Opportunities and Challenges to Broad Acceptance of Mobile Payments in the United States

Elisa Tavilla

July 24, 2012

Elisa Tavilla is a payments industry specialist in the Payment Strategies department at the Federal Reserve Bank of Boston. Her e-mail address is elisa.tavilla@bos.frb.org.

The author would like to thank Marianne Crowe and Suzanne Lorant for their helpful comments and valuable assistance.

Until recently, mobile phones were used primarily to make calls and transmit text messages. Most consumers likely never imagined that they would be able to unlock their front doors and start their cars with their mobile phones. Similarly, few consumers envisioned being able to take pictures, film videos, or watch last night's episode of their favorite sitcom on their mobile phones. The reality is that a growing number of consumers can now use their mobile phones as keys, cameras, and TVs. So, why not as a credit or debit card, or even as a replacement for cash or a traditional wallet?

Experts from a variety of sectors, including banks, card networks, payment services providers, mobile network operators, and technology companies, contend that mobile payments are destined to take off. They anticipate significant growth in both consumer adoption rates and transaction volume. Some industry analysts are confident that 2012 is a breakout year for mobile payments and mobile wallets, while more conservative estimates predict that it could take several more years. Some discrepancies in estimates result from being based on varied types of mobile payments measured, diverse assumptions about how mobile payments will evolve, and a lack of reliable data around consumer adoption. Moreover, numerous stakeholders are involved in the mobile payment ecosystem, all of whom are vying to be the first to market and capture the potential revenues, while still struggling to develop effective business models.

What will it take to attract and satisfy the demands of consumers, whom some have termed irrational in their payment behaviors?[1] Recent studies indicate that consumer awareness and interest in mobile payments have been increasing. In the Federal Reserve Board's 2012 *Consumer Mobile Financial Services* survey, over half of consumers believed that mobile contactless payments would become a major form of payment in the next five years, and over one-third of survey subjects indicated that they would use this method of payment if it were made available to them.[2] Industry analysts and service providers have identified a number of important drivers for the adoption of mobile payments by consumers, including familiarity and comfort with using mobile technology, particularly for financial transactions and retail purchases, strong security, and a desire for greater convenience. Although large-scale mobile payment systems are still in development, a number of mobile financial and mobile commerce applications (apps), such as the Starbucks app, iTunes, and Google Wallet, are helping to build user experience and encourage the adoption of mobile payments among consumers.

[1] Dan Ariely, *Predictably Irrational*, Harper Collins, February 2008.

[2] Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.

While convenience and increasing consumer comfort are obvious benefits, concerns about security and privacy risks around mobile payments remain major barriers to adoption. Consumers worry about the possibility of personal data being hacked or intercepted, mobile transactions being less secure than credit and debit card transactions, and possible fraudulent charges in the case of lost or stolen mobile phones. Consumer concerns represent a mix of perception and reality. Some concerns may be based on inaccurate or misleading information. With proper security measures and specific regulatory guidance in place, mobile payments can be just as or even more secure than traditional payment methods. However, comprehensive education and marketing efforts are needed to reassure consumers of the safety of mobile payments.

Defining *Mobile* Terminology

Mobile banking, mobile bill payment, mobile commerce, and mobile payments are terms that consumers may find being used interchangeably and somewhat confusingly.[3] For the purposes of this report, the term "mobile payments" refers primarily to proximity or in-store payments made with a mobile phone at the point of sale (POS). In lieu of swiping a credit, debit, or prepaid card, or paying with cash or paper check, a consumer either taps his mobile phone or scans a barcode at the terminal during checkout to pay for purchases. If a consumer taps his phone, he is making a mobile contactless payment using *near field communication* (NFC) technology along with his payment account information that is securely stored in the mobile phone.[4] When the consumer taps his mobile phone, the NFC chip and the merchant's NFC-enabled terminal communicate to transmit payment credentials from the mobile phone to the terminal. To use a barcode for a mobile payment, the consumer downloads a merchant-provided mobile app. Starbucks is one example. After registering and downloading the app, a customer logs into his Starbucks account on his mobile phone. A barcode containing the customer's Starbucks prepaid account information is displayed on his phone screen, which can be scanned at the point of sale to make purchases. After payment is made, the app updates the customer's prepaid and rewards account balances in real time. Starbucks customers may also use the app to reload their prepaid account for card or mobile use, view transaction history, and track rewards.

[3] Mobile banking, similarly to online banking via a traditional personal computer, allows bank customers to conduct informational and transactional banking functions, such as balance inquiries, account transfers and bill payments, and receipt of alerts, using a mobile phone. Mobile commerce refers to a consumer's using a mobile phone to make an internet purchase by downloading a merchant's app or by accessing a merchant's website through a mobile browser.

[4] A consumer's payment information is stored in a secure element, which can be located on a SIM card, embedded in the phone or in an external plug-in microSD memory card. The secure element is a platform where applications can be installed, personalized, and managed (preferably over the air). It is a combination of hardware, software, interfaces, and protocols that enable secure storage and use of credentials for payment, authentication, and other services.

A mobile wallet is software application that is loaded onto a mobile phone, and enables storage of multiple payments credentials and value-added services, such as bank, prepaid, and credit or debit card accounts, transit tickets, and coupon and loyalty information, to be securely accessed in order to initiate mobile payments. A mobile wallet can be stored on a secure chip in a mobile phone, as in the case of NFC mobile contactless payments, or on remotely located servers, also known as the "cloud." In a cloud-based digital wallet, a consumer can access his payment credentials in a number of ways, including via an app on the phone, a phone number and PIN, or a physical card.[5] Regardless of which technology is used, mobile wallets offer consumers multiple payment method options during checkout at a point of sale. Mobile wallets are most useful in high-volume, low-value situations, such as parking, transit, quick-service restaurants, and convenience and drug stores. To add value beyond payment functions, providers are incorporating electronic coupons, loyalty rewards, location-based discounts, and other promotional offers into mobile wallets.

What will it take to enable widespread adoption of mobile payments in the United States?

In the United States (U.S.) consumers can pay with cash, checks, debit, credit, and prepaid cards, all of which compete with mobile payments. These traditional and electronic payment alternatives are considered relatively safe and secure, and are widely accepted. A number of factors increase the likelihood that a consumer will also adopt mobile payments. These factors include the following:

- Owning a smartphone,[6]
- Being reasonably comfortable with mobile technology, and
- Recognizing the value of capabilities enabled by mobile payments, including
    - Placing a high value on convenience, ubiquity, and interoperability, and
    - Gaining access to a broad range of demographically relevant financial services via mobile phone.

In addition, the likelihood of widespread adoption of mobile payments by consumers increases if they are rightly confident of:

- Having the ability to conduct safe and secure mobile payment transactions and
- Having trust in financial institutions and other non-bank payment providers.

[5] A comparable use case of cloud storage and computing services that may be familiar to consumers is Apple's *iCloud*. It enables consumers to store music, apps, photos, and other content and access this content from multiple devices, including the iPhone, iPad, iPod touch, Mac, and PC.

[6] While sophisticated feature phones can perform mobile payments, we do not include them in this analysis. Based on historical growth and forecasts, it appears that the development of future mobile solutions in the U.S. will be based on smartphones.

The smartphone barrier is disappearing

The smartphone barrier turns out to be a lower hurdle than it was just a few years ago. Industry forecasts representing a variety of consumer surveys in the U.S. have shown fairly consistent results, indicating major growth in smartphone adoption and an anticipated increase in the use of NFC-enabled mobile phones.

- Pew Research reports that smartphone ownership in the United States is at approximately 46 percent and growing, while feature phone ownership is at about 41 percent. This indicates that smartphone owners are more prevalent within the overall population than owners of more basic mobile phones as of February 2012.[7]
- Forrester Research forecasts that 48 percent of all U.S. mobile phone subscribers will be smartphone subscribers by 2013, a marked increase from just 7 percent in 2008.[8]
- Three forecasts predict that smartphone availability and adoption in the nation will reach a tipping point by 2015.
    - Yankee Group – Smartphone adoption will surge to 175 million phones, with 77 percent of U.S. consumers owning a smartphone by 2015.[9]
    - Gartner – 50 percent of smartphones will have NFC capability by 2015.[10]
    - Park Associates – NFC technology will become a standard feature on smartphones by 2015.[11]

The appetite for mobile payments is spreading among smartphone owners

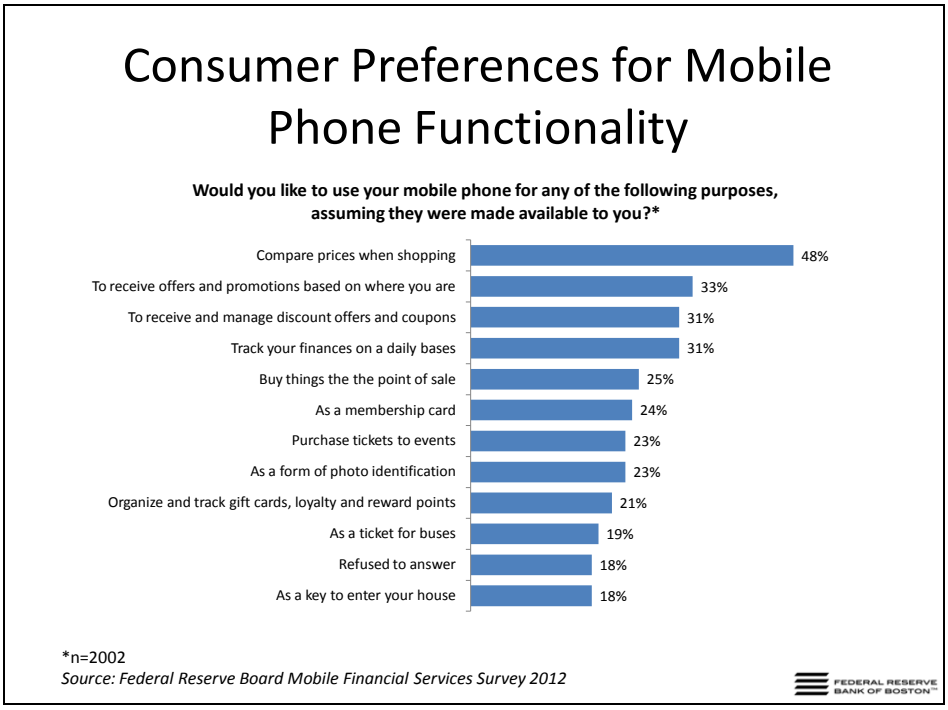
While the results vary, industry research clearly indicates that mobile phone owners are aware of and interested in mobile contactless payments, with greater interest among smartphone owners, who tend to be younger and more tech-savvy.

- The Federal Reserve survey found that approximately three in 10 consumers with mobile phones said they would be likely to use mobile contactless payments, if offered the option to use the service.[12]

[7] Aaron Smith, "46% of American adults are smartphone owners," Pew Internet & American Life Project, March 1,2012.
[8] "Consumers Going Mobile: The Transformation of Payments," First Data, 2011.
[9] Carl Howe and Kaitlyn Lewis, "Yankee Group Webinar: Mobile OS Fight for Survival," February 14, 2012.
[10] Cadie Thompson, "Near Field Communication — the Next Mobile Boost?" CNBC, January 5, 2012.
[11] Leonard Klie, "Consumers Want NFC-Enabled Mobile Wallets," CRM Magazine, February 2012.
[12] Data include both feature phones and smartphones. Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.

- According to Synergistics Research's 2011 "Mobile Payments: Consumer Viewpoint" survey, nearly six in 10 mobile phone (feature phone and smartphone) owners expressed awareness of mobile contactless payments.[13]
- Javelin's 2011 contactless NFC mobile payments survey found that 24 percent of U.S. smartphone owners indicated that they would be likely to use mobile contactless payments, compared with only 12 percent of feature mobile phone owners and 14 percent of all consumers.[14]

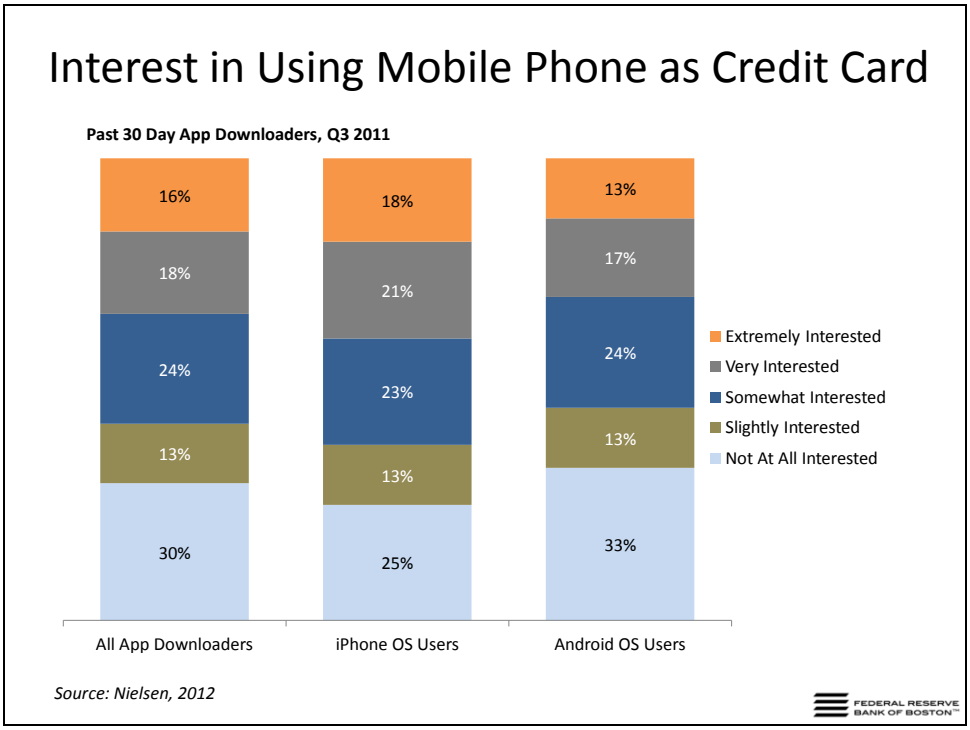
As a first step in the evolving mobile payments experience, consumers typically use their mobile phones, especially smartphones, in brick and mortar retail stores to compare prices, research products, search for discount coupons, look up product reviews, and share recommendations. According to the Federal Reserve survey, nearly half of consumers said they would like to use their mobile phone to compare prices when shopping, about one-third said they would like to receive location-based offers and promotions and receive and manage discount offers and coupons, and a quarter said they would like to use their mobile phones to make purchases at the point of sale.



[13] "Mobile Payments: Consumer Viewpoint," Synergistics Research Corporation, August 2011.
[14] "2011 Contactless Near Field Communication (NFC) Mobile Payments: Framing Mobile Payments on the Foundation of Mobile Banking," Javelin Strategy & Research, April 2011.

A fourth-quarter 2011 study by AlixPartners found that nearly 40 percent of smartphone owners reported using a mobile shopping app, which includes price check and research tools, as well as coupon receipt and redemption.[15] This finding illustrates how price transparency and real-time access to product information can provide immediate gratification to mobile-oriented consumers.

Using a mobile phone to pay for purchases in stores would be viewed as a natural progression from conducting product research. Nielsen reported that 22 percent of mobile shoppers buy retail products on their phones through apps or on the web.[16] And although only 9 percent have used phones as mobile wallets to buy products at the point of sale, Nielsen's researchers noted that "the desire to do so is apparent—71 percent of app downloaders would be interested in an app that allows them to use their phone as a credit card, with iPhone users leading the way.[17]



Some phone-related supply-side barriers are falling

In November 2011, the GSM Association[18] announced it had commitments from 45 mobile network operators (MNOs) worldwide to implement NFC with a SIM-based secure element in their handsets.

[15] "The Mobile Shopping Revolution: How Mobile is Defining Shopping and Payments," AlixPartners, March 2012.
[16] Tim Carmody, "The Smartphone in Your Pocket is a Multifunction Buying Machine," *Wired*, February 22, 2012.
[17] "Smartphones: The Ultimate Shopping Companion," Nielsen Wire, February 22, 2012.
[18] The GSMA (**GSM Association)** is an association of mobile operators and related companies devoted to supporting the standardizing, deployment and promotion of the GSM mobile telephone system. GSMA represents the interests of mobile

AT&T and Verizon were two of the MNOs included. In June 2012, Microsoft announced that Windows Phone 8 will officially support NFC.[19] Such initiatives represent a major step in making mobile contactless phones and wallets more widely available and accessible. How these phones will be marketed to consumers and provisioned with mobile wallets will be a critical factor in encouraging consumer use of mobile payments. Ideally, mobile wallets should be interoperable and offer consistent purchase experiences across financial institutions, card network brands, mobile network operators, and merchants.

Mobile banking and innovative mobile payments applications are promoting interest and comfort with the technology

As more banks offer mobile banking services, a growing number of customers are taking advantage of and becoming more familiar and comfortable with these services and adept at conducting financial transactions via mobile phones. Mobile banking may serve as one of the main catalysts for consumer adoption of mobile contactless payments. Twenty-one percent of mobile phone owners have used mobile banking in the past 12 months.[20] The two most common uses of mobile banking are to check account balances or recent transactions and to transfer money between accounts.[21]

While informational banking services are the ones most frequently used by mobile phone consumers, financial institutions are also offering more innovative applications, particularly for check deposits and money transfers. Mobile remote deposit capture (mRDC), which has only recently been made available and is offered by only a few banks, is becoming increasingly popular. This is clearly an example of a value-added feature of mobile banking, as it offers an app that enables customers to deposit paper checks by using a mobile phone camera to photograph the check and send it electronically to the bank. With the use of paper checks declining over the years and consumers visiting bank branches less frequently, the ability to deposit a check from a mobile phone provides convenience and efficiency benefits for both consumers and banks.

Industry studies have found that satisfied mobile banking customers are more aware of mobile payments and more willing to use this payment method than other customers are. For example, Javelin found that consumers who use mobile banking are more likely to use mobile contactless payments (when

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operators worldwide, including nearly 800 mobile operators, and over 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, Internet companies, and media and entertainment organizations

[19] Dante D'Orazio, "Microsoft adds NFC to Windows Phone 8 with Wallet Hub, Tap + Send," The Verge, June 20, 2012

[20] Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.

[21] Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.

available). Forty percent of mobile banking users indicated that they would be likely to use their mobile phone to complete a mobile contactless payment, compared with only 14 percent of all consumers.[22]

While mobile payments at the point of sale are still not widely available, a number of programs and initiatives are providing consumers the opportunity to make payments with their mobile phones and digital wallets. These services help consumers build awareness and experience in using mobile phones to make payments in stores, provide valuable feedback to the providers and should eventually boost adoption when open mobile wallets become more readily available.

Starbucks' Mobile Application

Since the launch of the Starbucks mobile payment program in January 2011, customers have made over 55 million mobile transactions at more than 9,000 U.S. locations, including more than 2,000 Starbucks locations in Target and Safeway stores and 7,000 company-operated stores.[23] Consumers pay for one in four Starbucks transactions in the United States from their Starbucks prepaid accounts (card and mobile). In 2011, customers used the mobile app to reload $110.5 million onto Starbucks prepaid accounts, indicating that customers find benefit in using the service.[24]

The success and popularity of Starbucks' mobile payment program can be attributed to several factors, including the growing number of consumers using smartphones, acceptance of the mobile app at many locations, and customers' perception of an enhanced retail experience. However, areas for improvement still exist, including the ability to access the app and pay where mobile or Wi-Fi reception is limited, and instant in-store reward redemption. For example, if a customer tries to load the app at a Starbucks location where mobile reception is spotty, and if the line is short or nonexistent, the attempt to use the app may actually slow the overall checkout process for customers. Also, while customers can track their rewards points using the mobile app, Starbucks has not yet implemented instant reward redemption: customers still have to wait for traditional mail to receive a postcard offering them a free drink.

[22] "2011 Contactless Near Field Communication (NFC) Mobile Payments: Framing Mobile Payments on the Foundation of Mobile Banking," Javelin Strategy & Research, April 2011.
[23] Starbucks spokesperson, July 19, 2012.
[24] "Starbucks Mobile Transactions Exceed 26 Million within First Year," December 6, 2011. For reference, $183.1 billion was loaded onto closed-loop and $278.7 billion onto open-loop prepaid card accounts in 2011 (source: "Eighth Annual Prepaid Market Forecast 2011 to 2014," Mercator Advisory Group, November 2011).

Google and Isis Wallets

In 2011, some significant mobile wallet announcements were made. In September of that year, Google officially launched its *Google Wallet* app, fundable with Citibank's MasterCard or the Google Prepaid Card, on Sprint Nexus S 4G phones. Google has a limited number of NFC-enabled mobile phones and is working with only one wireless carrier that is third in market share, and must address these issues in order to reach a broader group of consumers. In May 2011, AT&T, Verizon, T-Mobile, Barclaycard, and Discover launched Isis, a mobile payment joint venture. Isis added Visa, MasterCard, and American Express in July 2011 and entered into agreements with Chase and Capital One in early 2012. Isis pilots have yet to be launched, so product offerings remain unclear. Isis plans to begin its trial in the third quarter of 2012. Consumers will be able to load these three financial institutions' credit, debit, and prepaid cards into their Isis wallets and shop at participating merchants in Austin, Texas and Salt Lake City, Utah, and ride the UTAH Transit System. Both the Google and Isis wallets also enable customers to digitally store loyalty cards for participating merchants and include a variety of discounts and incentives to help promote mobile wallet use.

PayPal Wallet

PayPal's wallet is presently considered a digital wallet, not a mobile wallet, as a mobile phone is not required to make a transaction at the point of sale. Unlike the Google and Isis wallets, PayPal's wallet is cloud-based and does not require an NFC-enabled phone. However, using a digital wallet helps to improve consumer electronic payment proficiency at the point of sale.

Consumers shopping at participating merchants pay at existing POS terminals integrated with PayPal software, either by swiping a PayPal issued card to access their online PayPal account, or via "Empty Hands"—entering their phone number and PIN into the terminal's key pad to connect to their online PayPal account. Different from traditional credit and debit cards, PayPal does not include user identification on its card, such as name and card number. Instead, it relies on PIN entry to complete transactions.[25] Similarly to other mobile wallets, the PayPal wallet enables consumers to fund their PayPal account with multiple credit, debit, and gift card accounts, and to access special offers and store receipts. As of March 2012, PayPal customers can use the digital wallet service in more than 2,000 Home Depot stores. In May 2012, PayPal announced 15 additional national retail partners that will support PayPal's in-store payment system. If, in the future, PayPal or another provider includes NFC for a true mobile wallet

[25] Andrew Diechler, "PayPal POS Card Could Lower Interchange Fees," Association for Financial Professionals, October 17, 2011.

experience, consumers will already be accustomed to using an e-wallet online payment service at retail point of sale locations.

Which demographic groups are prime candidates to use mobile payments?

Consumers who are more technology savvy and comfortable with mobile financial transactions—most likely young consumers, affluent consumers, smartphone owners, and mobile bankers—are more likely than others to use mobile payments. A January 2012 survey conducted by Ipsos Research for American Express found that more than half (52 percent) of consumers ages 18 to 24 are likely to try new technology-enabled payment tools as they become available, compared with 23 percent of those ages 55 to 65.[26]

Findings across multiple surveys consistently indicate that younger consumers express a greater level of willingness and interest in using mobile payments than their older counterparts. The Federal Reserve survey found that mobile payments[27] are disproportionately used by younger consumers. More than 70 percent of those who used mobile payments in the past 12 months were under the age of 45.[28] KPMG's *Consumers and Convergence Survey* showed that 30 percent of younger adults in the United States, ages 16 to 34, were "very willing or willing" to use their mobile phones as a wallet, compared with only 23 percent of the general population.[29] Specific to mobile contactless payments, Javelin reported that users tend to be younger—Gen Yers and Gen Xers are more likely to make mobile NFC payments than Baby Boomers.[30]

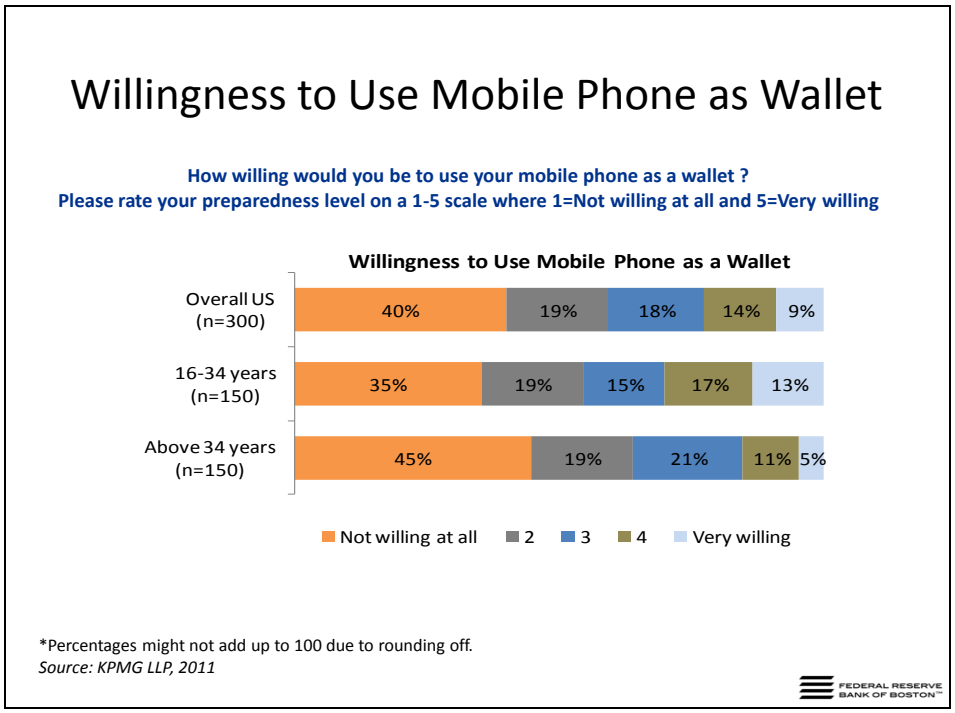
[26] "Consumers on the Future of Payments: Millennials to Lead Adoption and Security is King," PRNewswire, March 22, 2012

[27] The Federal Reserve survey defined mobile payments as "purchases, bill payments, charitable donations, payments to another person, or any other payments made using a mobile phone. Mobile payments can be used by accessing a webpage through the web browser on your mobile device, by sending a text message (SMS), or by using a downloadable application on your mobile device. The amount of the payment may be applied to your phone bill (for example, Red Cross text message donation), charged to your credit card, or withdrawn directly from your bank account."

[28] Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.

[29] Consumers and Convergence V: The Converged Lifestyle, KPMG LLP, December 2011.

[30] Javelin defines Gen Y as those born between 1979 and 1999; Gen X as those born between 1961 and 1980; and Baby Boomers as those born between 1945 and 1965. Slight overlapping between the generational years is intentional, as there is not a clear demographic distinction between similar years.



Industry studies also agree that awareness of mobile payments is greater among higher-income consumers and current mobile banking and mobile bill pay users. According to Synergistics, the interest level in using mobile phones for contactless payments tends to decrease with age, but increases with household income. Two points to consider based on these findings: to convince mainstream consumers to adopt mobile payments, value-added services and opportunities (what else can I do besides make payments?) may be more important than basic mobile payment functions. To attract the underserved, who may be younger, but more often lower-income consumers, a different approach is needed. For example, using alternative payment methods through mobile phones can help reduce the friction of cash transactions and enable the underserved to better track and manage their spending, pay bills, and transfer money more safely and efficiently. For older consumers, who are often more risk-averse and concerned with mobile technology security than their younger peers, better information about how to mitigate risks and realize the benefits of using a mobile phone for payments might be more useful. Mobile payment providers' understanding of user demographics and that there is no "one-size-fits-all" mobile consumer will ensure broader accessibility and inclusivity.

New capabilities that promise excitement as well as utility could win over consumers

Consumers may perceive little value in converting from card or cash payments to mobile payments alone. However, receiving more functions and features could tip more consumers toward using mobile payments and services. Providing consumers with the ability to benefit from additional features, such as

targeted offers coupled with the ability to conduct real-time comparison shopping and social media functionality increases the chance they will make a payment with a mobile phone as well.

Consumers have identified convenience and efficiency as two of the most attractive benefits of mobile payments. The Federal Reserve survey data show that some consumers view mobile payments as time-saving and convenient while providing them with increased access to, and control of, their finances.[31] A 2011 First Data study on consumer adoption and use of bank technology reported that 40 percent of consumers found the mobile wallet concept compelling due to its convenience.[32] And the top benefits in a consumer mobile payments survey conducted by Synergistics were: "saves time, can be done 24/7, don't have to carry cash, and can be done almost anywhere."[33]

Offering Incentives

Consumers value rewards points, loyalty programs, flash sales, daily deals, and coupon codes for their purchases. Sometimes, the deciding factor between using one credit card over another is the number of airline miles or cash back offered. Similarly, consumers can be motivated to use mobile payments if offered discounts or other incentives. According to First Data, 40 percent of consumers indicated they would be more interested in mobile wallets if they received discounts at the point of sale or rewards related to mobile wallet use.[34] Many mobile payments providers plan to incorporate value-added features into their mobile wallets, including loyalty programs, location-based promotions, and other personalized offers, to satisfy consumers' demand. Instead of having to carry a keychain with rewards cards for a dozen stores or clipped paper coupons, consumers would be able to receive coupons and discounts over the air directly to their phones (assuming they opted in to accept them) and have their loyalty points and offers automatically credited when they use their mobile phones to make purchases.

Some mobile wallet providers offer limited-time and ongoing incentives to promote use and build consumer experience. For its launch Google preloaded $10 onto the prepaid account in its mobile wallet prior to delivering the mobile phone. A participating mobile wallet merchant, American Eagle Outfitters, hosted a "Tapping Spree" event at its Times Square flagship store in New York City to introduce consumers to the Google Wallet user experience.[35] Trained Google and American Eagle Outfitters associates guided customers through the process of using Google Wallet on NFC-enabled phones. In

[31] Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.
[32] "Consumer Adoption and Usage of Bank Technology," First Data, 2011.
[33] "Mobile Payments: Consumer Viewpoint," Synergistics Research Corporation, August 2011.
[34] "Consumer Adoption and Usage of Bank Technology," First Data, 2011.
[35] "Introducing Google Wallet at American Eagle Outfitters, Aerie and 77Kids Stores in Five Major U.S. Markets," October 12, 2011.

addition, customers were able to take advantage of promotional offers in the store using Google Wallet, including 15 percent off their entire purchase.[36] Other participating merchants have also included Google Wallet discounts. Furthermore, consumers can simultaneously pay, redeem offers, and earn loyalty points with one tap of their mobile phone on the POS terminal at participating *Google SingleTap* merchants. Isis also plans to preload an unspecified amount of spending money on a prepaid account in its mobile wallet for its debut in 2012.

Appealing to the Unbanked and Underbanked

Since bank accounts and credit cards are not always prerequisites for mobile payments, the mobile phone could potentially serve as a channel for financial inclusion to the unbanked and underbanked consumer segments. An estimated 7.7 percent of U.S. households, approximately 9 million, are unbanked, and an estimated 17.9 percent of U.S. households, roughly 21 million, are underbanked.[37] While the unbanked do not have bank accounts, many do have access to mobile phones. Among individuals who are unbanked, 64 percent have access to a mobile phone and 18 percent have access to a smartphone.[38] More remarkably, 91 percent of the underbanked have a mobile phone and 57 percent have a smartphone—rates far above those for the overall population.[39]

The ubiquity of the mobile phone presents a potential solution to the issue of lack of access to internet connectivity as well as to banking and non-banking solutions, particularly for the underserved. A May 2011 Pew Internet Project survey found that "of those who solely rely on smartphones to surf the Web, most are minorities, younger than 30, and have low incomes."[40] Consumers can access a number of financial services via mobile phone without having traditional bank accounts that combine mobile banking and payment features. For example, mobile wallets can be funded from a variety of sources, including credit and debit cards, cash, and prepaid accounts. Several non-bank financial services providers, such as PayPal, Chexar, and Plastyc, already do or plan to offer mobile remote deposit capture, which would allow underbanked consumers to deposit, for example, payroll checks into a prepaid account on a mobile phone. Unbanked and underbanked consumers could potentially reload their mobile accounts

[36] See http://www.google.com/wallet/how-it-works-offers.html.
[37] "FDIC National Survey of Unbanked and Underbanked Households," FDIC, January 2009. Unbanked households do not have a checking or savings account. Underbanked households have a checking or savings account but rely on alternative financial services, such as non-bank money orders, non-bank check-cashing services, payday loans, rent-to-own agreements, or pawn shops at least once or twice a year or refund anticipation loans at least once in the past five years.
[38] Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.
[39] Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.
[40] Cecilia Kang, "As smartphones proliferate, some users are cutting the computer cord," The Washington Post, July 11, 2011.

and make purchases using their mobile phones, avoiding or reducing expensive check cashing services, ATM fees, and other charges. (We do not assume that loading to a prepaid account on a mobile phone would be free.) Similarly, mobile photo bill pay can offer this consumer segment a more convenient bill payment method. By originating payments through their mobile phones and accessing prepaid accounts or other alternative payment methods, underbanked consumers can pay bills in a timely, less costly, more efficient, and potentially safer manner than with traditional options currently offered to them.[41]

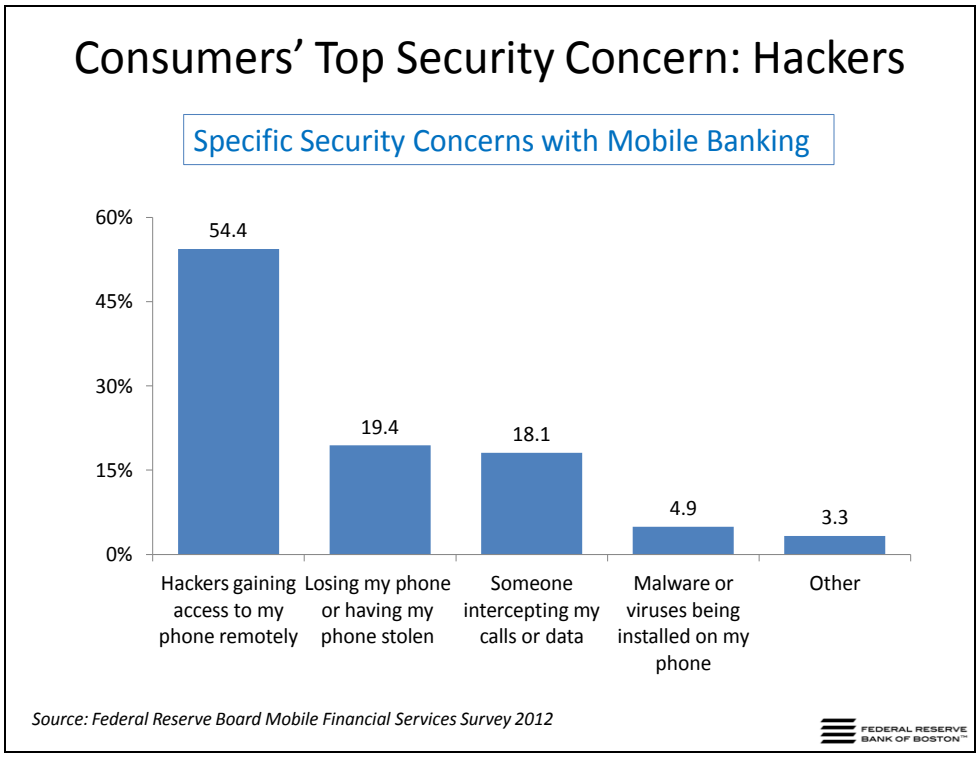
To serve a broad range of consumers, the technology must be widely available and accessible

Whether NFC-, barcode-, or cloud-based, it is important that a mobile wallet solution provide consumers with ubiquity, interoperability, and freedom of choice when deciding which payment methods to load into their wallets. Traditional payment methods offer these functions, so an alternative should offer consumers the same or an even greater level of convenience and value. At present, all wallets are considered closed or limited in terms of interoperability and accessibility, which is understandable as they are in early stages of development. Nonetheless, if over time they are not open to more major payment networks and issuers, wireless carriers, and merchants, limited interoperability and accessibility pose a challenge for mass adoption in the United States.[42]

Consumers' security concerns are a major barrier to broad adoption and use of mobile payments

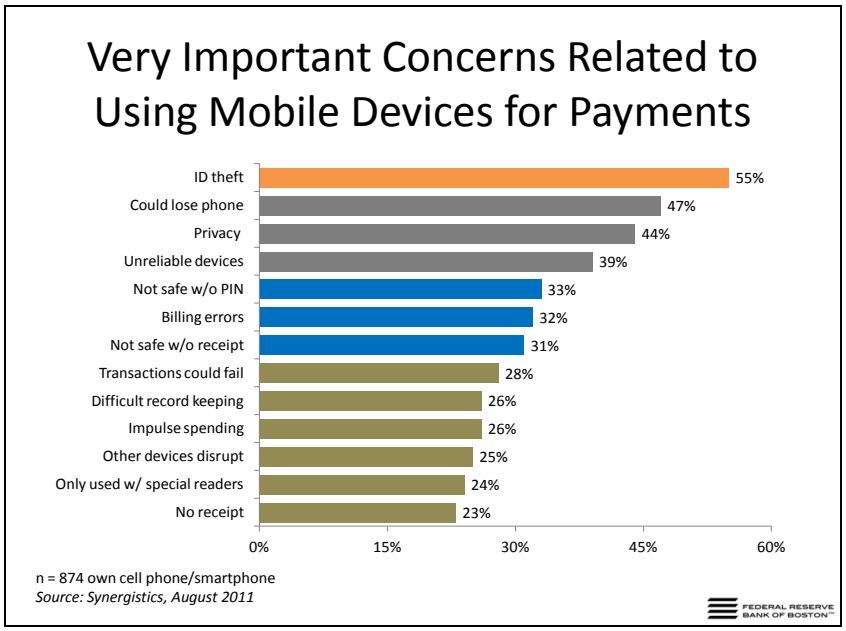
Despite growing interest and increasing comfort levels on the part of consumers toward conducting financial transactions via mobile phone, security and privacy risks remain top concerns for mobile payments, and they continue to be a major obstacle to widespread adoption. Specific security issues identified vary by survey. Some consumer reservations stem from fear of payment account information being intercepted, threat of unauthorized parties accessing personally identifiable information, and receipt of unsolicited promotional material.[43] The Federal Reserve survey found that major impediments to consumer adoption of mobile banking and mobile payment technologies were concerns about security, in particular the possibility of hackers' remotely accessing consumers' phones and intercepting payment information. [44]

[41] "Consumer Market Outlook for Mobile Photo Bill Pay," prepared by AlixPartners LLP for Mitek Systems, January 2012.
[42] U.S. smartphone market share by mobile carriers – AT&T: 35 percent; Verizon: 30.5 percent; Sprint: 13.7 percent; T-Mobile: 11.3 percent (Source: comScore, Q4 2011 data).
[43] Consumers and Convergence V: The Converged Lifestyle, KPMG LLP, December 2011.
[44] Matthew B. Gross, Jeanne M. Hogarth, and Maximilian D. Schmeiser, "Consumers and Mobile Financial Services," Board of Governors of the Federal Reserve System, March 2012.



According to research from Synergistics, over half of mobile phone owners surveyed indicated identity theft as a top concern related to making mobile payments.[45] And over 50 percent of the consumers surveyed in a First Data mobile payments study believed that making a payment via mobile phone was less secure than making a payment in person or with a credit or debit card.[46] Regardless of the specific reason for the security concern, security issues must be addressed to achieve mass adoption of mobile payments.

[45] "Mobile Payments: Consumer Viewpoint," Synergistics Research Corporation, August 2011.
[46] "Consumers Going Mobile: The Transformation of Payments," First Data, November 2011.



Interestingly, a consumer realizes that his mobile phone is missing sooner than his physical wallet. The average amount of time it takes a person to realize a lost wallet is approximately five or six hours, but it takes someone about 15 minutes to realize his phone is missing.[47] It is possible that mobile payments can be more secure than traditional payment methods. For this to be the case, the phone must be set up correctly with risk mitigation tools having the ability to remotely wipe, delete, lock, and disable a lost or stolen mobile phone, with anti-virus and malware software, and with multiple layers of security to lock both the phone and access to the secure mobile wallet – and the consumer must use the mobile payments capabilities correctly. As an added security measure, a consumer can request alerts for various types of account activities, such as suspicious purchases and transactions over preset limits. Effective use of these tools requires banks and other mobile payment providers to work collaboratively to help consumers understand that they also have responsibilities to protect their payment account credentials and physical devices, and to help consumers find and implement risk mitigation software and other tools. Consumers also need to be educated on what not to do, such as download untested, questionable, uncertified applications or share their mobile phones.

Banks and payment providers implement other security tools behind the scene that are not transparent to the consumer. For example, use of dynamic data authentication (DDA) can protect cardholder and other payment data by making the security code unique for each mobile payment transaction. A cryptogram is generated for each transaction, which is then validated with the network through the terminal to protect against fraud and skimming. The chip device (mobile phone) must be present to

[47] "A Mobile Wallet: Cash, Credit, or …. Cellphone?" NPR, January 27, 2012.

generate a valid cryptogram. It is very important that banks and payment providers actively and regularly communicate these types of safeguards to their customers, so that they understand how their mobile transactions are being protected.

Some merchants using QR barcode mobile apps, such as Starbucks, offer full balance protection for registered accounts in the case of a lost phone. To prevent unauthorized reloads to their prepaid account, customers must re-enter the account password in order to add funds using a stored credit or debit card. Customers also have the option of securing the app itself with a password. However, while use of QR codes in a closed loop prepaid business model may be low risk, they can be more susceptible to malware in an open environment. Scanning a malicious QR code could lead to a website that contains viruses or other malicious content.

Finally, under current banking and payment regulations, if a mobile payment account or wallet (whether NFC, barcode, or cloud) is funded with a credit, debit or bank checking account, a consumer would have the same protections as provided with traditional cards and bank accounts.

Strategic marketing and effective education concerning mobile payments are critical to building consumer trust, with special emphasis on demonstrating the safety features that are unique to mobile payments. Mobile payment stakeholders should collaborate to educate consumers about increased protection provided by mobile contactless chip technology, and about ways to mitigate fraud. Consumers need peace of mind that their mobile payment transactions are safe and secure. With appropriate consumer and merchant education, as well as the establishment of consistent industry security standards, fears around mobile payments should decrease, enabling consumers to make informed decisions about whether to engage in mobile payments, and ultimately increasing adoption.

Consumers need confidence that they can trust the providers of new payments methods

All stakeholders, including banks, credit card networks, mobile network operators, internet payment providers, and technology companies, would like to manage the customer relationship and have access for marketing purposes to the rich customer data that comes with that relationship. Here, the voice of the customer matters greatly. There appears to be an overwhelming consensus among respondents from a variety of surveys: consumers trust financial institutions most among the likely candidates to manage their mobile payments and financial information in general.

Findings from January 2012 research commissioned by American Express indicate that more consumers want trusted institutions, not internet or social media companies, to develop new payments: 62

percent of consumers prefer financial institutions take the lead on new payment methods, rather than wireless carriers and/or internet companies. The 2011 Fiserv *Consumer Trends Survey* shows that 40 percent of consumers trust their bank or credit union to handle mobile payments, outpacing all other entities, including PayPal, Visa, and MasterCard.

Conclusions

Given these findings, it is apparent that there are several key drivers that support broad mobile payments adoption in the United States. As a growing number of consumers across different demographic groups use smartphones, they are becoming increasingly comfortable with mobile technology and are taking advantage of the phones' vast capabilities. Consumers are using their phones to conduct mobile banking and various commerce-related activities, such as searching for product reviews and comparing prices. Being able to pay for purchases with their mobile phone at the point of sale would be a natural progression. New apps and programs are helping to build consumers' retail mobile payments experience and demonstrate the real benefits and value-added opportunities that can be gained from this new payment channel. While security concerns remain a deterrent to mobile payments for many consumers, collaborative industry efforts to develop adequate education and effective security tools can assure them that mobile payments are a safe way to pay. Together, all these factors would help significantly augment mobile payments acceptance in the U.S. Further, it would be beneficial for banks and other mobile stakeholders to continue to partner in developing their mobile payment solutions. Leveraging the strengths of each industry and business to address the consumer's needs, and presenting a comprehensive, coordinated front to the mobile consumer may be the best way to achieve long-term success.