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Discussion Paper

Contactless Payment Cards: Trends and Barriers to Consumer Adoption in the U.S.

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Trends and Barriers to Consumer Adoption in the U.S.

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Abstract

Since 2017, the payment cards industry has undertaken a concerted effort to bring contactless "tap-and-pay" credit and debit card products to consumers. Payment networks, card issuers, and banks have worked to ensure that contactless cards, which communicate payment information wirelessly to point-of-sale terminals through Near Field Communication technology, are at the forefront of consumers' minds when they make a purchase. Missing from the discussion of contactless payments, however, is an understanding of consumer interest in the technology; indeed, the current activities are a relaunch of a product that underwhelmed consumers in the mid-2000s. The authors discuss environmental and technological developments that make the current market more receptive to contactless cards and describe the results of a consumer survey on the topic. We conclude that while adoption of contactless card payments is more likely, the path to full adoption has notable barriers that are revealed in the survey results.

Keywords: credit card, debit card, payment cards, contactless, tap-and-pay, mobile payments, point-of-sale payments

JEL codes: D10, D14

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I. Introduction

Beginning in 2004, contactless payments, in which consumers "tapped" or "waved" their payment card over a terminal to make a purchase, were poised to become the next major consumer payments trend. In December 2005, Terri Bradford of the Federal Reserve Bank of Kansas City published a Payments System Research Briefing titled "Contactless: The Next Payment Wave?" In it, Bradford discussed the forecast of an impending growth surge in contactless payments (Bradford, 2005). The technology promised faster, more secure point-of-sale (POS) transactions for merchants and customers along with higher charge volumes for issuers as traditionally cash-oriented transactions were expected to move onto cards. All participants in the payments ecosystem would theoretically benefit.

Despite the payment industry's excitement and the wide coverage of the technology, contactless payments did not take hold in the U.S. the way it did in ostensibly similar markets such as in Canada and the UK. By 2016, most card issuers had long ceased distributing contactless chip cards, and only 3.47 percent of cards in the U.S. market had tap-and-pay functionality (Hedges, Epperson, and Gabel, 2017). Contactless payments had failed to gain traction. Post-mortem analyses of the reasons behind the lukewarm reception largely centered on consumers' ability to actually use the technology.

Although U.S. consumers have shown historical ambivalence to contactless payments, since late 2017, the U.S. payments industry has seen a resurgence of interest in contactless payment cards, driven primarily by Visa and large card issuers such as JPMorgan Chase and Wells Fargo. Visa projects that by the end of 2020 there will be 300 million contactless plastics (credit and debit cards) in the market.[1] Eight of the top 10 Visa issuers now offer contactless cards, and more than 80 percent of Visa's top 100 merchants by transaction volume offer tap-and-pay at checkout. That translates to contactless availability at more than 60 percent of face-to-face Visa transactions in the U.S. market (statistics provided to authors by Visa). MasterCard, American Express, and Discover have all announced their own contactless launches, and additional credit and debit card issuers continue to add their names to the list of programs moving to include the tool.

To provide insight into the drivers of the recent resurgence in interest in contactless payments, we conducted a survey of consumer attitudes around contactless card payments. The results of that survey generally support the belief that consumers will adopt contactless payments, but it reveals gaps in their understanding of the technology and risks to adoption in the short term. While consumers are interested in contactless payments, they currently do not see it as a significant improvement over existing payment methods, which leads to significant headwinds to large-scale consumer usage. Section II of the paper

[1] Visa has shared projections of contactless card volumes in a wide variety of conference and public forums. The volumes quoted here were also reporting in Visa's Form 10-K submitted to the U.S. Securities and Exchange Commission (SEC) for the fiscal year ending in September 2019 (p. 8).

provides a history of contactless payments in the U.S. and reviews recent developments in the market. In Section III, we describe the structure and execution of the survey. Section IV contains the primary observations from the data collected. Section V summarizes our conclusions from the early analysis; discusses the implications to merchants, banks, and consumers; and proposes future research.

II. A Brief History of Contactless Payments

In 1997, ExxonMobil released an innovative payment tool to the market — the Speedpass, a small keychain fob that could be waved in front of a spot on the gas pump to pay for a fill-up without having to dig out cash or a payment card. Speedpass, which used Near Field Communication (NFC) to transmit user and payment information to the pump, was heavily marketed by ExxonMobil as being a faster and safer way to pay for gas. Within a short time, the new payment technology that came to be known as "tap-and-pay" was widely used by ExxonMobil customers.[2]

The concept of using NFC tap-and-pay to communicate payment credentials to a POS system was intriguing to payment card issuers as well. Various form factors using the technology were tested in the early 2000s, but the development of the so-called smart card, with a microchip and antenna built into a standard payment card, led to a general rollout of the technology. American Express (ExpressPay), MasterCard (PayPass), and Visa (Visa Wave) all entered the contactless card arena by 2004, and major credit and debit card issuing banks such as MBNA, Citibank, JPMorgan Chase, and Key Bank began issuing cards with contactless capabilities to large portions of their customer base.

Despite the heavy advertising campaigns and consumer outreach by networks and banks, customers struggled to find stores that accepted contactless payments. To process the transactions, merchants had to upgrade their POS terminals, an expense that many were hesitant to undertake on the vague promise that contactless payments would make a noticeable difference in their bottom line.[3] This hesitation by merchants created a self-replicating adoption problem: If merchants did not upgrade their terminals to accept contactless payments, customers could not try the tap-and-pay method or experience its promised speed or convenience benefits. If customers were indifferent to the tap-and-pay option over existing payment methods, merchants had no incentive to invest or prioritize the necessary terminal upgrades. In turn, issuers did not have an incentive to replace their existing cards with more expensive,

[2] Specific volumes for the growth of Speedpass are difficult to locate. A website published by ExxonMobil on the history of service stations in the U.S. notes that "a few years [after launch] more than six million U.S. customers enrolled to use a Speedpass key tag."

[3] The Federal Reserve Bank of Chicago cited costs ranging from $200 to $1,000 per POS device in 2015 (Alter and Neumann, 2015). While this cost range comes from a 2015 payment processing study in the U.S., it is reasonable to assume similar cost impacts in 2004–2005 for contactless upgrades.

but underutilized, contactless cards. In short, the network effect necessary to establish contactless cards was not established.

The technology itself led to a certain amount of customer reticence as well. Security became a concern as studies demonstrated that enterprising thieves could theoretically intercept the transmitted payment credentials at the payment terminal or steal the card information simply by standing near you on the subway with an NFC reader in their bag (Hancke, 2005; Kfir and Wool, 2005; and Heydt-Benjamin, Bailey, Fu, Juels, and O'Hare, 2007 for examples of security studies). The popular press picked up on these largely theoretical concerns and amplified them. As unlikely as these scenarios were, the reports damaged the perception of contactless cards in the eyes of many consumers. Even today, the proliferation of RFID-blocking wallets and purses indicates that these fears are still present.

Based on the industry's previous experience with contactless cards, why has the technology recently regained prominence? Two recent developments were important to the resurgence of tap-and-pay payment methods and helped motivate recent investments by industry participants in the process.

The first development coincided with the U.S. payment cards industry beginning a slow transition away from traditional cards using magnetic stripes to chip cards using more secure EMV protocols.[4] The move from traditional plastics to chip-based EMV cards between 2013 and 2015 forced merchants and acquiring banks to spend the money to upgrade POS systems that were only compatible with mag-stripe cards (traditional "swipe" transactions) to systems that could also accept the chip cards. The new terminals accepted contact chip EMV cards ("dip" transactions in which the card must be inserted and remains in the machine during the transaction) to adhere to EMV rules. In addition, newer terminals came embedded with the ability to process NFC payments. Therefore, by 2016, the issue of merchant technical capabilities had been largely eliminated, and payment terminals that have the ability to process contactless payments now have become nearly ubiquitous. Despite merchants now having the capability, making tap-and-pay available as a payment option still required merchants to enable the functionality on their terminals; this required additional motivations because of the general lack of contactless products in the market.

The second key development took place in 2014, when Apple launched Apple Pay, an NFC-based contactless payment tool that embedded payment credentials in the iPhone. In 2015, Samsung Pay and Android Pay launched as well, making mobile payments available to users of the three largest mobile operating systems. In the early days of Apple Pay, merchant acceptance remained somewhat spotty, even in locations where the POS system was capable. With the addition of Samsung and Android to the market and continued focus on improving transaction speed and security, the capability has spread widely.

[4] Kossman (2017) provides an overview of the basic benefits associated with the transition to EMV in the U.S.

Although overall consumer adoption of mobile payments has been lower than forecast in 2014–15, the wide availability of smartphones with NFC capabilities theoretically gave merchants the incentive to activate contactless transactions in their POS to offer as many payment options as possible to customers with the tool in their pockets.

Most of the technical impediments to contactless growth have been eliminated. Entering 2020, consumers with a contactless card in their wallet are able to use tap-and-pay at many, if not most, merchants. Since 2017, most large credit and debt issuers have announced that they will begin distributing contactless smart cards to their customers, seeding millions of plastics into the market. Per Visa, 80 of the top 100 merchants by transaction volume offer tap-and-pay at checkout. Networks, issuers, and merchants are all prepared for contactless to take off. However, there is evidence that consumers are not as ready to adopt tap-and-pay as the industry would like. To understand this risk, we need only to look at the adoption of the most recently launched payment tool: mobile.

NFC-based mobile payments launched in 2014 to great fanfare, but despite millions of NFC-capable phones in the marketplace, mobile payments have only managed to penetrate a small percentage of consumer spend in five years. PYMNTS.com noted in October 2019 that data on mobile wallet usage imply that only a small percentage of Apple users who have Apple Pay actually use it (Apple is the most commonly used mobile wallet in most surveys) (Webster, 2019). The author noted that only 6 percent of adults with eligible phones use Apple Pay, despite massive sales volume at merchants accepting Apple Pay ($768.1 billion in 2019). The Federal Reserve Bank of Atlanta's Survey of Consumer Payment Choice report for 2018 indicated that, while consumer adoption of mobile payment instruments has increased since 2015, "there was no statistically significant change in measures of these types of transactions from 2017 to 2018, reflecting that consumer behavior is generally slow to change" (Foster, Greene, and Stavins, 2019, p. 20). The theory proposed by the authors at PYMNTS.com to explain this slow adoption pattern is that mobile payments do not specifically solve a consumer pain point; paying with existing cards (or other payment options) is simply not onerous enough for consumers to fully adopt the mobile alternative.[5]

Arguably, tap-and-pay cards provide similar levels of security, convenience, and speed as mobile payments but also do not solve a significant pain point in the purchase process. Is there evidence available that consumers will embrace card-based contactless payments after showing lackluster interest in the "cooler" technology of mobile contactless payments? To investigate this question, we fielded a survey in late 2019 to obtain insight into consumer attitudes toward contactless payment cards.

[5] Cheney (2008) examined consumer adoption of mobile banking and mobile payments under two frameworks of experience and learning.

III. Survey Overview

The survey was executed in October 24–29, 2019, by Dynata, an online market research firm that provides access to survey panels that are nationally representative of the U.S. based on age, gender, education, income, and political party affiliation. Panelists completed a survey designed by the authors that collected information on current payment products used, payment habits at various merchant types, and beliefs about current and future payment usage (see Appendix B for the full survey). Responses were managed throughout the survey process to mirror census demographic distributions (Appendix A).

Questions relating to preferred payment methods focused on five common payment tenders (cash, credit card, debit card, store mobile application, and mobile wallet). Questions on current and future payment behavior addressed the process used to pay (cash, dip-based card, contactless card, store mobile applications, and mobile wallet). Additional questions collected information relating to the respondents' personal demographics and attitudes toward their financial situation and technology use.

To ensure that respondents understood the differences in the payment processes, five 15-second animations were developed. Each animation depicted a typical transaction for a single payment process. Respondents were not required to view the animations, but the viewing statistics were tracked and recorded to evaluate whether viewing influenced the individual's responses to future questions. Of the respondents, 36 percent chose not to view the animations, and analysis revealed that the responses of those who did not view them were not significantly different that those who did. This indicates to the authors that respondents who did not choose to view the animations did so because they were already knowledgeable of the payment processes, so they remained in the analysis.

Responses were removed from the initial pool of 4,103 for three reasons. Respondents were flagged if they completed the survey in less than half the median time or if they responded with conflicting answers relating to cash (e.g., they indicated that they on average carry $0 in cash but also never leave the house without cash); these exclusions removed 399 records (9.7 percent). Additional respondents were flagged if they responded with "straight line" answers to a list of attitude questions; this rule identified 755 (18.4 percent) of respondents. The net population removed from the analysis was 987, leaving 3,116 records for analysis.

IV. Key Results[6]

Baseline prevalence and awareness of contactless tap-and-pay cards

As a baseline for the main subject of this research (i.e., contactless tap-and-pay payment card usage behavior), 41 percent of respondents reported they have a contactless card, either credit or debit. Of those,

[6] Unless otherwise stated, all figures and tables are derived from the authors' analysis of survey data.

only about one-third (12 percent of the total respondent population) use the tap-and-pay feature to make purchases frequently (Figure 1). This shows that adoption for contactless payments is still fairly low, even among consumers who have the product in their wallets.

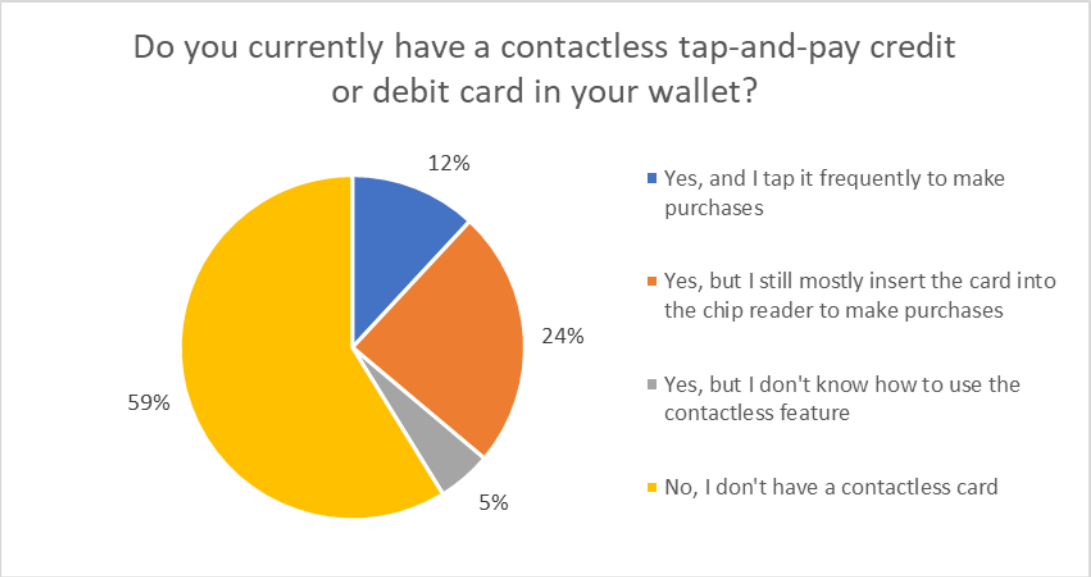

Figure 1: Ownership and usage of contactless cards

Self-stated availability of contactless cards among survey respondents varies significantly by issuers today (Figures 2 and 3). Forty percent of Bank of America-issued credit cards in the respondents' wallets are reported to be contactless capable, compared with only 12 percent at USAA; 39 percent of Citibank-issued debit cards in the respondents' wallets are reported to be contactless enabled, compared with only 11 percent at Navy Federal Credit Union. Additionally, respondents were asked whether they know if their bank is planning to reissue contactless cards. The results ranged from 2 percent to 15 percent in credit cards (Synchrony and Wells Fargo, respectively) and from 6 percent to 23 percent for debit (Navy Federal Credit Union and Bank of America). While these figures are self-reported based on the cards in respondents' possession, it does show directionally the difference in both an issuer's speed in replacing existing cards with contactless versions and the consumers' awareness of issuers' plans to replace them.

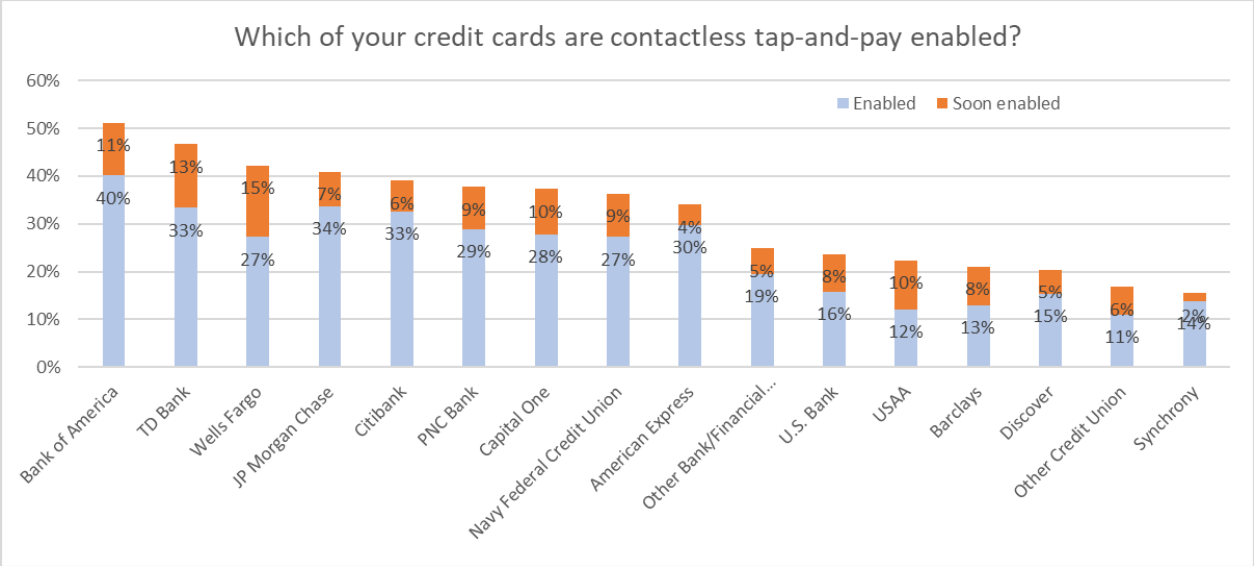

Figure 2: Self-reported availability of contactless tap-and-pay credit cards

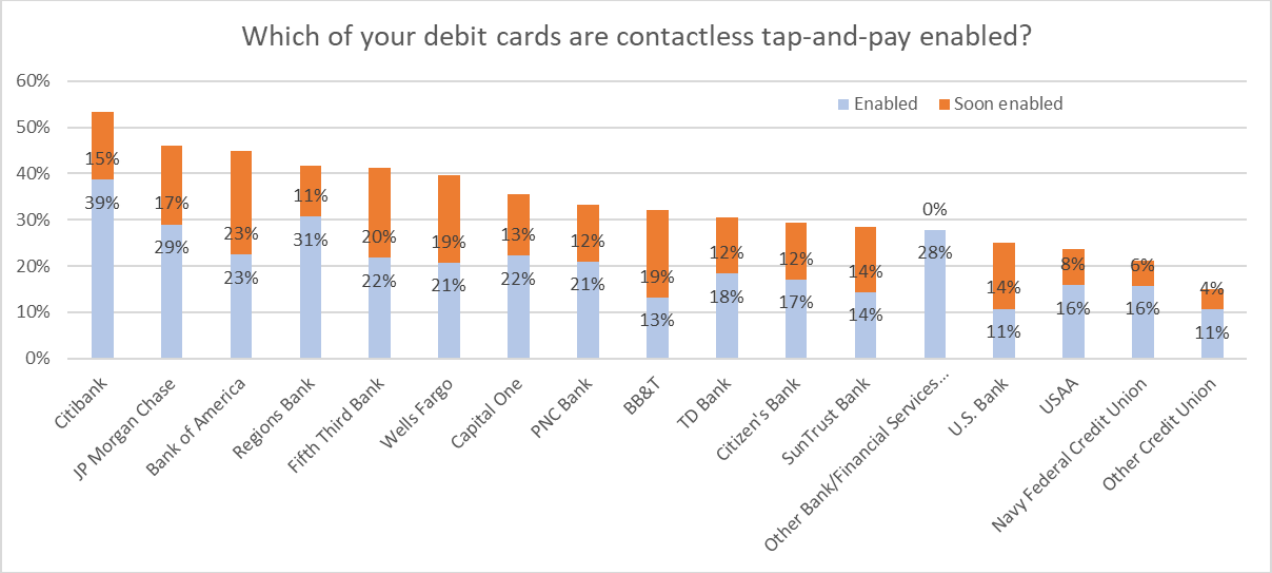

Figure 1: Self-reported availability of contactless tap-and-pay debit cards

Expected change in payment behavior because of widespread availability of contactless cards

Experience from countries that have implemented contactless tap-and-pay cards years before the U.S., such as Canada and the UK, show that the introduction of contactless cards will mostly likely cannibalize payments from cash and low-dollar chip-based debit or credit card transactions. If the U.S. experiences changes similar to those observed in other countries, we can expect a significant portion of the transaction volume to be routed through the contactless tap-and-pay interface once the availability of such cards

reaches critical mass. In particular, cash transaction volume can be expected to decline steadily and dramatically. Payments Canada, for example, has reported:

> Cash payments volume declined by over 40 per cent between 2013 and 2018, ceding nearly three billion transactions to card payments. Since 2013, debit and credit card based transactions have been the biggest beneficiaries, each making tremendous strides in mostly their volumes of contactless payments. (Tompkins and Galociova, 2019)

Canadian issuers have been distributing contactless credit and debit cards since 2011. In first quarter 2019, Moneris Solutions Corp., the country's largest merchant acquirer, reported that more than 51.5 percent of Canada's card-present transactions were contactless, representing a growth rate of 25 percent year-on-year (Moneris Solutions, 2019). In our survey, about 20 percent of the self-reported monthly spend is through cash, 45 percent with credit cards, and 30 percent with debit cards (Figure 4).

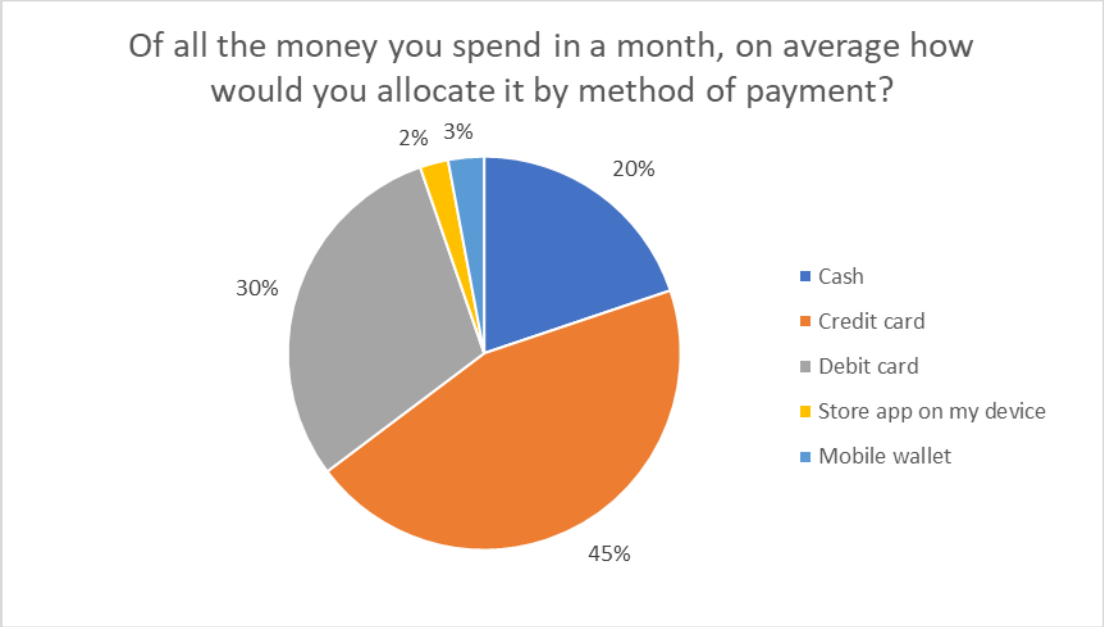

Figure 4: Self-reported allocation of monthly spend volume by payment method

The preferred method of payment varies significantly by location or merchant category, with card-based payments (credit and debit) generally dominating (Figure 5). Respondents indicated the highest likelihood of increasing the use of tap-and-pay is at locations where card payments represent the dominant method of payment, such as grocery stores, gas stations, and department stores. We expect contactless tap-and-pay payment volume to experience the most significant increase at these locations where customers are already most likely to be pulling a card out of their wallet.

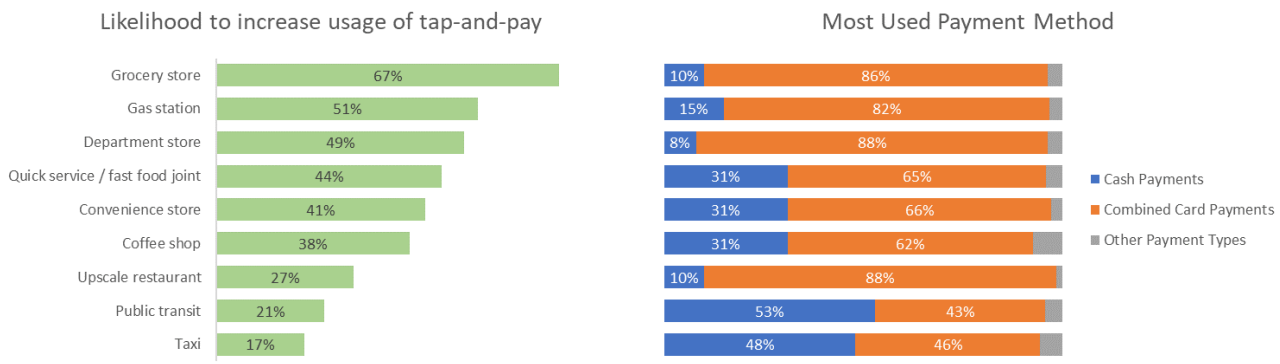

Figure 5: Expected increase in usage of contactless tap-and-pay

Interestingly, locations where cash is the dominant form of payment such as public transit (53 percent pay by cash) and taxi (48 percent pay by cash), the expected increase in contactless tap-and-pay usage is not as significant. This could change, however, as contactless-enabled POS devices become more widely available. Indeed, cities such as New York have launched pilots to allow transit fares to be paid via contactless tap-and-pay cards (Fitzsimmons, 2019).

Psychological barriers or misconceptions that impede contactless tap-and-pay adoption

While the widespread rollout of contactless tap-and-pay credit and debit cards is happening and is expected to accelerate in the coming years, there are psychological barriers or misperceptions that issuers should note and address before being able to unlock payment volume through this particular payment method. In the survey, we showed respondents five 15-second animations of each payment method: cash, credit or debit card using chip reader; credit or debit card using contactless tap-and-pay; store app on a mobile phone by scanning QR or bar code; and mobile wallet (e.g., Apple Pay). Objectively, these animations are of equal length, but the perceived differences in the payment methods as indicated in the survey responses vary widely, reflecting an inherent psychological bias.

The speed of transaction is considered in the survey, beginning with reaching for the payment method and ending with completing the transaction and leaving the register. Real-world transaction times for each payment method depend on a variety of factors (including network speeds, customer and cashier knowledge, hardware configurations, and other variables), and, therefore, they are challenging to determine. The authors, based on personal experience and observation, believe that the payment methods should generally rank order as follows (from fastest to slowest): contactless tap-and-pay, mobile wallet, chip reader, cash, and store mobile app.

Around 67 percent of the respondents identify contactless tap-and-pay to be one of the fastest (top two rankings) methods of payment (Figure 6). This is promising for tap-and-pay as it shows that consumers perceive speed benefits, although one-third of respondents still perceive it as being slow. Respondent views are mixed regarding the speed of chip-card payments, with 37 percent believing it to be fast and 41 percent believing it to be slow.[7] Of the respondents, 33 percent consider cash to be one of the fastest payment methods, whereas cash is probably the slowest payment method. We believe that breaking the habit and comfort of cash usage is an important step to converting that volume to tap-and-pay payments.

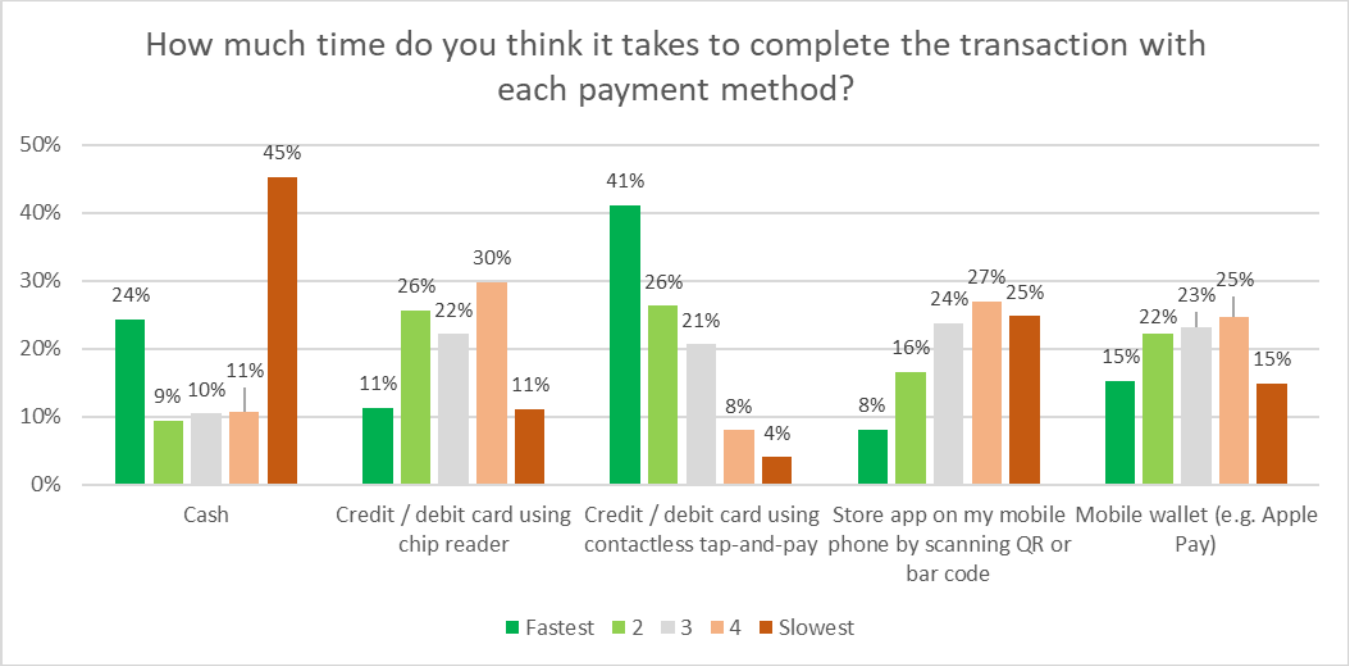

Figure 2: Perceived speed of payment methods

While speed of transaction addresses specifically the time taken, convenience relates more to ease of use. In the case of payment methods, the number of steps and the level of mental engagement in the task should affect respondents' perceptions of convenience. The authors believe that, in general, mobile, contactless, and chip reader payments should be ranked as more convenient, since they involve relatively few steps and light mental engagement. Cash (requiring counting, exchanging, and sorting of bills and

[7] The mixed response regarding chip-based transaction times likely reflects latent bias from the 2015–2016 rollout EMV, when many reports from retailers and industry groups cited slow transaction times as a significant issue in adoption. While improvements to hardware, software, and user knowledge have significantly reduced the actual and perceived transaction time for chip transactions, some of the bias likely remains.

coins) and store app payments (requiring multiple steps to access the phone, the application, and the payment screens) should be perceived as less convenient.

Survey responses were directionally similar to expectations but suggest that contactless tap-and-pay may need to overcome a perceived lack of convenience. While a majority rank it as highly convenient, a full 41 percent of the respondents rank it in the bottom three (Figure 7). This may be because of convenience being an attitude that closely correlates with habit. This theory is supported by the 26 percent of respondents who ranked cash as the most convenient payment method. Tap-and-pay represents a new routine to make payments and is therefore perceived to require climbing a learning curve.

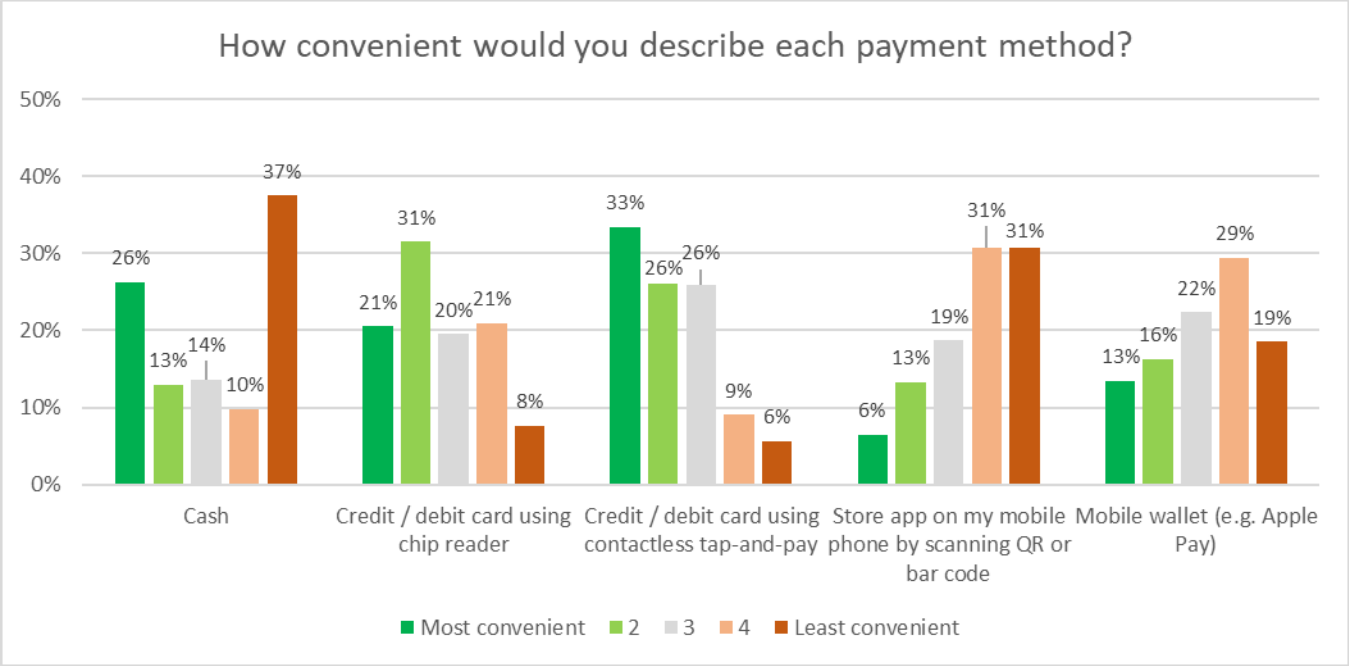

Figure 7: Perceived convenience of payment methods

When it comes to the perceived security of payment method, tap-and-pay encounters more perception challenges. Only 30 percent of the respondents consider contactless tap-and-pay to be most or second-most secure, compared with 64 percent for card payments using a chip reader, a clear psychological barrier that needs to be addressed through better consumer education (Figure 8). It is promising that a plurality (38 percent) of respondents ranked tap-and-pay in the middle of the group, indicating that consumers may not understand the method enough to have an opinion on security. Interestingly, 72 percent of the respondents consider cash payment to be secure. Here, perhaps they are confounding security (protecting your financial information from compromise or minimizing the personal

risk of theft) with privacy (the collection of data about yourself or your purchases, which may seem more likely to happen while using a tool such as a phone).

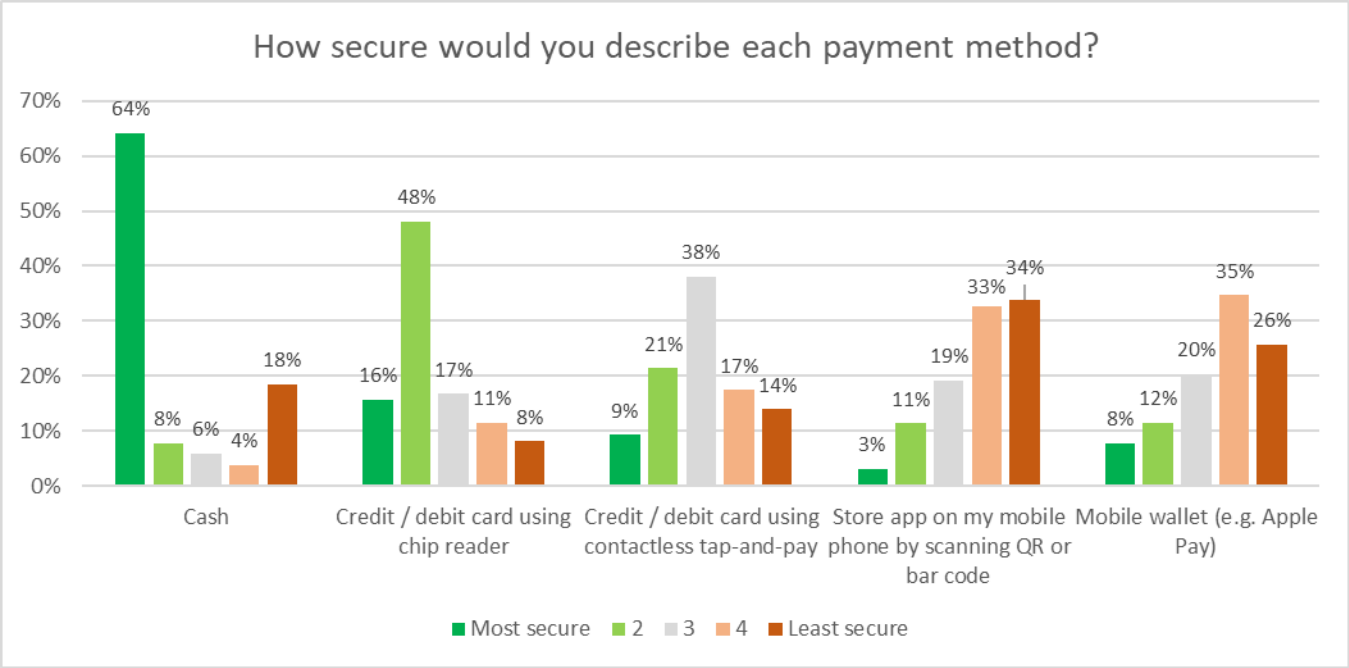

Figure 3: Security of payment methods

Transaction amount limit for contactless tap-and-pay

Issuers often set transaction limits on the tap-and-pay function of their payment cards as a means of limiting fraud risk. To determine the potential impact of transaction limits on consumers' attitudes toward tap-and-pay, we tested a range between $50 and $300 for hypothetical limits. A portion of respondents indicated they were not comfortable with any transaction amount on contactless (22 percent for credit and 27 percent for debit). For those who were comfortable with contactless transactions, clear psychological thresholds exist at roughly $50 increments (Figure 9). There were 78 percent of respondents who were comfortable with at least a $25 transaction limit for credit cards; however, the comfort levels drop rapidly, and only 45 percent of the respondents are comfortable at $150. Respondents were more conservative with their answers for debit — only 60 percent are comfortable at $50, dropping to only 30 percent at $150.

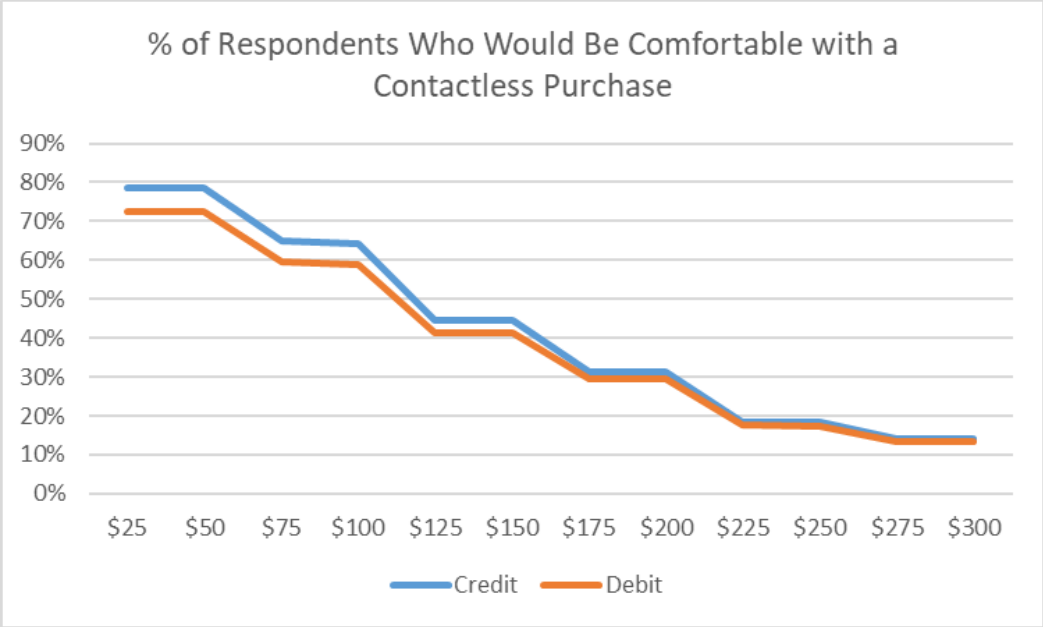

Figure 4: Transaction limit for contactless tap-and-pay that respondents would be comfortable with

Reality and implications on digital wallet adoption

While not the main focus of this study, digital payment adoption (whether in the form of a store app, QR code, or NFC-based contactless payment through a smartphone) is a logical question to examine. As noted earlier, mobile payment adoption is extremely low (in single digits), with only 5 percent of monthly spend volume expected to be from digital payment methods (app and wallet combined), even after years of promotion by big technology firms such as Apple, Google, and Samsung. In our survey, the highest rate of combined mobile payment usage was at coffee shops. In this case, still only 8 percent of respondents noted digital payments (app and wallet combined) as their preferred method of payment (probably heavily influenced by the popularity of the Starbucks mobile app) (Figure 10).

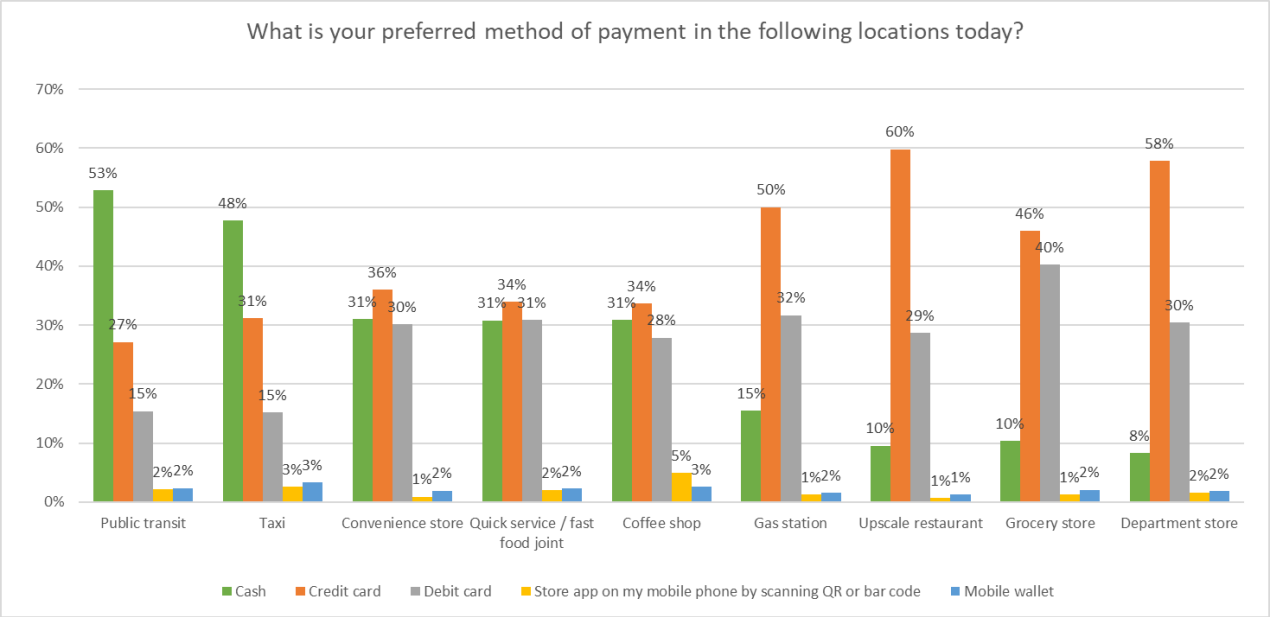

Figure 10: Preferred method of payment by location today

Aside from confusion about the availability of contactless cards at any given merchant, part of the reason for the low adoption rate is likely due to the psychological barriers we explored previously. For example, a majority of the respondents do not consider digital payment methods to be secure: Only 20 percent of mobile wallet users consider it to be secure, whereas that figure drops to only 14 percent for store app users (Figure 8). This indicates that users do not fully understand the technology underlying mobile wallets (e.g., encryption and tokenization of account numbers) that protects card data. It is possible that users equate the addition of the phone or store app to the payment process as adding an additional layer of security or privacy risk, but we are unable to glean that from the data.

The survey results indicate, however, that the rollout of contactless tap-and-pay cards in the U.S. could help with the growth of digital payments. Of those who do not have mobile wallet set up today, at least 25 percent of the respondents agree that they could be very comfortable with setting one up once they are comfortable with tapping their credit or debit cards to make most of their everyday purchases.

V. Conclusions/Future Implications

The promise of contactless adoption has grown in the minds of those in the payments industry in the last three years. Networks, banks, and payment card issuers are counting on changes in the payments environment to spur consumers to adopt tap-and-pay cards despite past challenges. The interest makes sense. If contactless cards gain a significant portion of consumer payments in the U.S. market similar to

the experience in the UK and Canadian markets, it has the potential to generate significant returns for the institutions involved. Those benefits would be realized largely through increased payment volume as some portion of cash payments shifts onto credit and debit cards.

For example, the U.S. Department of Commerce estimates 2019 retail sales for U.S. grocery stores at $696 billion. The Visa Payment Panel survey conducted in early 2018 indicated that 15 percent of consumer spend in grocery stores was cash (Akana, 2019), putting the cash portion of sales around $104 billion. Converting only 10 percent of that spend from cash to credit cards could generate approximately $189 million of interchange fees for banks and payment networks. While the realized incremental interchange would vary significantly based on the penetration into the cash spend as well as the mix of spend moving to debit rather than credit, the potential income stream would seem to be significant, even in the single sales category.

Incremental fees would seem likely to deter merchants from pushing for a transition to tap-and-pay; the benefits presented to merchants as an offset to potential fee increases tend to focus on reduced transaction time, improved customer experience, and decreased cash-handling costs. In an August 2019 overview of the impact of businesses going cashless, Claire Wang of the Federal Reserve Bank of San Francisco cited transaction time improvements of "four to five seconds" when moving from cash to card transactions, with hourly transaction volume increases of 5 percent to 15 percent (Wang, 2019, p. 5). For high-volume merchants, speeding up transaction times leads to more sales and happier customers. Wang also noted that eliminating (or reducing) the costs of handling cash — via lower opportunity for theft, reduced staff time counting and managing register balances, or reduced expense for bank processing of cash — could be enough incentive to reduce or eliminate cash transactions. The direct financial benefits of these improvements is challenging to determine, but it is clear they are strong considerations at the merchant level.

All of these benefits to the networks, issuers, and merchants are contingent on consumer adoption of the technology. With that in mind, what do we believe the results of our survey imply about the consumer attitudes?

Consumers who have the tool are not adopting it

In order for consumers to use the tool, they must be aware that it is available to them and that it can be used at any given merchant where they shop. Despite the accelerating flow of dual-purpose plastics into the marketplace and the availability of tap-and-pay at a wide variety of merchants (60 percent of Visa's face-to-face transactions take place at contactless-capable merchants), a minority of survey respondents (41 percent) report having a tap-and-pay card in their wallet. Of those who have a capable card, 59

percent (24 percent overall) rarely use tap-and-pay, and only 29 percent (12 percent overall) use it frequently. While the overall penetration rate will increase naturally as more issuers make the transition, it is not clear that consumers understand or embrace the benefits of the tool.

Changing consumer habits to the point in which retail customers choose tap-and-pay automatically at POS will ultimately require a high degree of coordination among acquirers, issuers, and other key players in the payments ecosystem.

The conversion of cash may not be as high as hoped

The top three merchant categories in which respondents believe they would increase their usage of tap-and-pay are grocery stores, gas stations, and department stores. All three of those merchant categories are significantly dominated by card-based payments, with combined credit and debit usage at 86 percent, 82 percent, and 88 percent, respectively. To the authors, this implies that tap-and-pay would likely be used on transactions that are already on cards, limiting the benefit of increased charge volumes; it seems unlikely that cash-paying customers in these venues would switch to card payments solely because of tap-and-pay. Regardless, cash is currently 10 percent or less of purchases across these categories.

Contrary to general thought and observation in other markets, respondents indicated that cash-heavy transit and taxis were the least likely places they would increase tap-and-pay usage. Penetration into transit categories is often cited as the key driver of contactless adoption in an environment. This discrepancy is likely driven by habit. Few transit systems in the U.S. have enabled full open-loop contactless payments (meaning that any contactless capable card may be used) at the entrance gate or turnstile. Therefore, respondents who have limited experience using anything other than cash, tokens, or tickets, or who live in a region with limited or no transit infrastructure may not be able to envision the benefits. Penetration of these categories (and conversion of the cash volume) will not occur until networks broadly launch tap-and-pay in as many metro areas as possible. Indeed, this is beginning to happen, as a number of key transit organizations in the U.S., including New York City, Los Angeles, and Miami have launched contactless capabilities and are advancing plans to roll out across their full networks.

Consumers will need a push to break their payment habits

While respondents correctly identified the speed-of-payment benefits to tap-and-pay, they were less clear about the convenience of the tool — speed-of-pay does not automatically translate into convenience. We believe this is a result of habit; consumers seem to be considering convenience in the context of having to change an existing payment habit, which was itself changed in recent memory when swiping was replaced

by dipping during the EMV rollout. To many consumers, this may represent simply another process change without clear benefits to the process they recently became used to using. Add to that the neutral-to-negative feelings about tap-and-pay's security, and it seems clear that adoption has an uphill climb ahead of it. That being said, there are positive indicators in the data.

With the correct incentive or environment, consumers can be persuaded to use contactless tap-and-pay more frequently. While 53 percent of respondents stated they would not switch their existing primary credit or debit card simply to get the contactless feature (with an additional 26 percent responding as being neutral), survey results suggest that 45 percent would increase usage of contactless cards simply with the capability being enabled at more merchant locations. So, consumers do not view the feature as significantly attractive by itself, but continuing to advance the availability of the technology at retailers will address the first barrier. Of the respondents, 59 percent agree that additional rewards or incentives would encourage them to use the feature. This would require an expense that may not make sense to some issuers or merchants. Since loyalty to their primary payment card is significant, issuers would benefit from emphasizing the security of the method to their existing cardholders.

Overall, the survey results support the long-term view that tap-and-pay will become a useful and valued payment card feature by consumers, although as described previously, a number of short- and medium-term risks have been revealed.

Future work

The introduction of contactless credit or debit cards in the United States is arguably anachronistic when compared with the evolution of payment technology in other countries. At the same time, the use of mobile phone-based NFC payments, which are the natural technological next step to contactless cards, is still very low in the U.S., even after years of development and marketing by major technology firms such as Google, Apple, and Samsung. For future work, the authors are interested in studying the consumer behavioral factors that would ultimately drive up adoption of contactless and mobile phone-based NFC payments. Is there evidence to suggest widespread adoption of contactless cards correlates with increased usage of mobile payments? What misconceptions do consumers still have about NFC payments that become barriers for its increased adoption? Could a black swan event such as the coronavirus pandemic of 2020 fundamentally shift cash payments into contactless or mobile payments? Indeed, by early April, 2020, as significant pandemic restrictions entered their second month, industry observers began speculating on the impact social distancing would have on the use of digital and contactless banking tools, including payments (Moeser, 2020; Fitzgerald, 2020; Kharif, 2020). Where and when is the tipping point for its widespread adoption? Contactless payments remain an exciting area of research.

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Appendix A — Sociodemographic Distribution of the Survey Sample

The 3,116 respondents included in the analyses exhibited the following sociodemographic distributions:

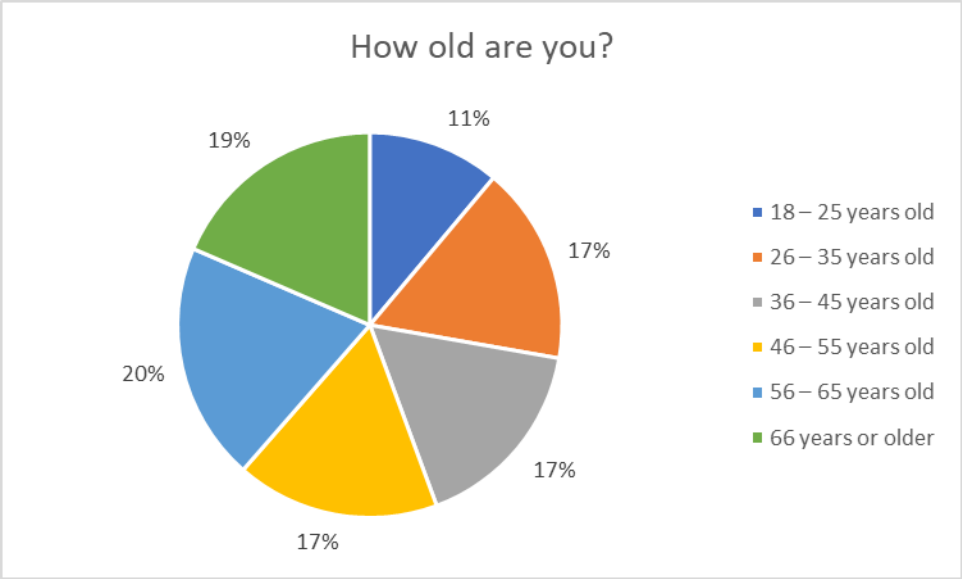

Figure 11: Age distribution

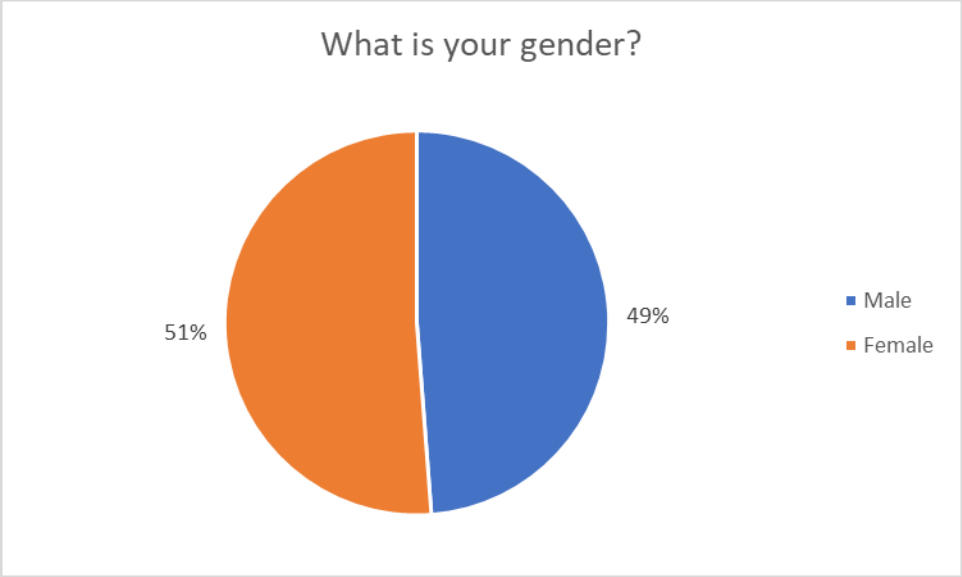

Figure 12: Gender distribution

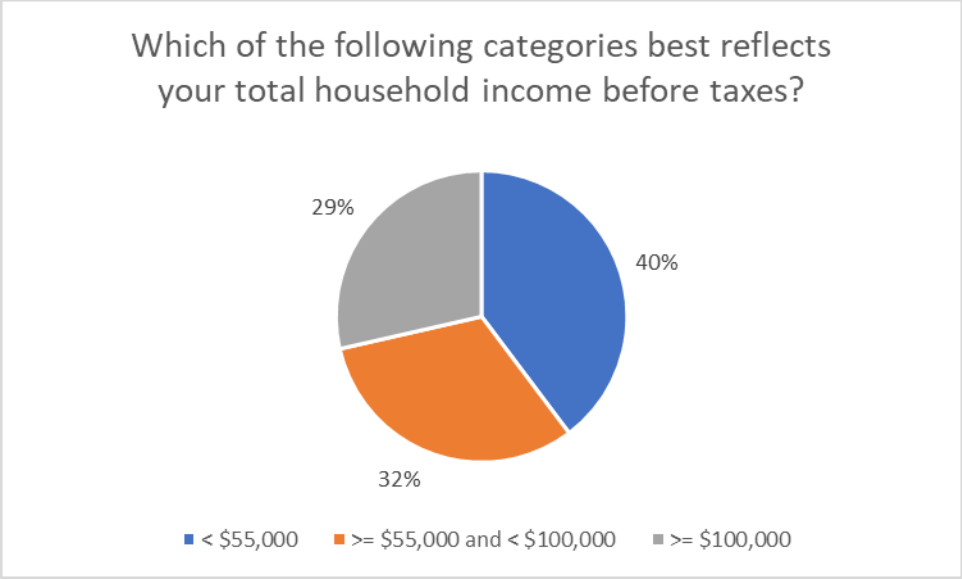

Figure 13: Household income distribution

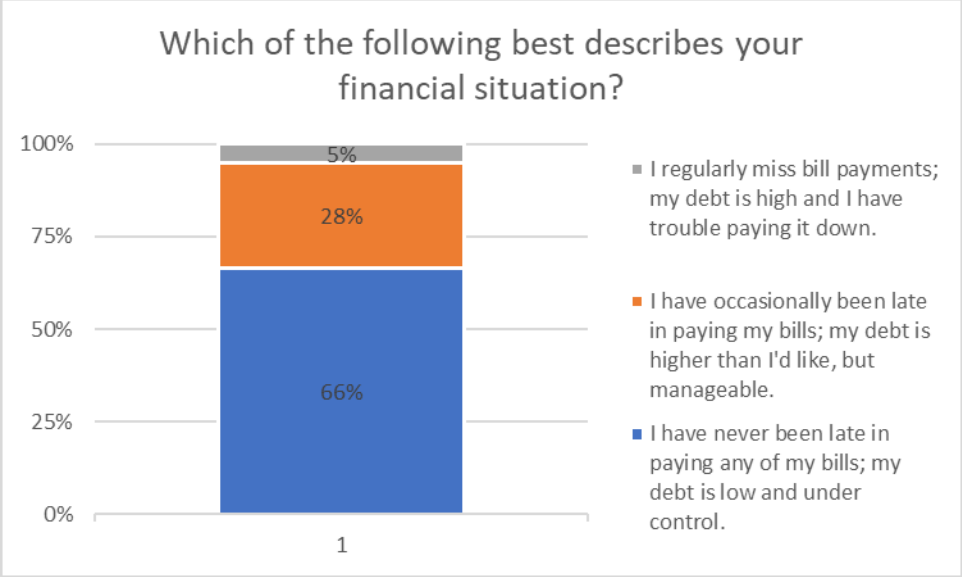

Figure 5: Current financial situation

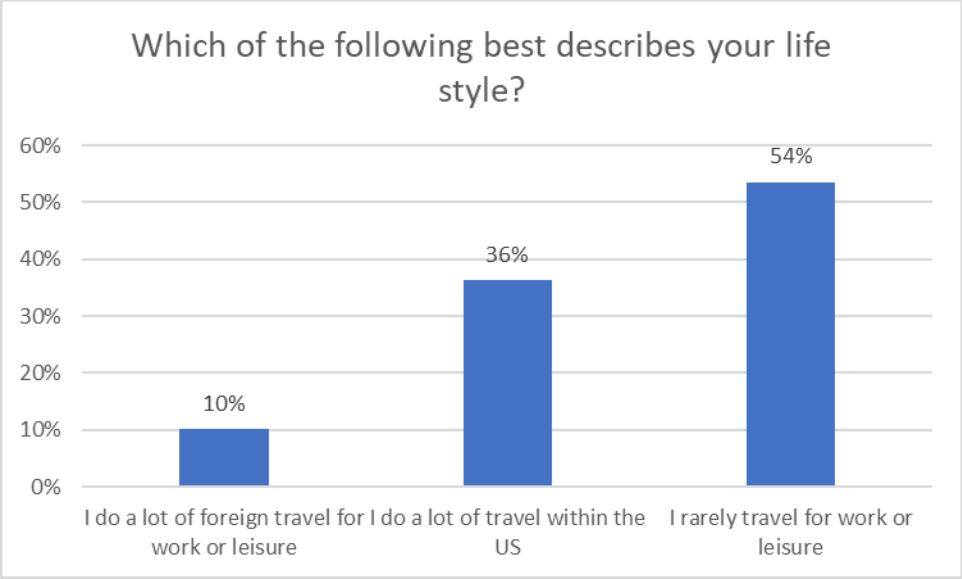

Figure 6: Travel pattern

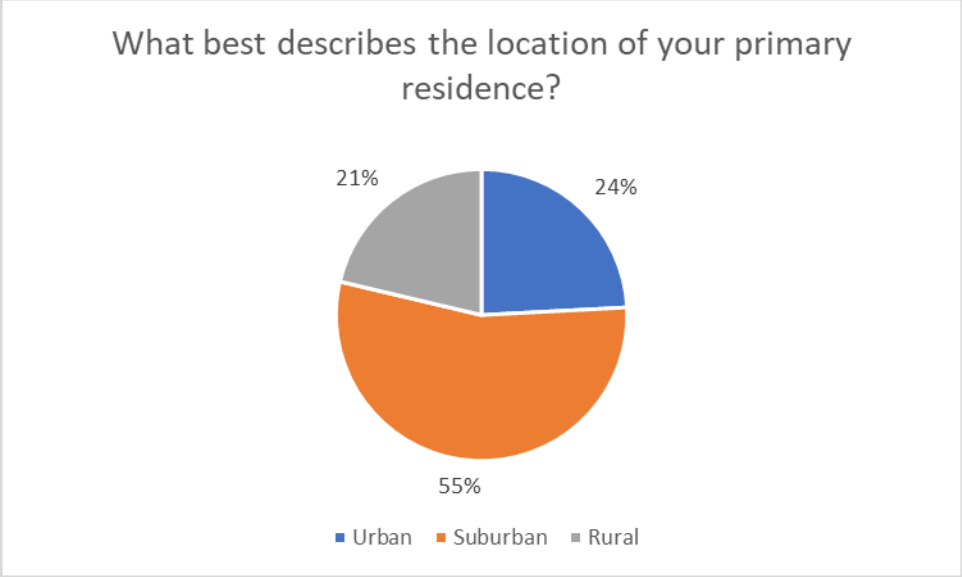

Figure 7: Location of primary residence

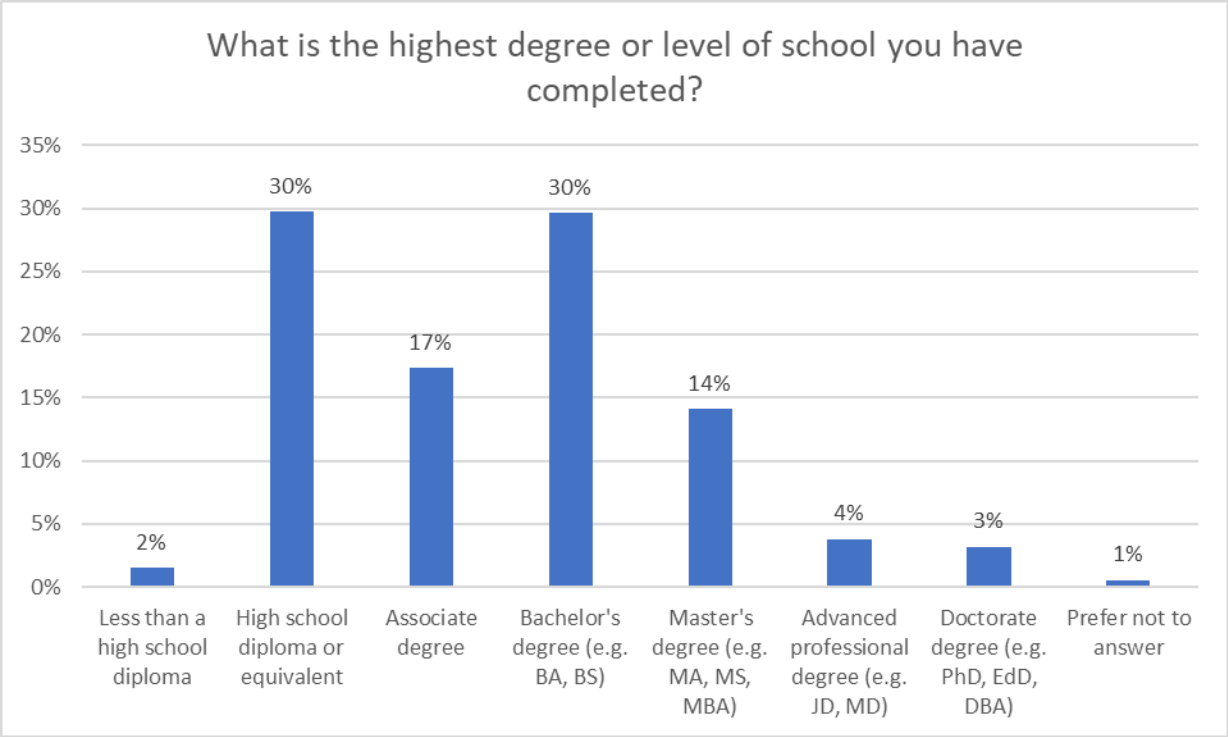

Figure 8: Highest degree attained

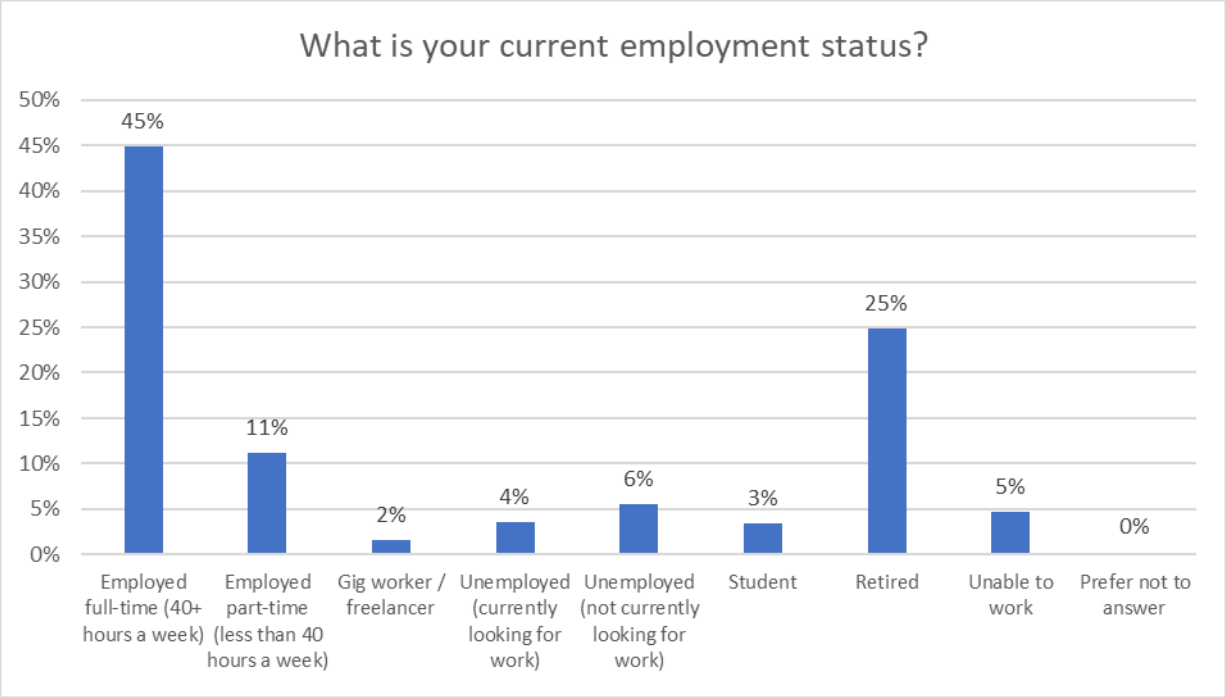

Figure 9: Employment status

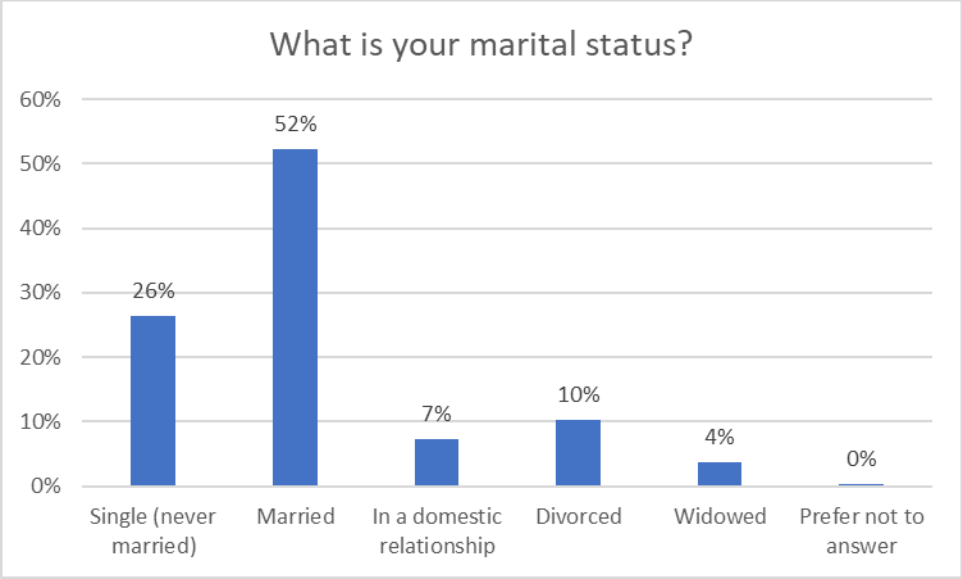

Figure 10: Marital status

Appendix B —– Consumer Survey Questionnaire

QUOTA DESIGN

Targeting total of 4,000 completes

Quota groups		**Screener**	**Quota Requirements**
Household income	<55k	Q3 = A, B	Free
	>=55k and <100k	Q3 = C, D	>=500
	>=100k	Q3 = E … H	>=500
Credit quality	Low	Q4 = C	Free
	Medium	Q4 = B	>=500
	High	Q4 = A	>=500
Globe trotter	Yes	Q5 = A	>=200
	No	Q5 = B,C	Free
Have contactless credit/debit card	Yes	Q7 = A, B, C	>=500
	No	Q7 = D	Free
Where I live	Urban	Q6 = A	>=500
	Suburban	Q6 = B	>=500
	Rural	Q6 = C	Free

INTRODUCTION

Thank you for agreeing to participate in our study. Your responses to all questions in this survey are confidential and will be used for research purposes only. We would like to assure you that we are not selling anything or trying to change your opinions. All of your responses will be kept strictly confidential, and will only be reported in aggregate form. Throughout the survey, please take your time to read all of the information and answer each question as honestly and accurately as possible. The entire survey should take roughly 15 minutes to complete.

To begin, we have just a few general questions.

SCREENER

1. How old are you?
   (Select One)

   A. 17 years or younger **[TERMINATE]**
   B. 18 – 25 years old
   C. 26 – 35 years old
   D. 36 – 45 years old
   E. 46 – 55 years old
   F. 56 – 65 years old
   G. 66 years or older

2. What is your gender?
   (Select One)

   A. Male
   B. Female

C. Other

3. Which of the following categories best reflects your total household income before taxes?
(Select One)

A. Less than $40,000
B. $40,000 to $54,999
C. $55,000 to $74,999
D. $75,000 to $99,999
E. $100,000 to $124,999
F. $125,000 to $149,999
G. $150,000 to $199,999
H. $200,000 or more
I. Prefer not to answer **[TERMINATE]**

4. Which of the following best describes your financial situation?
(Select One)

A. I have never been late in paying any of my bills; my debt is low and under control.
B. I have occasionally been late in paying my bills; my debt is higher than I'd like, but manageable.
C. I regularly miss bill payments; my debt is high and I have trouble paying it down.

5. Which of the following best describes your life style?
(Select One)

A. I do a lot of foreign travel for work or leisure
B. I do a lot of travel within the US
C. I rarely travel for work or leisure
D. I currently live overseas (outside of the US) **[TERMINATE]**

6. What best describes the location of your primary residence?
(Select One)

A. Urban
B. Suburban
C. Rural

7. Do you currently have a contactless tap-and-pay credit or debit card in your wallet? A contactless credit or debit card has the following image printed on the card.

(Select One)

A. Yes, and I tap it frequently to make purchases
B. Yes, but I still mostly insert the card into the chip reader to make purchases
C. Yes, but I don't know how to use the contactless feature
D. No, I don't have a contactless card

CURRENT PAYMENTS BEHAVIOR

8. How many credit cards do you have in your wallet?
   (Slider bar: Integer from 0 to 10, mark 10 as '10+')

   (Mouse-over pop-up box to explain 'credit cards': Credit cards allow you to borrow against a line of credit when making a purchase. You will pay interest on the purchases made if they are not paid off in 30 days.)

9. How many debit cards do you have in your wallet?
   (Slider bar: Integer from 0 to 5, mark 5 as '5+')

   (Mouse-over pop-up box to explain 'debit cards': Debit cards draw money directly from your checking account when you make a purchase.)

TERMINATE IF Q8=0 AND Q9=0

10. How much cash do you typically carry in your wallet?
    (Slider bar: Integer in $10 units from $0 to $200, mark $200 as '$200+')

11. Please identify the credit and/or debit cards you use at least once a week.
    (Show separate lists for credit and debit, with three drop-down boxes: Bank/Issuer, Network, Rewards/Points? Provide 1 response slot for each initially, with button to "Add another [credit/debit] card" (max of 5 each). MASK APPROPRIATE SECTIONS IF Q8/Q9 HAVE '0'.)

12. Which of your credit or debit cards are contactless))) tap-and-pay enabled?
    (Select all that apply)

    (Pipe in responses from Q11. Add 'select all' button and 'None of these' button.)

13. **(Show only if not all cards are selected in Q12)** For the remaining cards that are not contactless))) enabled yet, has your bank already told you soon they will be? For which cards?
    (Select all that apply)

    (Pipe in unselected text box answers from Q12. Add 'none of these' button.)

14. What is your preferred method of payment in the following locations today?
(Select One per row) RANDOMIZE ROWS

Across the top

A. Cash
B. Credit card **[MASK IF Q8=0]**
C. Debit card **[MASK IF Q9=0]**
D. Store app on my mobile phone by scanning QR or bar code
E. Mobile wallet, e.g. Apple Pay, Google Pay, Samsung Pay, etc.

Rows

A. Grocery store
B. Convenience store
C. Department store
D. Coffee shop
E. Quick service / fast food joint
F. Upscale restaurant
G. Public transit
H. Taxi
I. Gas station

15. Of all the money you spend in a month, on average how would you allocate it by method of payment?
(% text box that adds up to 100%)

A. Cash
B. Credit card **[MASK IF Q8=0]**
C. Debit card **[MASK IF Q9=0]**
D. Store app on my mobile phone by scanning QR or bar code
E. Mobile wallet, e.g. Apple Pay, Google Pay, Samsung Pay, etc.

16. What is the one **positive** word that best describes each of the method of payments in your mind?
(Open textbox after each)

A. Cash
B. Credit card
C. Debit card
D. Store app on my mobile phone by scanning QR or bar code
E. Mobile wallet, e.g. Apple Pay, Google Pay, Samsung Pay, etc.

17. What is the one **negative** word that best describes each of the method of payments in your mind?
(Open textbox after each)

A. Cash
B. Credit card
C. Debit card
D. Store app on my mobile phone by scanning QR or bar code
E. Mobile wallet, e.g. Apple Pay, Google Pay, Samsung Pay, etc.

FUTURE PAYMENTS BEHAVIOR

Next, we will show you some animations on how people pay with each method of payment and ask you a few questions afterward.

(Pipe in animations for each payment method) RANDOMIZE ORDER OF ANIMATIONS

A. Cash
B. Credit / debit card using chip reader
C. Credit / debit card using contactless tap-and-pay
D. Store app on my mobile phone by scanning QR or bar code
E. Mobile wallet, e.g. Apple Pay, Google Pay, Samsung Pay, etc.

18. How much time do you think it takes to complete the transaction with each payment method?
(Rank order from fastest to slowest) RANDOMIZE IN SAME ORDER AS ANIMATIONS

A. Cash
B. Credit / debit card using chip reader
C. Credit / debit card using contactless tap-and-pay
D. Store app on my mobile phone by scanning QR or bar code
E. Mobile wallet, e.g. Apple Pay, Google Pay, Samsung Pay, etc.

19. How convenient would you describe each payment method?
(Rank order from most convenient to least convenient) RANDOMIZE IN SAME ORDER AS ANIMATIONS

A. Cash
B. Credit / debit card using chip reader
C. Credit / debit card using contactless tap-and-pay
D. Store app on my mobile phone by scanning QR or bar code
E. Mobile wallet, e.g. Apple Pay, Google Pay, Samsung Pay, etc.

20. How secure would you describe each payment method?
(Rank order from most secure to least secure) RANDOMIZE IN SAME ORDER AS ANIMATIONS

A. Cash
B. Credit / debit card using chip reader
C. Credit / debit card using contactless tap-and-pay
D. Store app on my mobile phone by scanning QR or bar code
E. Mobile wallet, e.g. Apple Pay, Google Pay, Samsung Pay, etc.

21. What would it take to get you to make purchases almost exclusively with a contactless credit/debit card? State how much you agree or disagree with the following statements. **(Select one per row) RANDOMIZE ROWS**

    Across the top

    A. Strong disagree
    B. Disagree
    C. Neither agree nor disagree
    D. Agree
    E. Strongly agree

    Rows

    A. I already use contactless tap-and-pay whenever it's available at the merchant.
    B. I would increase my use of contactless cards if there were more merchants who had the capability.
    C. I would not switch my primary credit/debit card just for the contactless tap-and-pay feature
    D. I would use contactless payment methods more frequently if I received additional rewards or incentives to do it.
    E. I won't increase my use of contactless cards because the transaction limits are too low.

22. If you were to increase your usage of contactless tap-and-pay, which locations do you believe you'd be most likely to use it? **(Select all that apply) RANDOMIZE ROWS IN SAME ORDER AS Q14**

    A. Grocery store
    B. Convenience store
    C. Department store
    D. Coffee shop
    E. Quick service / fast food joint
    F. Upscale restaurant
    G. Public transit
    H. Taxi
    I. Gas station
    J. None of the above [SHOW AT BOTTOM OF LIST]
    K. Other [with text box]

    (Add select all button for A … I and K.)

23. For security reasons, banks typically set a transaction limit for tapping a **credit** card to make purchase. What is the highest purchase amount you would be comfortable using contactless tap-and-pay to make?
    (Slider bar: Integer in $50 units from $50 to $300) (ADD 'Not comfortable with any amount')

(Mouse-over pop-up box to explain 'credit cards': Credit cards allow you to borrow against a line of credit when making a purchase. You will pay interest on the purchases made if they are not paid off in 30 days.)

24. For security reasons, banks typically set a transaction limit for tapping a **debit** card to make purchase. What is the highest purchase amount youw would be comfortable using contactless tap-and-pay to make?
(Slider bar: Integer in $50 units from $50 to $300)) (ADD 'Not comfortable with any amount')

(Mouse-over pop-up box to explain 'debit cards': Debit cards draw money directly from your checking account when you make a purchase.)

25. How many credit cards have you loaded into your digital wallet such as Apple Wallet, Google Wallet or Samsung Wallet?
(Slider bar: Integer from 1 to 5, mark 5 as '5+'. Add check box: I don't have or use a digital wallet. Gray out slide bar if the check box is checked.)

26. State how much you agree or disagree with the following statement: If I'm comfortable with tapping my credit / debit card to make most of my everyday purchases, I can imagine I would also be very comfortable with setting up a digital wallet and using my phone to make contactless purchases.
(Select One)

    A. Strong disagree
    B. Disagree
    C. Neither agree nor disagree
    D. Agree
    E. Strongly agree

ATTITUDES AND REMAINING DEMOGRAPHIC QUESTIONS

27. State how much you agree or disagree with the following statements.
(Select One per row) RANDOMIZE ROWS

    Across the top

    A. Strong disagree
    B. Disagree
    C. Neither agree nor disagree
    D. Agree
    E. Strongly agree

Rows

A. I am always the first in line to try new technology
B. Convenience is the most important factor to me when it comes to choosing how I pay
C. I tend to stick to one method of payment that I use everywhere
D. I optimize the credit or debit card I use for specific occasions in order to maximize the rewards
E. I prefer to do all my spending with one credit or debit card
F. I will spend until the bank won't let me
G. I am in control of my finances
H. I never leave home without having some cash in my wallet
I. I think it is totally possible to leave my wallet at home and use only my phone to make purchases
J. I wish someone could explain to me how a contactless tap-and-pay card works

28. What is the highest degree or level of school you have completed?
(Select One)

A. Less than a high school diploma
B. High school diploma or equivalent
C. Associate degree
D. Bachelor's degree (e.g., BA, BS)
E. Master's degree (e.g., MA, MS, MBA)
F. Advanced professional degree (e.g., JD, MD)
G. Doctorate degree (e.g., PhD, EdD, DBA)
H. Prefer not to answer

29. What is your current employment status?
(Select One)

A. Employed full-time (40+ hours a week)
B. Employed part-time (less than 40 hours a week)
C. Gig worker / freelancer
D. Unemployed (currently looking for work)
E. Unemployed (not currently looking for work)
F. Student
G. Retired
H. Unable to work
I. Prefer not to answer

30. What is your marital status?
(Select One)

A. Single (never married)
B. Married
C. In a domestic relationship
D. Divorced
E. Widowed
F. Prefer not to answer

CLOSING

Congratulations! You have now completed the survey. Thank you very much for participating in our study.

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