Mobile Banking and Payment Practices of U.S. Financial Institutions

2016 Mobile Financial Services Survey Results from FIs in Seven Federal Reserve Districts

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I. Introduction

The year 2016 marks the second time that multiple Federal Reserve Banks (FR Banks) have surveyed financial institutions (FIs) about their mobile banking and payment practices and plans.[1] After surveying institutions in the Atlanta, Boston, Dallas, Minneapolis, and Richmond Federal Reserve Districts (Districts) in 2014, the FR Banks, led by the Federal Reserve Bank of Boston, distributed an updated survey in September 2016. Two additional FR Banks, Cleveland and Kansas City, participated in the 2016 Mobile Financial Services Survey (MFS Survey). This report presents the consolidated findings from these seven Districts.[2]

The FR Banks share a common objective to provide FIs and the broader industry with an understanding of the current landscape for mobile banking and payment services – both consumer and business – within each District and across several regions of the United States (U.S.). Additionally, FR Banks want to augment their own knowledge about the status of mobile banking and payments at institutions within their Districts.

The information collected in this 2016 MFS Survey included:

- Number/percentage of banks and credit unions offering mobile banking and mobile payment services
- Markets to which FIs offer mobile banking services
- Types of mobile banking services offered or planned
- Mobile technology platforms supported
- Business drivers associated with offering both mobile banking and mobile payment services
- Consumer and business adoption of mobile banking and mobile payment services
- FI strategies related to mobile payment services
- Implementation issues and incentives associated with offering mobile payment services
- Security, risks, and other barriers to providing mobile banking and payment services

The 2016 MFS Survey captures a point-in-time snapshot of mobile banking and payment activities at FIs in the participating Districts. Because five of the seven FR Banks participated in the MFS Survey in 2014, historical information is used, where relevant, to augment the 2016 findings.

This study is important to the understanding of mobile financial services in the U.S., as it encompasses data from 706 FIs. These survey respondents are geographically dispersed across 34 states and the District of Columbia, providing a broad view of the availability of mobile banking and payment services in the U.S.[3] The study is also noteworthy because it addresses mobile services from the FI perspective

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[1] The MFS Survey defines **MOBILE BANKING** as the use of a mobile phone to connect to a financial institution to access bank/credit account information (e.g., view balance), transfer funds between accounts, pay bills, receive account alerts, locate ATMs, deposit checks, etc. **MOBILE PAYMENT** is defined as the use of a mobile phone to pay for a retail purchase at point of sale (POS) using near field communication (NFC) or quick response (QR) code, or to pay remotely via mobile app or web for digital content, goods and services (e.g., transit, parking, ticketing, etc.). **MOBILE WALLET** is defined as an app within the mobile phone that controls access to credit, debit, prepaid or bank account credentials (or payment tokens) stored securely in the mobile phone and used to pay for mobile purchases.

[2] There are 12 Federal Reserve Banks, each representing a geographic District in the U.S.

[3] Refer to "Consolidated District Overview" section for a more detailed breakdown.

and because the data is drawn primarily from banks and credit unions with less than $500 million in assets[4] – a group for which information is not readily available.[5]

A total of 706 FIs – 520 banks and 186 credit unions – participated in the survey, yielding a consolidated **response rate of 12 percent** based on 6,074 solicitations. Survey participants represent 8.7 percent of all banks and 3.1 percent of all credit unions nationally. The study confirms that mobile banking comprises a standard and maturing set of services for consumers, offered by 89 percent of respondents, and that retail mobile payment services, while not yet widespread, are already offered by 24 percent of survey respondents. Additionally, implementations are accelerating among those FIs in the planning stage: only three percent of respondents stated that they do not plan to offer mobile banking services and over a third (36 percent) have no plans to offer mobile payment services by 2018. Of the 465 respondents that offer mobile banking to consumers in addition to having business relationships, 78 percent of the banks and 72 percent of the credit unions either offer or plan to offer mobile banking services to their business customers.

II. Key Findings

The following are *mobile banking* findings common to institutions across most Districts:

- Retail mobile banking is ubiquitous at U.S. FIs: 89 percent of FI respondents currently offer mobile banking services to consumers; and 97 percent will offer these service by 2018.
- By 2018, 77 percent of bank and 47 percent of credit union respondents anticipate providing mobile banking services to other customer segments including commercial and small business, government agencies, educational entities, and non-profits – commercial and small business are the most prevalent.
- Nearly all FIs offer or plan to offer mobile apps that support the two dominant mobile operating systems: 98 percent to support Apple iOS and 97 percent to support Android OS.
- Most respondents offer or plan to offer the following services to consumers: ability to check balances (92 percent); transfer funds between their accounts within the FI (90 percent); mobile enrollment (71 percent); and single sign-on capabilities (61 percent).
- Of those FIs tracking customer adoption, 54 percent now have more than 20 percent of their retail customers enrolled in mobile banking; and 44 percent have more than 20 percent actively using these services.
- Among FIs offering and tracking business mobile banking adoption, more than half (55 percent) still have adoption rates less than five percent.
- Mobile banking is essentially a free service to retail customers; only eight percent either charge or plan to charge an explicit mobile banking fee and only for some advanced services; however, 25 percent of respondents currently charge or are considering fees for mobile banking services to business customers.
- The key mobile banking security concern cited by respondents is the consumer's lack of protective behavior. In response, FIs have implemented a range of mitigation controls – more

[4] Two-thirds (66 percent) of FIs surveyed had less than $500 million in assets.

[5] Only six of the MFS survey respondents were in the list of the largest 30 U.S. retail banks based on deposits as of March 31, 2015, identified in Daniel Van Dyke and Emmet Higdon, "2016 Mobile Banking Financial Institution Scorecard," *Javelin Research & Strategy,* May 2016.

than 80 percent support inactivity timeouts and multi-factor authentication (MFA), as well as mobile alerts –to enhance security and help change consumer behavior.

The most important *mobile payment* findings include:

- Implementation of mobile payment services is accelerating as FIs respond to competitive pressure and industry momentum for mobile payments: in addition to the 24 percent already offering mobile payments, 40 percent plan to do so within two years.
- Over two-thirds of the respondents partner or plan to partner with third-party processors and more than half are considering partnerships with wallet providers that support near-field communication (NFC).[6]
- Mobile wallet implementations are increasing steadily, with Apple Pay as the current leader. Survey results indicate that by 2018, FI support for wallets will be: 99 percent for Apple Pay; 84 percent for Android Pay; and 70 percent for Samsung Pay.
- Asset size affects results in several areas: larger FIs have greater resources to expend on new services, implementations, and security technologies/controls.
- Banks and credit unions often differ in approaches and strategies for mobile payments.

III. Survey Background and Methodology

Background

The original MFS Survey was conducted in 2008 by the Federal Reserve Bank of Boston in conjunction with the New England Automated Clearing House Association (NEACH) and investigated what was taking place at banks and credit unions in the First District. That survey was subsequently expanded and revised several times to reflect ongoing changes in the mobile landscape in New England, including technology, services, and customer adoption.

The MFS Survey conducted in Q3 2014 was augmented by the participation of four other FR Banks: Richmond, Atlanta, Minneapolis, and Dallas (representing the Fifth, Sixth, Ninth, and Eleventh Districts respectively) – extending the reach and value of the study. It illuminated the maturation of mobile banking and the advent of mobile payment services at regional FIs. The 2016 MFS Survey focuses more on FI strategies for implementing mobile payments. In 2016, two additional FR Banks, Cleveland (Fourth District) and Kansas City (Tenth District) elected to participate and survey institutions in their districts.

Consumer research data from the Federal Reserve Board Division of Consumer and Community Affairs (DCCA) *Consumer and Mobile Financial Services 2016 Survey*[7], as well as information from industry sources, are cited in this report to provide context for some survey findings.

[6] Near-field communication (NFC) is a standards-based wireless communication technology that allows data to be exchanged between devices a few centimeters apart.

[7] "Consumers and Mobile Financial Services 2016," *Board of Governors of the Federal Reserve System,* March 2016. The report presents findings from a nationally representative survey fielded in November 2015 on consumer use of mobile technology to access financial services and make financial decisions. The survey will be referred to as the *2016 FR Board Consumer Mobile Survey* throughout the rest of this report.

Methodology

The 2016 MFS Survey was open to banks and credit unions in the seven Districts between September 19 and October 28, 2016. The FR Banks promoted the survey via email and, in several cases, by contacting banks and credit unions directly to drive participation. Additionally, regional payment associations (RPAs)[8] assisted with promotion by encouraging their members, particularly credit unions, to complete the 2016 MFS Survey. Almost all responses were collected through an online survey tool – just 45 surveys were returned via email and entered manually into the online tool.

Data Presentation

This report presents consolidated findings from the seven participating Districts; therefore, each question in the survey includes a table or chart based on consolidated data. Consolidated data percentages represent an average of all Districts' responses to each question. Asset size and FI type (bank or credit union) comparisons, and in a few cases, District data, are used where relevant throughout the report to underscore nuances in the data. (Note that District data present the percentage of FIs within each District.) In cases where comparison is made between 2014 and the 2016 findings, consolidated data from all respondents is used: 2014 data is drawn from five Districts and 2016 data from seven Districts.[9]

Data are presented as percentages rounded to the nearest whole number; however where the paucity of respondents makes percentage comparisons misleading, actual values are used instead.

The names of individual FR Banks are used throughout this report to represent the FIs in their District. For example, "Boston" refers to the 201 respondent banks and credit unions in the First District.

FI Participation by Service

Of the 706 FIs that completed the 2016 MFS Survey, only 24 (15 banks and nine credit unions) responded that they had 'no plans to offer' mobile banking services within the next two years. Those FIs were next asked if they offered mobile payment services (none did). They were then asked to answer two opinion questions at the end of the survey, and their responses were considered complete at that point. As a result, the respondent pool for the mobile banking questions was 682 institutions. Some respondents either do not have business customers or do not offer mobile banking to their business customers. Therefore, the number of FIs that answered the questions addressing mobile banking for businesses was 465. Finally, not all FIs offer or plan to offer mobile payment services in the next two years (compared to mobile banking services), so the respondent pool for mobile payment questions was 450 institutions. Report figures and tables include both the survey question and the number of respondents answering that question.

[8] ePayResources, EPCOR, NEACH, PaymentsFirst, Southern Financial Exchange, UMACHA - Upper Midwest ACH Association.
[9] For reference, the Appendices present all data by FI type, District, and asset size, irrespective of whether the data were included in the body of the paper.

IV. Consolidated District Overview

When the MFS Survey was conducted in September 2016, there were 11,917 FIs (5,980 banks and 5,937 credit unions) in the U.S.[10] The seven participating FR Banks solicited 6,074 FIs to participate in the survey; 706 responded, representing six percent of the national total.

These seven Districts encompass 34 states (a few partial states) and the District of Columbia, providing a broad picture of mobile banking and payments at FIs across disparate areas of the country. (**Table 1** lists the states in each participating District.)

Table 1: States Represented by Participating Federal Reserve Districts

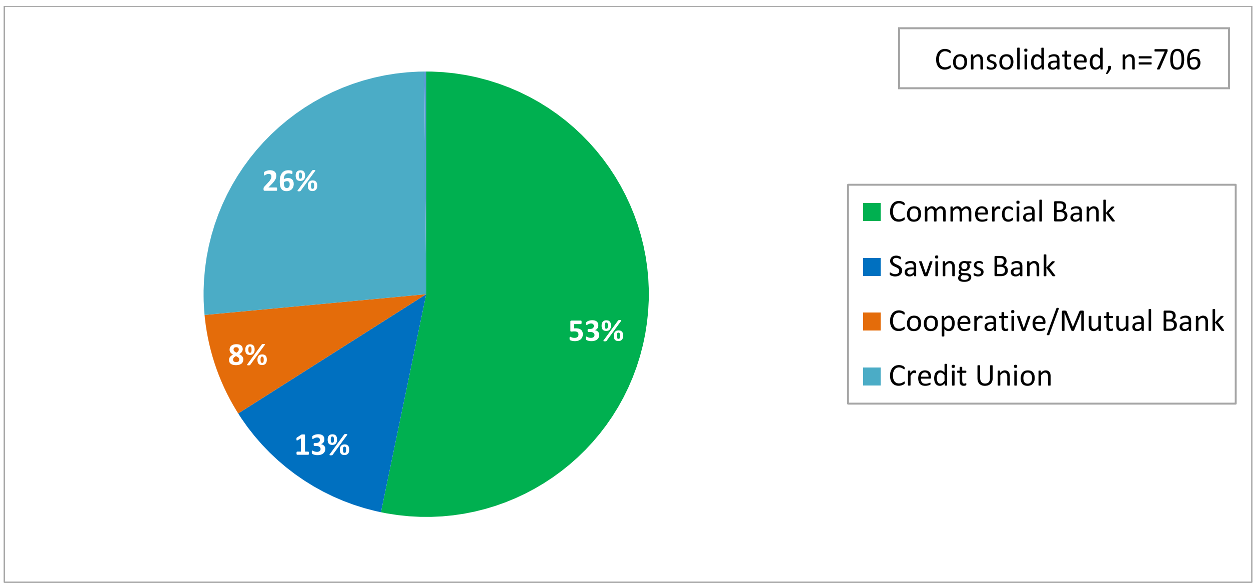
Federal Reserve District	States included in Federal Reserve District
Atlanta (6th District)	Alabama, Florida, Georgia, and portions of Louisiana, Mississippi, and Tennessee
Boston (1st District)	Connecticut (excluding Fairfield County), Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont
Cleveland (4th District)	Ohio, and portions of Kentucky, Pennsylvania and West Virginia
Dallas (11th District)	Texas, and portions of Louisiana and New Mexico
Kansas City (10th District)	Colorado, Kansas, Nebraska, Oklahoma, Wyoming, and portions of Missouri and New Mexico
Minneapolis (9th District)	Minnesota, Montana, North Dakota, South Dakota, and portions of Wisconsin and the Upper Peninsula of Michigan
Richmond (5th District)	Maryland, Virginia, North Carolina, South Carolina, Washington, DC, and portions of West Virginia

[10] For bank data, see FDIC; for credit union data see NCUA, September 2016.

Commercial banks, mutual/cooperative banks, savings banks, and credit unions participated in the survey. In aggregate banks represented 74 percent and credit unions 26 percent of the respondents (**Figure 1**). This mix represents a shift of four percentage points from credit unions to banks between the 2014 and 2016 respondent pools.

Several factors may account for the smaller credit union participation. First, FR Banks, while having connections to both member and non-member banks, may lack direct connections to their district's credit unions, which typically process payments through corporate credit unions or third parties. Some credit unions may not offer mobile banking due to their size or the nature of their charters (e.g., municipal teachers' associations or fire fighters' credit unions). The result is that the survey is weighted toward both banks and FIs in general that offer mobile services today or plan to offer them by 2018. Where the number of bank respondents obscures differences between banks and credit unions, figures and charts present both bank and credit union data in addition to the consolidated data.

Figure 1: Survey respondents by FI Type (percent of respondents)



Q10: Please indicate your financial institution type.

District participation numbers and percentages for banks and credit unions differ widely. The First District is unique in that Massachusetts has a special charter for mutual 'cooperative' banks, which represents 23 percent of its respondents. Additionally, the number of First District savings bank respondents (53) is five times greater than that of the next highest District and also represents a high percentage of respondents in the First District.

Boston, with its eight-year history of conducting biennial FI mobile surveys, had the highest number of both bank and credit union respondents (132 and 69, respectively), but Richmond had the highest percentage of credit union respondents (37 percent). Both newly-participating Districts, Cleveland and Kansas City, had lower overall response rates.

Table 2 presents a District breakdown by respondent FI type, and **Table 3** compares aggregate bank and credit union respondents within and across Districts.

Table 2: Survey Respondents by Type within Federal Reserve Districts (percent of respondents)

FR District	n=	Commercial Bank	Cooperative Bank	Savings Bank	Credit Union
Atlanta	117	72%	1%	4%	23%
Boston	201	17%	23%	26%	34%
Cleveland	27	52%	4%	11%	33%
Dallas	125	66%	9%	1%	24%
Kansas City	75	80%	1%	4%	15%
Minneapolis	86	72%	2%	12%	14%
Richmond	75	55%	1%	7%	37%
Total All Districts	706	53%	8%	26%	13%

Q10. Please indicate your financial institution type.

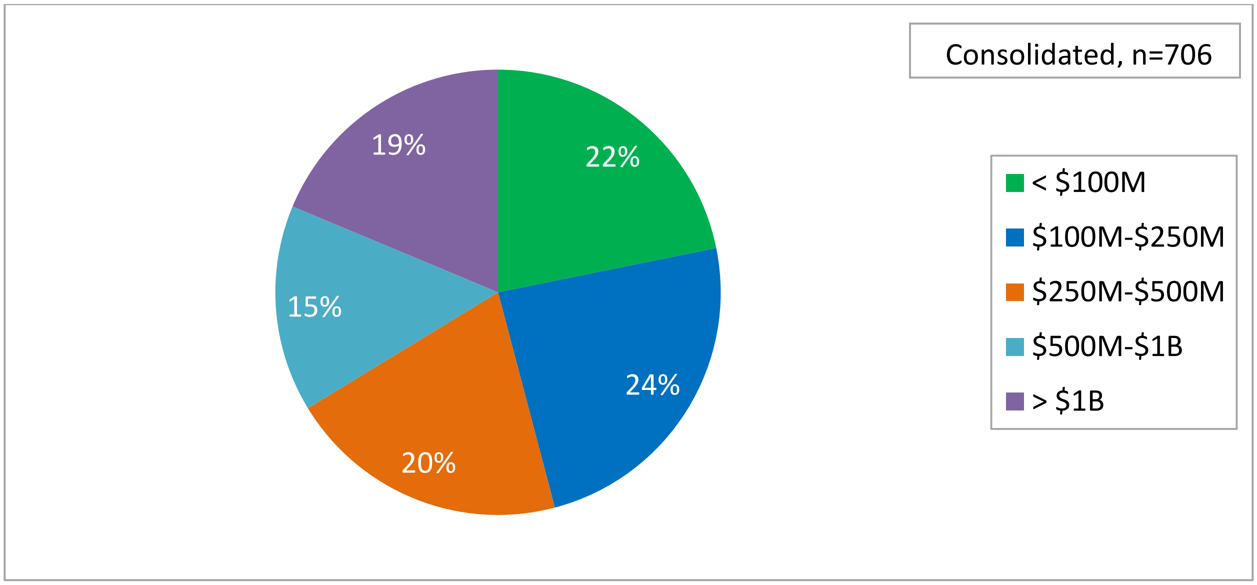
Table 3: Survey Respondents by Type across Federal Reserve Districts

FR District	Number within District		Percentage within District		District as % of Total Respondents	
	Banks	Credit Unions	Banks	Credit Unions	Banks	Credit Unions
Atlanta	90	27	77%	23%	17%	15%
Boston	132	69	66%	34%	26%	37%
Cleveland	18	9	67%	33%	3%	5%
Dallas	95	30	76%	24%	19%	16%
Kansas City	64	11	85%	15%	12%	6%
Minneapolis	74	12	86%	14%	14%	6%
Richmond	47	28	63%	37%	9%	15%
Total All Districts	520	186	74%	26%	100%	100%

Q10. Please indicate your financial institution type.

On a consolidated basis, 66 percent of survey respondents have less than $500 million in assets and 46 percent are under $250 million (**Figure 2**). Credit unions are smaller than banks: 44 percent of credit union respondents have assets under $100 million. Also, the number of credit unions declines as asset size increases. The median asset range in the survey is $250-$500 million. For banks, there was a clear delineation: 24 percent of bank respondents were in this range, while 38 percent had assets above and another 38 percent had assets below the median.[11] There was no median range for credit union respondents.

Figure 2: Consolidated Survey Respondents by Asset Size (percent of respondents)



Q9. What is your FI's asset size?

[11] There were only two more banks below the $250-$500 million asset range than above the $500 million range.

Respondent asset size varies significantly from District to District (**Table 4**). In Boston, for example, the number of banks increases with each asset tier, while the reverse is true for Kansas City where the number of banks decreases as asset tiers increase. Cleveland has no credit unions with more than $1 billion in assets, but more than 10 percent of credit union respondents in Atlanta (11 percent), Dallas (13 percent), and Minneapolis (17 percent) exceed the $1 billion mark.

Table 4: District Respondents by Asset Size (percent of respondents)

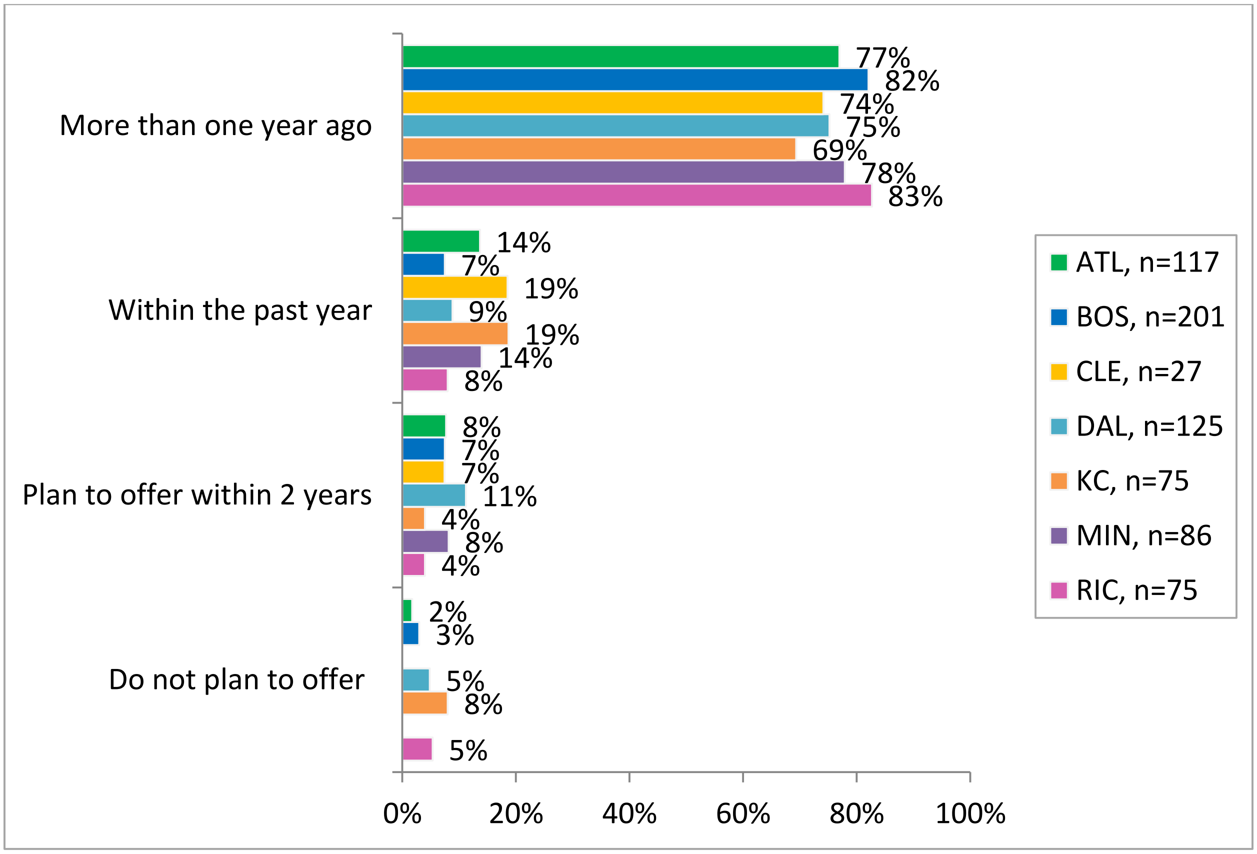
District	*n=*	Percentage of Banks by Asset Tier					*n=*	Percentage of Credit Unions by Asset Tier				
		< $100M	$100M to $250M	$250M to $500M	$500M to $1B	> $1B		< $100M	$100M to $250M	$250M to $500M	$500M to $1B	> $1B
ATL	90	6%	32%	30%	16%	17%	27	44%	26%	7%	11%	11%
BOS	132	2%	16%	22%	27%	33%	69	41%	25%	16%	12%	7%
CLE	18	17%	11%	39%	17%	17%	9	33%	56%	0%	11%	0%
DAL	95	15%	33%	19%	15%	19%	30	60%	13%	7%	7%	13%
KC	64	34%	31%	22%	6%	6%	11	64%	0%	9%	18%	9%
MIN	74	30%	24%	18%	11%	18%	12	42%	42%	0%	0%	17%
RIC	47	16%	15%	27%	16%	27%	28	32%	14%	21%	11%	21%

Q9. What is your FI's asset size?

Since 2008 the MFS surveys have been tracking when FIs started offering mobile banking services to their retail customers and have recorded greater increases with each survey.

At least three-quarters of the respondents in all Districts but Kansas City have been offering mobile banking services for more than a year (**Figure 3**). All respondents in Cleveland and Minneapolis already offer or plan to offer mobile banking services. The percentage of respondents that currently have no plans to offer mobile banking services peaks at eight percent (Kansas City).

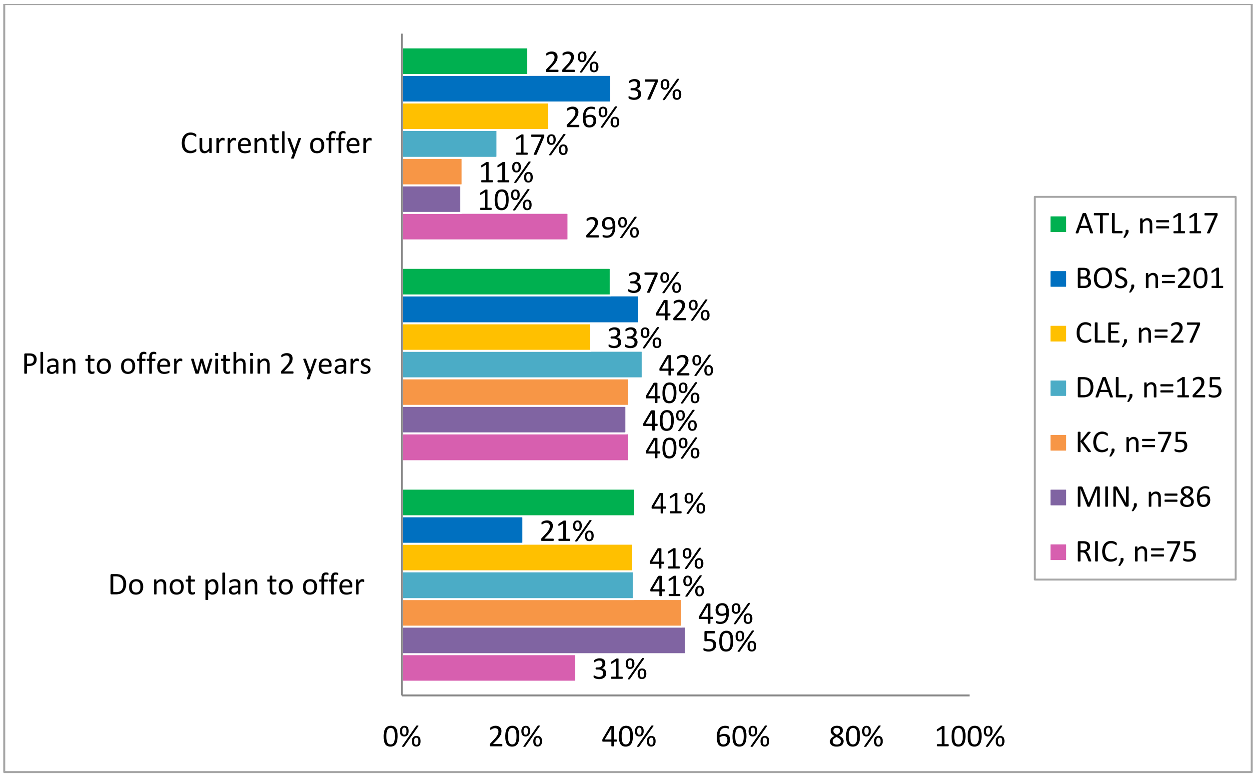
Figure 3: Status of FIs Offering Mobile Banking Services by District (percent of respondents)



Q12. When did you start offering mobile banking to consumers?

Most FI respondents have yet to offer mobile payment services. On a consolidated basis, just 24 percent on average indicated that they offered or supported mobile payments. Three Districts had rates above and four Districts had rates below 24 percent – ranging from a low of 10 percent in Minneapolis to a high of 37 percent in Boston (**Figure 4**). The percentage of respondents planning to offer mobile payments is more consistent: three Districts share the consolidated rate of 40 percent; Boston and Dallas are at 42 percent, Atlanta stands at 37 percent, and Cleveland at 33 percent. The percentage of FIs not planning to offer mobile payment services surpasses the consolidated rate of 36 percent in five Districts.

Figure 4: Status of FIs Offering Mobile Payment Services by District (percent of respondents)



Q35. Do you offer or plan to offer mobile payment/wallet services to customers?

V. Mobile Landscape

Driven largely by their expanded functionality, mobile devices are now firmly entrenched in most consumers' lives. The rise of mobile technology has paved the way for new consumer services, such as point-of-sale (POS), internet, in-app and other remote mobile payments and commerce, location-based marketing, transportation, Internet of Things (IoT[12]), etc., in addition to mobile financial services. Mobile devices are becoming increasingly pervasive and indispensable across most demographics and geographies.

Expansion of Mobile Banking Capabilities

Mobile banking is now considered mainstream in the U.S. Most FIs view it as part of their core business strategy and an important customer service channel. They understand that mobile banking can improve overall customer satisfaction and loyalty, and that customers with high mobile banking satisfaction are more likely to recommend their FIs to others.[13] Mobile banking also optimizes cross-selling; as one industry survey reported, mobile banking customers have 2.3 products compared to 1.3 for branch-only customers, an opportunity to generate more revenue.[14]

Some larger FIs and major payment processors are developing their own solutions as well as integrating mobile payment solutions into their mobile banking systems.

More consumers are expanding their mobile banking use from passive monitoring to active transactional functions. An industry survey of consumers[15] found that over 95 percent of mobile banking users log in to check their balances or transaction history, which is consistent with the 2016 MFS Survey findings of mobile services offered by all FIs. Furthermore, some mobile banking users, particularly younger cohorts, are transacting via mobile – depositing checks (mRDC), transferring funds and sending P2P payments. Over half of the mobile banking users made a mobile P2P payment in the last year, primarily through a nonbank service provider. Expansion of P2P industry solutions is driving increased mobile P2P use, as solutions, particularly those that are FI-based, provide faster funds transfers and easier payee identification and setup. In all cases, security is a key requirement.

Mobile banking can provide functionality more easily than physical or online banking channels for some payment use cases, including enhanced security features and alerts. Some banking customers view it as a complement to physical and online banking channels, while others use it as a replacement.

As the competitive landscape for mobile banking expands, FIs will need to enhance their mobile services and apps. Features that make mobile banking interactions faster, safer, more convenient and easier to use, and that add value by allowing customers to access more complex services from their phones will help to increase the number of mobile banking users. The needs of these mobile banking customers parallel what mobile payment users want as well. Looking to the future, other considerations include integration of

[12] Internet of Things (IoT) is a network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, and network connectivity which enable these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure.
[13] Jim Miller and Paul McAdam "2016 US Retail Banking Satisfaction Study," *JD Powers*, April 2016.
[14] "Mobile Banking Adoption: Where Is the Revenue for Financial Institutions?" *Fiserv*, January 2016.
[15] Melissa Fox, Emma Causey, Chris Razzano and Caleb Marley, "Mobile Banking, A Payments Channel," *First Annapolis*, July 2017.

mobile payments into the mobile banking app, cardless ATM access and cash withdrawals using NFC-enabled mobile phones (a feature some large banks already offer); and enhanced security tools such as biometrics.

Mobile Payment Developments

The mobile payments landscape continues to experience significant developments in the physical and digital space. More consumers and businesses are leveraging these channels for financial services through FIs as well as nonbank processors, technology companies, and merchants. Consumer expectations for the mobile/digital channels are expanding as new use cases evolve. Security remains at the top of the requirements list for a successful shift to the mobile/digital space, and the industry is responding with strong tools for data and identity protection and authentication. The migration in the U.S. to EMV chip cards is well underway, and payment tokenization and biometrics are helping to secure more mobile payment solutions (e.g., NFC contactless and digital checkout). Concerns about the shift in fraud from the point-of-sale (POS) to the card-not-present (CNP) channel are also being addressed by tools such as tokenization and an updated 3-Domain Secure[16] (3DS v2.0) solution, among others.

Payment Trends across the expanded mobile ecosystem are highly interconnected

The convergence of payment channels is blurring the lines between e-commerce, mobile, and physical retail environments. Merchants and consumers benefit with easier and more convenient mobile payment options, however merchants must manage and ensure secure and consistent customer experiences across channels.

The convergence of retail channels also supports the increase in use of mobile for mobile online (m-commerce) purchases and payments. More merchants are expanding mobile payments to the online channel to complement their brick and mortar businesses via mobile website and/or apps. The growth of mobile commerce was 20 percent of e-commerce in 2016 compared to 11.7 percent in 2014.[17] Retail e-commerce is growing steadily – 8.2 percent at end of 2016, up from 7.6 percent the previous year.[18] More telling is that the percentage of e-commerce transactions made from mobile phones is growing at a faster rate than that for transactions made via desktop.[19]

Mobile/digital wallets represent the next step in the payments evolution, even as traditional credit and debit card transactions still account for most of the electronic payments.[20] Competing mobile technologies and platforms have evolved for wallets that can support multiple channels. The challenge is to determine how they will co-exist and interoperate. Merchants, issuers, and card networks are adding loyalty programs and rewards to incent customer adoption of their mobile services. Stakeholders want similar results from a mobile payments experience: security, convenience, ease of use, and availability to consumers whenever and wherever they want to shop, whether at the retail POS or remotely via mobile web or app.

[16] EMVCo recently released an enhanced version of the 3DS specification that reduces some of the friction, which should be more acceptable to U.S. merchants and FIs. For more information on 3DS, see https://www.emvco.com/specifications.aspx?id=299.
[17] Compiled from "comScore E-Commerce and M-Commerce Measurement," 2014-2016.
[18] "U.S. Census Quarterly Retail E-Commerce Sales 4th Quarter 2016," *US Department of Commerce*, February 17, 2017.
[19] Andrew Lipsman, "State of U.S. Online Retail Economy in Q1 2017," *comScore*, May 10, 2017.
[20] Card payments, including debit and credit card payments, grew to 103.3 billion with a value of $5.72 trillion in 2015. "The Federal Reserve Payments Study 2016," *Federal Reserve System*, December 2016.

As seen in the 2016 MFS Survey results, some FIs are partnering with other entities to leverage different strengths and reduce the costs of developing their own mobile wallets. For example, several large U.S. FIs have joined forces with technology and fintech providers to develop their own mobile wallets or mobile P2P solutions, and engaged with major card networks and technology companies (e.g., Apple, Google) to offer NFC "Pay" and digital wallets. Also, PayPal has partnered with Mastercard to offer tokenized contactless payments for in-store purchases using the PayPal wallet.[21]

Security impacts mobile payment adoption

Security can be a deciding factor for both merchant acceptance and consumer adoption of mobile payments. Consumers want to be assured that it is safe to store sensitive financial information on a mobile device before making payments and other financial transactions. A recent industry survey found that when consumers were asked to select the most important issue related to adopting mobile payments, 36 percent of respondents chose 'security,' 31 percent chose 'convenience,' 19 percent selected 'broad acceptance' (by merchants), and just eight percent said 'rewards.'[22]

As a prerequisite for success, stakeholders are building strong risk management tools into their mobile payment strategies. They are taking a layered approach to security by adding a combination of tools, such as payment tokenization, multi-factor authentication (MFA)[23], and biometrics.

The mobile device also has numerous features to help secure and confirm identity, such as camera, voice recording, location-based services, unique device ID, fingerprint recognition, safe storage of a payment token in lieu of the real payment account number, and mobile phone disablement if the phone is lost or stolen. Despite such controls, security issues often originate from the mobile device and/or consumers who share credentials unintentionally via phishing, provide personal identity information (PII) data in other ways, or use unsecured Wi-Fi when accessing mobile banking or payment apps, rather than from specific mobile apps. The 2016 MFS Survey found that FIs attribute much of the malware risk to poor consumer efforts to protect their devices.

Mobile payment adoption challenged by the chicken and egg syndrome

Large and small merchants recognize that mobile payments can create a more efficient and faster checkout experience for their customers.[24] Despite the growth of mobile solutions in the market and increased focus on security, growth in both merchant acceptance and consumer adoption of mobile/digital payments remains sluggish. Wallet solutions are not yet accepted broadly by merchants. Most merchants are selective as to which wallets they do accept; some accept only one wallet solution, (e.g., their own QR code[25] wallet), while others accept more open wallet solutions. Additionally, while there are only five or

[21] "Mastercard and PayPal Expand Digital Partnership Globally," *Mastercard*, October 5, 2017.
[22] "The Future of Money: How digital payments are changing global commerce," *Oxford Economics*, March 2017.
[23] In April 2016, the Federal Financial Institutions Examination Council (FFIEC) released mobile financial services security guidance, which included MFA, to ensure that institutions' mobile banking and payment services are more secure. See "FFIEC IT Examination Handbook Appendix E: Mobile Financial Services," FFIEC, April 2016. The guidance recommends that management should ensure that an FI's mobile banking services contain log-on credentials in addition to those used to access the device. Management should also employ MFA or layered security controls depending on the types and volumes of transactions.
[24] "The Next Phase of Digital Wallet Adoption," *Forrester*, September 2017.
[25] A Quick Response (QR) code is a machine-readable two-dimensional barcode that contains information (e.g., payment account data) which can be scanned and decoded quickly.

six mobile/digital wallet models[26] in the U.S., the lack of ubiquity and number of solutions create fragmentation. Consumers are often confused and frustrated by the absence of consistent practices, which discourages repeat use and hinders higher adoption.

Opportunities to increase mobile payment adoption exist

Consumers, particularly millennials, are using the mobile channel more frequently for banking and payments than in previous years. One industry survey[27] reported that between 2015 and 2016, 60 percent of millennials increased their use of mobile banking and 57 percent increased their use of a digital wallet. Another survey, conducted by a large FI, reported that mobile wallet transactions currently represent less than five percent of all transactions. Yet, the results indicated strong growth in mobile wallet purchase and spend volume across all consumer age groups, with the convergence of POS, mobile, and digital channels helping to build this momentum. [28]

Changing consumer preferences and behaviors are focused on ease of use, convenience, and immediacy of payment that can be obtained through the mobile channel. Consumers also seek incentives and other features that are customized and real-time. In response, more providers are offering mobile solutions that connect purchases and payments across POS, online, and mobile channels to alleviate consumer pain points and provide value-added services. For example, some merchants follow the Uber model (frictionless, background payment transactions). Others, such as QSR/coffee shops, permit mobile order and prepayment in advance with faster "no-line" in-store pick up. Use cases at the periphery of retail, such as public transit, parking, ride-sharing, kiosks, and vending machines are advancing and should be included as a component to achieve broader consumer adoption.

FIs represent an important stakeholder group, although not yet at the epicenter of mobile payments. They play a strong role in the payments landscape, which is why the 2016 MFS Survey should be useful to FIs determining their next steps to enhance or develop their mobile banking and payment strategies.

[26] Wallet models include NFC with secure element or HCE, QR code, digital check-out, etc.
[27] "Expectations & Experiences: Consumer Payments," *Fiserv*, August 2016. The report is based on survey data collected in November 2015.
[28] "July 2016 Bank of America Consumer Spending Snapshot," *Bank of America*, July 31, 2016.

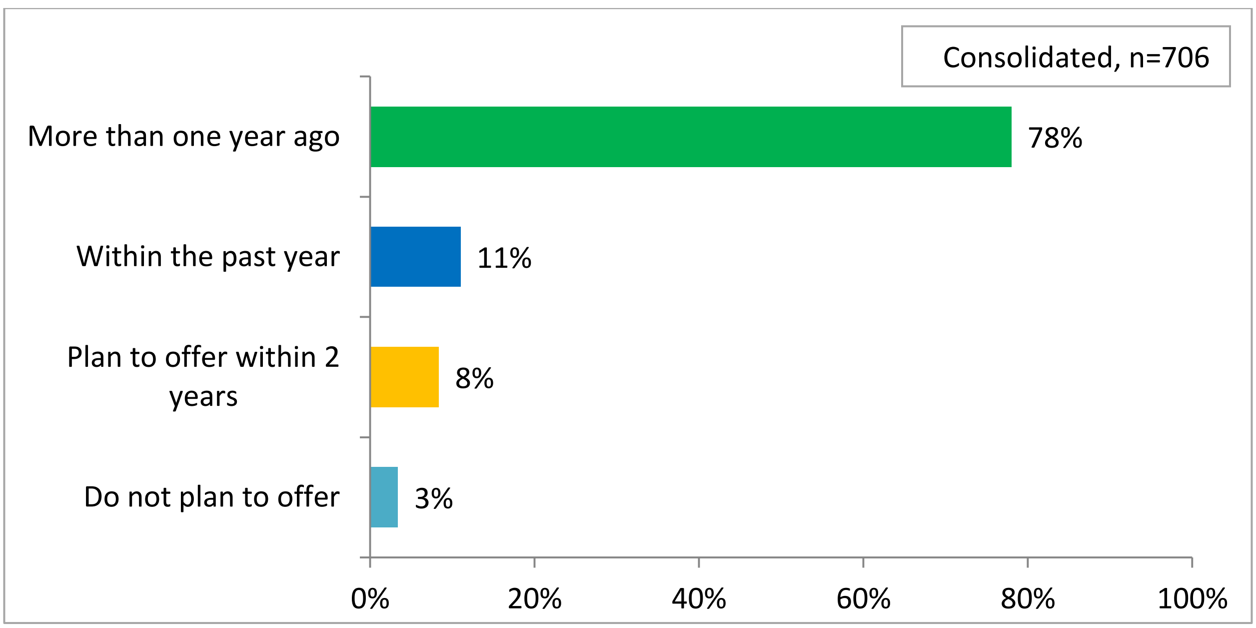
VI. Consumer Mobile Banking Survey Results

Since 2008 when the FR Bank of Boston conducted the first survey in this series, mobile banking has evolved from being an emerging service to an essential offering for FIs. In response to growing consumer demands for greater convenience, speed, and security from their financial service providers, FIs are enhancing their digital and mobile channels.

The 2016 MFS Survey results show that 89 percent of FI respondents currently offer mobile banking to consumers. Another eight percent plan to do so within the next two years, bringing the total of mobile-enabled FIs to 97 percent.

Seventy-eight (78) percent of banks and credit unions have offered mobile banking for at least one year, and another 11 percent implemented mobile services within the twelve months preceding the survey (**Figure 5**). The percentage of FIs that still have no plans to offer mobile services has dropped to three percent – half the 2014 rate.

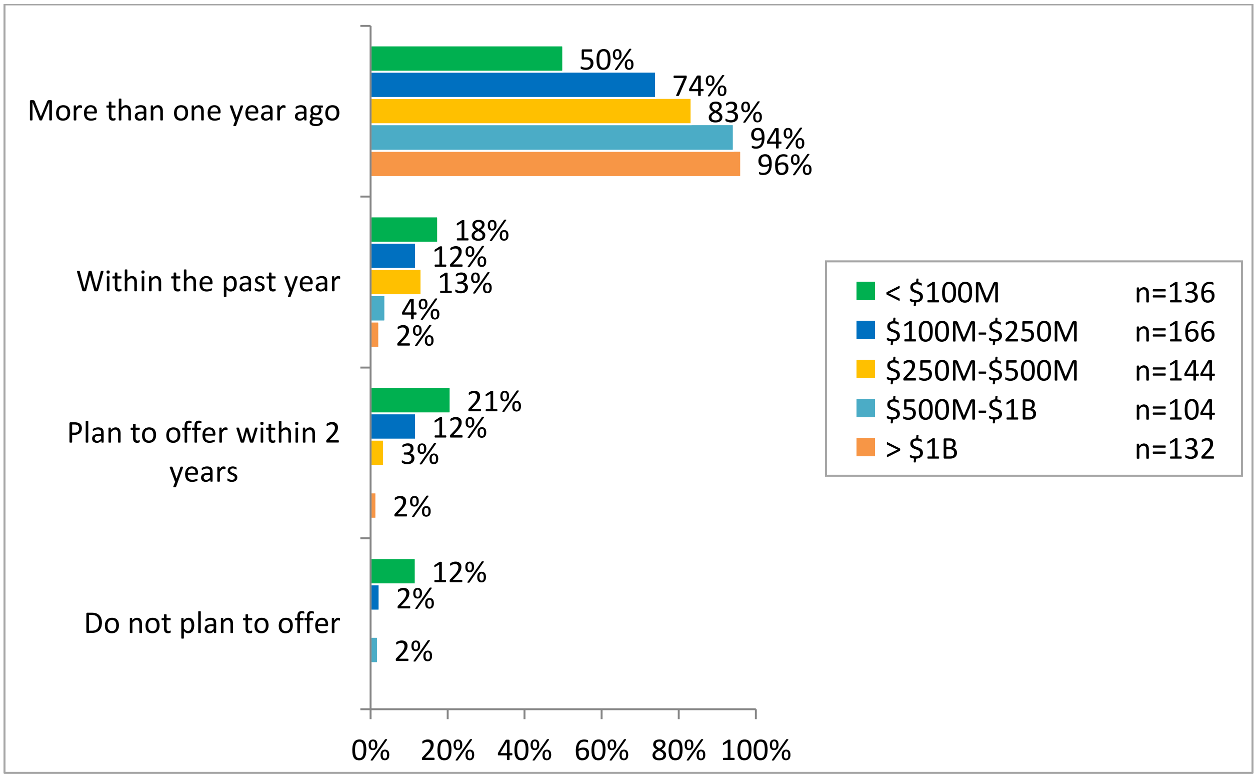
Figure 5: FIs Offering Mobile Banking Services (percent of respondents)



Q12. When did you start offering mobile banking to CONSUMERS? (Check only ONE)

Larger banks and credit unions have been offering mobile banking longer than smaller FIs. FIs in the lowest asset tier in particular started offering mobile banking more recently. As **Figure 6** shows, only 50 percent of FIs with less than $100 million in assets have offered mobile banking services for more than one year, and another 18 percent began offering mobile banking within the past year. Twenty-one (21) percent of that asset group plan to implement mobile banking in the next two years. Among the 24 respondents with no plans to offer mobile banking, 16 have less than $100 million in assets. All respondent banks with more than $1 billion in assets currently are or will be offering mobile banking within the next two years.

Figure 6: FIs Offering Mobile Banking Services (percent of respondents by asset size)

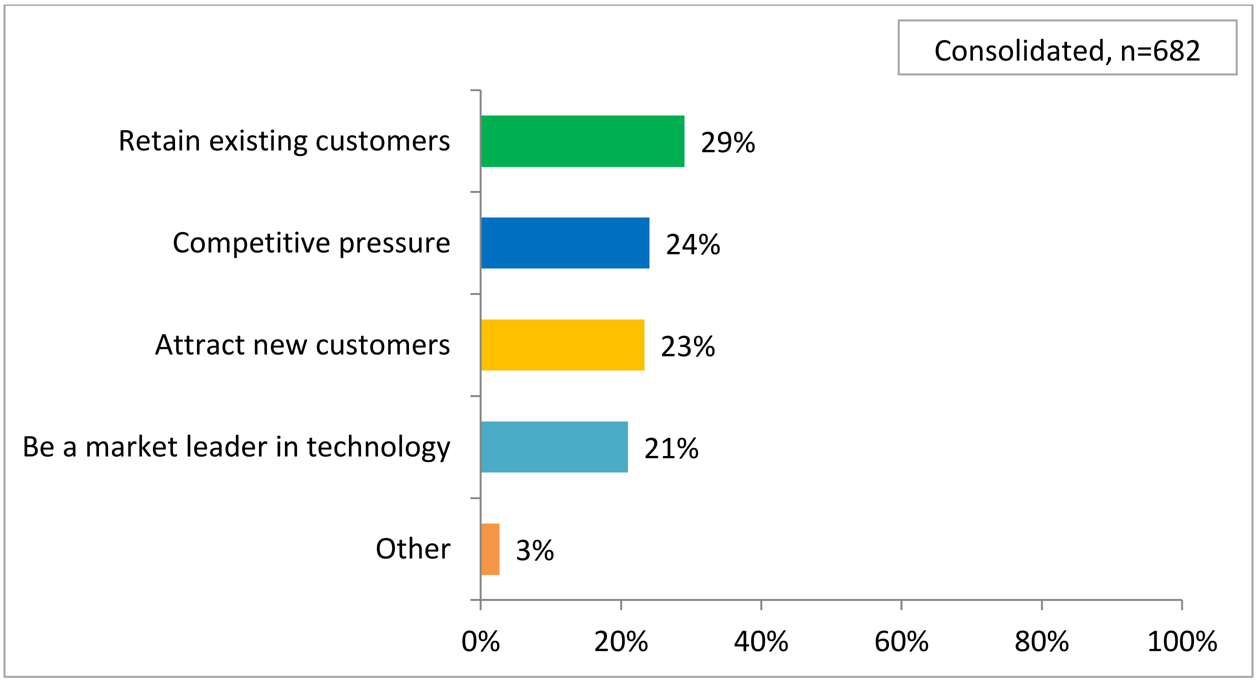


Q12. When did you start offering mobile banking to CONSUMERS? (Check only ONE)

Mobile Banking Strategies

Many respondents selected 'retain existing customers' as their primary reason to offer mobile banking. 'Competitive pressure' was the primary reason for offering mobile banking for 24 percent of FIs, 23 percent chose 'attract new customers,' and another 21 percent selected the desire to 'be a market leader in technology.' This represents a shift in strategy from 2014 when responses were split among the top three reasons. By 2016, only customer retention remained the same; both competition and customer acquisition lost support as seven percent more respondents focused on being a market leader in technology. Three percent of FIs ('other' responses) gave equal importance to multiple factors (e.g., customer retention and attracting new customers). (Refer to **Figure 7** below.)

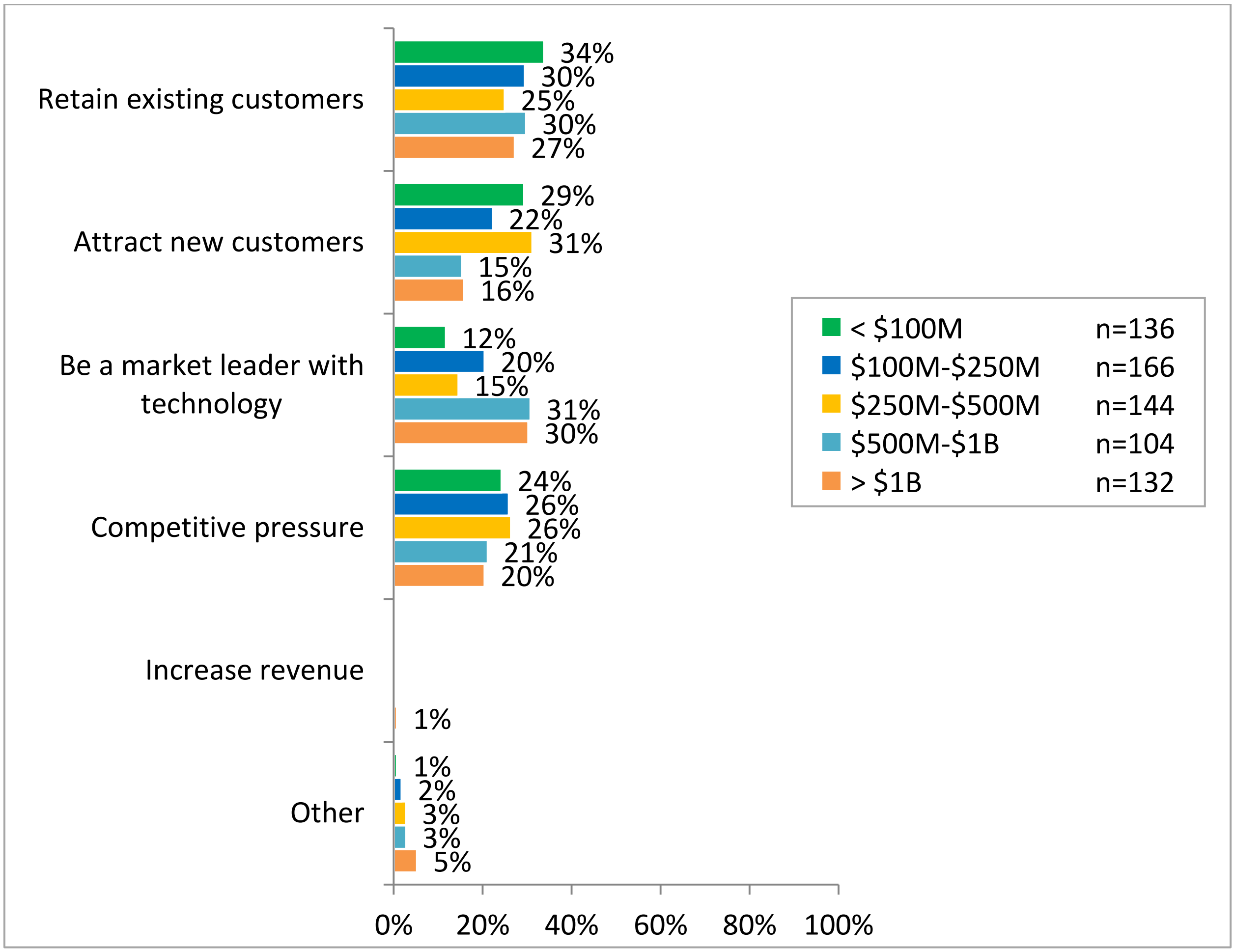
Figure 7: Primary Business Reason for Offering Mobile Banking (percent of respondents)



Q13. What is your PRIMARY business reason for offering or planning to offer mobile banking? (Check only ONE)

Asset size influences an FI's primary reason for offering mobile banking (**Figure 8**). FIs with less than $100 million in assets are focused on retaining customers (34 percent), while FIs with more than $500 million in assets selected being market leaders with technology (31 percent). Only one FI selected increasing revenue as the primary reason, which indicates that revenue is not a factor for offering mobile banking.

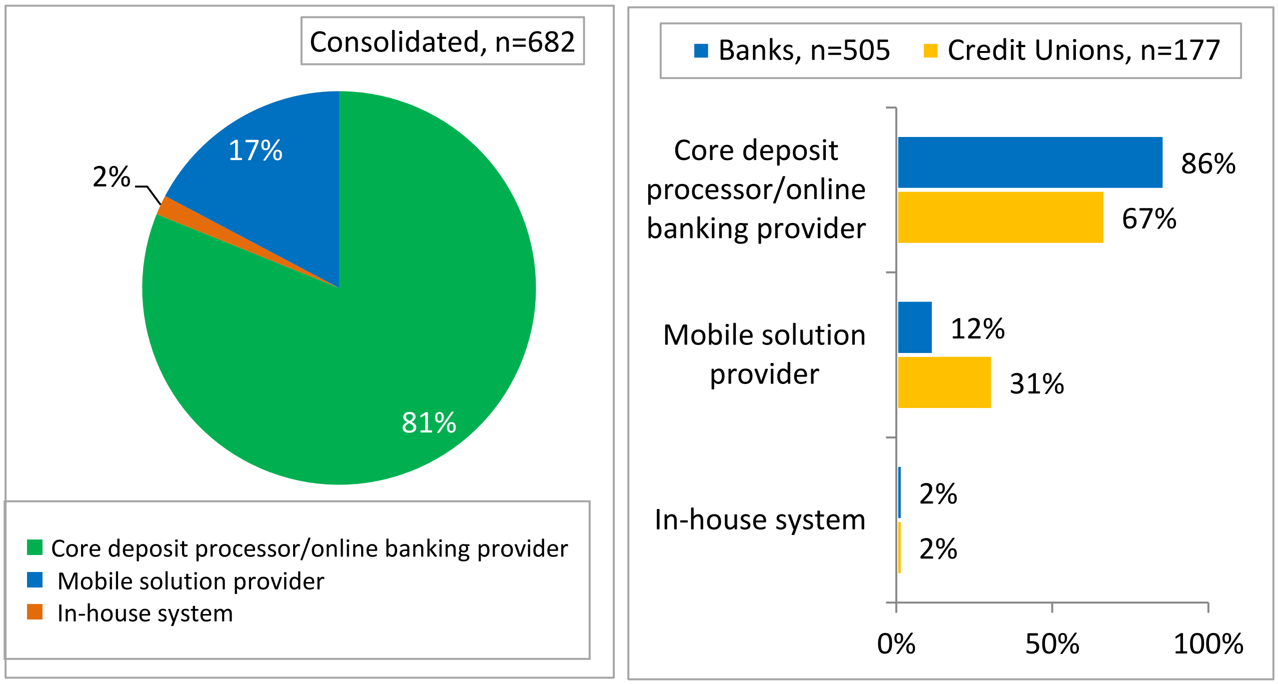
Figure 8. Primary Business Reason for Offering Mobile Banking by Asset Size (percent of respondents)



Q13. What is your PRIMARY business reason for offering or planning to offer mobile banking? (Check only ONE)

Most respondents rely on their core deposit processors or online banking providers to deliver mobile banking services that parallel what they offer via the online channel (**Figure 9**). Thirty-one (31) percent of credit union respondents implement services from mobile solution providers, possibly because their core service providers do not offer mobile banking; while just 12 percent of banks use mobile solution providers.

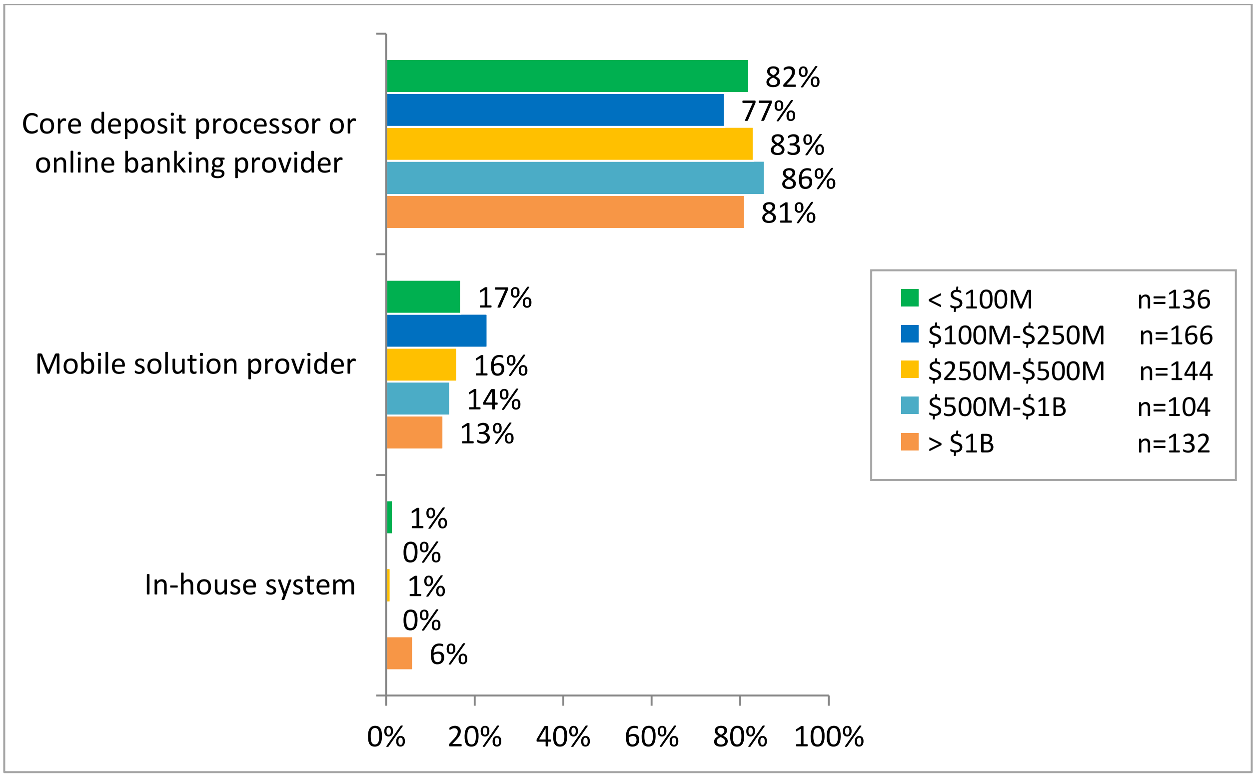
Figure 9: Use of Providers of Mobile Banking Services (percent of respondents)



Q16. Who provides or will provide your mobile banking service

Only 11 respondents (seven which are banks with assets over $1 billion) have developed in-house mobile banking systems (**Figure 10**).

Figure 10: Use of Providers of Mobile Banking Services by Asset Size (percent of respondents)

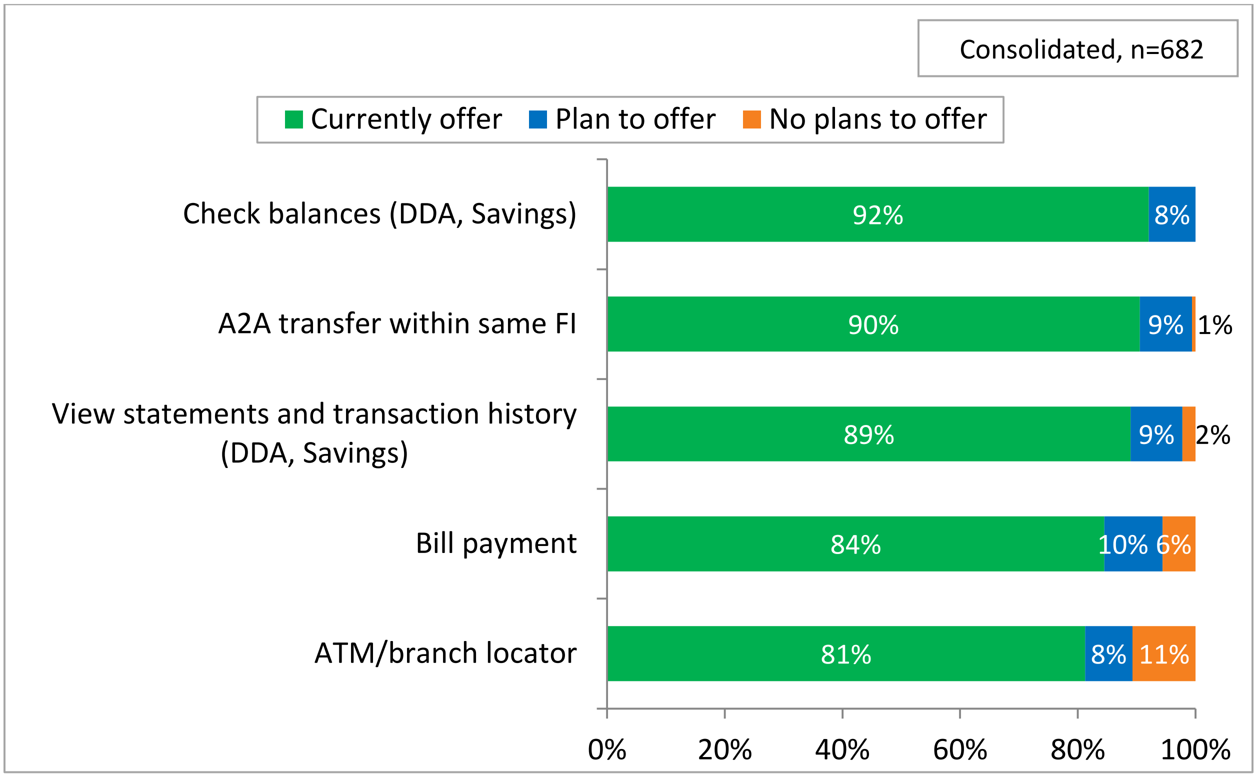


Q16. Who provides or will provide your mobile banking service?

Consumer Services and Capabilities

Most FIs initially offer the five basic mobile banking services shown in **Figure 11**. Checking account balances and transferring funds between accounts within the same FI are the most common, offered by more than 90 percent of respondents. Overall, the results were consistent across FI-type, District, and asset size.

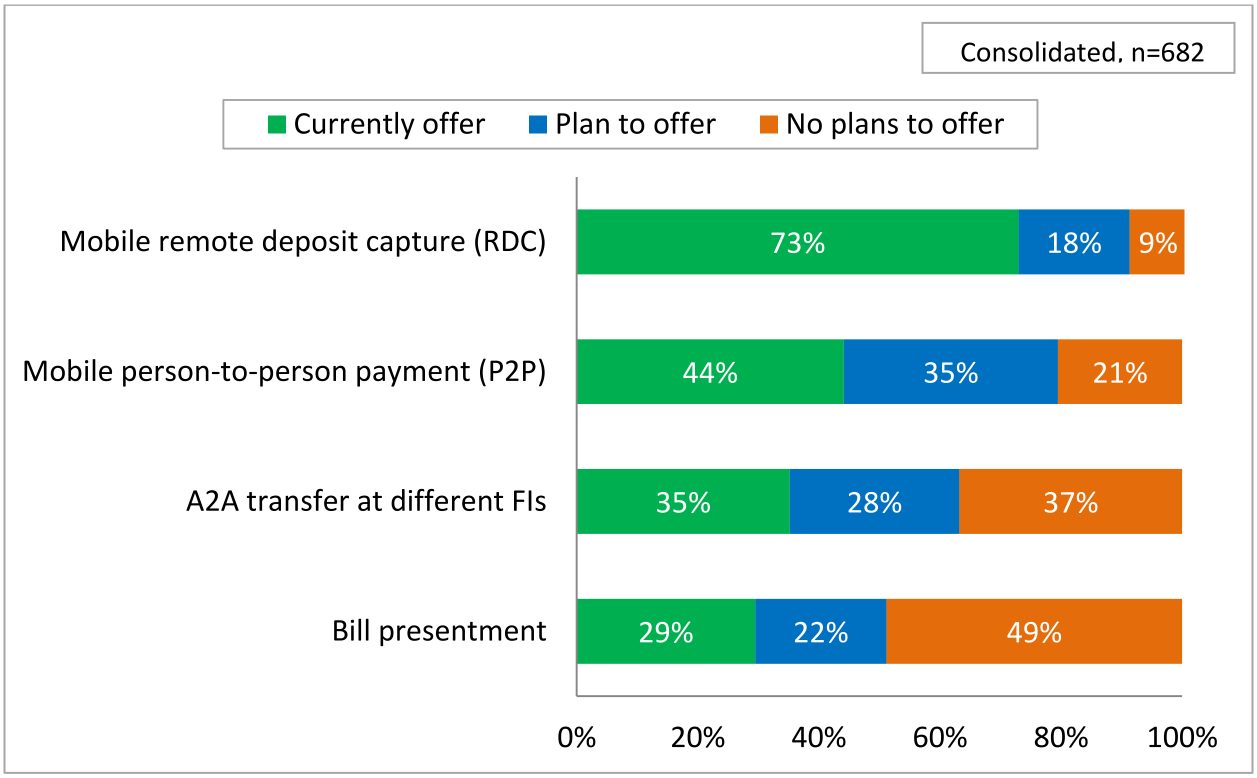
Figure 11: Basic Mobile Banking Services Offered by FIs (percent of respondents)



Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

Some FIs offer more advanced mobile banking functions, such as mobile remote deposit capture (mRDC), mobile person to person (mP2P) payments, funds transfers between accounts (A2A) at different FIs, and bill presentment (**Figure 12**). Mobile RDC is becoming a basic mobile banking service, as 73 percent of respondents offer the service and another 18 percent plan to do so by end-of-year 2018. The number of FIs offering mP2P payments is also expanding rapidly: 79 percent of respondents expect to offer it by the end of 2018. The majority of respondents also expect to offer A2A transfers between a customer's accounts at their own and another FI as well as bill presentment as part of their mobile banking services.

Figure 12: Advanced Mobile Functions Offered by FIs (percent of respondents)



Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

Table 5 presents the percentages of FIs that offer multiple advanced mobile banking features. Eighty-nine (89) percent of FIs that offer mRDC also offer at least one other advanced mobile capability, including 38 percent that offer only mRDC and mP2P payments. Ten (10) percent of the group offer all four advanced features.

Table 5: Advanced Mobile Features Offered by FIs (percent of respondents)

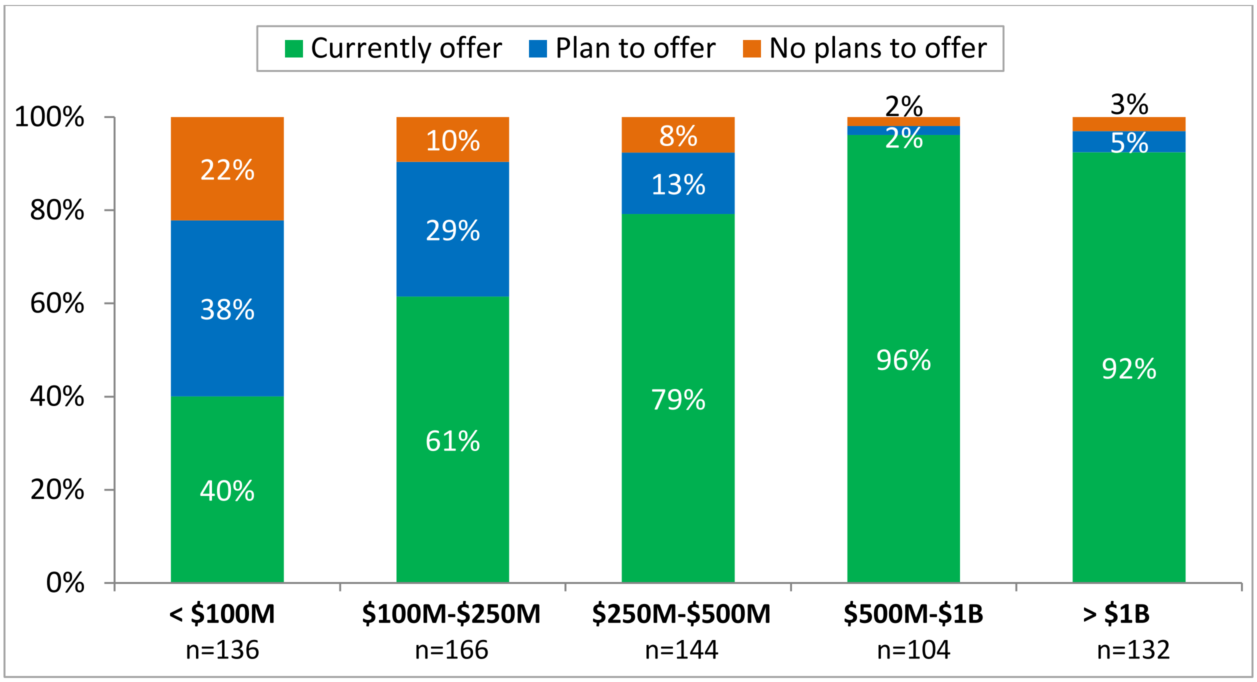
Mobile RDC	Mobile P2P	External A2A	Bill Presentment	FIs offering mobile banking features *n=682*
✓	✓			38%
✓	✓	✓		21%
✓	✓	✓	✓	10%
✓	✓		✓	6%
✓		✓		6%
✓			✓	5%
✓		✓	✓	3%
	✓	✓		2%
	✓	✓	✓	1%
	✓		✓	1%
		✓	✓	< 1%

Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

Mobile Remote Deposit Capture

At the consolidated level, 73 percent of respondents enabled retail customers to deposit checks via mobile in 2016, a significant increase from 2014 when just 48 percent did so. Larger FIs were in the market earlier with mRDC, and more than 90 percent of FI respondents above $500 million in assets offer the service today. Even among the smallest respondents, 78 percent support or plan to support mRDC within two years (**Figure 13**).

Figure 13: FIs Offering Mobile Remote Deposit Capture by Asset Size (percent of respondents)



Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

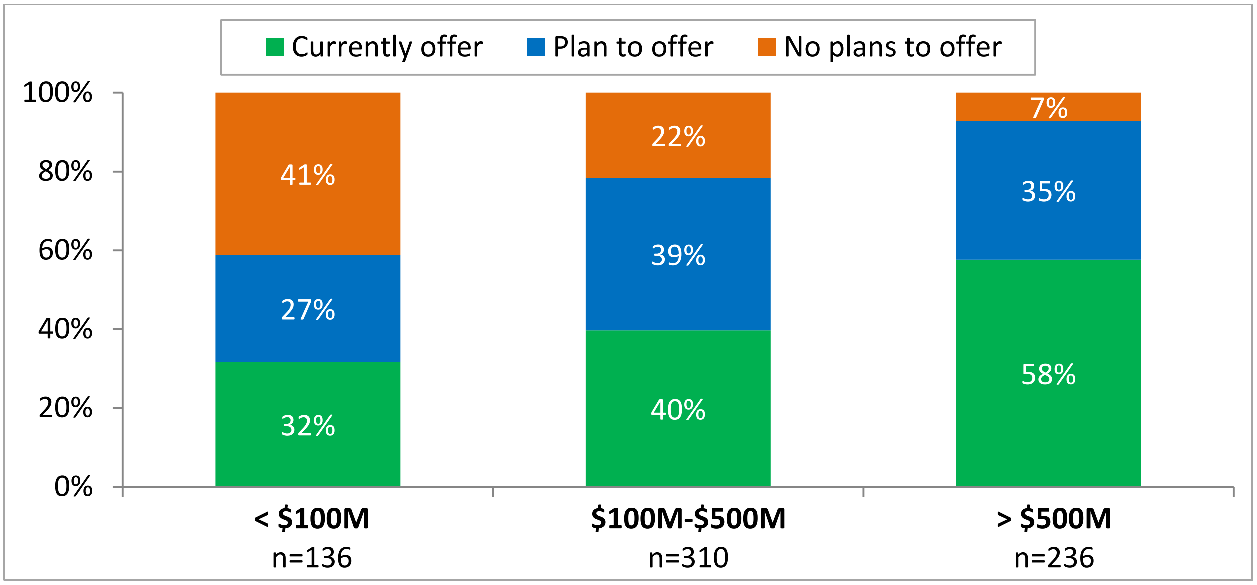
These findings are consistent with industry trends that show that mRDC is one of the most popular mobile banking features. According to Javelin's *2016 Mobile Banking Financial Institution Scorecard* study, 97 percent of the top 30 U.S. financial institutions (by deposit size) currently offer mRDC.[29] Some are enhancing their mRDC services by providing more sophisticated features that include display of mobile deposit limits, customized limits, communicating deposit funds availability, reviewing check images, and automatic mobile deposit image capture.

[29] Daniel Van Dyke and Emmet Higdon, "2016 Mobile Banking Financial Institution Scorecard," *Javelin Research & Strategy,* May 2016.

Mobile Person-to-Person Payments

Across Districts, 44 percent of FI respondents offered mP2P payments in 2016 compared to only 26 percent in 2014 – and another 35 percent plan to offer mP2P by 2018. As in the case with mRDC, larger FIs were in the market first with mP2P and a higher percentage offer the service (**Figure 14**). Although the uptake is not as significant as mRDC, a majority of FIs in each asset tier plan to offer P2P payments via mobile within two years.

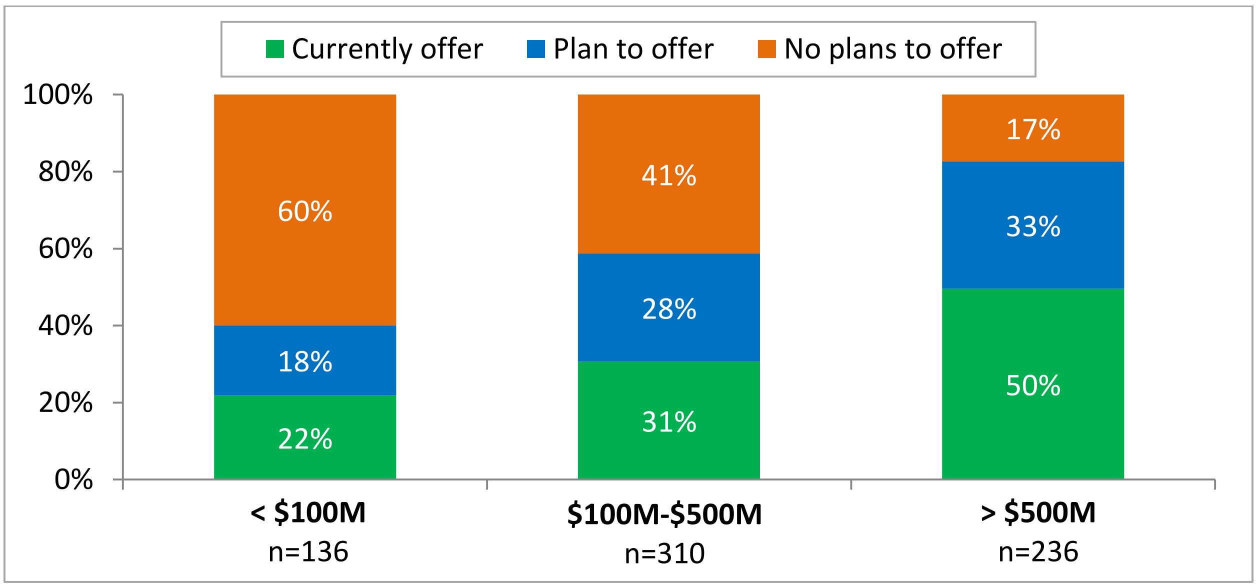
Figure 14: FIs Offering Mobile P2P by Asset Size (percent of respondents)



Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

While a growing number of banks and credit unions (35 percent of respondents) enable customers to perform external A2A transfers, it is one of the least commonly offered mobile banking services. However, this percentage is somewhat higher than the 23 percent of respondents that supported external A2A transfers in 2014, and again, they are primarily larger FIs (**Figure 15**). Fifty (50) percent of respondents with assets over $500 million currently support external A2A transfers, while only 22 percent of FIs with assets under $100 million already provide this service, and just another 18 percent of those smaller FIs plan to offer it within the next two years. Fifty-nine (59) percent of FIs with assets between $100 million and $500 million offer or plan to offer external mobile A2A services by 2018. Customer demand as well as the FI's appetite for risk must be considered when deciding whether to offer mobile A2A.

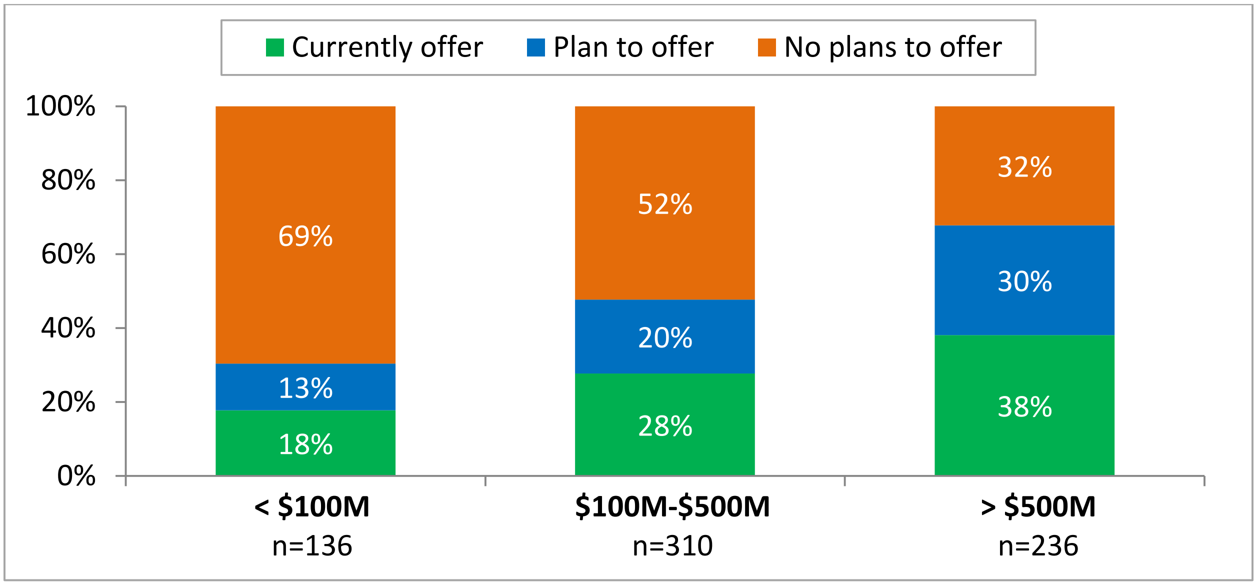
Figure 15: FIs Offering External A2A Transfers by Asset Size (percent of respondents)



Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

Most FIs do not offer online bill presentment services, so it is not surprising that less than a third of respondents in the lowest two asset tiers currently offer mobile bill presentment and only 38 percent offer bill presentment in the over $500 million asset tier. The service is primarily the purview of larger FIs, but even among respondents in the largest asset tier, 32 percent have no plans to offer it by 2018 (**Figure 16**).

Figure 16: FIs Offering Bill Presentment by Asset Size (percent of respondents)

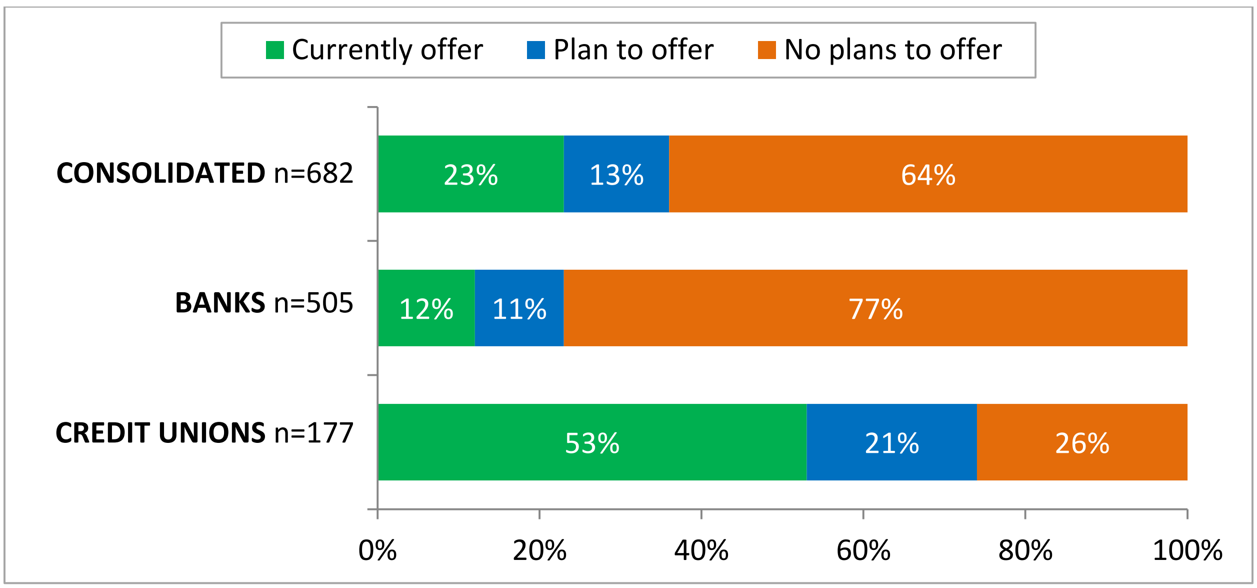


Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

Specialized Mobile Banking Features

Few FI respondents support specialized mobile banking features, such as credit card account services, personal financial management (PFM), access to brokerage services, or cross-border payments. At the consolidated level, 23 percent of respondents allow customers to view credit card balances, statements, and transaction history via mobile (**Figure 17**). The number of bank respondents, however, skews the consolidated findings, obscuring results that show more credit unions offering credit card account services. The same was true in 2014, when nine percent of banks and 46 percent of credit unions offered this feature. Thirty-six (36) percent of the credit unions (47 of 131 credit unions) that offer mobile credit card account services have mobile banking systems from mobile solution providers, compared to 16 percent of banks (19 of 116 banks).

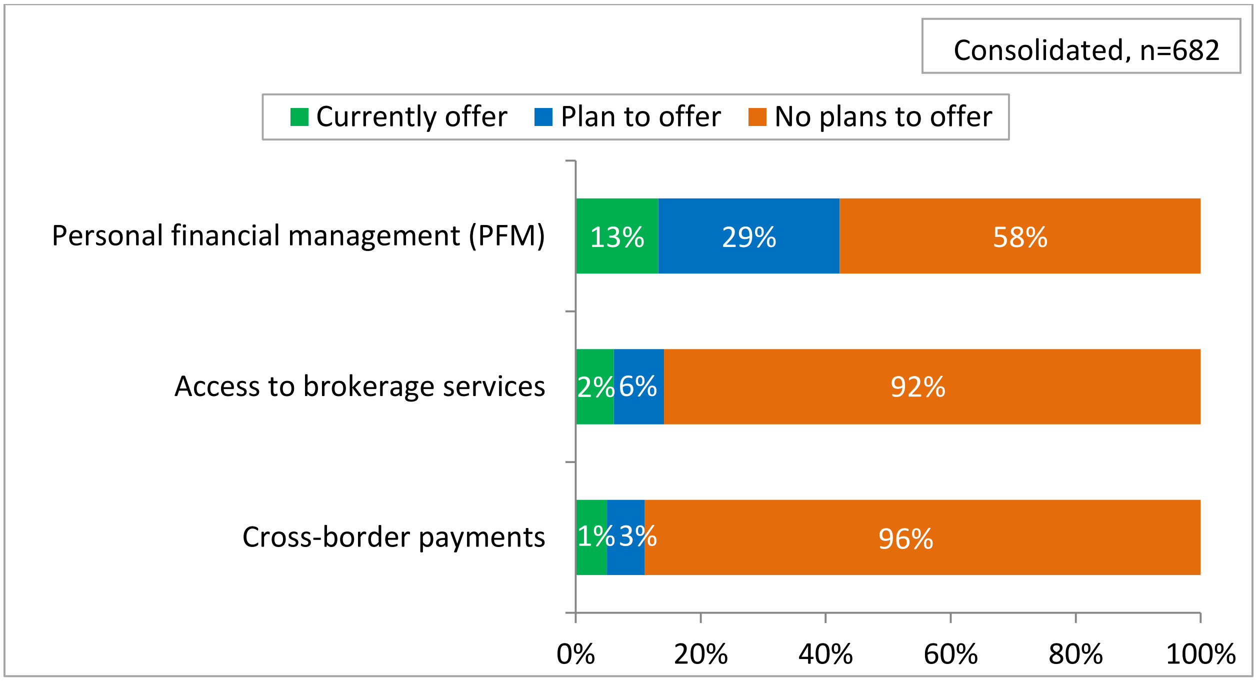
Figure 17: FIs Offering Mobile Credit Card Account Services (percent of respondents)



Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

FIs' low interest in mobile PFM tools has remained consistent since 2014 when only 12 percent of respondents offered them; just 13 percent offered them in 2016. However, in 2014, 27 percent of respondents indicated that they planned to support PFM tools by 2016, which clearly did not materialize. Just a few more FIs, or 29 percent, stated in 2016 that they plan to offer such tools by 2018 (**Figure 18**). It will be interesting to see whether these plans will be realized at that time. Smaller banks and credit unions do not typically offer brokerage services or cross-border payments –regardless of channel –so we would not expect to see much activity in those FI segments today. Just eight percent provided or planned to provide access to brokerage services, and only five banks and four credit unions offered or planned to offer mobile cross-border payments.

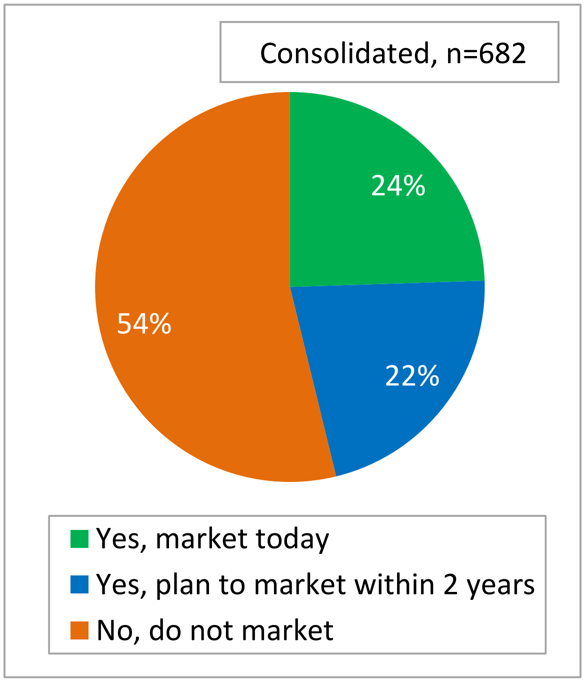
Figure 18: Specialized Mobile Banking Services Offered by FIs (percent of respondents)

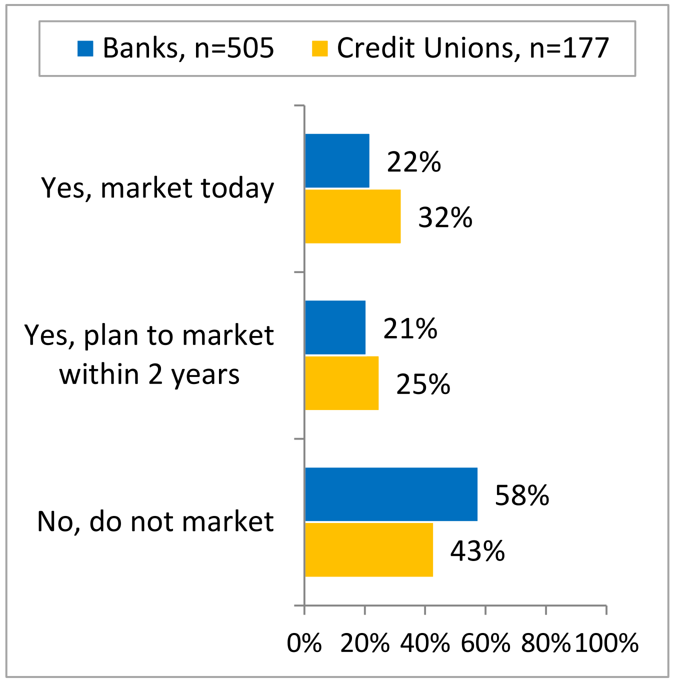


Q17. Which of the following mobile banking features do you currently offer or plan to offer within the next 2 years? (Check ALL that apply)

Services to underbanked consumers are gaining some momentum among FI respondents. In 2014, 15 percent of respondents targeted mobile banking to this customer segment. By 2016, 24 percent of respondents reported marketing mobile banking services to the underbanked, and another 22 percent plan to do so by year-end 2018 (**Figure 19**). On a percentage basis, more credit unions than banks market mobile banking to the underbanked.

Figure 19: Marketing Mobile Banking Services to the Underbanked (percent of respondents)



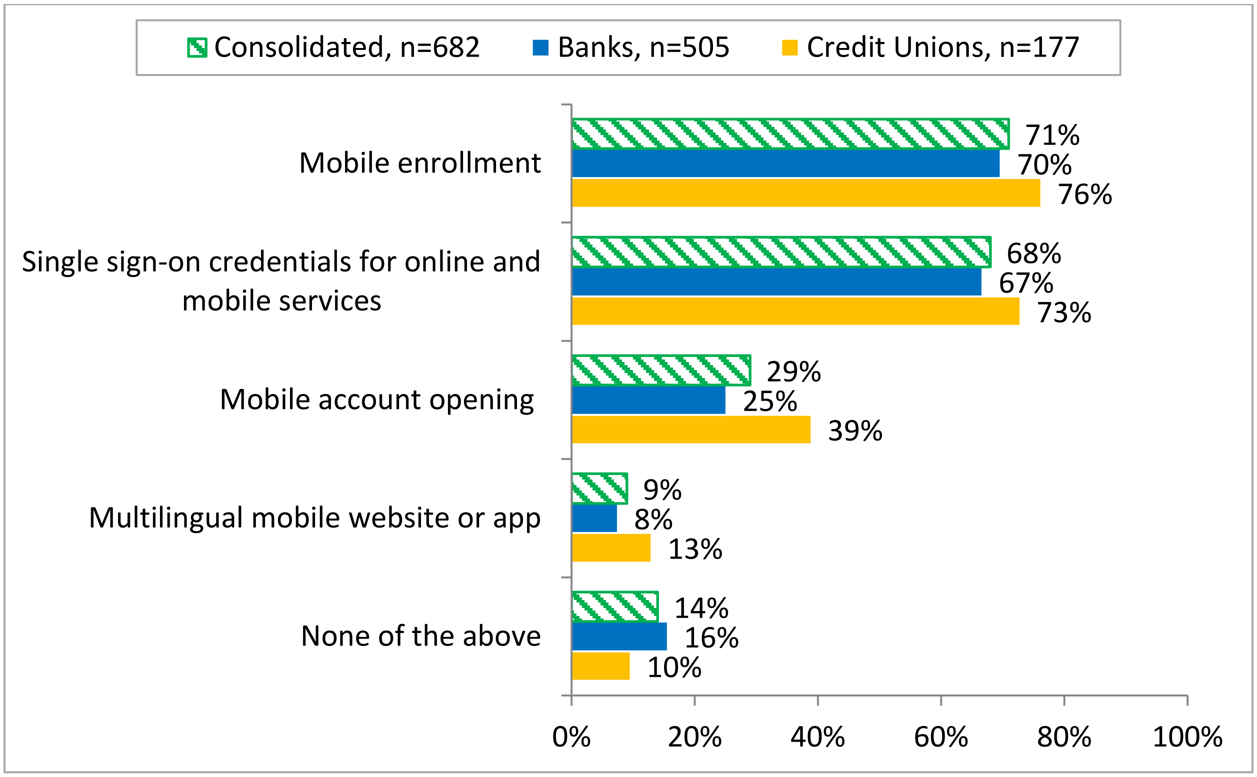


Q19. Do you market or plan to market any mobile banking products to the underbanked?

Mobile Banking Usability Features

Banks and credit unions offer a variety of mobile onboarding and usability features such as enrollment and account opening (**Figure 20**). Seventy-one (71) percent of survey respondents supported mobile banking enrollment, and 68 percent supported single sign-on (SSO) credentials for online and mobile banking services. Less than a third (29 percent) of all respondents supported the ability to open checking or savings accounts through the mobile channel. A slightly higher percentage of credit unions than banks supported these features, the greatest difference being 'mobile account opening.'

Figure 20: Mobile Banking Usability Features Offered by FIs (percent of respondents)

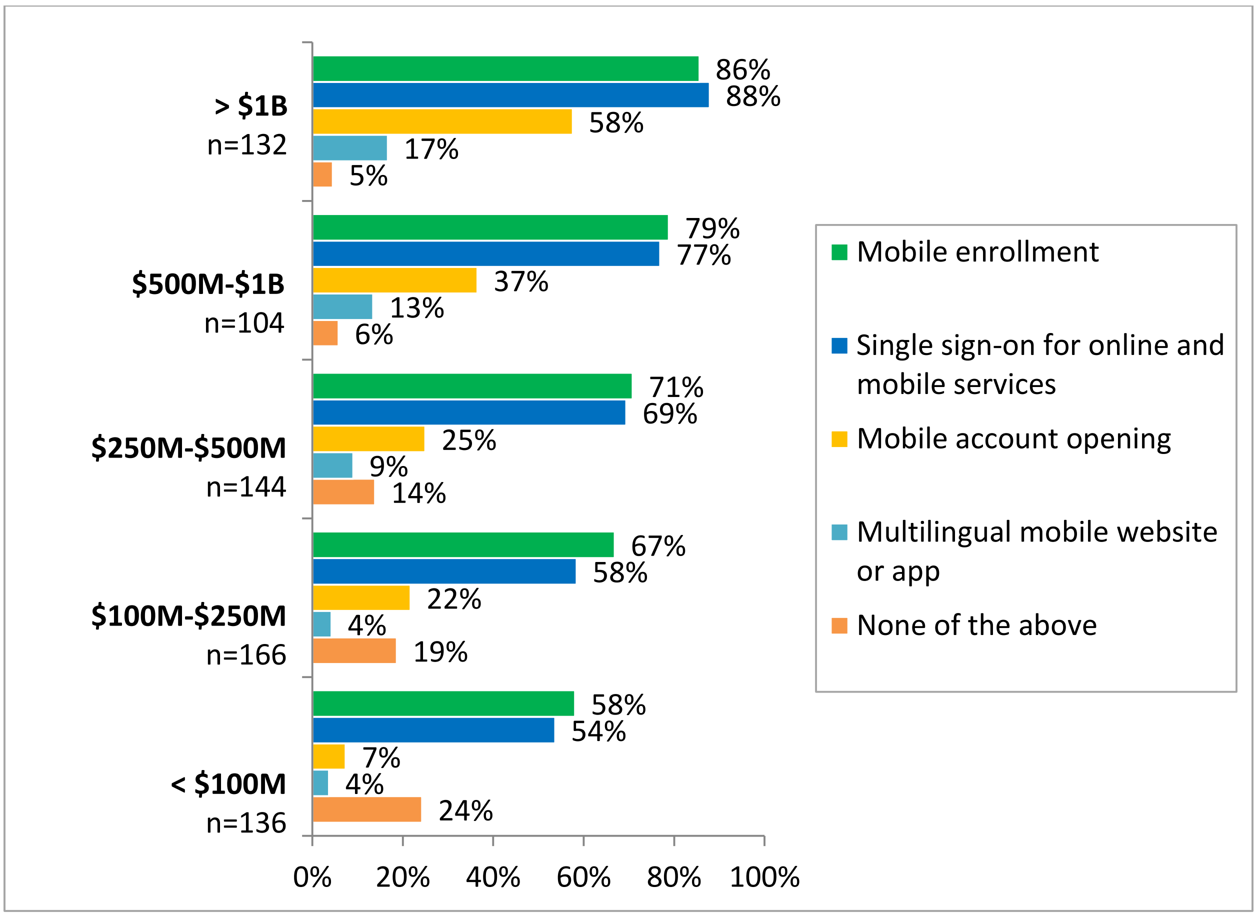


Q18. Do you offer or plan to offer the following mobile features? (Check ALL that apply)

Large FIs supported all mobile banking usability features at higher rates. FIs with more than $1 billion in assets represented the only tier where more than 80 percent offered mobile enrollment and SSO. Similarly, this tier was the only one where more than half (58 percent) offered mobile account opening services (**Figure 21**). FIs in all asset tiers prioritized enrollment and SSO over other features.

Account opening is a higher risk activity regardless of channel, and FIs must comply with the appropriate regulations and rules.[30] It is also more complex, sometimes requiring consumers who initiate an application in one channel to switch to another to complete the process. This is supported by industry data, e.g., Javelin, which reported that 33 percent of the 30 largest U.S. FIs (by deposit) support mobile account opening – but that only eight percent of those banks' customers could open an account entirely via the mobile channel.[31]

Figure 21: Mobile Banking Usability Features Offered by FIs by Asset Size (percent of respondents)



Q18. Do you offer or plan to offer the following mobile features? (Check ALL that apply)

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30 FFIEC BSA/AML Examination Manual.

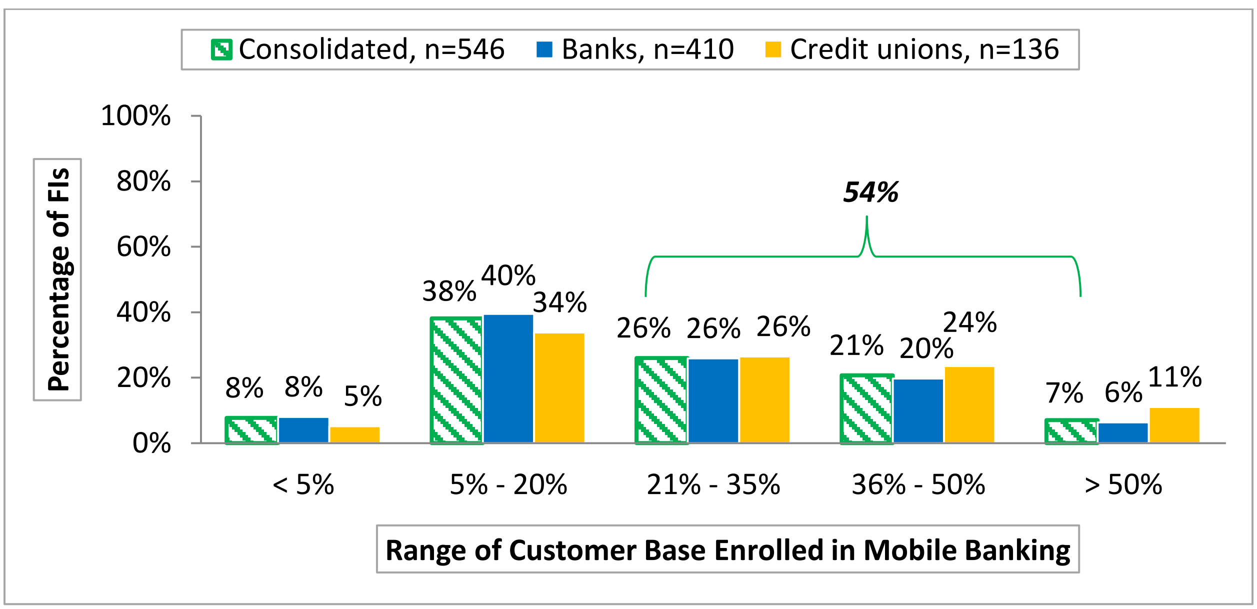
31 Daniel Van Dyke and Emmet Higdon, "2016 Mobile Banking Financial Institution Scorecard," *Javelin Research & Strategy,* May 2016.

Consumer Adoption of Mobile Banking Service

Consumer adoption of mobile banking services is growing steadily as more individuals rely on their mobile phones for access to financial services. According to the *2016 FR Board Consumer Mobile Survey*[32], mobile banking usage has increased annually for all age groups since the survey began in 2011, although younger consumers have consistently used mobile banking more than older consumers. Mobile banking is used by 67 percent of those in the 18-29 age range and 58 percent of those in the 30-44 age range. By comparison, only 18 percent of individuals age 60 or older reported having used mobile banking. The study also indicated that consumer use of mobile banking is shifting from primarily accessing information (e.g., viewing balances, statements, and ATM locations) to performing more complex financial transactions. Additionally, it found that 82 percent of mobile banking users had their FI's mobile app on their phones. Other industry research reported that 96 percent of consumers check balances and transactions, 51 percent deposit checks, and 47 percent pay bills using their FI's mobile app.[33]

Enrollment and usage rates for mobile banking are increasing at FIs across the country. **Figure 22** shows the percentage of FI respondents that have retail customers enrolled in mobile banking and that track such data. Currently, 546 FIs offer mobile banking and track customer enrollment data, while 77 FIs offer mobile banking, but do not track this data. Fifty-four (54) percent of FIs that track the data (52 percent of banks and 61 percent of credit unions) reported that at least 21 percent of their customers enrolled in mobile banking. Only 7 percent of FIs reporting had an enrollment rate greater than 50 percent.

Figure 22: Range of Retail Customers Enrolled in Mobile Banking (percent of respondents)



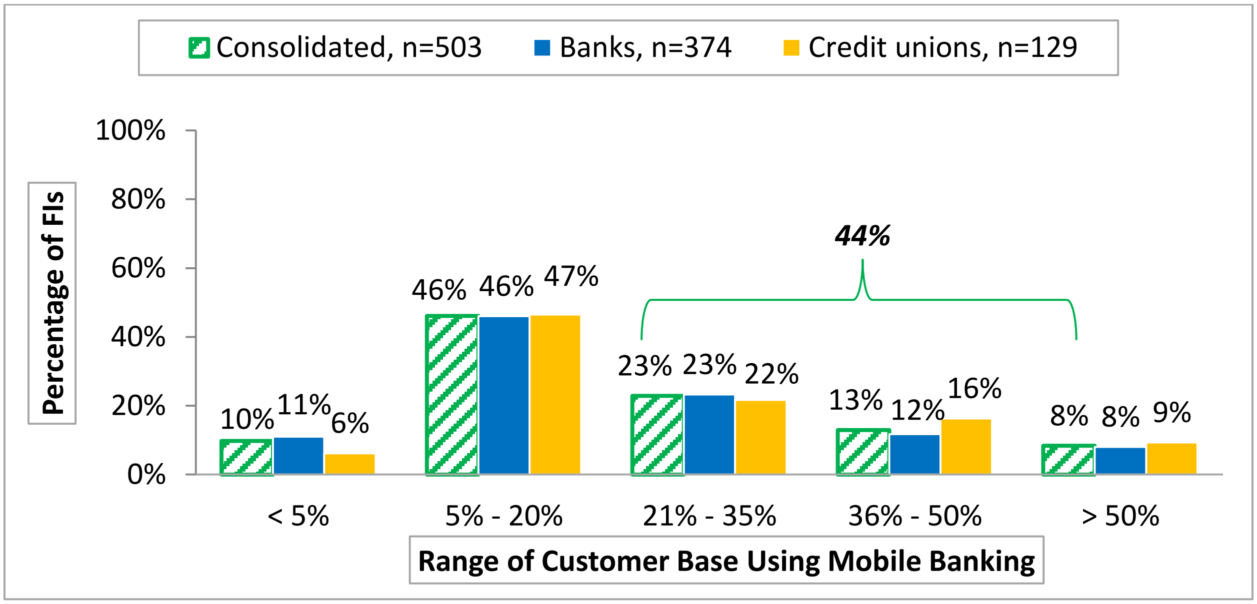
Q20. What percentage of your RETAIL customers has used your mobile banking services?

[32] "Consumers and Mobile Financial Services 2016," *Board of Governors of the Federal Reserve System,* March 2016. The FR Board study defines an active user as having one transaction in the last twelve months and the 2016 MFS Survey defines active users as having one transaction within the last 90 days.

[33] "Study of Mobile Banking & Payments, Third Edition," *First Annapolis Consulting*, August 2016.

Figure 23 shows the percentage of FI respondents with retail customers who actively using mobile banking and that track such data. There are 503 FIs that tracked customer mobile banking usage in the 90 days prior to completing the survey, and 121 FIs that currently offer mobile banking but do not track this data. Fifty-six (56) percent of FIs that track this data have customer mobile banking usage rates of 20 percent or less, but 44 percent are already seeing rates of 21 percent or more.

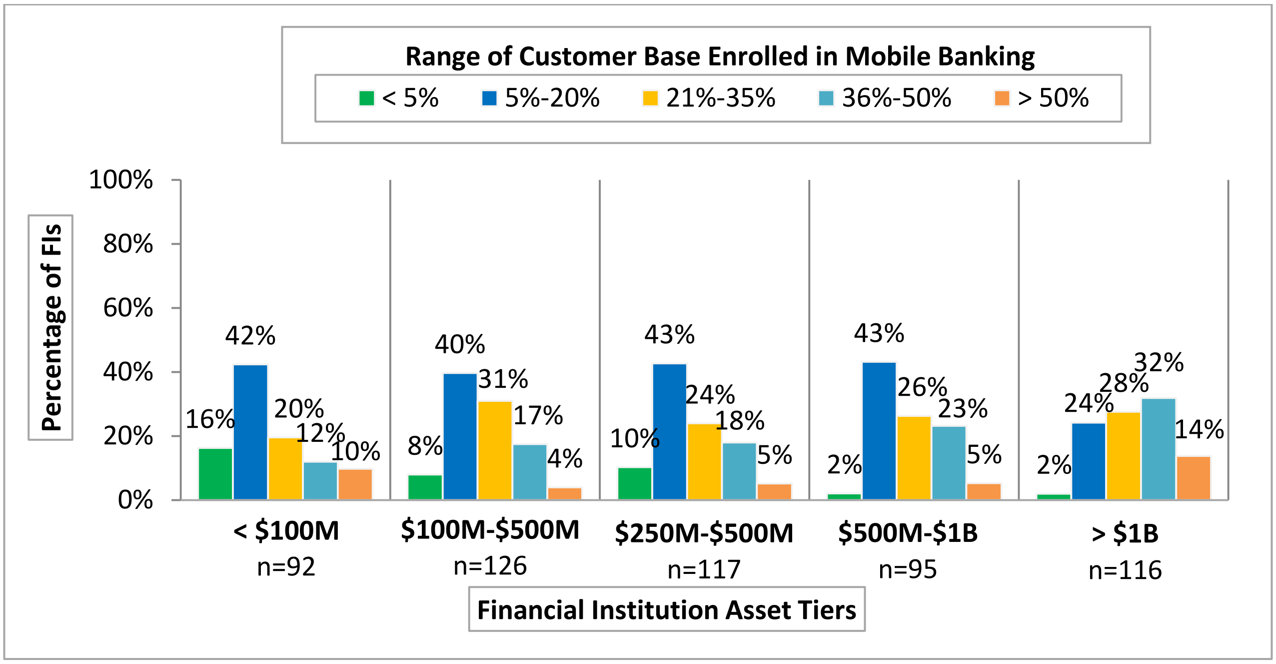
Figure 23: Range of Retail Customers Using Mobile Banking (percent of respondents)



Q20. What percentage of your RETAIL customers has used your mobile banking services?

Larger respondents have more customers enrolled in mobile banking: 46 percent of FIs with assets above $1 billion have over 35 percent of their customers enrolled (**Figure 24**).

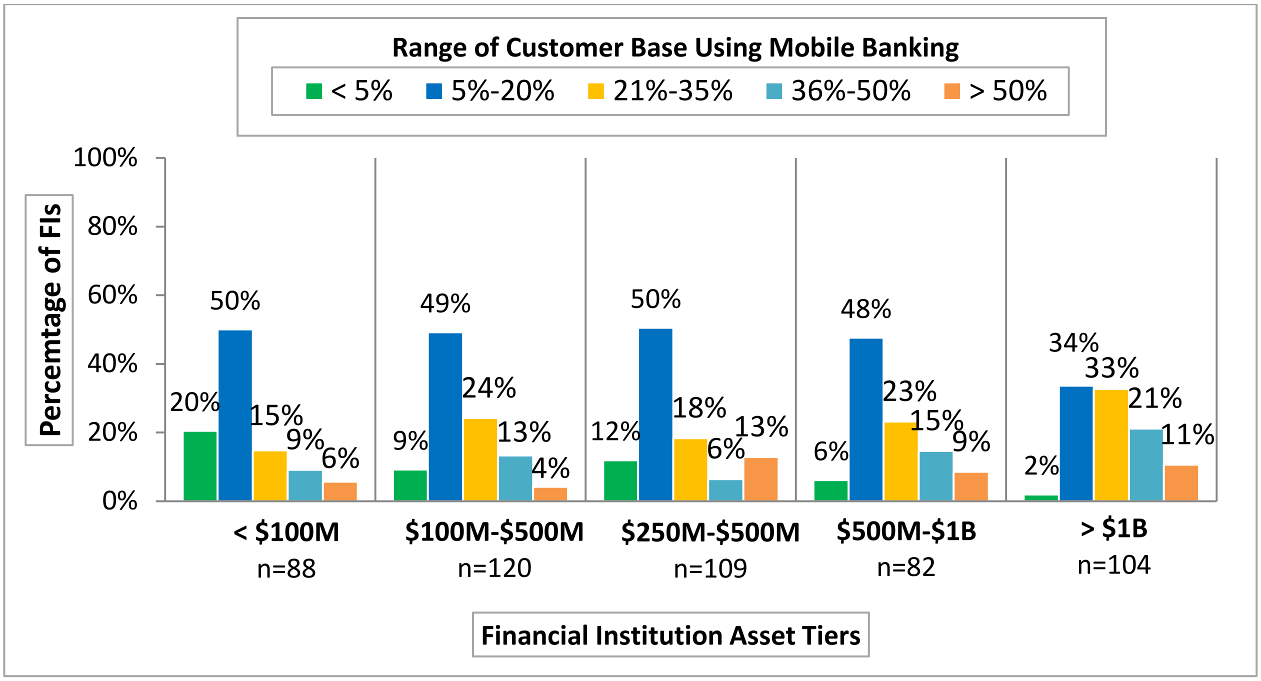
Figure 24: Range of Retail Customers Enrolled in Mobile Banking by Asset Size (percent of respondents)



Q20. What percentage of your RETAIL customers has used your mobile banking services?

Furthermore, 32 percent of FIs with assets above $1 billion have over 35 percent of their customers actively using mobile banking (**Figure 25**).

Figure 25: Range of Retail Customers Using Mobile Banking by Asset Size (percent of respondents)



Q20. What percentage of your RETAIL customers has used your mobile banking services?

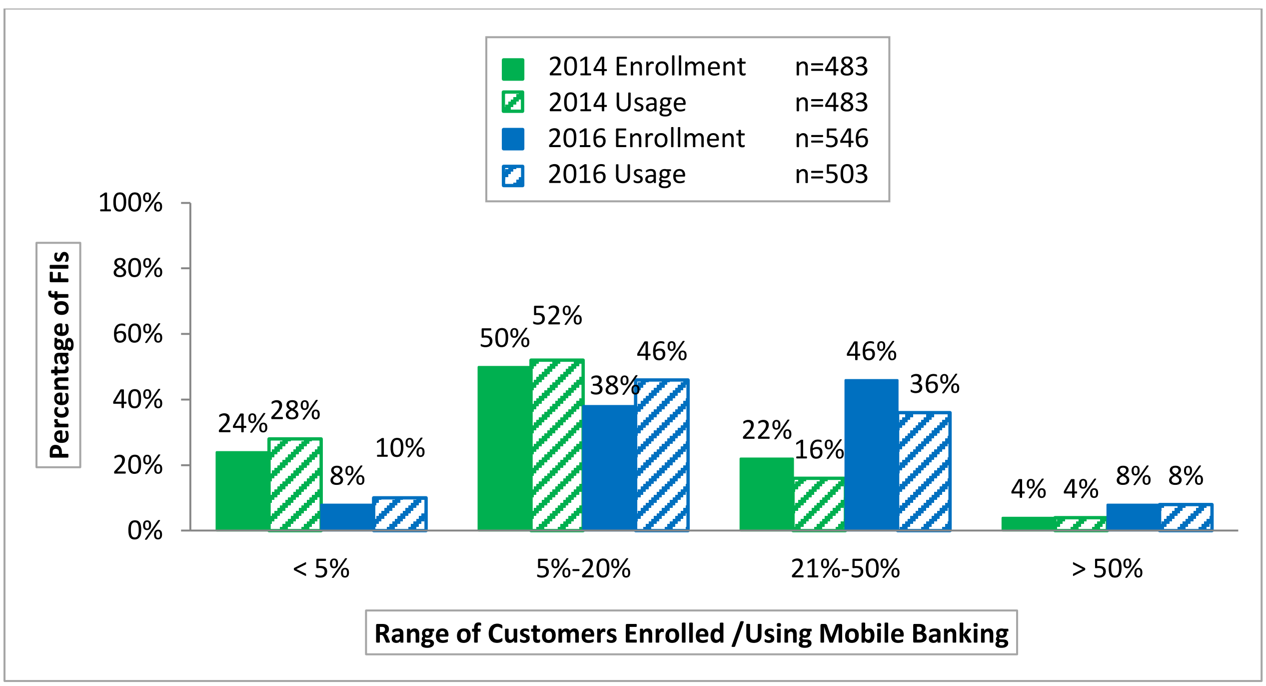
Consumer Adoption Trends – 2014 and 2016 Comparison

As more FIs offer mobile banking services to consumers and increasingly to commercial entities, the number of banking customers enrolled in and actively using mobile banking services increases organically. However, what we have observed in the 2016 data is more than organic growth. After the initial 'soft launch' approach taken by most FIs that introduced mobile banking, FIs have recognized the need for better marketing and are now more actively promoting their consumer mobile banking services – moving those customers to the less expensive mobile channel, and soliciting new customers from growing demographics, primarily millennials.

Much of this change is market-driven as there is now wider consumer acceptance of mobile banking apps and related technologies. Increasing customer adoption, therefore, is an important component of the mobile strategy of many respondent FIs. At those institutions that track such data, enrollment and usage have increased substantially from 2014 to 2016.

Figure 26 highlights the extent to which consumer enrollment and usage have risen during the two-year period. Respondents monitoring this data have seen strong increases, primarily in the 21-to-50 percent adoption range, which doubled in this period. And, although the percentages of FIs with more than 50 percent of their consumers adopting their mobile banking services are much smaller, they have doubled from four percent to eight percent for both enrollment and use.

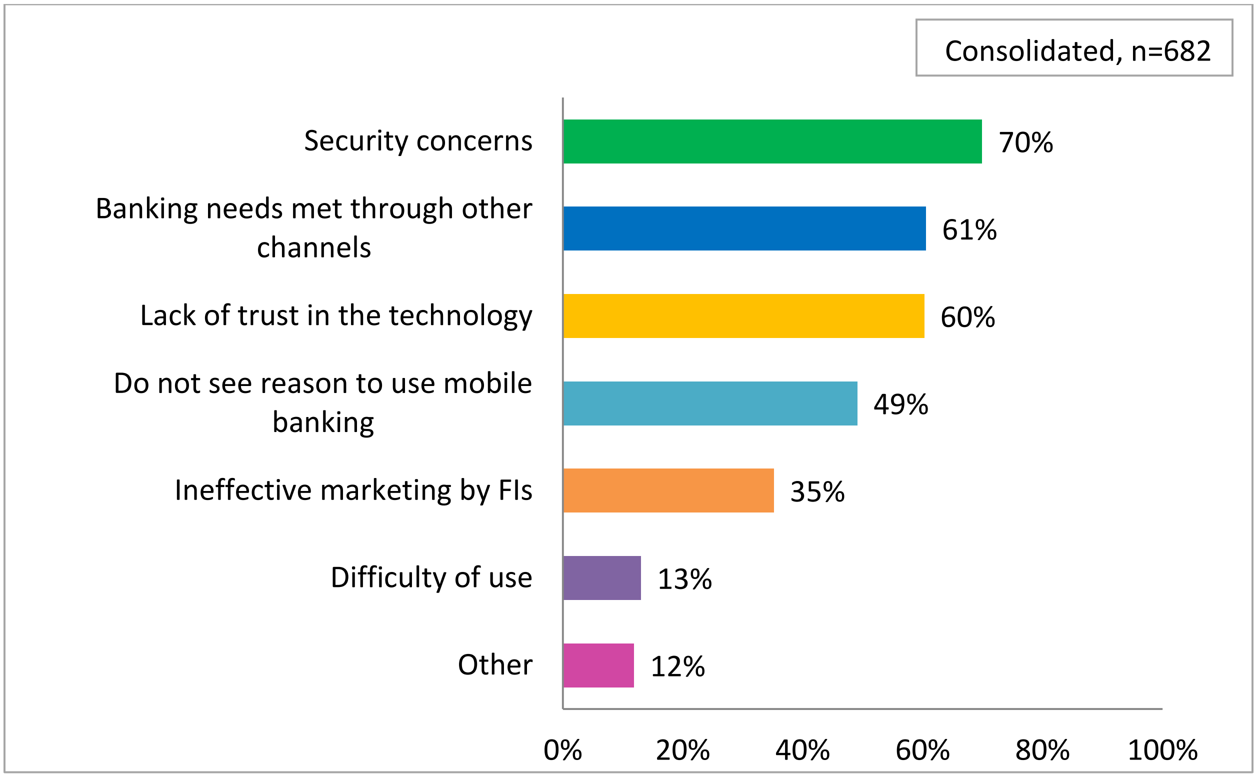
Figure 26: Retail Customer Adoption of Mobile Banking: 2014 and 2016 (percent of respondents)



Q20. What percentage of your RETAIL customers has used your mobile banking services?

Figure 27 shows the barriers to consumer mobile banking adoption from the perspective of the FIs. They identified the top three as: 'security concerns' (70 percent); 'banking needs met through other channels' (61 percent); and 'lack of trust in technology' (60 percent). 'Other' barriers identified included a mature customer base that does not have a mobile lifestyle, inconsistent cellular service, and insufficient staff training to communicate with customers about mobile banking services.

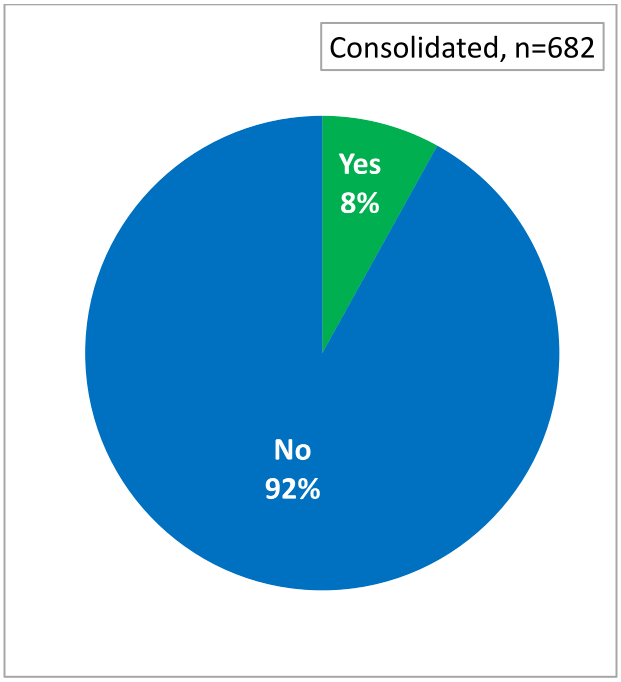
Figure 27: Most Common Barriers to Customer Adoption of Mobile Banking (percent of respondents)



Q21. For your FI, which are the THREE most common barriers to greater CONSUMER adoption of mobile banking? (Check only THREE)

Consumers generally expect mobile banking services to be free, as is the case with online banking. In fact, 92 percent of respondents do not charge for the services (**Figure 28**). In the few instances where FIs charge or plan to charge fees for advanced features, fees for mP2P, mRDC, and external A2A transfers are most common. Large FIs are more likely to charge some fees: of the 55 FIs charging or planning to charge any mobile banking fees, 16 FIs have more than $1 billion in assets and 13 have assets between $500 million and $1 billion.

Figure 28: Consumer Mobile Banking Fees (percent of respondents)



55 FIS CHARGE OR PLAN TO CHARGE FEES FOR:

- Mobile P2P: 41 FIs
- Mobile RDC: 27 FIs
- External A2A transfers: 20 FIs
- Expedited services: 4 FIs

44 FIs CHARGE/PLAN TO CHARGE FOR MULTIPLE SERVICES:

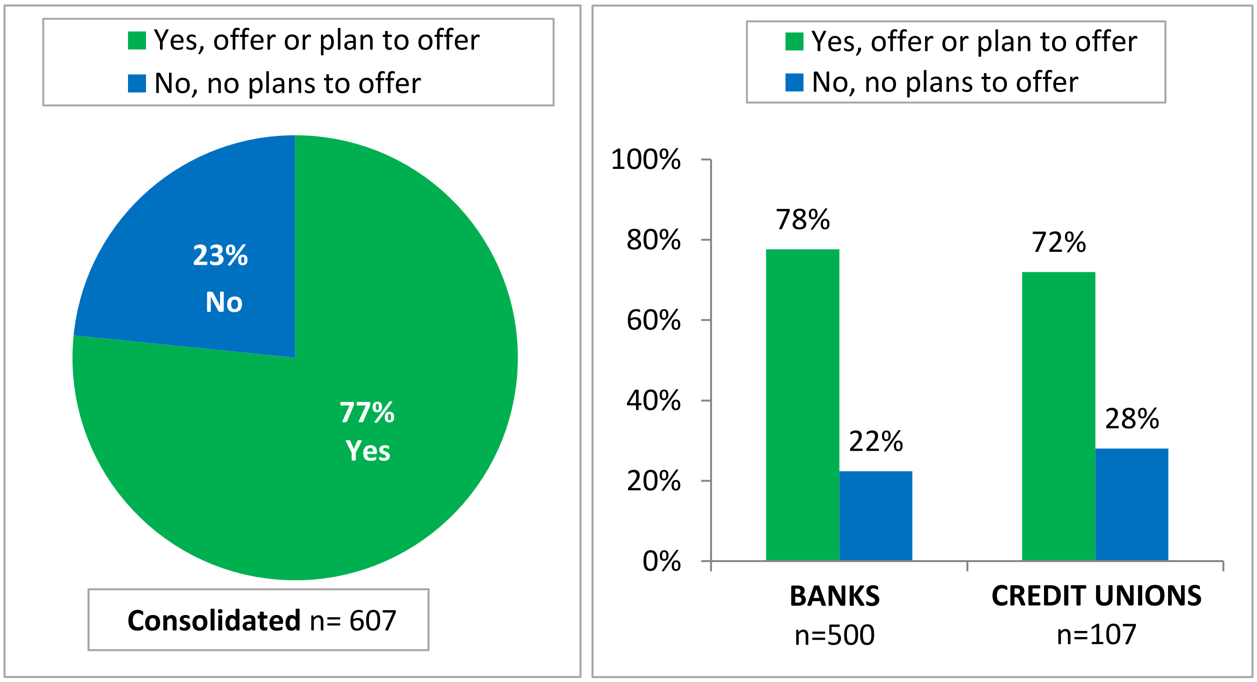
- mP2P + external A2A: 16 FIs
- mP2P + mRDC: 15 FIs
- mRDC + external A2A: 8 FIs
- mP2P + mRDC + external A2A: 5 FIs

Q22. Do you charge or plan to charge a fee for any CONSUMER mobile banking services?

VII. Business Mobile Banking Services

Across all Districts, 607 respondents (500 banks and 107 credit unions) offer mobile banking services to consumers and have commercial and/or small business customers – equating to 99 percent of the banks and 60 percent of the credit unions. Within this group, 465 FIs (77 percent) either offer or plan to offer mobile banking services to business customers[34] (**Figure 29**). Asset size is a factor among the bank respondents: the percentage of banks currently offering business mobile services increases with each tier. Asset size does not appear to be a factor for credit union respondents.

Figure 29: FIs Offering Mobile Banking Services to Businesses (percent of respondents)



Q28. Do you offer or plan to offer mobile banking services to your BUSINESS customers?

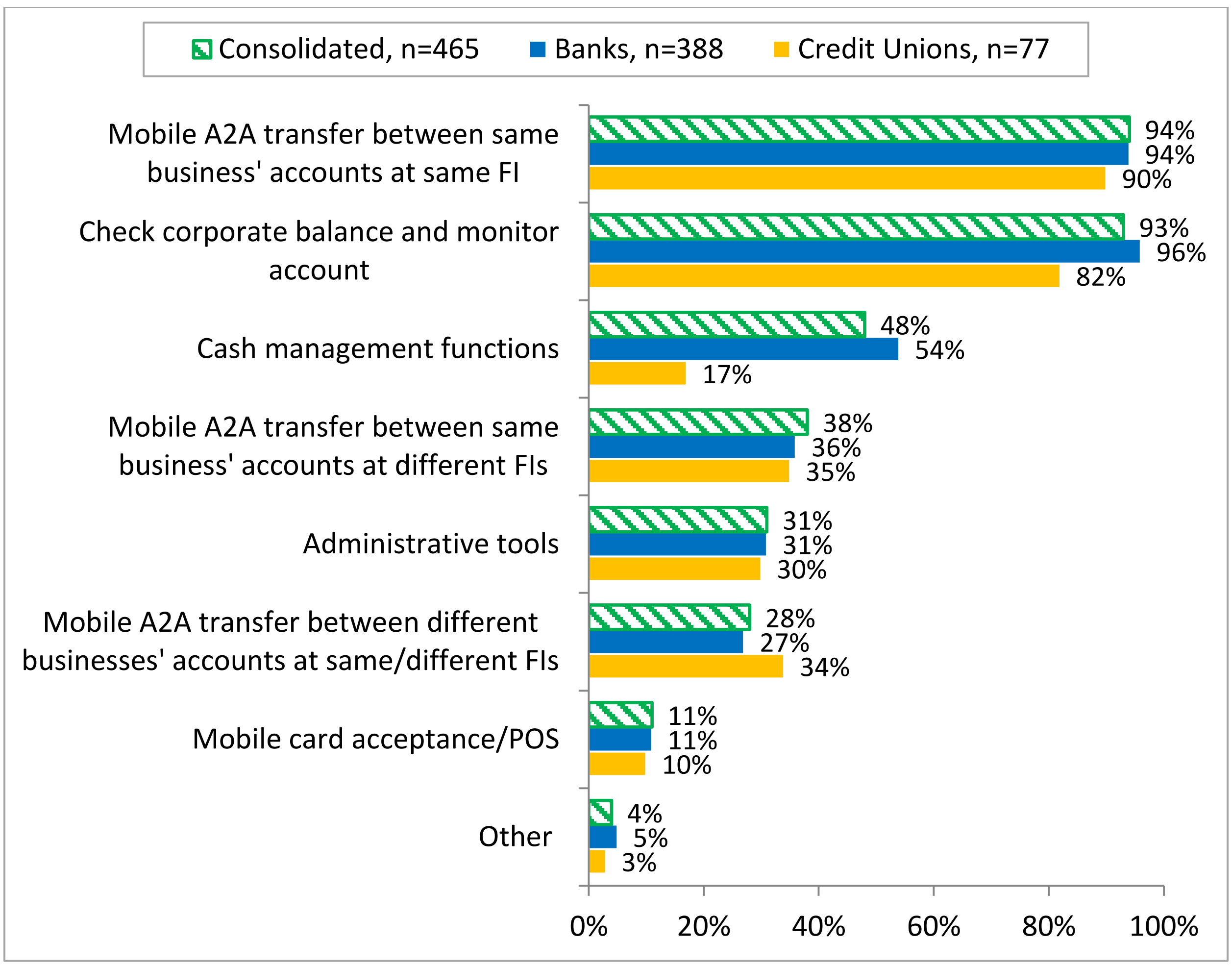
[34] Seven respondents offer or plan to offer mobile banking services to non-retail customers other than commercial or small businesses (e.g., government agencies, educational entities, non-profits, other). These respondents are not discussed in this section.

Mobile Banking Products and Services Offered to Businesses

FIs are increasing the mobile banking services they offer to businesses, but this is a gradual progression from simply mirroring retail services to implementing new services tailored to business users. In 2016, only two services were offered by almost all respondents: 94 percent allowed transfer of funds between a customer's accounts within their institution, and 93 percent offered the ability to check corporate balances and monitor accounts. The percentage of FIs offering the ability to check balances and accounts has more than doubled since 2014, rising from 45 percent to 93 percent of all respondents in 2016. Banks offer both services at higher rates than do credit unions, but nonetheless 82 percent of credit union respondents offer balance and account monitoring, and 90 percent offer internal A2A transfers.

Cash management services are offered by 54 percent of the banks, but no other service listed in **Figure 30** is offered by more than half of the respondents. Nonetheless, as small businesses increase demand for mobile banking services, more FIs are providing administrative tools to give them greater control of their end-user environment. The percent of FIs offering such tools increased 45 percent from 2014 (17 percent of respondents) to 2016 (31 percent of respondents).

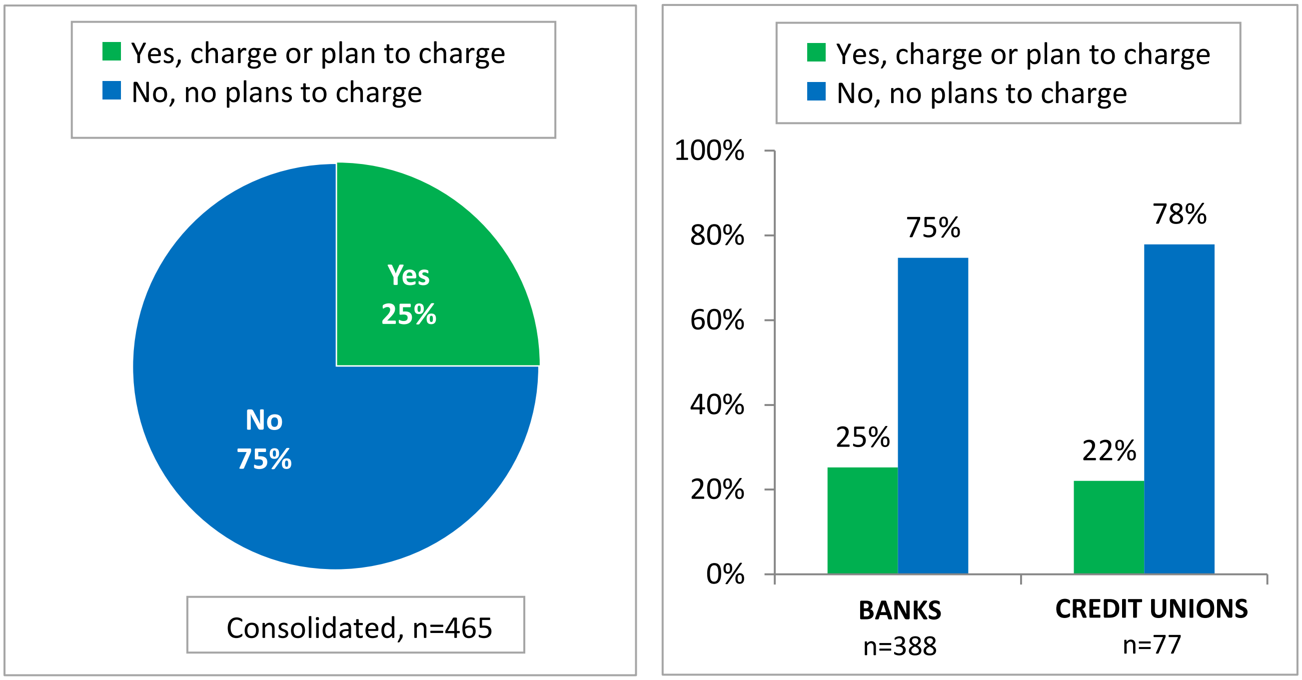
Figure 30: Mobile Banking Services Offered to Businesses (percent of respondents)



Q29. What services to you offer or plan to offer to your BUSINESS customers?

While the majority of respondents do not charge or plan to charge fees to business customers for mobile services, in aggregate, 25 percent (115 FIs) currently do or plan to in the future (**Figure 31**) – a rate substantially higher than for consumer mobile banking services. Large FIs are more likely to charge fees. For example, 56 of the 80 respondents that currently offer and charge fees for business mobile services have assets above $500 million.

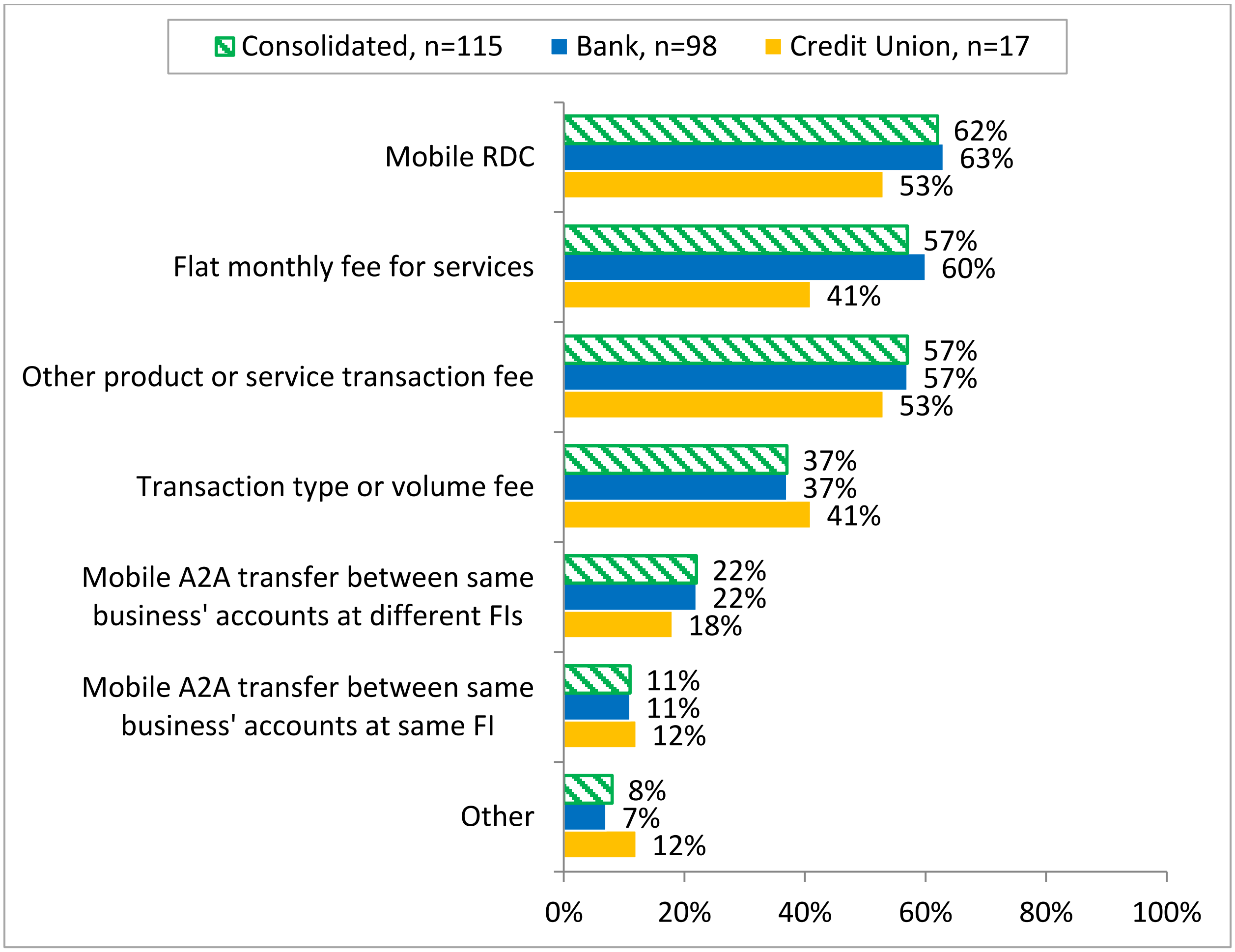
Figure 31: FI Plans to Charge Business Mobile Banking Fees (percent of respondents)



30. Do your charge or plan to charge to your BUSINESS customers a fee for any mobile banking services?

These 115 banks and credit unions have slightly different pricing strategies for business mobile services (**Figure 32**). Sixty (60) percent of bank respondents are likely to impose a flat monthly fee vs. forty-one (41) percent of credit unions – and credit unions are four percentage points more likely than banks to charge a transaction fee. More banks (63 percent) than credit unions (53 percent) – 62 banks and nine credit unions, respectively, charge or plan to charge for mRDC.

Figure 32: Fee-Based Business Mobile Banking Services (percent of respondents)



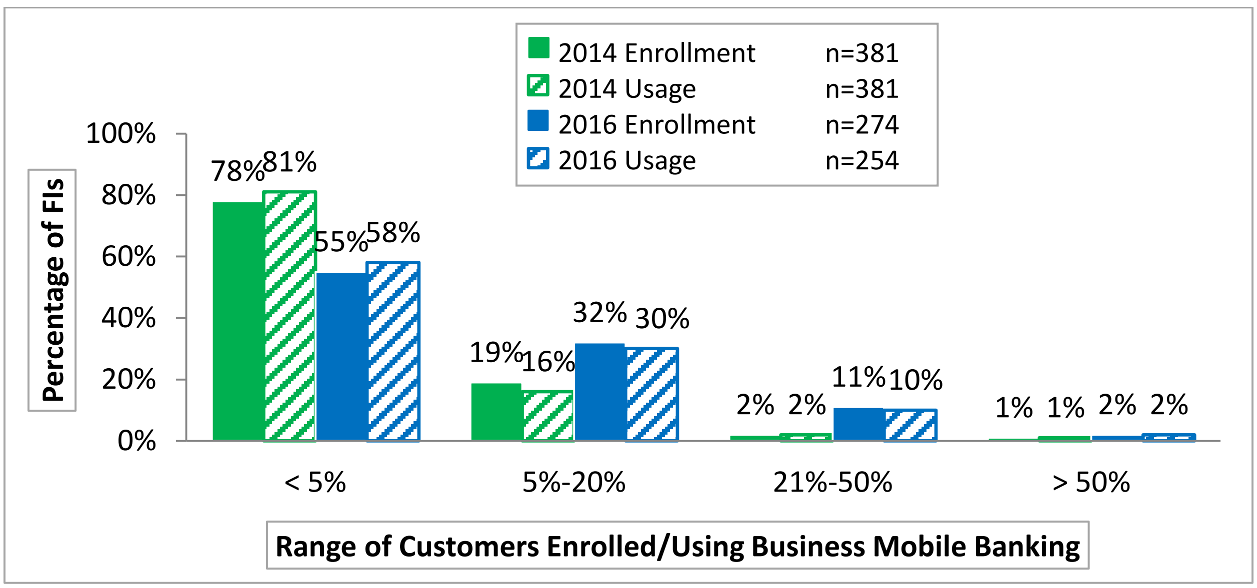
Q31. Please indicate all BUSINESS services for which you charge or plan to charge a fee.

Business Mobile Banking Adoption and Challenges

Most FIs began offering mobile banking services to businesses only after achieving traction with consumers. Also, industry providers have been slower to develop customized mobile banking solutions that meet the needs of business and commercial customers, giving businesses little incentive to move away from online banking. As a result, business adoption (enrollment and active usage) significantly lags consumer growth. Even among leading banks, business adoption rates typically do not exceed 20 percent.[35] This situation is borne out by the survey findings. Fifty-five (55) percent of respondents have fewer than five percent of their business customers enrolled in mobile banking; while only eight percent of respondents that offer mobile banking to consumers have fewer than five percent of their retail customers enrolled. Business usage rates slightly lag enrollment rates: 58 percent of respondents offering mobile banking services to businesses have active usage rates of less than five percent (**Figure 33**).

Despite this situation, there has been substantial progress since 2014. At that time, 78 percent of all FI respondents had enrollment rates for business customers in the '< 5%' range; and 81 percent of all respondents had fewer than five percent of active business mobile banking users. By 2016 adoption and usage had increased substantially. The number of FIs with enrollment in the '5%-20%' range grew 68 percent and usage rates rose 88 percent from 2014.[36] There were smaller increases in the ranges above 20 percent for both enrollment and adoption.[37]

Figure 33: Customer Adoption of Business Mobile Banking: 2014 and 2016 (percent of respondents)

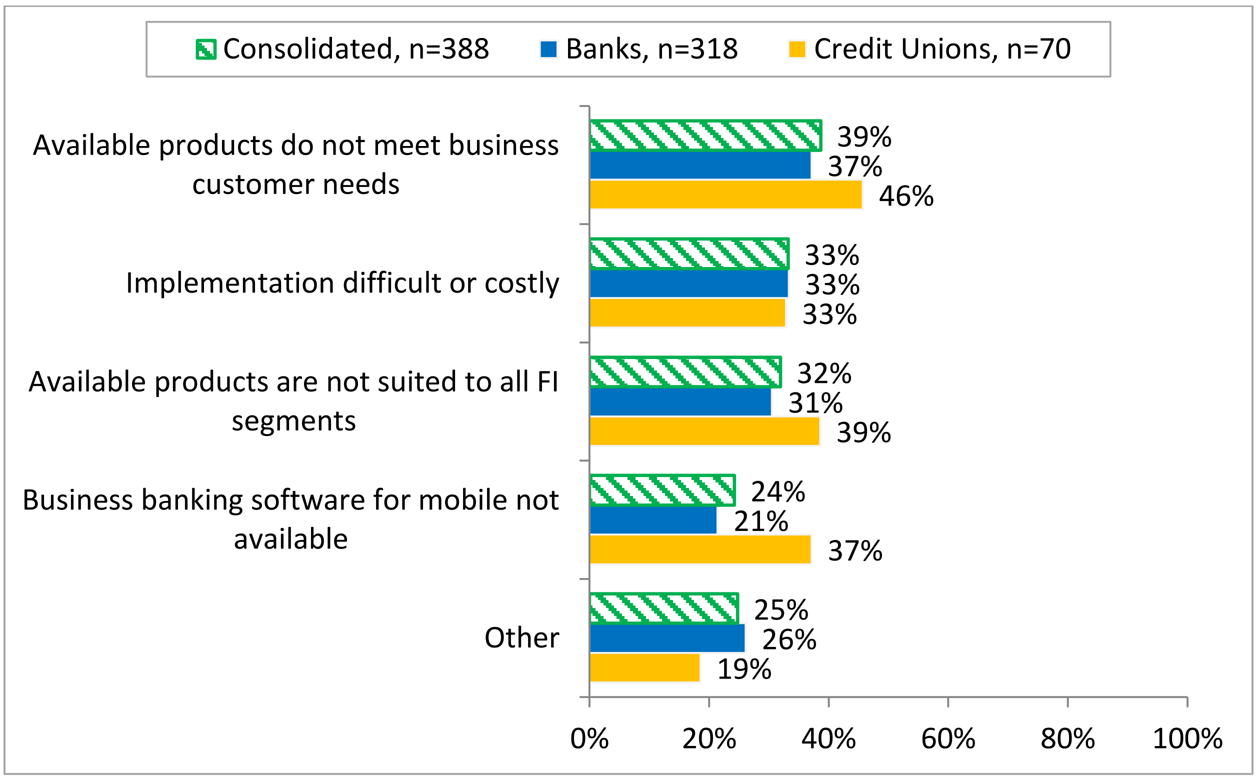


Q32. What percentage of your BUSINESS customers has enrolled/used your mobile banking services?

[35] "Business Banking Goes Mobile," *PYMNTS.com*, November 17, 2016.
[36] Enrollment generally exceeds usage; the difference here is due to inequities in the number of FIs tracking such data.
[37] One key issue, not depicted in Figure 33, is the large number of FIs that offer mobile banking to businesses but do not track enrollment or usage data – 61 banks and 24 credit unions do not track enrollment data; and 78 banks and 28 credit unions do not track activity data. (On a percentage basis, fewer credit unions track data.)

One sign that FIs are becoming more comfortable with offering business mobile banking services is that each of the perceived challenges is important to less than half of the respondents (**Figure 34**). The major challenge cited by 39 percent of all FI respondents (but 46 percent of credit unions) was: 'available products do not meet business customer needs.' This may reflect a gap where some smaller institutions, credit unions in particular, are still having difficulty finding business banking products that meet the needs of their customers. Thirty-nine (39) percent of credit unions identified 'available products are not suited to all FI segments' – a challenge for 31 percent of banks as well. Additionally, 37 percent of credit union respondents (compared to 21 percent of banks) viewed lack of business banking software as being a challenge for their institutions. Among 'other' responses, several respondents highlighted security, marketing, and education as being issues.

Figure 34: Challenges in Offering Business Mobile Banking Services (percent of respondents)



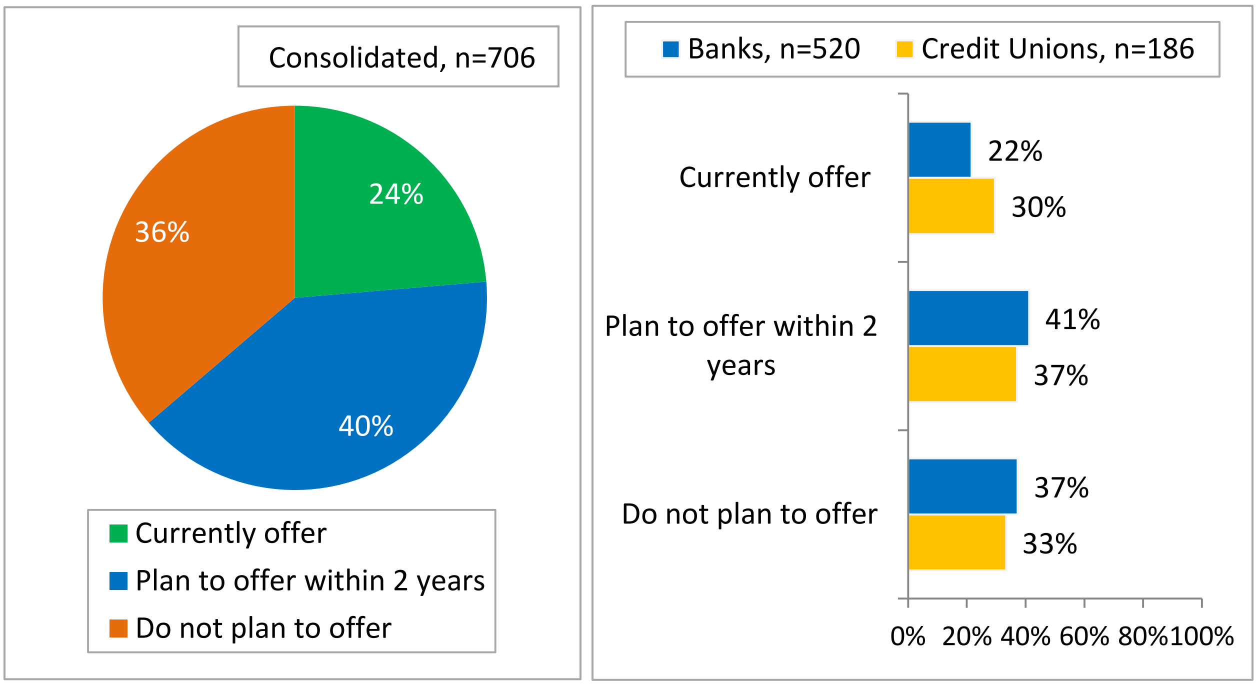
Q33. What challenges to you see in offering m-banking services to BUSINESS customers?

In summary, the survey found that respondents are turning their attention to, and finding some success with, mobile services for commercial and small businesses. Business mobile banking adoption rates show that FIs are starting to gain traction with this customer segment. Both FIs and their customers, however, recognize that there is significant room for improvement. About a third (388) of respondents have not yet found products that are readily available and/or meet the needs of their customers – and it may be that businesses are unaware of services that do exist. This situation will change once new products, which are both more tailored to the needs of business banking customers and are cost-effective, emerge and are proactively marketed by the FIs.

VIII. Consumer Mobile Payment Services

Most respondents are still considering their strategies for mobile payments and have yet to offer these services. Twenty-four (24) percent of FI respondents offer mobile payment services (**Figure 35**). Another 40 percent of respondents anticipate offering mobile payment services within the next two years, bringing the percentage that offer mobile payments to 64 percent by 2018. At the time the survey was conducted, 36 percent of respondents did not plan to offer mobile payments. It is expected that as the industry evolves and FIs gain a better understanding of the available mobile payment options and which best meet their strategic objectives, this situation will change.

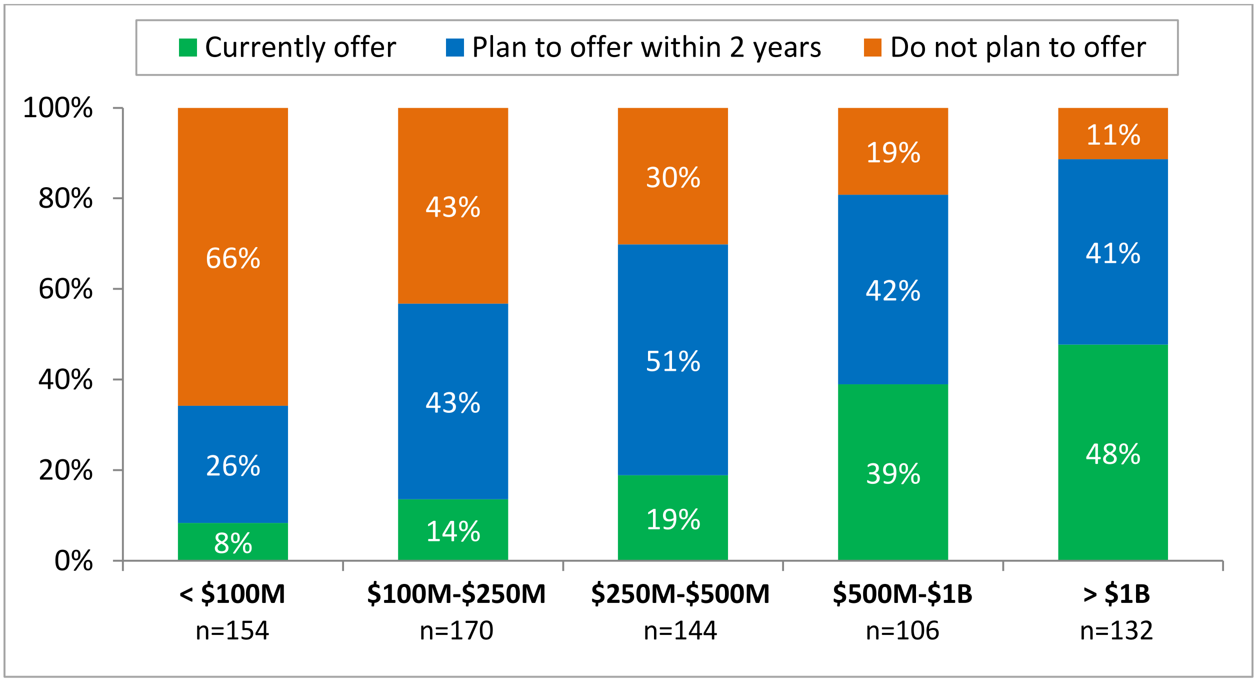
Figure 35: FI Plans to Offer Mobile Payment Services (percent of respondents)



Q35. Do you offer or plan to offer mobile payment/wallet services to customers?

Larger FIs are more likely to offer mobile payments today. Forty-eight (48) percent of respondents with assets '> $1B' and 39 percent of those with assets in the '$500M-$1B' range already offer mobile payment services (**Figure 36**). Except for FIs under '< $100 million' in assets, some who may not yet fully understand the value or benefits in offering mobile payments, smaller FIs are trying to catch up with the higher growth rates of their larger peers. Fifty-one (51) percent of FIs in the '$250M-$500M' range and 43 percent with '$100M-$250M' in assets plan to provide mobile payment services.

Figure 36: FI Plans to Offer Mobile Payment Services by Asset Size (percent of respondents)

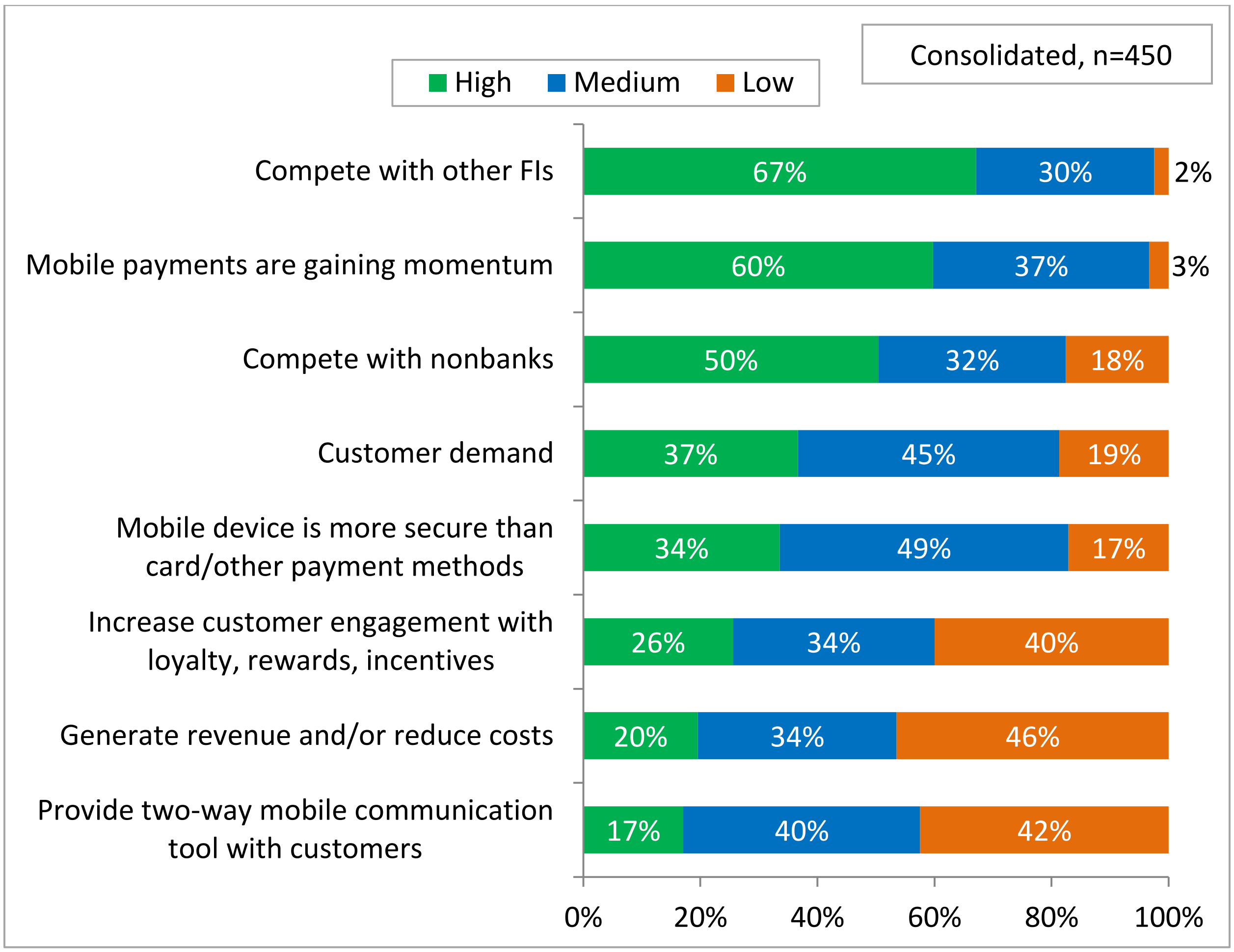


Q35. Do you offer or plan to offer mobile payment/wallet services to customers?

Mobile Payment Strategies

Respondents were asked to rate the importance of several factors influencing their decision to offer mobile payments (**Figure 37**). Sixty-seven (67) percent of respondents rate competition with other FIs as the key driver in offering mobile payments, more so than competition with nonbanks (e.g., Amazon, Apple, Google and PayPal), which received high ratings from 50 percent of the group. Just behind competition with other FIs, 60 percent rated mobile payments momentum with high importance. Respondents gave the most medium ratings to mobile device security (49 percent) and customer demand (45 percent). Using incentives to foster customer engagement; generating revenue reducing cost; and providing a two-way mobile communication tool were all rated as low drivers from more than 40 percent of respondents.

Figure 37: Drivers for Offering Mobile Payment Services (percent of respondents)

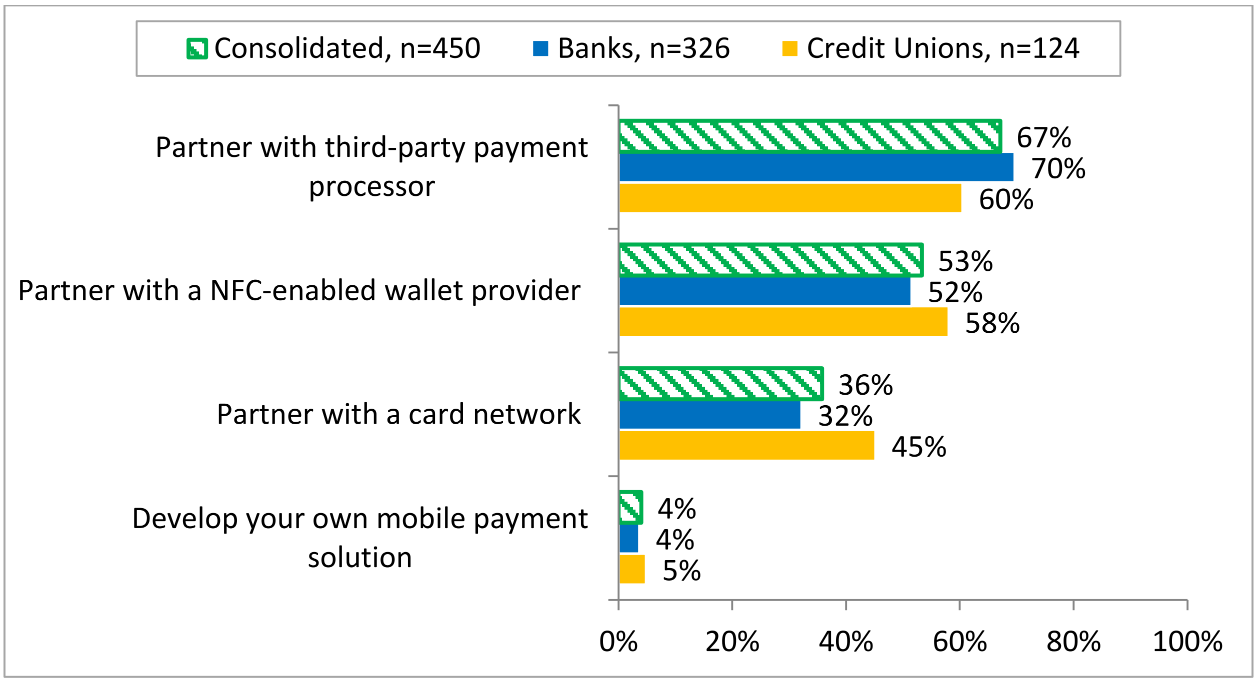


Q36. Please RATE the IMPORTANCE of factors that influenced your FI's decision or plans to offer mobile payments.

The two leading strategies for offering mobile payments were 'partnering with third-party payment processors' and 'partnering with NFC wallet providers' (**Figure 38**). Sixty-seven (67) percent indicated a preference for third-party processors; 53 percent used or planned to use NFC wallet providers.

Banks and credit unions weighed these strategies differently. More banks than credit unions, 70 percent and 60 percent respectively, partner with third-party processors. The result for credit unions that preferred partnerships with NFC-enabled wallet providers was six percentage points higher (58 percent) than banks (52 percent). Additionally, a greater percentage of credit unions (45 percent) than banks (32 percent) partnered or planned to partner with card networks. Only four percent were planning or had already developed in-house mobile payment solutions.

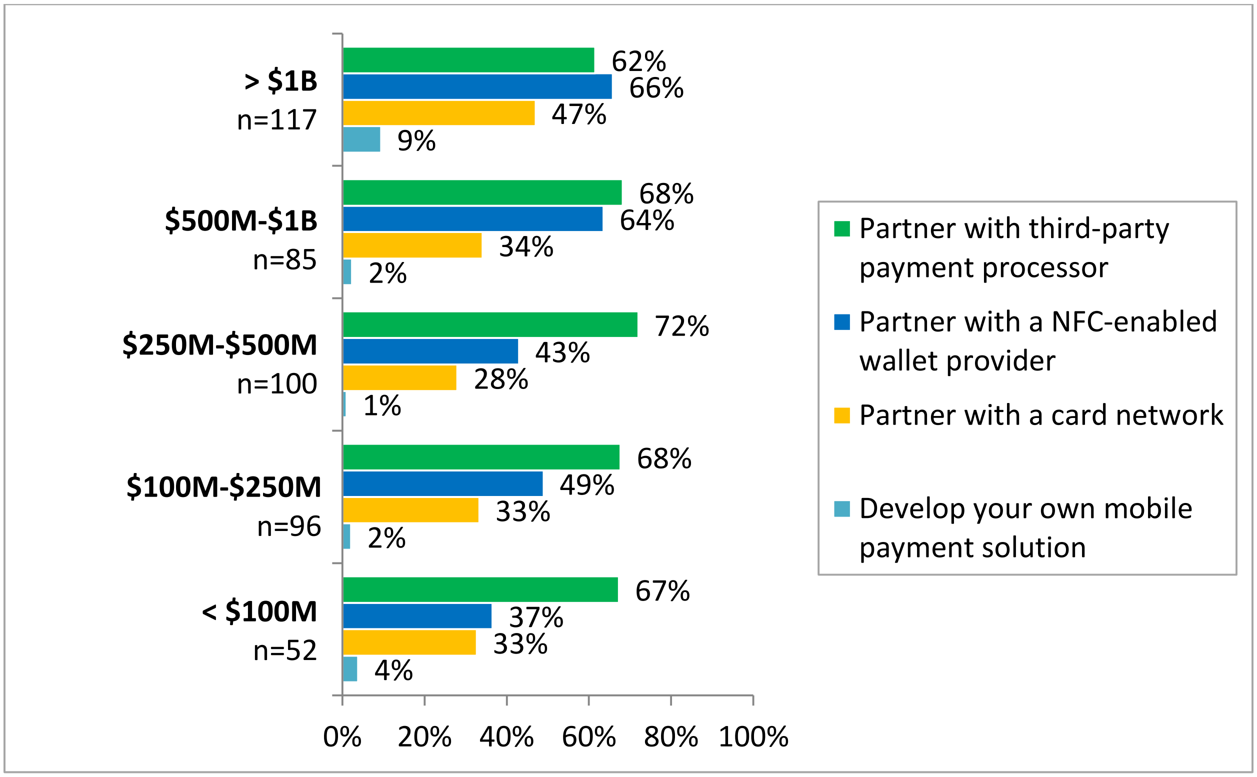
Figure 38: FI Strategies for Offering Mobile Payments (percent of respondents)



Q38. How do you offer or plan to offer mobile payment/wallet services? (Check ALL that apply)

Asset size has an impact on the mobile payment strategies respondents select (**Figure 39**). In general, most respondents, irrespective of asset size, selected 'partner with a third-party processor' as one option. However, among respondents with assets between $500M-$1B and over $1B, the top two choices were 'partner with NFC-enabled wallet provider' and 'partner with third-party payment processor,' both in the 62-68 percent range. For FIs with assets over $1B, working with NFC providers edged out third-party processors by four percentage points, with the reverse true for the $500M-$1B tier. FIs with assets above $1 billion are also more likely than other respondents to partner with card networks, which offer digital wallet solutions. Not surprisingly, 11 of the 18 FIs developing their own mobile payment solutions were in the largest asset tier.

Figure 39: FI Strategies for Offering Mobile Payments by Asset Size (percent of respondents)



Q38. How do you offer or plan to offer mobile payment/wallet services? (Check ALL that apply)

Mobile/Digital Wallet

Figure 40 represents FI respondents' familiarity with several mobile wallet service(s). Collectively, most respondents were aware of the three NFC "Pay" wallets – Apple Pay (98 percent), Android Pay (82 percent), and Samsung Pay (77 percent). Nearly three-quarters (74 percent) of the group were also familiar with PayPal's mobile wallet. Respondents had some familiarity with the digital wallets offered by the card networks – 45 percent knew about Visa Checkout and 37 percent had heard of Masterpass.

Figure 40: FI Mobile Wallet Recognition

Wallet	% of Respondents (n=450)
Apple Pay	98%
Android Pay	82%
Samsung Pay	77%
PayPal	74%
Visa Checkout	45%
Amazon Payments	41%
Mastercard Masterpass	37%
Walmart Pay	29%
Microsoft Wallet	21%
Amex Express Checkout	10%
LevelUp	8%
Other	3%

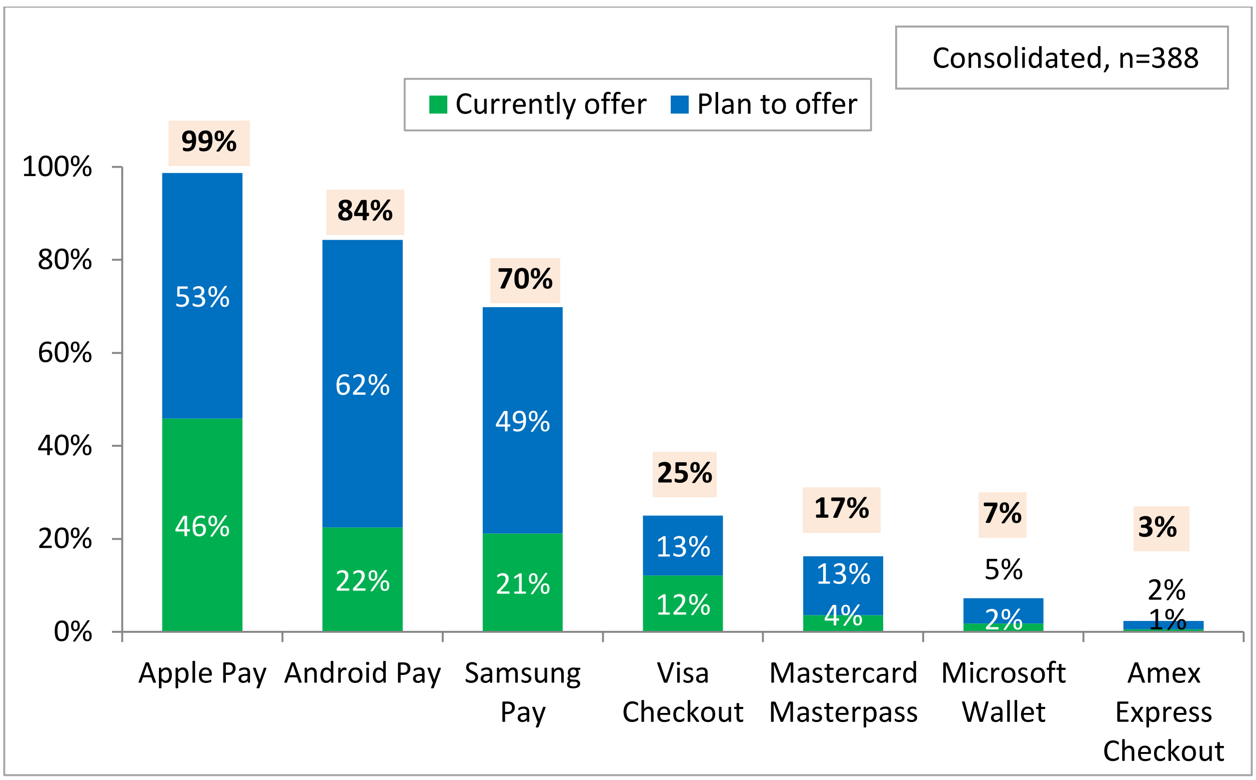
Q37. Please indicate the mobile wallet service(s) that you are familiar with. (Check ALL that apply)

While the list has grown since the survey was conducted, the mobile/digital wallets listed in **Figure 41** were well-recognized in 2016. Most FIs offered or planned to offer one or more of the NFC "Pay" wallets. Apple Pay was offered by 46 percent of respondents and planned by another 53 percent; the percentage is even higher for larger FIs: 60 percent of respondents with assets above $500 million already offered the mobile wallet. Apple Pay has been in the market for a relatively longer amount of time (it launched in October 2014). Twenty-two (22) percent of respondents offered Android Pay (launched September 2015) and 21 percent offered Samsung Pay (launched August 2015), while an additional 62 percent and 49 percent, respectively, were planning to offer Android Pay and/or Samsung Pay.

Support for Microsoft Wallet (also NFC) was extremely limited: the wallet is relatively new (launched in June 2016) and to date less than one percent of consumers have Windows phones.[38]

Differences between how many FIs offer each of the digital wallets may reflect that Visa Checkout and Masterpass are card network-agnostic digital wallets, but Amex Express Checkout supports only American Express cards.

Figure 41: Mobile Wallets Offered by FIs (percent of respondents)

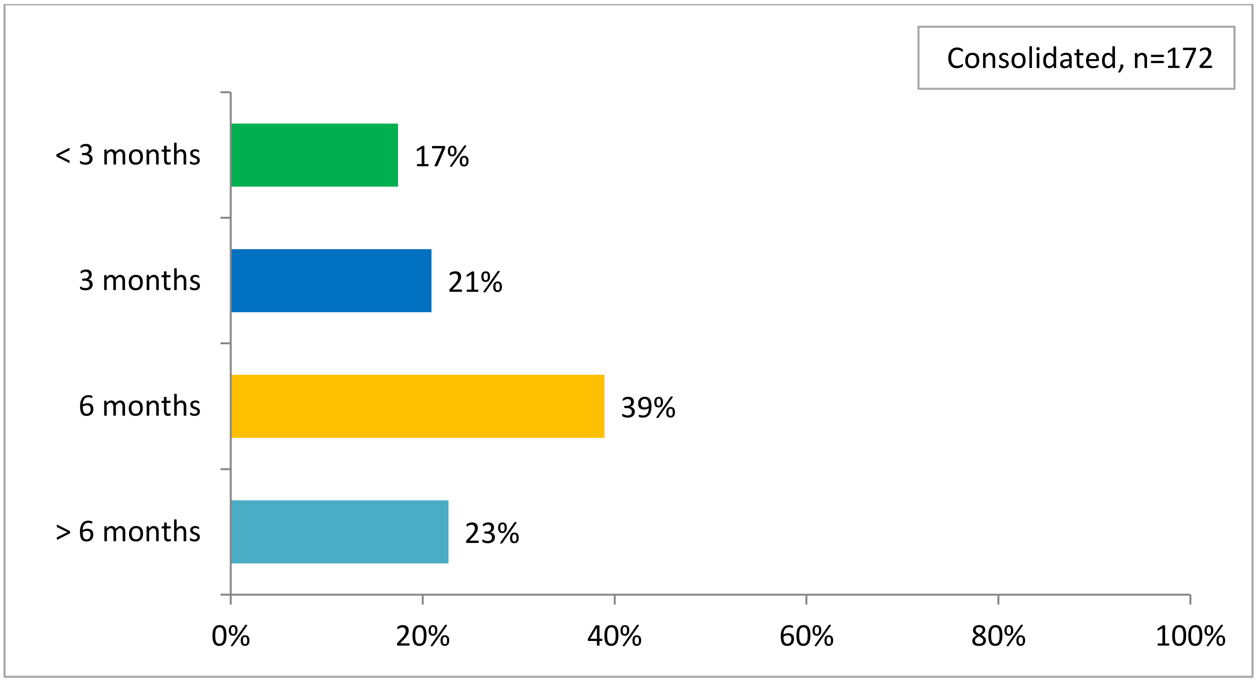


Q39. Which of the following MOBILE WALLET service(s) do you offer or plan to offer? (Check ALL that apply)

[38] Dan Thorp-Lancaster, "Kantar's latest smartphone market share report sees Windows Phone dip below 1% in the U.S," *Windows Central,* January 11, 2017.

Early on, there was a great deal of industry discussion about implementation times for NFC "Pay" mobile wallets. The survey found that such times varied among the 172 respondents that had implemented an NFC mobile wallet (**Figure 42**). Just over three-fourths (77 percent) had implementation times of six months or less; while 23 percent of respondents experienced implementation times longer than six months. Implementation times were comparable between banks and credit unions and across Districts and asset tiers.[39]

Figure 42: NFC "Pay" Mobile Wallet Implementation Time (percent of respondents)

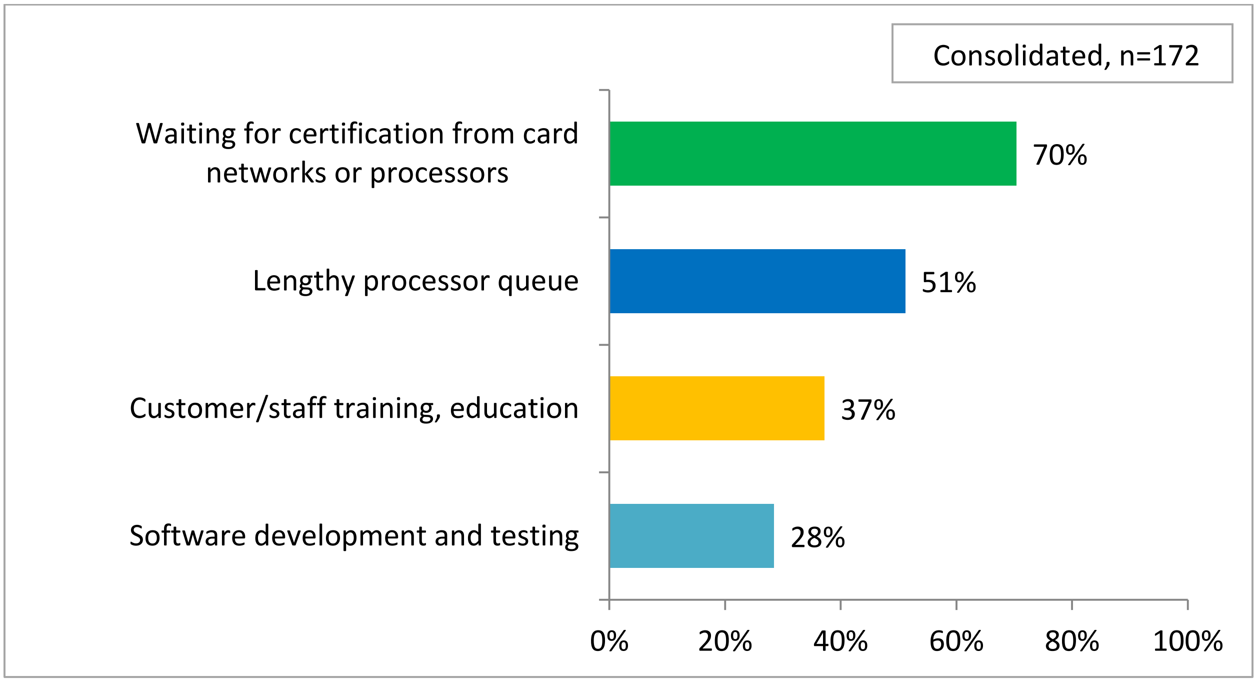


Q40. About how much time did it take for your FI to implement the NFC MOBILE WALLET service? (If you have not implemented NFC mobile wallet service, please check 'N/A')

[39] See Data Tables for detailed results by FI-type, District and asset size.

The primary implementation challenge for NFC mobile wallets, identified by 70 percent of the 172 respondents, was 'waiting for certification from card networks or processors' (**Figure 43**). Fifty-one (51) percent of FIs reported a 'lengthy processor queue' as being a challenge. (Note: Anecdotal information suggests that NFC "Pay" wallet implementation time has improved since the survey was conducted in 2016 primarily due to streamlining of the network and processor certification processes.)

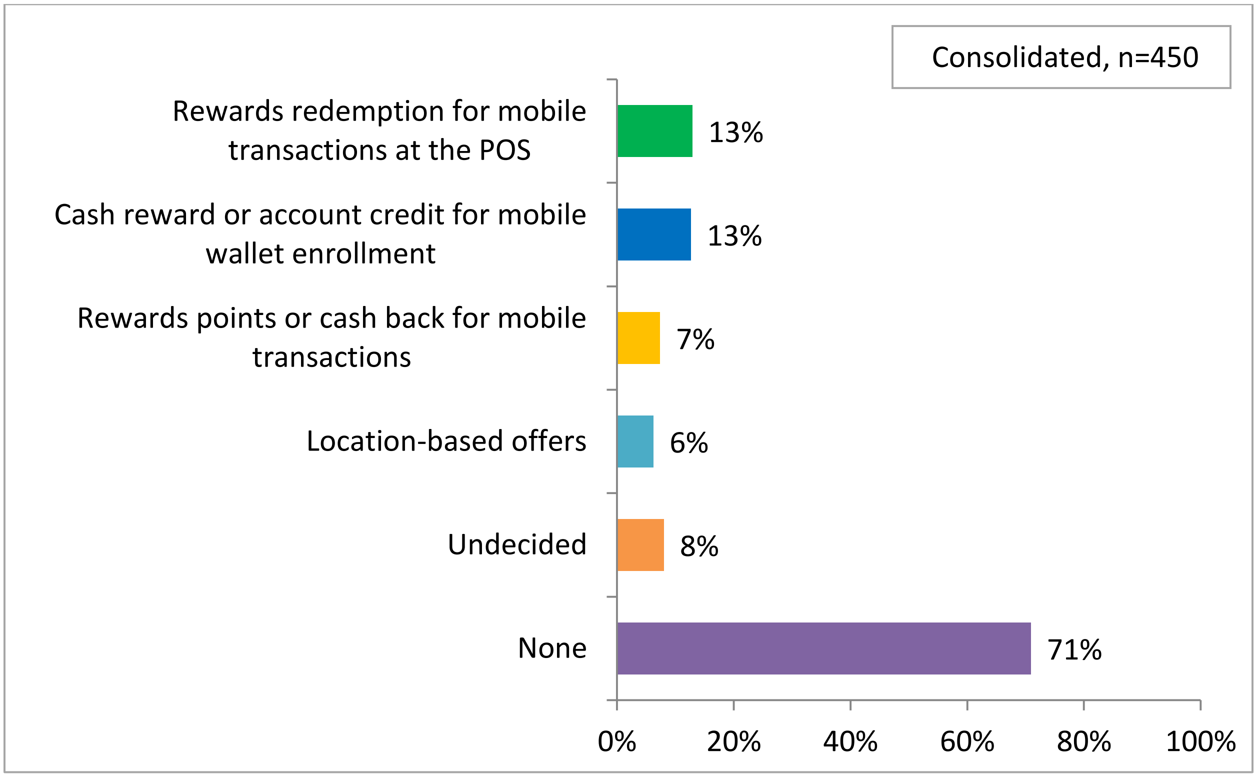
Figure 43: NFC "Pay" Mobile Wallet Implementation Challenges (percent of respondents)



Q41. What challenges did your FI experience implementing the NFC MOBILE WALLET? (Check ALL that apply)

Seventy-one (71) percent of respondents did not offer or have plans to offer incentives tied to mobile payments, and eight percent were undecided (**Figure 44**). These results are not surprising as only about one-quarter of respondents rated 'increase customer engagement with loyalty, rewards, and other incentives' as being of high importance to their decision to offer mobile payments. The two most commonly-offered incentives, each offered by 13 percent of FIs, were 'rewards redemption for mobile transactions at POS' and 'cash reward or account credit for mobile wallet enrollment.' Some FIs offer loyalty rewards for credit cards that can be linked to mobile wallets, but generally do not market them as mobile-exclusive rewards. Among survey respondents, fewer than 10 percent offered location-based offers or rewards points and cash back for mobile transactions.

Figure 44: FI Mobile Payment Incentives Offerings (percent of respondents)



Q42. What types of incentives tied to mobile payments/wallets do you offer or plan to offer? (Check ALL that apply)

Interestingly, a higher percentage of respondents who have not yet implemented mobile payments plan to include mobile incentives (35 percent), compared to only 20 percent of those currently offering mobile payments.[40]

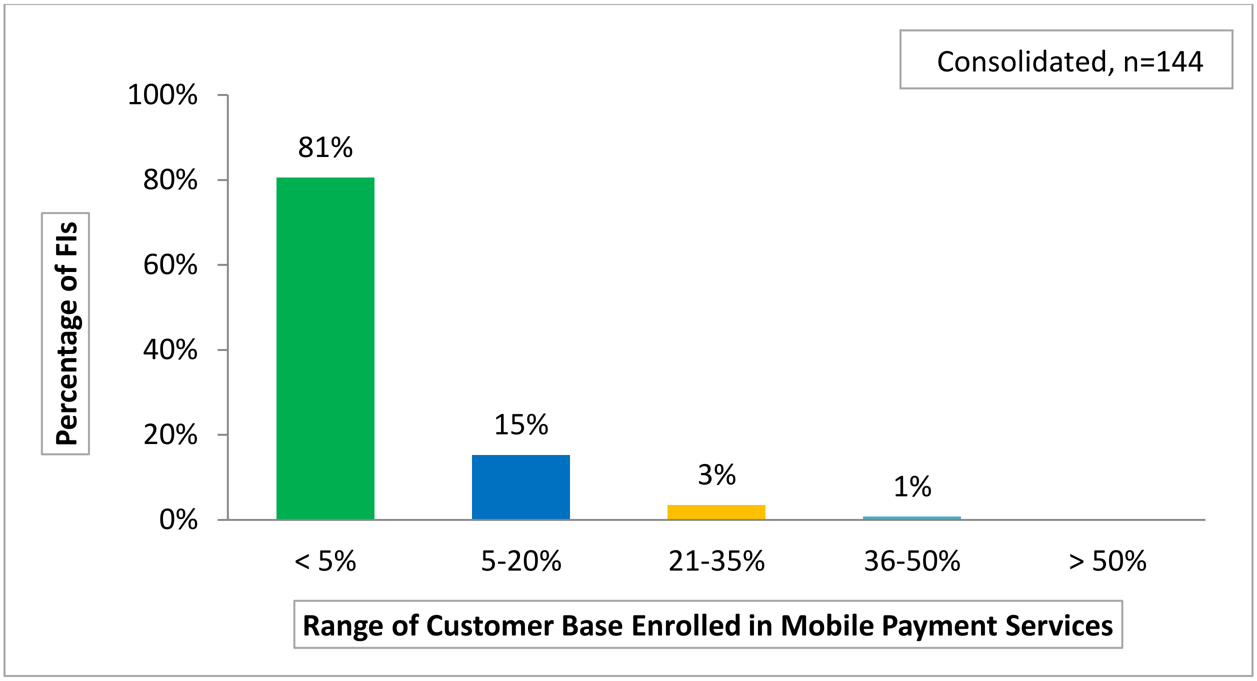
[40] For more information on mobile loyalty and rewards, see Elisa Tavilla, "Rewarding Loyal Customers to Increase Mobile Payments Adoption," *Federal Reserve Bank of Boston*, April 6, 2017.

Consumer Adoption of Mobile Payment Services

Of the 211 respondents that reported offering mobile payments, 144 FIs tracked customer enrollment data, and 131 FIs tracked customer usage of mobile payments. **Figure 45** and **Figure 46** show customer enrollment and usage ranges for FIs that offer and capture mobile payments data.

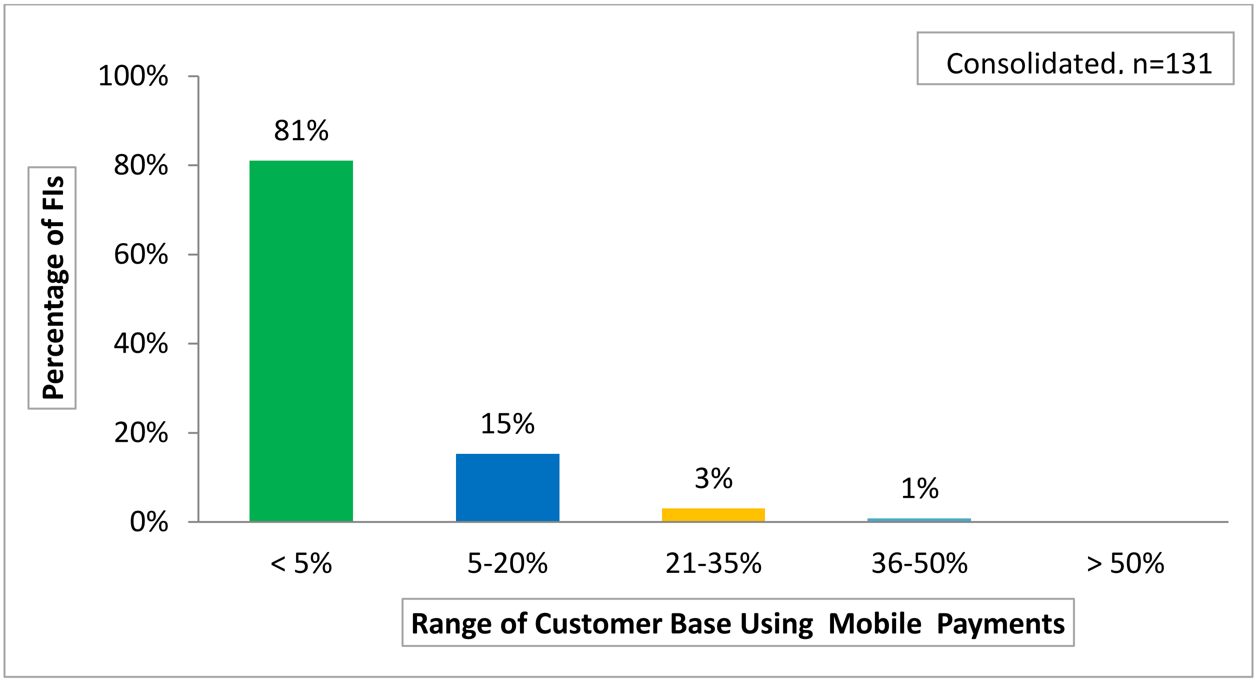
Given some of the challenges related to security and merchant acceptance, customer enrollment is growing at a slow rate. Eighty-one percent of FI respondents had fewer than five percent of their customers enrolled and actively using their mobile payment services.

Figure 45: Customer Enrollment in Mobile Payment Services (percent of respondents that track data)



Q43. What percentage of your RETAIL customers use your mobile payment/wallet services?

Figure 46: Customer Use of Mobile Payment Services (percent of respondents that track data)



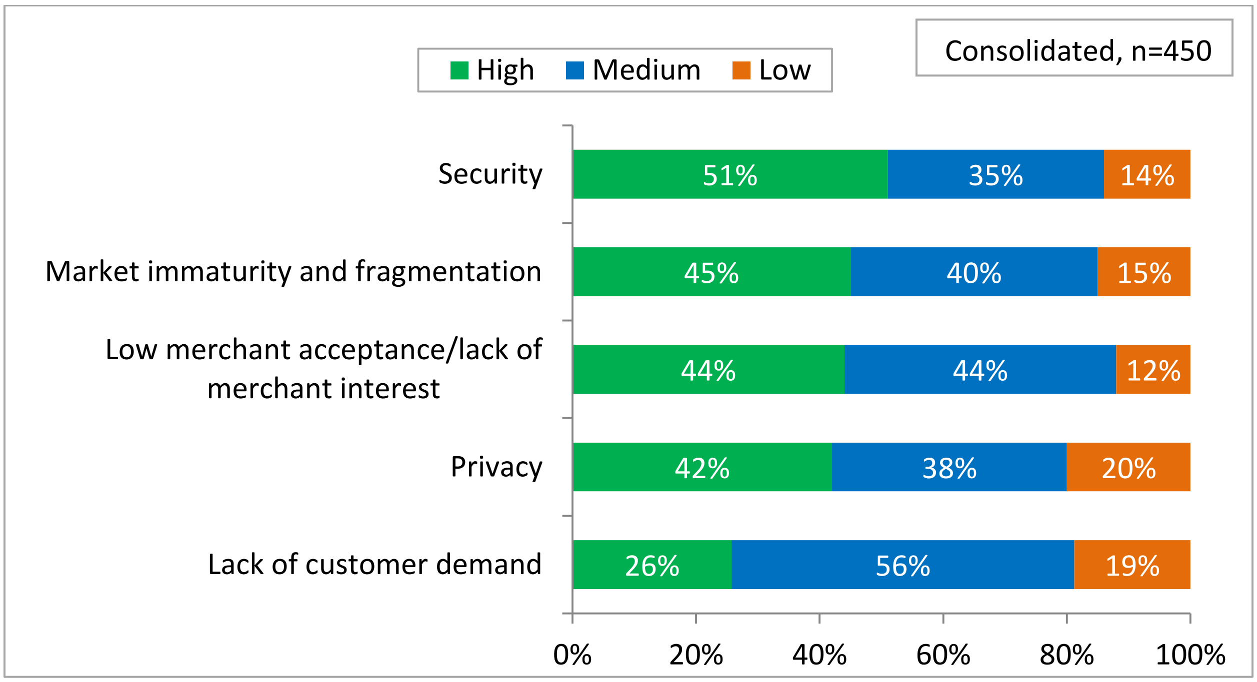
Q43. What percentage of your RETAIL customers use your mobile payment/wallet services?

A few more FIs track customer enrollment (**Figure 45**) than track usage (**Figure 46**). Also, although not shown in **Figures 45** and **46**, 21 FIs had more than five percent of their customers enrolled and actively using mobile payment services. Of the 21 FIs, nine had more than $1 billion in assets, and four had between $500 million and $1 billion. Thirteen (13) of these FIs offered all three NFC “Pay” wallets.

Responding FIs perceived different barriers to consumer adoption of mobile payments from those related to mobile banking. FIs directly manage and control access to their mobile banking services, but mobile payments can be offered by third parties independent of the FI (e.g., merchant and wallet provider mobile apps) and involve multiple parties in the transaction process. Therefore, there are more points of vulnerability and less standardization of mobile payment functions and processes.

Fifty-one (51) percent of respondents rated 'security' as a high barrier to consumer adoption of mobile payments (**Figure 47**). Additionally, over 40 percent of FIs rated 'market immaturity and fragmentation,' 'low merchant acceptance,' and 'privacy' as high. Just 26 percent of respondents rated 'lack of customer demand' as a high barrier, which is an encouraging sign for the growth of mobile payments.

Figure 47: Barriers to Consumer Adoption of Mobile Payments (percent of respondents)



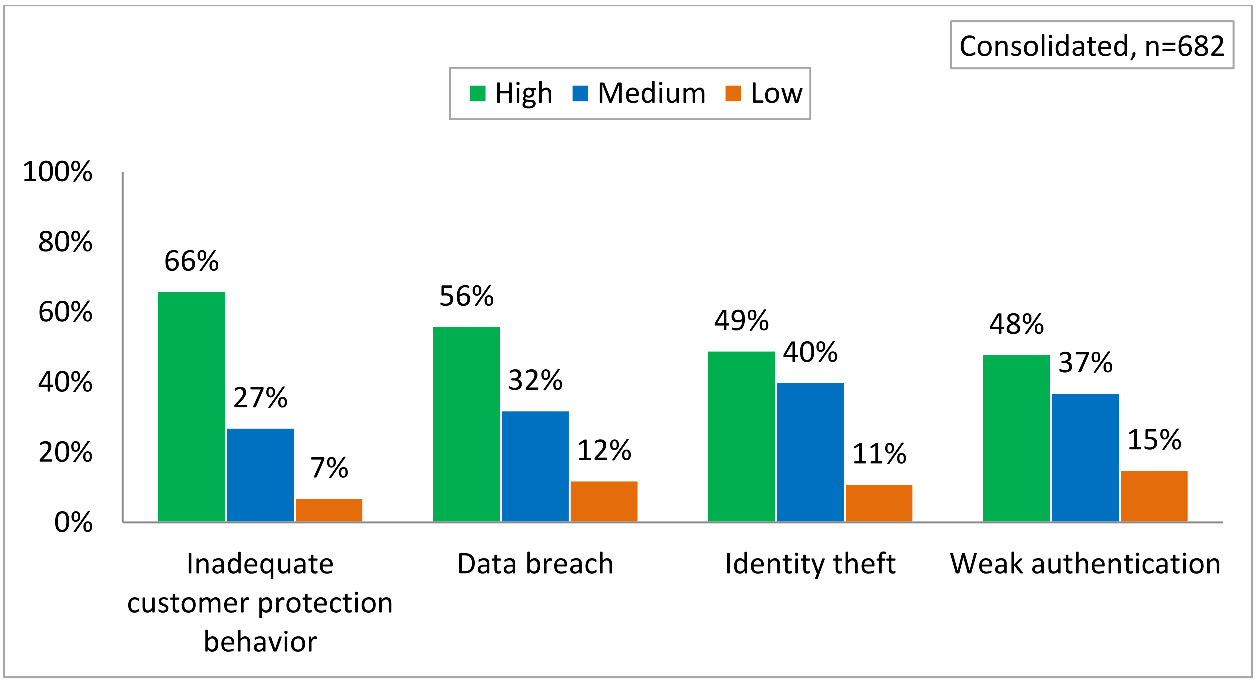
Q44. From your FI's perspective, please RATE the SIGNIFICANCE of these barriers to consumer adoption of mobile payments.

IX. Mobile Banking and Payment Security Results

Mobile Banking Security

Because security continues to be a primary concern for FIs deciding to offer mobile banking and mobile payment services, respondents were asked how they rated their security concerns and preferences for various mitigation tools. **Figure 48** highlights how FIs rated different security concerns. Sixty-six (66) percent of FIs rated 'inadequate customer protection behavior' with high importance for offering mobile banking to consumers, in large part because FIs have little control over how consumers secure their mobile devices. Fifty-six (56) percent of respondents rated data breach as a high concern. Just under half of FIs rated identity theft (49 percent) and weak authentication (48 percent) as high. Fifteen (15) percent or less rated any of the security concerns of low importance.

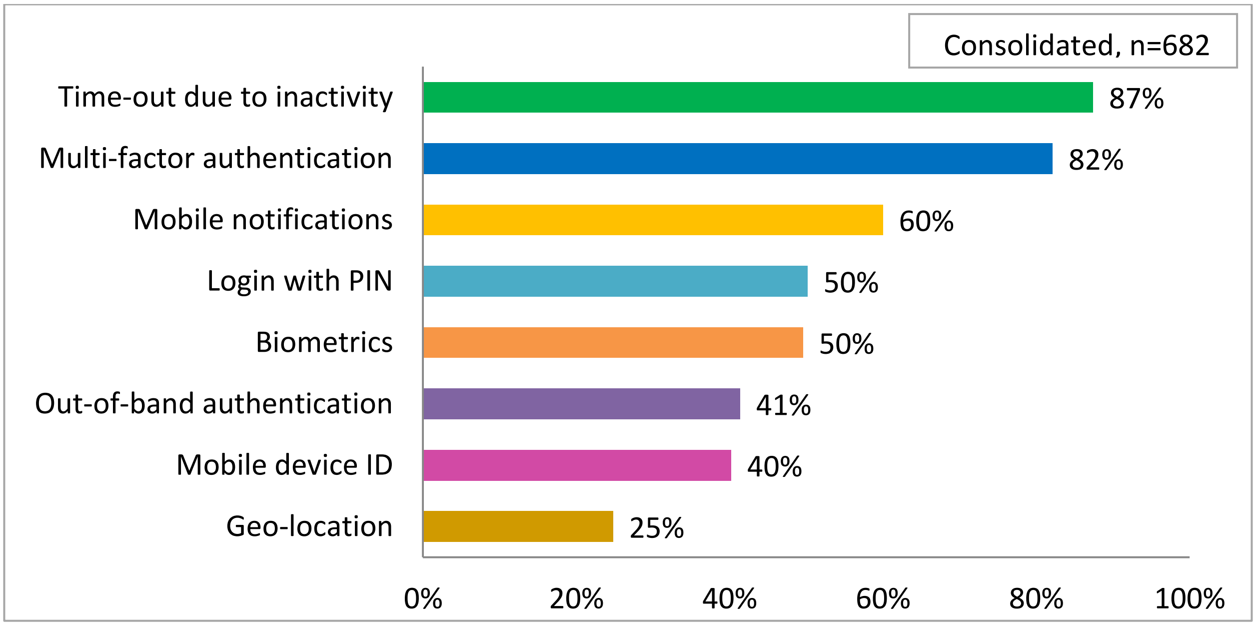
Figure 48: Mobile Banking Security Concerns (percent of respondents)



Q25. Please RATE the IMPORTANCE of your FI's security concerns associated with offering mobile banking services to consumers.

Mobile security methods most commonly used by survey respondents included 'Time-out due to inactivity' and 'multi-factor authentication (MFA),' implemented by 87 percent and 82 percent of respondents, respectively (**Figure 49**). Generally, FIs use layered methods to enhance mobile banking security. Fifty (50) percent of the respondents supported PIN log-in and biometrics. Although not shown in **Figure 49**, large FIs used biometrics more heavily: 61 percent of FI respondents with $500 million to $1 billion in assets, and 83 percent of respondents with over $1 billion in assets use biometrics.

Figure 49: Mobile Banking Security Methods Used by FIs (percent of respondents)



Q27. Which of the following does your FI use or plan to use to enhance mobile security? (Check ALL that apply)

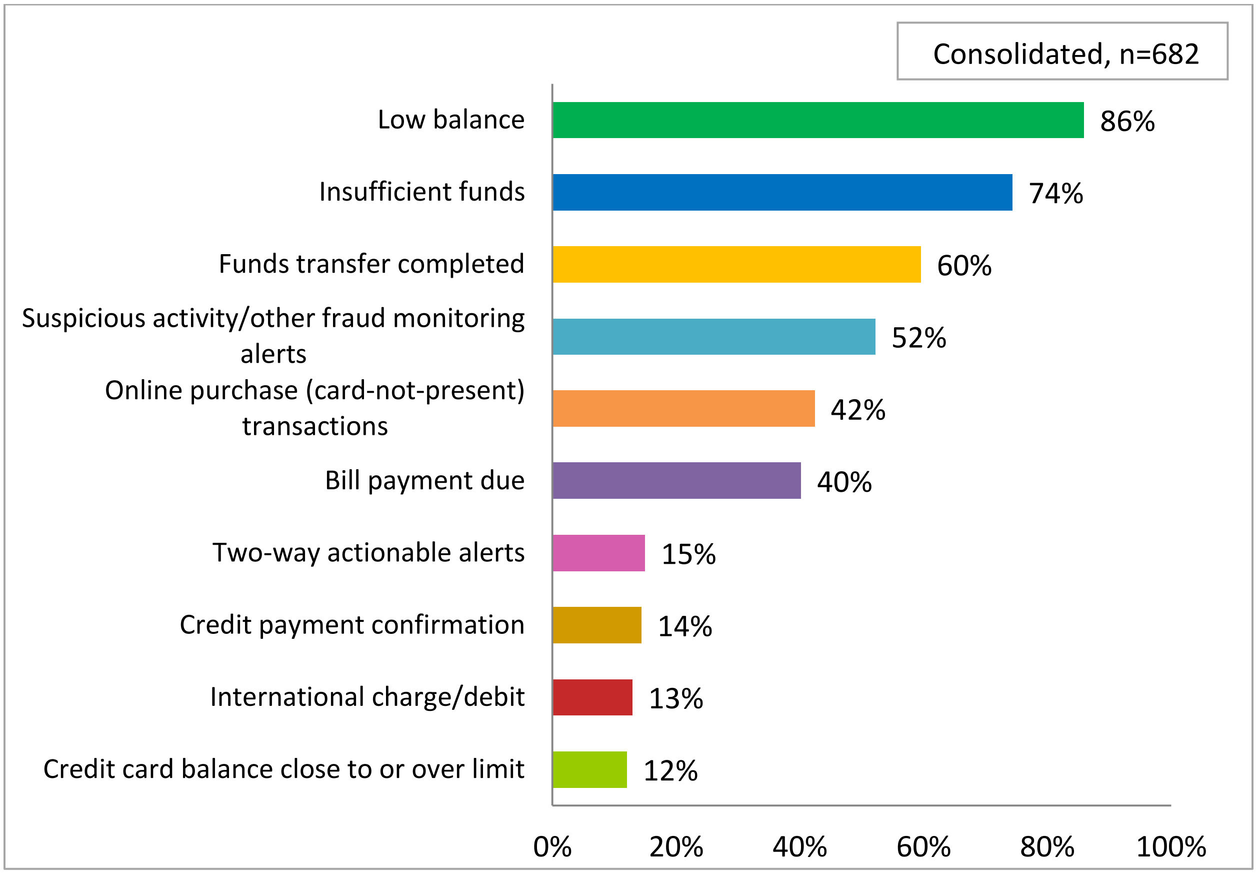
These results are in line with industry findings. According to Javelin, nearly half of the top 30 U.S. FIs (by asset size) support login through fingerprint recognition.[41] Biometrics meet consumer demand for convenience, providing faster logins and greater security. A survey conducted by biometrics solution vendor EyeVerify[42] found that:

- 79 percent of respondents want the opportunity to use eye, face, fingerprint and voice authentication methods to log into their mobile banking or payment apps
- 78 percent perceived biometrically-enabled mobile apps to be more secure
- 74 percent used biometrically-enabled banking and payment apps more frequently because logins are faster
- 84 percent think it is faster to log into an app with biometrics than with a password
- 82 percent believe biometrics are more secure than passwords for mobile banking and payment transactions
- 80 percent believe apps that access bank accounts should use biometric authentication

[41] Daniel Van Dyke and Emmet Higdon, "2016 Mobile Banking Financial Institution Scorecard," *Javelin Research & Strategy,* May 2016.
[42] "The Retail Banking Biometrics Confidence Report," *EyeVerify*, May 4, 2017.

As many consumers have near-constant access and interaction with their mobile phones, FIs can use mobile alerts to provide just-in-time information to influence consumers' financial behavior to help them make better financial decisions and alert them to potential issues. **Figure 50** highlights different types of alerts that FIs provide to help customers manage their funds and monitor fraud. The two most commonly-supported alerts are 'low balance' and 'insufficient funds,' offered by 86 percent and 74 percent of respondents, respectively. Sixty (60) percent of the group also offered alerts for 'funds transfer completed.' Additionally, 52 percent offered alerts for 'suspicious activity/other fraud monitoring' and 42 percent for 'online purchase (card-not-present) transactions.'

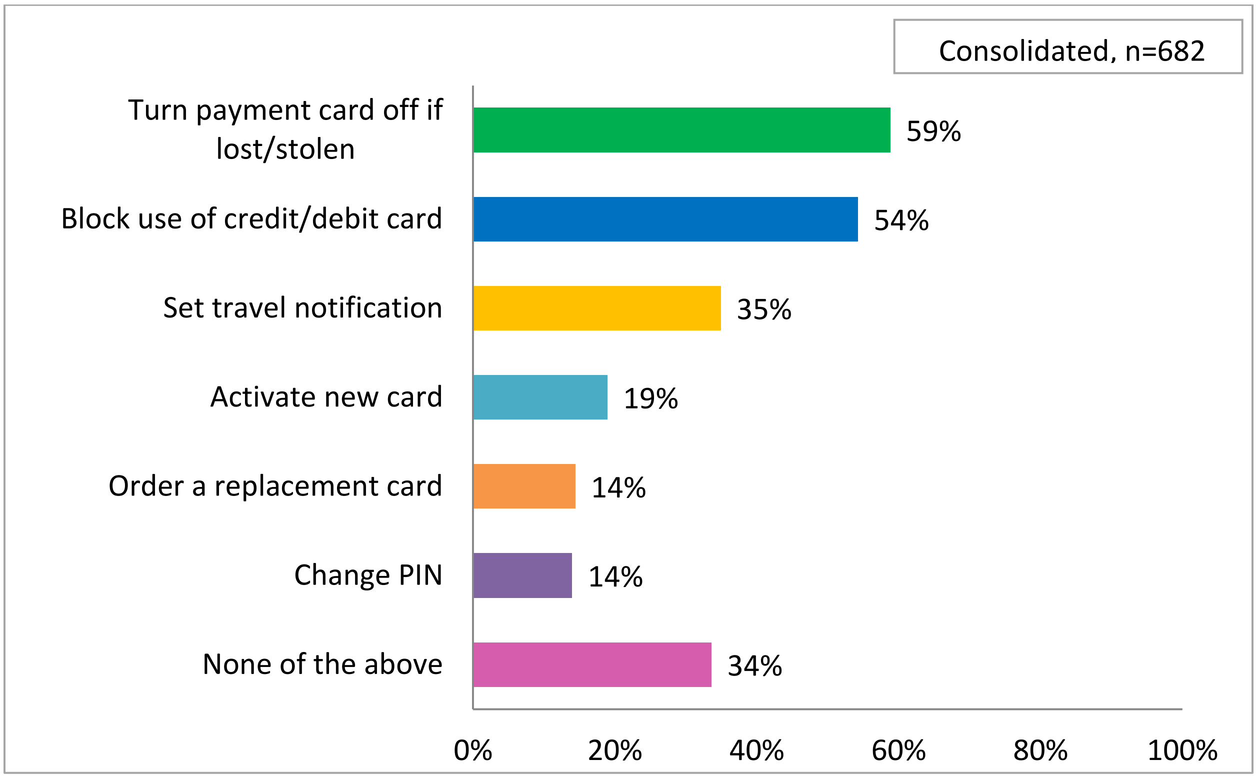
Figure 50: **Mobile Alerts Offered by FIs** (percent of respondents)



Q24. What types of mobile alerts does your FI offer or plan to offer? (Check ALL that apply)

In a new 2016 MFS Survey question, respondents were asked what mobile card control features they offered. The two most supported features were the ability to turn off a lost or stolen credit/debit card (59 percent) and the ability to block use of a credit/debit card (54 percent) (**Figure 51**). Thirty-five (35) percent of the FIs allowed customers to set travel notifications through the mobile banking app. However, fewer than 20 percent of respondents allowed customers to activate a new card, order a replacement card, or change their PIN via mobile. FIs may be reluctant to offer these three capabilities because of the greater risk of fraud and account takeover associated with direct access to the customer's account. Thirty-four (34) percent of respondents offered no mobile card controls.

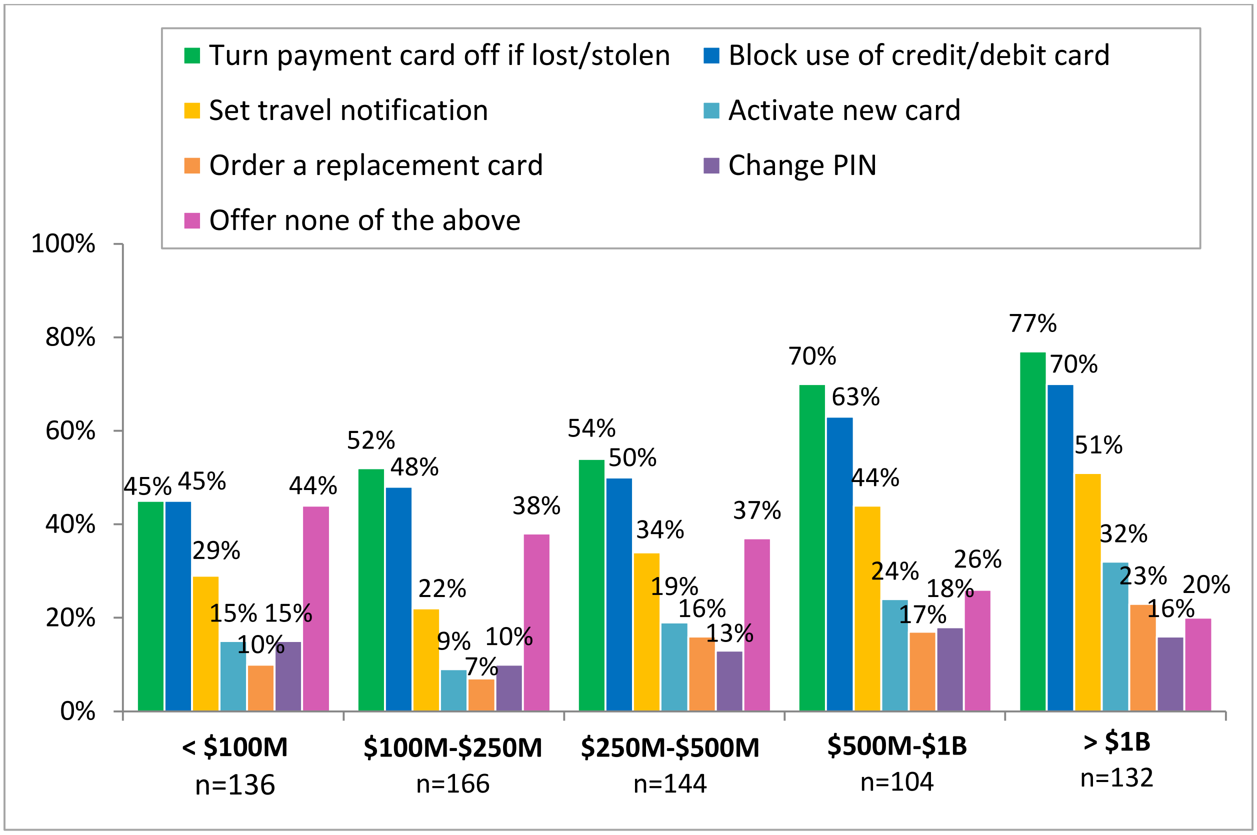
Figure 51: Mobile Card Controls Offered by FIs (percent of respondents)



Q26. Which of the following card control features does your FI's mobile banking app support or plan to support? (Check ALL that apply)

More large FIs offer mobile card control capabilities than the smaller institutions. Thirty-eight (38) percent of respondents in the $100-$250 million asset range did not offer any mobile card controls, and the percentage was even greater (44 percent) among FIs in the smallest asset tier (under $100 million) (**Figure 52**).

Figure 52: Mobile Card Controls Offered by FI by Asset Size (percent of respondents)

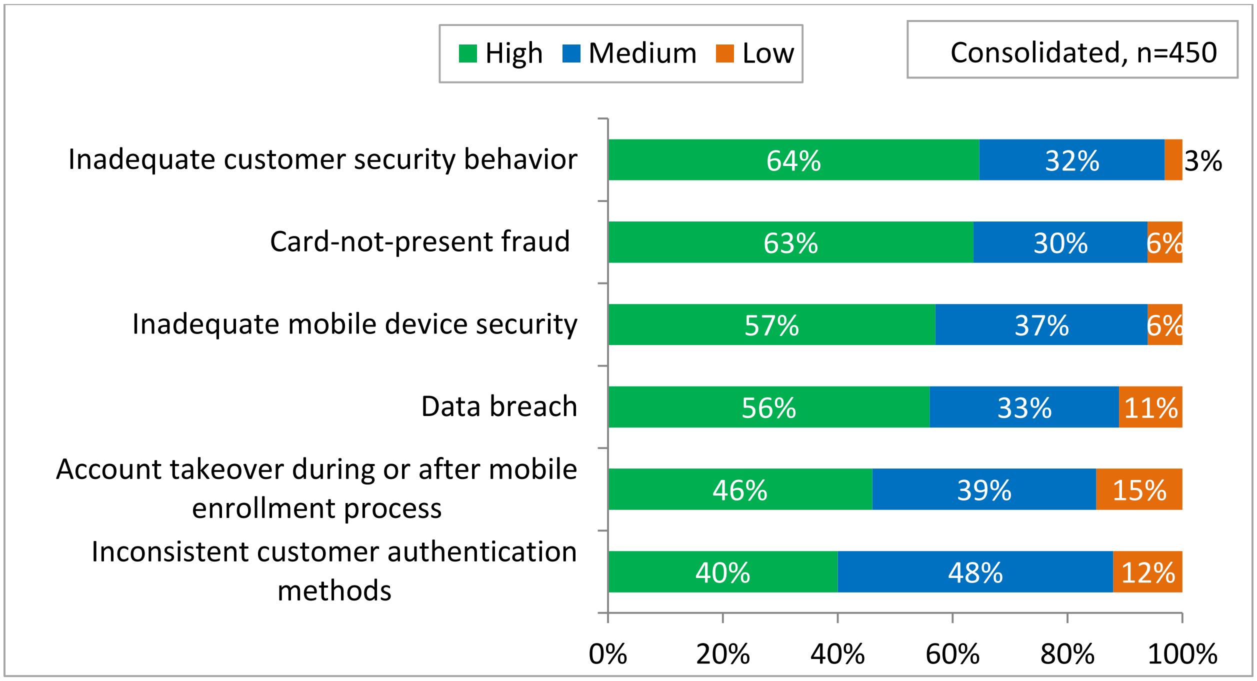


Q26. Which of the following card control features does your FI's mobile banking app support or plan to support? (Check ALL that apply)

Mobile Payment Security

When asked to rate the importance of their institution's mobile payment security concerns, about two-thirds of respondents rated 'inadequate customer security behavior' (64 percent) and 'card-not-present (CNP) fraud' (63 percent) as high (**Figure 53**).[43] Both of these security factors were consistently rated 'high' by banks and credit unions across all Districts. Fifty-seven (57) percent of all respondents rated 'inadequate mobile device security' as high, and 56 percent did the same for 'data breach.' Similar to their rating of mobile banking security, few FIs (15 percent or less) rated any mobile payment security concern as low.

Figure 53: FI Ratings of Mobile Payment Security Concerns (percent of respondents)



Q46. Please RATE the IMPORTANCE of your FI's security concerns associated with mobile payment/wallet services.

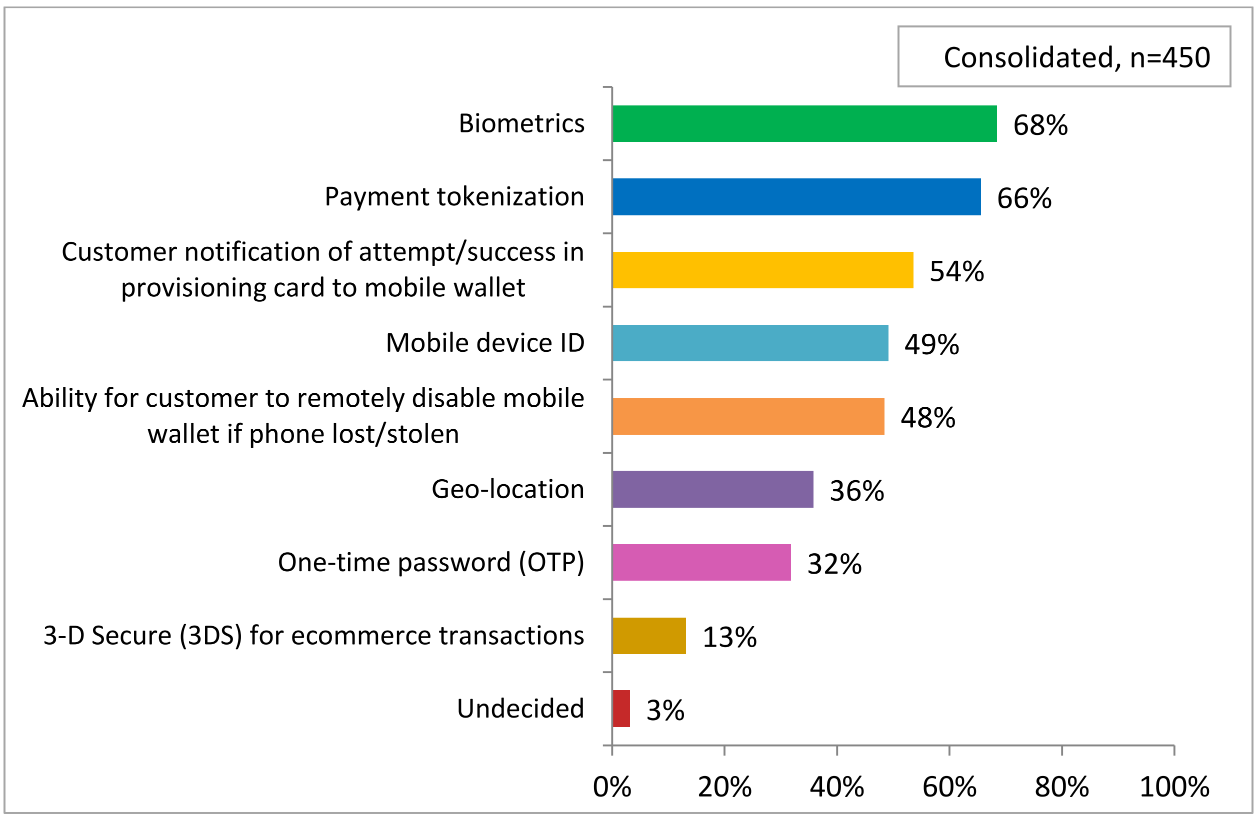
[43] For more information on card-not-present fraud, see Marianne Crowe, Susan M. Pandy, Ph.D., and David Lott "Getting Ahead of the Curve: Assessing Card-Not-Present Fraud in the Mobile Payments Environment," *Federal Reserve Bank of Boston*, November 10, 2016.

Consistent with the approach for mobile banking, FIs also use a layered approach to enhance mobile payments security. Not all security tools (listed in **Figure 54)** are ubiquitous across mobile/digital wallet solutions. For example, because NFC "Pay" wallets store tokenized payment credentials in the mobile phone and allow customers to use a fingerprint to authenticate, FIs that implement NFC "Pay" wallets support both biometrics and payment tokenization.[44]

As most FIs surveyed either offered or planned to offer NFC "Pay" wallets, the two most commonly-supported security tools were biometrics (68 percent) and payment tokenization (66 percent). Among the 172 FIs that have implemented an NFC "Pay" wallet:

- 80 percent (138 FIs) use payment tokenization
- 78 percent (135 FIs) use biometrics
- 65 percent (111 FIs) provide customer notification when a card is provisioned to a mobile wallet
- 52 percent (88 FIs) allow customers to remotely disable a mobile wallet if their phone is lost or stolen

Figure 54: Security Tools Used for Mobile Payments (percent of respondents)

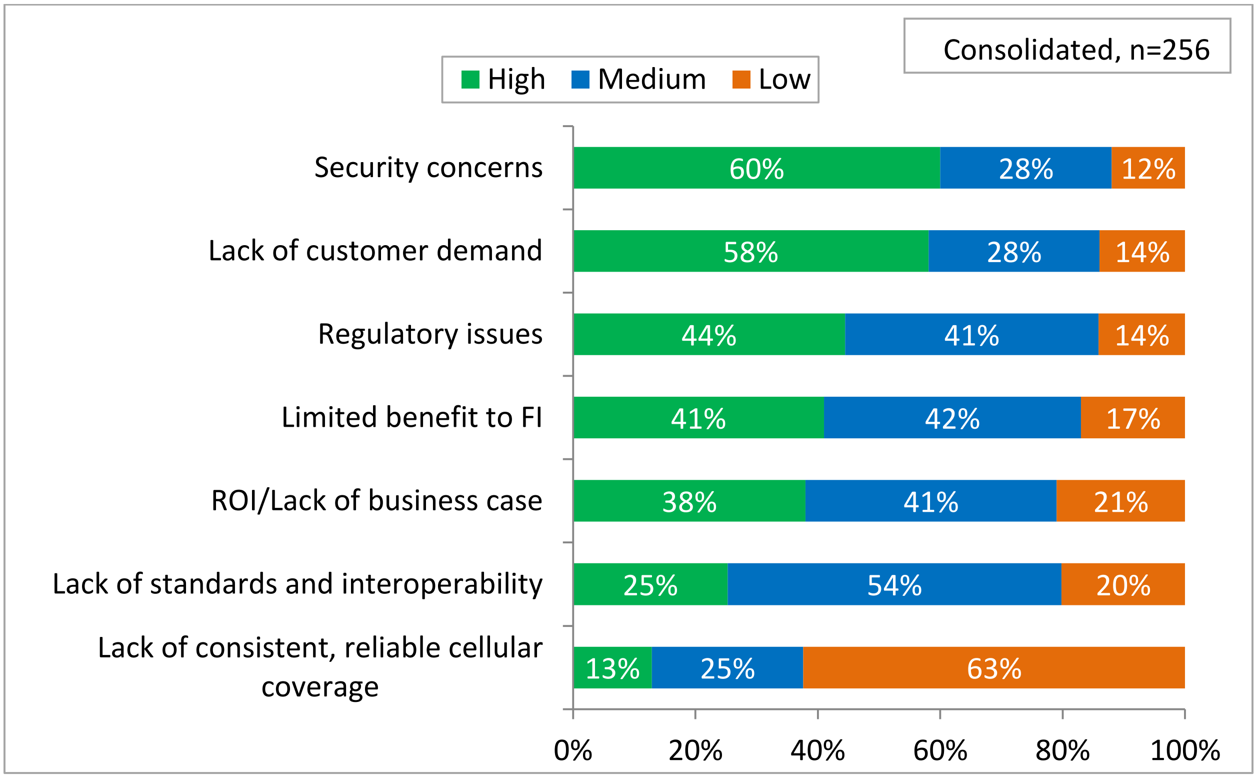


Q47. Do you use or plan to use the following mobile security tools? (Check ALL that apply)

[44] For more information on payment tokenization, see Marianne Crowe, Susan M. Pandy, Ph.D., David Lott, and Steve Mott, "Is Payment Tokenization Ready for Primetime?" *Federal Reserve Bank of Boston*, June 11, 2015

Among the 256 respondents that do not offer mobile payments, 60 percent cited 'security concerns' as being highly important to their decision (**Figure 55**). 'Lack of customer demand' was rated as a high barrier by 58 percent of this group. Furthermore, over half (54 percent) of the respondents rated 'lack of standards and interoperability' as medium importance. Improving security and interoperability will help to increase customer demand.

Figure 55: Reasons FIs Do Not Offer Mobile Payments (percent of respondents)

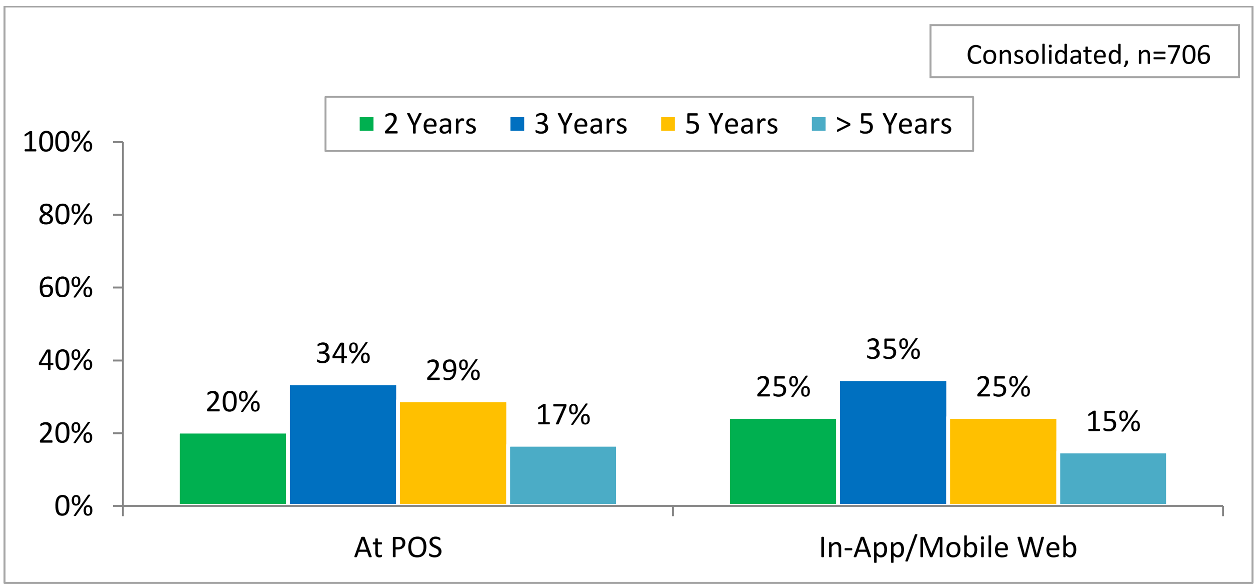


Q48. Please RATE the IMPORTANCE of factors that influenced your decision NOT TO OFFER mobile payment/wallet services.

At the conclusion of the survey, all 706 FI respondents were asked if they thought a mobile payment solution that uses payment tokenization and biometrics is more secure than a card payment. Ninety-four (94) percent of the respondents asserted that mobile payments with tokenization and biometrics are more secure than card payments (**Figure 56**).

Respondents were also asked their perspective about the length of time it would take for industry-wide consumer adoption of mobile payments[45] (whether at POS, mobile in-app or mobile browser to exceed 50 percent. The largest percentage of respondents (34 and 35 percent respectively) predicted that it would take three years for consumer adoption to exceed 50 percent for both proximity and remote mobile payments. Twenty (20) and 25 percent of respondents, respectively, were more optimistic and thought that consumers will broadly adopt mobile payments for POS and in-app/mobile browser transactions in two years. However, at least 15-percent of respondents thought that it would take more than five years for industry-wide mobile payments adoption in either channel.

Figure 56: FI Predictions for Industry-wide Consumer Adoption of Mobile Payments (percent of respondents)



Q50. In your opinion, how long will it take for industry-wide CONSUMER adoption (at least one mobile payment within 90 days) of mobile payments to exceed 50%?

[45] This survey defines **INDUSTRY-WIDE CONSUMER ADOPTION** of mobile payments as having made at least one mobile payment within 90 days.

X. Conclusions

Consumer mobile banking services are becoming ubiquitous across U.S. retail FIs. By 2018, almost all FI respondents are expected to offer mobile banking as a standard part of their retail services portfolio. Mobile banking services for non-retail customer segments will not achieve ubiquity within this timeframe, but three-quarters of FI respondents with commercial and/or small business customers have or anticipate having mobile banking services in place for those segments by year-end 2018.

The reasons why FIs offer mobile banking services have evolved in response to market and technology changes. Historically, FIs have been concerned with protecting their customer base, fending off competition, and attracting new customers – all still important – with customer retention the primary reason, as it was in 2014. A notable shift in 2016 was the seven percentage point increase in FI respondents that want to be perceived as a mobile banking "technology leader." This shift toward technology leadership indicates that those FIs already offering mobile banking are now looking for new ways to differentiate their mobile services.

FIs are gaining traction among retail customers for mobile banking. The period between the 2014 and 2016 MFS Surveys showed consumer adoption and usage gains. The percentage of FIs with more than 20 percent of their customers enrolled/using their mobile banking services doubled during this time. While these figures reflect a wider availability of mobile banking services and some consumer uptake, overall consumer readiness to adopt and move away from other channels is still sluggish.

FIs have standardized on five key retail mobile banking services: the ability to view DDA account balances; make internal A2A transfers; view DDA statements and history; pay bills; and locate ATMs and branches. In addition, mRDC is expected to become a standard offering by year-end 2018 when 91 percent of respondents indicated that they will offer it.

With implementation of basic mobile banking services completed, FIs should see more volume growth in mobile banking over the next two years. The 2016 MFS Survey found that most FIs offer or are exploring other more advanced mobile functions, including mP2P payments and external A2A mobile transfers, as well as more alerts and security features.

Many FIs are turning their attention to mobile payments; almost two-thirds of respondents will be offering mobile payments by year-end 2018. Partnering is the key go-to-market strategy, with most FIs planning to work with third-party providers to launch their mobile payment solutions. FIs are increasingly developing strategies for mobile wallets, with over half selecting an NFC contactless solution as one of their wallets.

Security is a perennial issue, particularly given the variety and sophistication of threats and consumers' failure to protect their devices, apps, and account credentials adequately. In response, FIs have increased their use of customer education and mobile alerts to mitigate risk. Additionally, FIs are considering more robust tools, such as biometrics and tokenization, to enhance security.

Almost all FIs continue to offer mobile banking as a free service for consumers. On the business/commercial side, more FI respondents see some opportunity for pricing mobile, but here too, such FIs are in the minority. Given the paucity of mobile services tailored to business requirements, it is too soon to determine whether business mobile services will be priced broadly.

Despite many commonalities, differences between banks and credit unions are reflected in their approaches to mobile services – from the providers they use, to the types of services offered via the mobile channel, to their perspectives about the factors impacting mobile banking and payments.

A key takeaway throughout the survey is the impact of scale on mobile services. The largest FI respondents (those with assets above $500 million) were earlier to market, offer more services to more market segments, provide greater mobile capabilities (e.g., alerts and mobile account opening), and have implemented more sophisticated security and risk mitigation tools. Larger FIs have also been faster out of the gate in offering mobile payment services.

Finally, analysis of faster or real-time payments in the U.S. has emerged in the interim between the 2014 and 2016 surveys. The Faster Payments Task Force (FPTF), convened by the Federal Reserve, concluded its work in June 2017; The Clearing House (TCH) launched its real-time payments system, RTP, in November 2017; and NACHA has successfully implemented same-day credit and debit services. While it is still "early days," it seems probable that mobile payment strategies will become interwoven with strategies for implementing real-time or faster payment services in the U.S. over the next few years.

XI. Recommendations for Financial Institutions

Develop a comprehensive strategy for mobile banking and mobile payments. Larger and more innovative FIs are building out their mobile banking product strategies and positioning enhanced services, service delivery options and mobile payments to derive additional value from these services. While smaller FIs do not have commensurate resources, they still need to craft strategies that will allow them to differentiate their mobile banking and payment services and leverage their own value propositions. Aligning mobile and faster payments strategies may also make sense as the two converge around P2P payments and consumer-business interactions. Customer adoption and product decisions are key: on a tactical basis, establishing metrics and tracking adoption and usage are essential. The number of FI respondents that indicated they did not track customer enrollment and usage in their mobile banking and mobile payments was unexpected.

Build out marketing and education plans for mobile banking and payments. This two-pronged approach should extend internally as well as externally to FI customers, such that FIs are not only using marketing to encourage new segments or target audiences to use their mobile services, but are also measuring the effectiveness of their marketing strategies in influencing customer adoption and usage. The same is true for customer education, which should dovetail with marketing efforts to deliver information in key areas such as customer benefits, product capabilities, and security. The findings from this 2016 MFS Survey are important for FIs to 'benchmark' their mobile services and to understand the mobile banking and payment practices of other institutions.

Strengthen security and risk management practices. FIs should develop robust risk management programs for mobile banking and payments – including a review of the activities set out in the FFIEC guidance for mobile financial services. The program should include use of mobile security tools to mitigate fraud and protect customer data, implementation of a layered security approach, and controls to protect the security of the mobile apps and services offered to customers.

Consumer security concerns may be based on insufficient information, despite the tools available to secure mobile payments. Industry stakeholders need to take consumers' fears seriously and step-up their efforts to educate the public to build trust in the mobile channel and mitigate potentially risky customer behavior. FIs should inform their customers about how they apply security tools and controls to secure mobile banking apps or wallet offerings to protect consumer account and payment information. FIs should consider working with other stakeholders to provide consistent information to consumers about actions they can take to protect their mobile devices and sensitive payment information.

Conduct due diligence on mobile payment solutions. The 2016 MFS Survey findings illustrate that retail mobile payment services are already being implemented, at least among the larger respondents. With partnership as the go-to-market strategy for almost all respondents, now is the time for FIs to explore the various alternatives to gain an understanding of what vendors are providing and how their services support (or not) the FI's mobile strategy. The MFS Survey highlights some lessons learned with regards to rewards and security considerations for mobile payments that should prove useful to FIs considering a mobile payments solution.

Expand mobile banking services to businesses. FIs interested in offering mobile banking services to businesses should begin to invest in tailored solutions that better support the needs of this segment: funds transfers including ACH and wires, as well as account history, investment services, and more robust capabilities. For smaller businesses, basic money movement, DDA information, mRDC, and straightforward administrative tools are important.

XII. Appendix: 2016 Survey Questionnaire

2016 Federal Reserve Mobile Banking and Payments Survey

Please complete this online survey to help us better understand your organization's mobile banking and payments initiatives and service offerings. Your responses are very important. They will enable us to give you a detailed description of mobile banking and payments activities at financial institutions within our region. Your responses will be kept confidential and data will be consolidated at the district level with no individual financial institution data being reported.

Survey Instructions:

Please answer all questions. If a question is not applicable, please answer using the "Other: (please specify)" option.

If more than one person from the same financial institution receives this survey, please consolidate your responses into a single survey.

If completing this survey using the PDF format, please scan completed survey and send as an attachment to Elisa.Tavilla@bos.frb.org.

Thank you for taking the time to complete this survey.

Section 1: Respondent Profile

1. Financial institution name:____
2. ABA number:____
3. Contact name:____
4. Contact title:____
5. Functional area of contact (e.g., business line, operations, etc.):______________________
6. Email*:____
7. Contact phone: (optional)____

*An electronic copy of the survey results report will be emailed to respondents.

Section 2: Demographics

8. Corporate address:
   Address line 1:____
   Address line 2: ____
   City/town:____
   State:____
   ZIP:____

9. What is your FI's asset size?

- ☐ < $100 Million
- ☐ $100 Million to $250 Million
- ☐ $250 Million to $500 Million
- ☐ $500 Million to $1 Billion
- ☐ > $1 Billion

10. Please indicate your financial institution type:

- ☐ Commercial bank
- ☐ Cooperative or mutual bank
- ☐ Credit union
- ☐ Savings bank
- ☐ Other: (please specify)____

11. Please indicate to whom you provide services. (Check ALL that apply)

- ☐ Consumers (retail customers)
- ☐ Corporate/commercial entities
- ☐ Small businesses
- ☐ Government agencies (including local)
- ☐ Educational and/or non-profit
- ☐ Other: (please specify)____

Section 3: Consumer Mobile Banking

Please refer to the definition below for questions in the **MOBILE BANKING** section:

MOBILE BANKING is the use of a mobile phone to connect to a financial institution (FI) to access bank/credit account information (e.g., view balance), transfer funds between accounts, pay bills, receive account alerts, locate ATMs, deposit checks, etc.

12. When did you start offering mobile banking to **CONSUMERS**? (Check only ONE)

- ☐ More than one year ago
- ☐ Within the past year
- ☐ Currently do not offer mobile banking, but plan to offer within next 2 years
- ☐ Do not plan to offer mobile banking*

*If you checked "Do not plan to offer mobile banking," please go directly to Question 34 on Page 9.

13. What is your **PRIMARY** business reason for offering or planning to offer mobile banking? (Check only ONE)

- ☐ Retain existing customers
- ☐ Attract new customers
- ☐ Be market leader with technology
- ☐ Competitive pressure
- ☐ Increase revenue
- ☐ Other: (please specify)____

14. Which mobile operating system(s) (OS) does or will your mobile banking application support? (Check ALL that apply)

   ☐ Apple iOS
   ☐ Google Android
   ☐ Windows Phone
   ☐ Blackberry
   ☐ Other: (please specify)____

15. Do you offer or plan to offer mobile banking services to consumers via a tablet? (Check ALL that apply)

   ☐ iPad
   ☐ Android
   ☐ Kindle
   ☐ No
   ☐ Other: (please specify)____

16. Who provides or will provide your mobile banking services?

   ☐ Core deposit processor or online banking provider
   ☐ Mobile solution provider
   ☐ In-house system
   ☐ Other: (please specify):____

17. Which of the following mobile banking features do you currently offer or plan to offer to consumers within the next 2 years? (Check ALL that apply)

Mobile Banking Feature	**Currently offer**	**Plan to offer**	**No plans to offer**
Check balances (DDA, Savings)	☐	☐	☐
View statements and/or transaction history (DDA, Savings)	☐	☐	☐
View credit card balances, statements and/or transaction history	☐	☐	☐
Bill payment	☐	☐	☐
Bill presentment	☐	☐	☐
Transfer funds between same owner's accounts within your FI	☐	☐	☐
Transfer funds between same owner's accounts at different FIs	☐	☐	☐
Mobile person-to-person payment (P2P)	☐	☐	☐
Mobile remote deposit capture (RDC)	☐	☐	☐
ATM/branch locator	☐	☐	☐
Personal financial management (PFM)	☐	☐	☐
Access to brokerage services	☐	☐	☐
Cross-border payments	☐	☐	☐

18. Do you offer or plan to offer the following mobile features? (Check ALL that apply)

- ☐ Enroll for mobile banking using a mobile device (mobile enrollment)
- ☐ Open accounts over mobile device (mobile account opening)
- ☐ Single sign-on/authentication credentials for online and mobile services
- ☐ Multilingual mobile website or app
- ☐ None

19. Do you market or plan to market any mobile banking products to the underbanked?

- ☐ Yes, market today
- ☐ Yes, plan to market within next 2 years
- ☐ No

20. What percentage of your **RETAIL** customers has used your mobile banking services?

% of customers ENROLLED	**% of customers who USED services within last 90 days**
☐ Not yet offered	☐ Not yet offered
☐ <5%	☐ <5%
☐ 5-20%	☐ 5-20%
☐ 21-35%	☐ 21-35%
☐ 36-50%	☐ 36-50%
☐ >50%	☐ >50%
☐ Do not track customer enrollment	☐ Do not track customer use

21. For your FI, which are the **THREE** most common barriers to greater **CONSUMER** adoption of mobile banking? (Check only THREE)

- ☐ Ineffective marketing by FIs
- ☐ Security concerns
- ☐ Difficulty of use
- ☐ Lack of trust in the technology
- ☐ Banking needs are being met through other channels
- ☐ Do not see any reason to use mobile banking
- ☐ Other: (please specify)____

22. Do you charge or plan to charge a fee for any **CONSUMER** mobile banking services?

- ☐ Yes
- ☐ No*

*If you checked “No,” please go directly to Question 24 on Page 6.

23. Please indicate **ALL** services for which you charge or plan to charge a fee. (Check ALL that apply)

☐ Mobile RDC
☐ Mobile P2P
☐ Mobile funds transfer between same customer’s accounts within your institution
☐ Mobile funds transfer between same customer’s accounts at different FIs
☐ Other: (please specify)____

Section 4: Consumer Mobile Banking Security

24. What types of mobile alerts does your FI offer or plan to offer? (Check ALL that apply)

☐ Insufficient funds
☐ Low balance
☐ Credit card balance close to or over limit
☐ Online purchase (card-not-present) transaction
☐ Funds transfer completed
☐ Credit payment confirmation
☐ Bill payment due
☐ International charge/debit
☐ Suspicious activity/other fraud monitoring alerts
☐ Two-way actionable alerts (e.g., FI sends customer insufficient funds alert, customer replies to schedule transfer)
☐ Other: (please specify)____

25. Please **RATE** the **IMPORTANCE** of your FI’s security concerns associated with offering mobile banking services to consumers.

	High	Medium	Low
Data breach			
Weak authentication*			
Identity theft			
Inadequate customer protection behavior**			

*e.g., ‘Easy to guess’ password or answers to security questions
**e.g., Consumer may use unsecured network, not use antivirus solutions, not set-up mobile password, not protect device from theft or loss

26. Which of the following card control features does your FI’s mobile banking app support or plan to support? (Check ALL that apply)

☐ Activate new card
☐ Change PIN
☐ Order a replacement card
☐ Turn payment card on or off if lost/stolen
☐ Block use of credit and/or debit card
☐ Set travel notification
☐ None

27. Which of the following does your FI use or plan to use to enhance mobile security? (Check ALL that apply)

- ☐ Multi-factor authentication
- ☐ Time-out due to inactivity
- ☐ Out-of-band authentication (e.g., calls/texts to alternate phone number)
- ☐ Login with PIN
- ☐ Biometrics (e.g., fingerprint, facial, voice recognition, etc.)
- ☐ Mobile notifications (e.g., SMS text message, push notifications)
- ☐ Mobile device ID
- ☐ Geo-location
- ☐ Other: (please specify)____

Section 5: Business Mobile Banking

28. Do you offer or plan to offer mobile banking services to your **BUSINESS** customers?

- ☐ Yes
- ☐ No*

* If you checked "No," please go directly to Question 35 on Page 10.

29. What mobile banking services do you offer or plan to offer within the next 2 years to your **BUSINESS** customers? (Check ALL that apply)

- ☐ Check corporate balances and monitor accounts
- ☐ Cash management functions
- ☐ Mobile funds transfer between same business customer's accounts within your institution
- ☐ Mobile funds transfer between same business customer's accounts at different FIs
- ☐ Mobile funds transfer from one business customer's account to another business customer's account at same or different FIs
- ☐ Administration tools (e.g., setup and manage users, reset passwords, etc.)
- ☐ Mobile card acceptance plug-in reader/mobile POS (e.g., Square, QuickBooks GoPayment)
- ☐ Other: (please specify)____

30. Do you charge or plan to charge your **BUSINESS** customers a fee for any mobile banking services?

- ☐ Yes
- ☐ No*

* If you checked "No," please go directly to Question 32 on Page 9.

31. Please indicate **ALL BUSINESS** services for which you charge or plan to charge a fee. (Check ALL that apply)

- ☐ Mobile RDC
- ☐ Other product /service (e.g., cash management) transaction fee
- ☐ Mobile funds transfer between same business customer's accounts within your institution
- ☐ Mobile funds transfer between same business customer's accounts at different FIs
- ☐ Commercial/small business customers flat monthly fee for services
- ☐ Commercial/small business customers by transaction type or volume
- ☐ Other: (please specify)____

32. What percentage of your **BUSINESS** customers has used your mobile banking services?

% of customers ENROLLED	% of customers who USED services within last 90 days
☐ Not yet offered	☐ Not yet offered
☐ <5%	☐ <5%
☐ 5-20%	☐ 5-20%
☐ 21-35%	☐ 21-35%
☐ 36-50%	☐ 36-50%
☐ >50%	☐ >50%
☐ Do not track business customer enrollment	☐ Do not track business customer use

33. What challenges do you see in offering mobile banking services to your **BUSINESS** customers? (Check ALL that apply)
    - ☐ Business banking software for mobile not available
    - ☐ Available products do not meet business customer needs
    - ☐ Available products are not suited to all FI segments
    - ☐ Implementation difficult or costly
    - ☐ Other: (please specify)____

34. Please **RATE** the **IMPORTANCE** of factors that influenced your decision **NOT TO OFFER** mobile banking services.

	High	Medium	Low
Lack of customer demand			
Security concerns			
Regulatory issues			
Lack of standards and interoperability			
ROI/Lack of business case			
Lack of consistent, reliable cellular coverage			
Processor does not offer a solution			
Lack of resources to offer in-house solution			
Other: (please specify)			

Section 6: Mobile Payments

Please refer to the definition below for questions in the **MOBILE PAYMENTS** section:

MOBILE PAYMENT is the use of a mobile phone to pay for a retail purchase at point of sale (POS) using near field communication (NFC) or quick response (QR) code, or to pay remotely via mobile app or web for digital content, goods and services (e.g., transit, parking, ticketing, etc.).

MOBILE WALLET is an app within the mobile phone that controls access to credit, debit, prepaid or bank account credentials (or payment token substitutes) stored securely in the mobile phone and used to pay for mobile purchases.

35. Do you offer or plan to offer mobile payment/wallet services to consumers?

- ☐ Currently offer mobile payment services
- ☐ Plan to offer mobile payment services within next 2 years
- ☐ Do not plan to offer mobile payment services*

*If you checked "Do not plan to offer mobile payment services," please go directly to Question 48 on Page 15.

36. Please **RATE** the **IMPORTANCE** of factors that influenced your FI's decision to offer or plan to offer mobile payments.

	High	Medium	Low
Mobile payments are gaining momentum			
Customer demand			
Increase customer engagement with loyalty, rewards, and other incentives			
Generate revenue and/or reduce costs			
Compete with other FIs			
Compete with nonbanks (e.g., Amazon, Apple, Google, PayPal, etc.)			
Mobile device is more secure than card or other payment methods			
Provide two-way mobile communication tool with customers			
Other: (please specify)			

37. Please indicate the mobile wallet service(s) that you are familiar with. (Check ALL that apply)

- ☐ Apple Pay
- ☐ Android Pay
- ☐ Samsung Pay
- ☐ Microsoft Wallet
- ☐ Visa Checkout
- ☐ Mastercard Masterpass
- ☐ Amex Express Checkout
- ☐ PayPal
- ☐ Amazon Payments
- ☐ LevelUp
- ☐ Walmart Pay
- ☐ Other: (please specify)____

38. How do you offer or plan to offer mobile payment/wallet services? (Check ALL that apply)*

- ☐ Partner with a card network (e.g., AmEx, MasterCard, Visa or Discover to offer online digital wallet (check-out) services via mobile)
- ☐ Partner with a NFC-enabled wallet provider (e.g., Apple Pay, Android Pay, Samsung Pay)
- ☐ Partner with third-party payment processor (e.g., FIS, Fiserv)
- ☐ Develop your own mobile payment solution (e.g., Capital One Wallet, Chase Pay, CU Wallet, Wells Fargo Wallet)
- ☐ Other: (please specify)____

*If you did not check at least one of the first two answers, please go directly to Question 42 on Page 12.

39. Which of the following **MOBILE WALLET** service(s) do you offer or plan to offer? (Check ALL that apply)

Mobile Wallet	**Currently offer**	**Plan to offer**
Apple Pay	☐	☐
Android Pay	☐	☐
Samsung Pay	☐	☐
Microsoft Wallet	☐	☐
Visa Checkout	☐	☐
MasterCard MasterPass	☐	☐
AmEx Express Checkout	☐	☐
Other: (please specify)	☐	☐

40. About how much time did it take for your FI to implement the **NFC MOBILE WALLET** service? (If you have not implemented NFC Mobile Wallet service, please check 'N/A')

- ☐ Less than 3 months
- ☐ 3 months
- ☐ 6 months
- ☐ More than 6 months
- ☐ N/A

41. What challenges did your FI experience implementing the **NFC MOBILE WALLET**? (Check ALL that apply)

- ☐ Waiting for certification from card networks or processors
- ☐ Lengthy processor queue
- ☐ Software development and testing
- ☐ Customer/staff training, education, etc.
- ☐ Other: (please specify)____

42. What types of incentives tied to mobile payments/wallets do you offer or plan to offer? (Check ALL that apply)

- ☐ Location-based offers
- ☐ Cash reward or account credit for mobile wallet enrollment
- ☐ Rewards points or cash back for mobile transactions
- ☐ Rewards redemption (e.g., pay with points) for mobile transactions at the POS
- ☐ None
- ☐ Other: (please specify)____

43. What percentage of your **RETAIL** customers uses your mobile payment/wallet services?

% of customers ENROLLED	**% of customers who USED services within the last 90 days**
☐ Not offered yet	☐ Not offered yet
☐ <5%	☐ <5%
☐ 5-20%	☐ 5-20%
☐ 21-35%	☐ 21-35%
☐ 36-50%	☐ 36-50%
☐ >50%	☐ >50%
☐ Do not track customer enrollment	☐ Do not track customer use

44. From your FI’s perspective, please **RATE** the **SIGNIFICANCE** of these barriers to consumer adoption of mobile payments.

	High	Medium	Low
Security			
Privacy			
Market immaturity and fragmentation			
Lack of customer demand			
Low merchant acceptance/lack of merchant interest			
Other: (please specify)			

45. Do you offer or plan to offer mobile payment/wallet services for your **BUSINESS** customers?

☐ Currently offer
☐ Plan to offer within the next 2 years
☐ No plans at this time

Section 7: Mobile Payments Security

46. Please **RATE** the **IMPORTANCE** of your FI’s security concerns associated with mobile payment/wallet services.

	High	Medium	Low
Account takeover during or after mobile enrollment process			
Card-not-present fraud (for online purchases made via mobile phone)			
Data breach			
Inadequate customer security behavior			
Inadequate mobile device security			
Inconsistent customer authentication methods			
Other: (please specify)			

47. Do you use or plan to use the following mobile security tools? (Check ALL that apply)
☐ Biometrics (e.g., fingerprint, facial, voice recognition, etc.)
☐ Geo-location
☐ Payment tokenization
☐ Customer notification of attempt/success in provisioning card to mobile wallet
☐ Mobile device ID
☐ One-time password (OTP)
☐ Ability for customer to remotely disable mobile wallet if phone lost/stolen
☐ 3-D Secure* (3DS) for ecommerce transactions
☐ Other: (please specify)____

***3-D Secure** is an XML protocol designed to provide an additional layer of authentication to CNP online transactions, supported by Visa Verified by Visa, MasterCard SecureCode and AmEx SafeKey.

48. Please **RATE** the **IMPORTANCE** of factors that influenced your decision **NOT TO OFFER** mobile payment/wallet services.

	High	**Medium**	**Low**
Lack of customer demand			
Limited benefit to FI			
Security concerns			
Regulatory issues			
Lack of standards and interoperability			
ROI/Lack of business case			
Lack of consistent, reliable cellular coverage			
Other: (please specify)			

Section 8: Financial Institution Feedback

49. In your opinion, do you think a mobile payment that uses payment tokenization and biometrics is more secure than a card payment?

☐ Yes
☐ No (please explain)____

50. In your opinion, how long will it take for industry-wide **CONSUMER** adoption (at least one mobile payment within 90 days) of mobile payments to exceed 50%?

At POS	**In-App/Mobile Web**
☐ 2 years	☐ 2 years
☐ 3 years	☐ 3 years
☐ 5 years	☐ 5 years
☐ > 5 years	☐ > 5 years

51. Please share your ideas on what role(s) the Federal Reserve can play in helping to increase your knowledge of mobile banking and payments, and other feedback.

52. Please indicate the **FIRST TWO DIGITS** of your ABA number to help us link your response with appropriate Federal Reserve district:

☐ 01 or 21
☐ 04 or 24
☐ 05 or 25
☐ 06 or 26
☐ 09 or 29
☐ 10 or 30
☐ 11 or 31
☐ Other: (please specify)____

Thank you for taking the time to complete this survey!