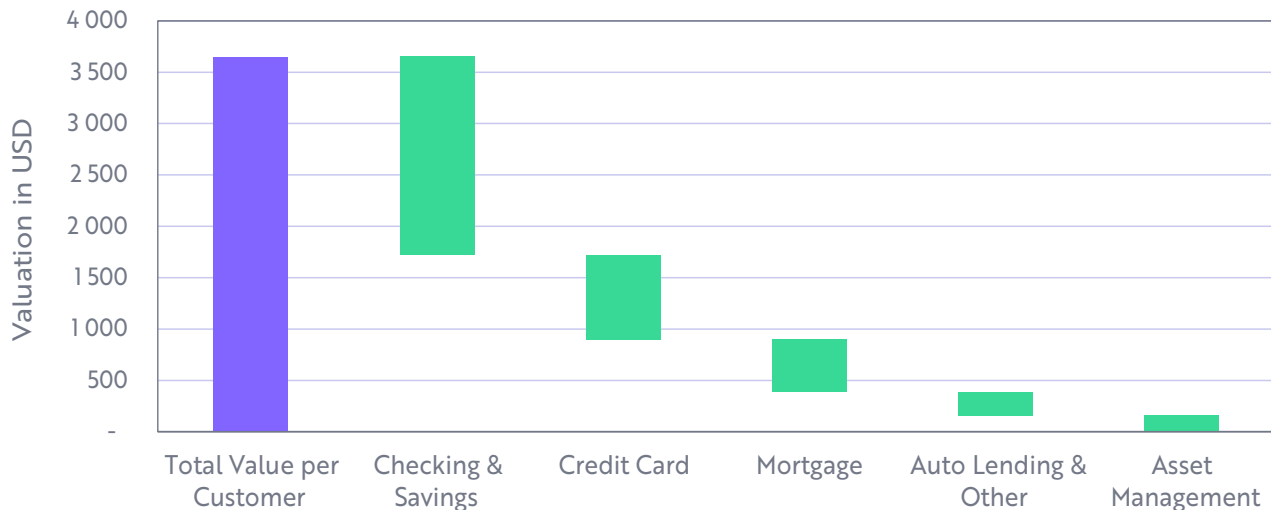


For perspective, users are downloading the Cash App six times more rapidly, with more than three million in December alone.⁴⁰

How to Value the Digital Wallet Opportunity

Investors value an active retail banking customer at roughly \$3,600, as shown in the chart below. Important to note, traditional retail banks generate several income streams, the highest value of which accrues to interest earnings on checking and saving accounts. In our view, if digital wallet companies execute on their product roadmaps, the value of a digital wallet user could rise to that of a bank customer at maturity today or perhaps higher given lower customer acquisition costs and superior margins relative to traditional brick-and-mortar banks.

**Figure 18: Valuation Per Customer Across Revenue Segments (USD):
 Representative Retail Banks in the US**



Source: ARK Investment Management LLC, 2019. Representative Retail Banks: ARK Estimates based on JP Morgan Chase, Wells Fargo, US Bank, PNC Bank, Bank of America 2018 Annual Reports.

According to our research, given their organic network effects and superior value propositions, digital wallets in the US should scale to nearly 220 million active users by 2024. Banks have been trying to pivot and participate but are struggling to get their digital offerings off the ground,^{41,42} primarily because their "DNA" and central nervous systems have been centered on bank branch openings.⁴³

40 Emory, Sean D. "Cash App December: \$SQOver 3M Downloads in the Month: Highest EVER Monthly Downloads: 31% Higher y/y: 26% Higher than Prior High: 14M Downloads the Last 6 Months..." Twitter, Twitter, 3 Jan. 2020, twitter.com/_SeanDavid/status/1212903336334254081.

41 Jason, et al. "RBS Fintech Venture Attempts Reboot after 11FS Fallout." Sifted, 27 Jan. 2020, sifted.eu/articles/mettle-rbs-11fs-natwest-bank/.

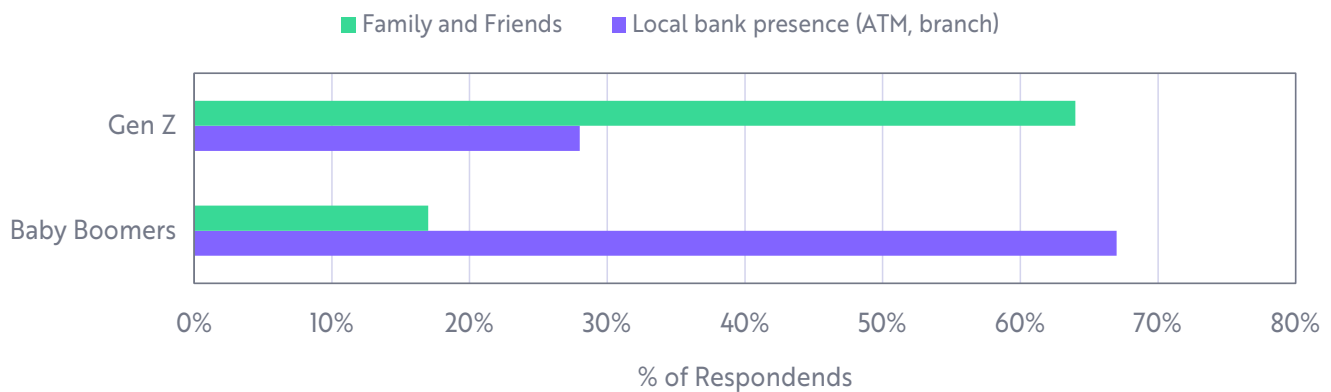
42 Benoit, David, and Peter Rudegeair. "JPMorgan Scraps New App Service for Young People." The Wall Street Journal, Dow Jones & Company, 6 June 2019, www.wsj.com/articles/jpmorgan-closing-down-finn-digital-bank-a-year-after-nationwide-launch-11559819232.

43 "Chase Announces Major Branch Expansion in 2019." Link to Chase Media Center, media.chase.com/news/chase-announces-major-branch-expansion-in-2019.



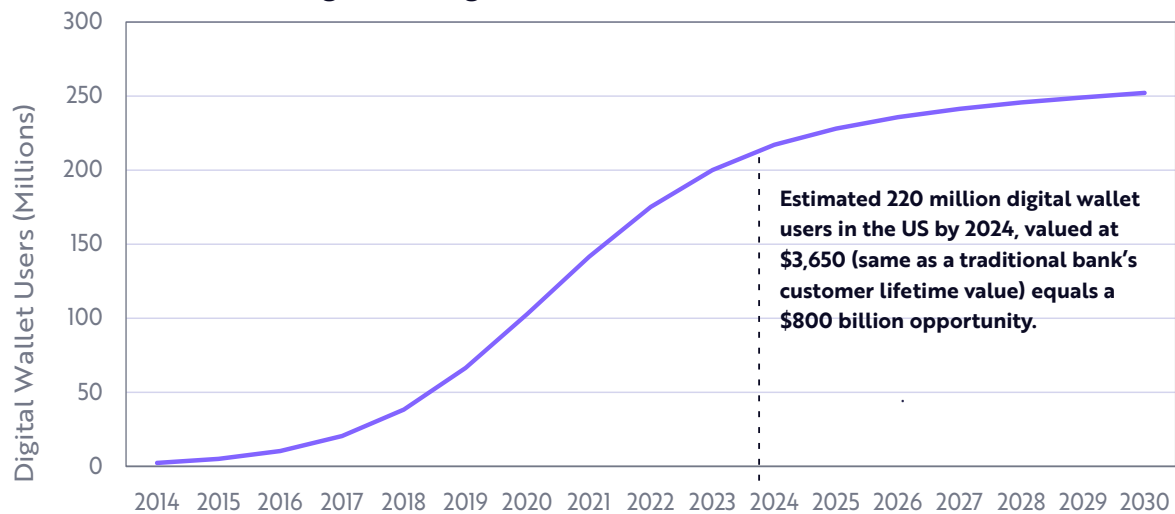
Interestingly, the number of branches in the US is declining,⁴⁴ primarily because we believe banks have been forced to cut operating costs as their CAC has increased in a more competitive environment. As they are looking to open primary bank accounts, Gen Z consumers are influenced more by recommendations from family or friends (64%) than by the presence of bank branches or ATMs in their neighborhoods (28%), while Baby Boomers still respond to local bank branches (67%) more than recommendations (17%), as shown below.⁴⁵ Capitalizing on this trend, Cash App offers a \$5-dollar referral bonus for anyone recommending a new user and targets close-knit communities by marketing on social media platforms.⁴⁶

Figure 19: Factors Influencing the Opening of a Primary Bank Account



Source: ARK Investment Management LLC, PwC 2019 Digital Banking Consumer Survey

Figure 20: Digital Wallet Users in US (Million)



Source: ARK Investment Management LLC, 2020. Forecasts are inherently limited and cannot be relied upon.

44 "Number of Bank Branches for United States." FRED, 21 Oct. 2019, fred.stlouisfed.org/series/DDAI02USA643NWDB.

45 "2019 Consumer Digital Banking Survey." PwC Digital Consumer Research. June 2019. <https://www.pwc.com/us/en/industries/financial-services/library/pdf/pwc-consumer-digital-banking-survey-2019.pdf>

46 Ousley, Parkes. "League of Legends: An Exclusive Look inside the New 100 Thieves Cash App Compound." InvenGlobal, 27 Feb. 2020, www.invenglobal.com/articles/10243/an-exclusive-look-inside-the-new-100-thieves-cash-app-compound.



In our view, consumers increasingly will manage their personal finances through digital wallets - bank branches in their pockets. Digital wallets will accommodate services not only like payments and personal lending, but also brokerage, insurance and mortgages, many of which are provided inadequately by traditional banks in today's digital age.

If the number of US digital wallet users were to increase as we anticipate and to be valued in line with traditional bank customers at maturity, their equity market capitalizations would scale at a compound annual rate of 93% from roughly \$30 billion today to \$800 billion in 2024. Venmo, Cash App and venture funded startups are likely to upend traditional banks by activating the mobile phones - the bank branches - in their users' pockets and handbags.



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Max joined ARK as a Fintech Analyst in December 2018. Prior to ARK, he spent nearly two years at Redstone, a Berlin-based venture capital firm. Max also was Research Assistant at the Centre for European Economic Research (ZEW), where he studied the syndication behavior of venture capitalists and subsequent effects on their portfolio companies. Max obtained his Bachelor of Science in Economics from the University of Heidelberg.

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