

# Mobile Payments: Merchants' Perspectives

*By Fumiko Hayashi and Terri Bradford*

The U.S. payment market has attracted increasing attention from technology firms and their investors seeking to capitalize on mobile and cloud technologies and the growing trend in consumer adoption of smartphones. Although consumers in the United States largely have not adopted mobile payments, merchants believe these technologies will address some current barriers to the use of mobile payments. In fact, many merchants are actively developing and implementing mobile payment applications.

Will these new technologies increase the overall value of mobile payments for end users, namely merchants and consumers, and motivate them to use mobile payments? End users' preferences will influence the industry's direction as industry participants consider making investments and policymakers consider payments policies. This article focuses on merchants' mobile payments preferences because, unlike consumer payment preferences, there is little research on the merchant perspective.

The article examines attributes of mobile payments that may be a benefit or a concern to U.S. brick-and-mortar merchants. The analysis is based on phone interviews with about 20 large and midsize merchants from various retail categories. The article finds some attributes have clear effects on merchants. An enhanced customer shopping experience will be a benefit for merchants, while, at least in the near term, fragmented

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markets—in which several mobile technologies and applications coexist but no one gains enough traction to propel the industry forward—will be a concern. The effect of other attributes, such as cost, customer data control, and security, depends on what technologies will be used, which payment method will be linked to fund the mobile payment transaction, and who will provide the mobile payment application.

Section I reviews the current payment environment for merchants and compares basic features and associated business models of mobile payment technologies. Section II discusses key attributes of mobile payments for merchants—customer shopping experience, cost, customer data control, security, and fragmented markets—and examines how benefits and concerns about these attributes vary by merchant characteristics. Section III summarizes the findings and draws conclusions by discussing the direction of mobile payments in the United States.

## **I. PAYMENT ENVIRONMENT AND MOBILE PAYMENT TECHNOLOGIES**

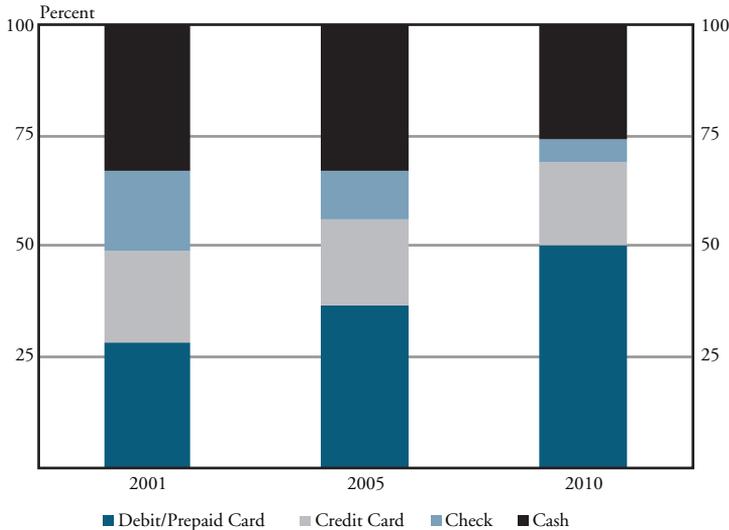
Merchants view the adoption of mobile payments methods, especially those that use barcodes, quick response (QR) codes, and cloud technology, as an opportunity to improve a payment environment long dominated by cards. Merchants generally have been dissatisfied with card fees and rules that limit payment acceptance practices, such as surcharging and discounting. Although any mobile payment technology theoretically can accommodate a variety of payment methods as a funding source, each mobile technology tends to favor a particular payment method due to business models associated with the technology.

### *Payment cards—the current payment environment*

As the U.S. payments system has evolved from paper-based to electronic, the share of merchants' total sales made with payment cards has increased. The share of consumers that prefers to use a payment card (either a credit, debit, or prepaid card) over other payment methods at brick-and-mortar merchants increased from 49 percent in 2001 to 69 percent in 2010 (Chart 1). Consequently, fees charged to merchants to process payment cards, as well as rules and security standards set by payment card networks, significantly affect merchants' net income.

Chart 1

### PAYMENT METHOD SHARES AT BRICK-AND-MORTAR MERCHANTS MEASURED AS CONSUMERS' MOST PREFERRED METHOD



Source: Hitachi Consulting and BAI. 2010 Study of Consumer Payment Preferences, September 2010.

Fees merchants pay to accept card transactions have risen rapidly in the last two decades because of increased volume and value of card transactions and increased fees per transaction. The increased fees per transaction are attributed to interchange fees, which are paid to card issuers and account for more than 80 percent of all fees merchants pay for card transactions.<sup>1</sup> Recent debit card regulation, however, has capped interchange fees for some debit and prepaid card transactions. Following implementation of the regulation, the average interchange fee for debit and prepaid card transactions declined from 48 cents to 30 cents (Hayashi 2012c). In contrast, credit card interchange fees are not regulated and the average fee is about 2 percent of a transaction's value—about 80 cents for a \$40 transaction, the average transaction value of debit cards.<sup>2</sup>

For merchants, payment cards are more expensive to accept than other payment methods. Credit cards, especially ones offering rewards, are the most expensive method (Hayashi 2009). Recent debit card regulation reduced the cost of processing a debit card transaction, but for some merchants cash remains the least expensive method.<sup>3</sup> One new

electronic payment method some merchants offer is a proprietary payment method using the automated clearinghouse (ACH) to directly debit their customers' bank accounts (Wack). Merchants' cost to process ACH transactions is about 15 cents per transaction (Johnson), making ACH less expensive than debit or prepaid cards but likely more expensive than cash.

Merchants seeking to control payment acceptance costs have sought greater flexibility to steer customers toward less costly payment methods. Previously, merchants had limited ability to steer customers because payment card networks imposed "no-steering" and "no-surcharge" rules (Hayashi 2012b). Recent debit card regulation and two legal settlements have changed these rules, and merchants now have more flexibility to steer their customers. Merchants now can impose a surcharge on credit card users and offer discounts based on payment method, brand, and product.<sup>4</sup> Most merchants, however, are not yet using this new flexibility.

The different costs of payment methods and merchants' new flexibility have affected merchants' mobile payment strategies. Merchants seeking to reduce processing costs may prefer to accept mobile payments using ACH as a funding source over mobile payments using credit cards as a funding source. While merchants have been reluctant to steer consumers through surcharges or discounts, they may find it easy to offer digital coupons, promotions, or discounts specifically to users of mobile payments integrated with mobile commerce.

The U.S. payment card industry's current migration to cards embedded with a computer chip (referred to as EMV or chip cards) to improve security relative to magnetic stripe cards will also affect merchants' mobile payment strategies. Instead of mandating the use of the more secure chip cards, payment card networks are shifting fraud loss liability for "card-present" (CP) transactions—when consumers pay by physically presenting their payment card—from the card issuer to the merchant if the merchant has not invested in EMV technology but the issuer has.<sup>5</sup> Otherwise, liability remains the same as it is today, with issuers absorbing the majority of fraud losses for CP transactions.<sup>6</sup>

Another important merchant strategy is the device merchants choose for reading EMV cards at the point of sale: contact or contactless readers. A *contact* card reader requires insertion of a card into

a reader (similar to an ATM) so information in the computer chip can be read. In contrast, a *contactless* card reader connects with a chip card using near field communication (NFC). NFC is a short-range, high-frequency, standards-based wireless communication technology through which data are exchanged between compatible devices in close proximity. NFC also is used in some mobile payments applications. The next section discusses how merchants' choices to invest in contactless card readers will also affect their acceptance of mobile payments.

### *Mobile payment technologies and associated business models*

Technologies that enable mobile payments are still fragmented in the United States, where there is no dominant method for making mobile payments. The choice of technologies significantly affects requirements for consumer and merchant use, business models, and funding sources.

The three main technologies that have emerged for mobile payments are NFC, code-based (for example, barcode and QR code), and cloud-based (see Box). NFC enables wireless devices to communicate over a short distance. A consumer completes a transaction by tapping or waving a mobile device at a merchant's point-of-sale (POS) device. Barcodes and QR codes store information that can be read by a scanner or a mobile device that has a code reader application installed. One way to make a payment using these codes is for a consumer's mobile device to display a barcode or QR code containing payment information that is scanned by a POS device. Cloud technology uses remote servers to store data, eliminating upfront investments in software and hardware, and removing volume limits on stored data. One way to make a cloud-based mobile payment is to use a consumer's mobile phone number with a personal identification number (PIN) entered into a PIN pad at a merchant's POS. Other cloud-based methods rely on location-based technology that monitors a consumer's location (for example, inside a given store) with a mobile payment application.

Each of the three technologies is used in some existing mobile payment applications or ones in development (Table, row 1). NFC is used for mobile wallet applications provided by Google and by Isis, a joint venture of mobile network operators AT&T, T-Mobile, and Verizon.<sup>7</sup> Barcodes and QR codes are mainly used in a merchant's proprietary mobile payment application, such as the one used by Starbucks, and for

**BOX**  
**TECHNOLOGIES USED FOR MOBILE PAYMENTS**  
**AT THE POINT OF SALE**

**Near field communication (NFC)** is a short-range, high-frequency, standards-based wireless communication technology that enables exchange of data between compatible devices in close proximity. This requires at least one device to transmit a signal and another to receive it. NFC devices can be passive or active. A passive device, such as an NFC sticker, contains information that other devices can read, but does not read information itself. Active devices, like smartphones, point-of-sale terminals and other digital devices can both read and send information to other compatible devices. In terms of security, NFC often establishes a secure channel and uses encryption when sending sensitive information such as payment card numbers.

**Barcode and quick response (QR) code** are a machine readable means by which information can be pulled. Linear barcodes consist of a series of vertical black lines and white spaces of variable width, representing numbers, which are read by a barcode reader to extract the information they represent. QR codes are formed by patterns of black and white squares typically arranged in a square grid and can contain thousands of alphanumeric and other characters in virtually any language, solving issues of the amount of information that they can store. Credentials used for payments may be encrypted within codes or stored in the cloud.

**Cloud technology** utilizes remote servers where data can be stored and eliminates limitations of how much data can be stored and the need to make upfront investments in software and hardware. The technology leverages encryption, tokenization, and the mobile device's connection to the Internet to obtain credentials to enable payment.

Table

## REQUIRED INVESTMENT, BUSINESS MODELS, AND FUNDING SOURCES BY TECHNOLOGY

	Technology	NFC	Code-Based	Cloud-Based
1	Examples	Google Wallet, Isis	Starbucks, LevelUp, MCX	PayPal, Square Wallet
2	Required Investment: Consumer	Moderate: NFC-enabled smartphone	Minimal: Smartphone	Minimal: Smartphone
3	Required Investment: Merchant	Significant: NFC-capable POS terminals; Software installation and integration with accounting system	Moderate: QR code scanners; Software installation and integration with accounting system	Moderate: Software installation and integration with accounting system
4	Business Models: Participants	Mobile wallet providers; Hardware providers; Tech providers; App vendors; Mobile network operators; Card issuers/Networks; Handset providers	Mobile payment provider; Hardware providers; Tech providers; App vendors	Mobile payment provider; Tech providers; App vendors
5	Business Models: Coordination and Collaboration besides Merchants	Critical	Less important	Less important
6	Funding Sources	Debit, credit, and prepaid cards	Pre-funded accounts or bank accounts	Bank account and/or debit, credit, and prepaid cards

open-loop mobile payment applications offered by third-party providers such as LevelUp.<sup>8</sup> Also, a joint venture among a growing number of leading merchants called the Merchant Customer Exchange (MCX) plans to use QR codes at least initially in its mobile payment application.<sup>9</sup> Cloud technology is used by third-party mobile payment providers, such as PayPal and Square.<sup>10</sup>

The type of technology used for mobile payments significantly affects requirements for consumer and merchant adoption (Table, rows 2 and 3). The most important requirement of consumers and merchants who want to make or accept NFC-based mobile payments is investment in NFC-capable equipment. Because a given NFC-enabled mobile phone supports only a subset of NFC-based mobile payment applications, consumers need a mobile phone that supports payment applications they want to use. For merchants, especially those with multiple locations and multiple checkout lanes, implementing

NFC-based payments requires significant investment. However, the U.S. payment card industry's migration to EMV card technology may encourage merchants to install NFC-equipped terminals. Merchants who plan to adopt EMV can also accept NFC-based mobile payments by installing contactless card readers. For many merchants, the cost difference between investing in EMV contactless card readers and investing in EMV contact card readers is likely small.

In contrast, mobile payments using barcodes, QR codes, or cloud technology have fewer requirements for consumers and merchants. Consumers only need to download an application to their smartphones. Some payment applications are proprietary and enable payment only to a specific merchant, meaning consumers may need to download multiple applications. Nevertheless, downloading and using multiple applications is less cumbersome than carrying multiple proprietary cards. For merchants to accept code- or cloud-based mobile payments, they must integrate an application into their POS system. With barcode- or cloud-based payments, merchants may be able to use current equipment, while mobile payments using QR codes may require installation of a separate QR code scanner.

Business models for mobile payments also vary by technology (Table, rows 4 and 5). The business models for NFC-based mobile payments require coordination and cooperation among a variety of participants. However, coordination and cooperation have been difficult. Not all major mobile phone manufacturers incorporate NFC technology in their devices. Mobile network operators have only selectively supported available mobile wallet applications. And few card issuers enable their cards to be stored for use in mobile wallet applications.

The contrasting, simpler business models for code- and cloud-based mobile payments are less dependent on hardware. Furthermore, these technologies are typically used for proprietary or smaller open-loop mobile payments, for which merchants generally work closely with mobile payment service providers. These service providers may offer mobile payment applications to consumers on behalf of merchants. They may also establish routing to payment methods that are used as funding sources for mobile payments.

Funding sources used for mobile payments are closely related to business models (Table, row 6). Card networks and issuers have

significant involvement in the business models of NFC-based mobile payments, thus the main funding sources are general-purpose credit, debit, and prepaid cards. Proprietary or small open-loop mobile payments that use code- and cloud-based technologies typically use pre-funded accounts (held at a merchant or at a third-party mobile payment provider) or bank accounts via ACH as funding sources.

## II. KEY MOBILE PAYMENT ATTRIBUTES FOR MERCHANTS

This section examines key mobile payment attributes for merchants. It first describes the survey conducted by the authors to collect merchants' mobile payment preferences. Next, it examines five key attributes of mobile payments for merchants—customer shopping experience, cost, customer data control, security, and fragmented markets. For each attribute, the section explains the relevance of the attribute to mobile payments, discusses merchants' perspectives, and determines whether the attribute is a benefit or a concern for merchants.

### *Survey design*

The analysis in this section is based on the authors' survey of merchants. Unlike consumer payment preferences, there is little research on merchant payment preferences.<sup>11</sup> Thus, previous studies do not provide evidence on which attribute of mobile payments will be a benefit or a concern for merchants. To fill the gap, the authors conducted phone interviews with about 20 large and midsize merchants.<sup>12</sup>

Merchants were selected from various retail categories, including consumer electronics, department stores, discount stores, drug stores, gas stations, grocery stores, home improvement stores, quick service restaurants, and restaurants. A variety of categories was selected because preferences for mobile payments may vary significantly by category.<sup>13</sup> Larger merchants were selected over smaller counterparts because they tend to be more advanced in the use of mobile payments. As a result, about 65 percent of merchants interviewed were from the top 100 retailers, based on 2012 retail sales, and each was either a national or large regional retailer.<sup>14</sup> Survey participants represented various functions in their organizations, including treasury, payment services, information systems, marketing, and compliance/legal departments. All participants

were knowledgeable about mobile payment and commerce strategies at their organization. Although merchants interviewed may not represent the entire U.S. merchant population, understanding their preferences for mobile payments is informative for industry participants and policymakers. These merchants may shape the future acceptance of mobile payments, and other merchants may follow their example.

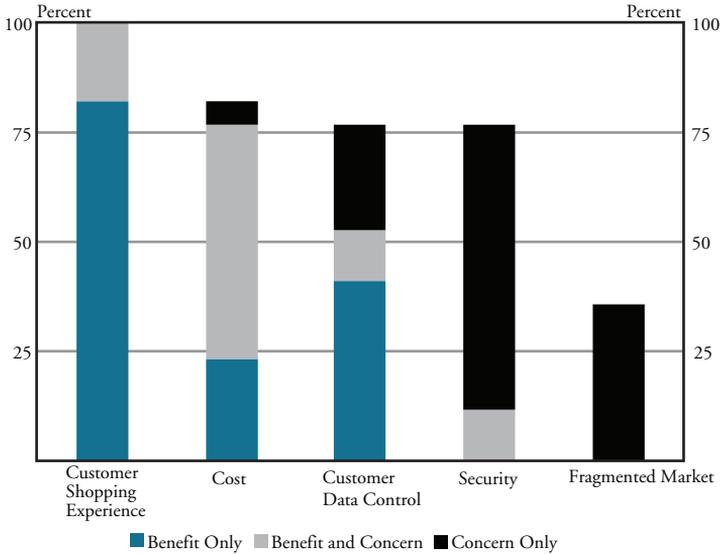
Merchants were asked five questions: (1) does the merchant currently accept any type of mobile payments, or plan to in the next few years; (2) what types of mobile payments does the merchant accept or plan to accept; (3) does the merchant offer (or plan to offer) any mobile applications to consumers to enhance their shopping experience, and if so what kind; (4) what are the biggest benefits the merchant anticipates from mobile payments; and (5) what concerns does the merchant have about mobile payments? Questions 2 through 5 are open-ended. Responses to the first three questions reveal merchants' mobile payment and commerce strategies, while responses to the last two questions facilitate analysis of their preferences for mobile payments.

Responses to the first three questions reveal interviewed merchants have robust mobile payment and commerce strategies. Most of the interviewed merchants currently offer or are developing mobile *commerce* applications for their customers; however, service offerings or planned services vary by merchant. A majority of merchants interviewed, with few exceptions, also accept or plan to soon accept mobile *payments*. More than 40 percent of interviewed merchants accept mobile payments—at least as pilot programs at some locations—and another 40 percent plan to accept.<sup>15</sup> Among mobile payment technologies, merchants generally prefer barcode, QR code, or cloud to NFC. A couple of merchants currently use other mobile payment technologies, such as text.

Responses to the last two questions about benefits and concerns about mobile payments concentrated on five attributes—customer shopping experience, cost, customer data control, security, and fragmented market. Customer shopping experience was the most-cited attribute and fragmented market was cited least (Chart 2). Interviewed merchants generally view customer shopping experience as a benefit, while fragmented market is a concern. The rest of this section analyzes each attribute, ordered from most cited to least.

Chart 2

## SHARES OF MERCHANTS WHO CITED ATTRIBUTES AS A BENEFIT, A CONCERN, OR BOTH



Source: Authors' interviews.

### Customer shopping experience

Given a lack of compelling benefits of mobile payments for U.S. consumers, providing consumers more benefits from mobile *commerce* may encourage consumer adoption of mobile *payments*.<sup>16</sup> Merchants have started offering mobile commerce to enhance their customers' shopping experience.

*Relevance.* Mobile commerce, together with mobile payments, will enhance a consumer's shopping experience in several ways. First, mobile commerce will make shopping more convenient. Many mobile commerce applications help consumers find stores and products in a store. Some applications offer shopping list capability and alert consumers when a listed item is among the "deals of the day" or when discount coupons are available. The integration of digital coupons with mobile payments may reduce checkout time. Applications that scan barcodes allow consumers to compare prices at other stores, obtain more product information, or see product reviews. Barcode applications can also be integrated with mobile payments to allow consumers to self-checkout and receive a digital receipt, reducing or eliminating time spent at a POS.

Second, mobile commerce will allow consumers to receive relevant promotions and advertisements. Merchants can use mobile devices to send consumers location-based, real-time coupons and vouchers. Individuals also may receive highly targeted promotions from merchants using detailed consumer information, including purchase and payment histories, and one-to-one communications enabled by mobile devices. Merchants may seek to mitigate the privacy concerns of some consumers or their annoyance with the receipt of ads by making certain functions of their mobile commerce and payment applications available on an opt-in basis.<sup>17</sup>

Third, mobile commerce may drive customer engagement and loyalty. Mobile devices allow merchants to provide timely, ongoing customer support. Individualized communications also allow consumers to select loyalty and rewards programs that meet their individual needs and preferences.

*Merchants' perspectives.* All interviewed merchants view enhancement of the customer shopping experience as a primary benefit of mobile payments, although some are concerned their customers may find mobile commerce or payment applications burdensome or complex. Interviewed merchants' positive view of this attribute is reflected in their practice: as discussed, they either already offer or are developing mobile commerce applications.<sup>18</sup> Further, merchants with wide profit margins, such as department stores, tend to prioritize customer shopping experience over cost.

Three of four merchants, covering all nine retail categories, cited enhanced customer convenience as a primary benefit, though the type of convenience varied by retail category. For example, improved accuracy of orders or prescriptions is expected at quick service restaurants or drug stores, respectively. Self-scanning and self-checkout have more value at merchants that sell numerous items, such as discount, grocery, and home improvement stores, and whose customers purchase at least several items at once.

Only one merchant cited marketing (specifically, offering coupons) as a primary benefit. Although many interviewed merchants now offer digital coupons through their mobile applications, many retail categories already offered paper-based coupons. In a category like gas stations, however, where there is little use of paper-based coupons, offering digital

coupons through mobile applications may be a significant marketing opportunity.

About 20 percent of merchants cited loyalty as a primary benefit. Those merchants are mainly from department, drug, and grocery stores with established, popular loyalty programs. Strengthening loyalty programs through mobile applications may be a necessary strategy for merchants in these retail categories to compete against rivals. In other categories, mobile applications are expected to help merchants gain loyalty from both existing and new customers.

*Conclusion.* Enhanced customer shopping experience with mobile devices will clearly benefit brick-and-mortar merchants in various retail categories. It not only helps entice consumers to adopt mobile payments but also allows merchants to stay competitive.<sup>19</sup>

### *Cost*

Reducing the cost of payment processing is a key motivation for many merchants to accept certain types of mobile payments. Other costs include investments needed to accept mobile payments, losses from fraudulent transactions, and overall operating costs.

*Relevance.* Investment in equipment needed for mobile payments varies significantly by technology. As discussed above, NFC-equipped POS terminals are needed to accept NFC-based mobile payments, and upgrading scanners may be required for QR code-based payments. In contrast, equipment upgrades may not be required for mobile payments using barcodes and the cloud.

Merchants incur other initial costs. For example, different mobile payment applications may require merchants to install separate software integrated with the merchant's accounting system. Merchants also need to train employees to handle new ways of accepting payments.

Payment processing cost is also relevant to mobile payments because, as discussed above, per-transaction processing cost greatly depends on underlying payment methods to which mobile payments are linked. The processing cost of NFC-based mobile payments is likely to be higher than that of code- or cloud-based mobile payments. While NFC-based mobile payments are mainly linked to general-purpose payment cards, code- or cloud-based mobile payments are generally linked to less costly ACH or proprietary pre-funded methods.<sup>20</sup> Even

higher interchange fees may be assessed for mobile payments linked to a payment card than for card payments. Because consumers who pay with mobile payments linked to a payment card do not physically present their card at the POS, their payments may not be considered CP transactions but rather “card-not-present” (CNP) transactions, which are assessed higher interchange fees than CP transactions. It is still uncertain whether payment card networks will treat all or only some of mobile payments linked to a payment card as CNP transactions.

Losses from fraudulent transactions are also relevant because mobile payments may potentially reduce such losses. As will be discussed below, mobile payments are likely to be more secure than magnetic-stripe payment cards, reducing the probability of fraudulent transactions and consequently reducing fraud losses incurred by merchants. Mobile payments may also reduce per-transaction processing fees merchants pay to other parties because the other parties may also incur less fraud losses with mobile payments.

Finally, coupled with mobile commerce, mobile payments may reduce merchants’ overall operating costs. For example, merchants may reduce customers’ checkout time by integrating digital coupons with mobile payment applications, which may reduce merchants’ labor costs. Also, collection of customers’ information through mobile payments may improve the efficiency of merchants’ marketing.

*Merchants’ perspectives.* Cost is the second most-cited attribute of mobile payments by interviewed merchants. About half of merchants view cost as a main benefit as well as a main concern, about 25 percent view it as a main benefit only, and about 10 percent view it as a main concern only (Chart 2). In general, cost is the highest priority among merchants in narrow-profit-margin retail categories, such as grocery and discount stores, while cost is a low priority among merchants in wide-profit-margin categories such as department stores.<sup>21</sup>

While a few merchants expect mobile payments to reduce fraud losses or overall operating costs, many merchants, especially those with narrow profit margins, consider mobile payments an opportunity to better control payment processing costs. Accepting mobile payments linked to payment methods less costly than credit cards will reduce the merchants’ average processing cost per transaction. Accepting mobile payments linked to payment methods other than credit cards may also

facilitate more competition among credit card networks for merchants. This potentially reduces fees charged to merchants for accepting credit cards (and mobile payments linked to credit cards).

However, there are a few concerns. First, mobile payments may potentially increase merchants' processing costs. Costs would likely increase if mobile payments linked to credit cards are widely adopted by consumers. Even mobile payments linked to less costly electronic payment methods have potential to increase processing costs for merchants with a relatively large cash share in their sales, such as quick service restaurants and convenience stores. Their processing costs may increase if mobile payments replace many cash sales.

Another concern relates to investment costs. For quick service restaurants and gas stations, investing in EMV, and thus NFC-enabled POS terminals, may not be justified.<sup>22</sup> Even for merchants planning to invest in NFC-capable terminals, investment costs may be significant, but yield little return, if mobile payment technologies and applications continue to be fragmented.

*Conclusion.* Merchants may reduce payment processing costs with little or no investment in equipment if code- and cloud-based mobile payments linked to less costly payment methods are widely adopted by consumers. However, for merchants who accept NFC-based mobile payments linked to payment cards, mobile payments may not provide benefits with respect to cost. Those merchants will incur significant investment costs and will be unable to reduce processing costs.

### *Customer data control*

Customer data is essential to providing consumers an enhanced shopping experience. Personalized customer profiles, deeper information linking multiple transactions, and location data will enable merchants to engage in highly targeted, contextually relevant marketing and improve management of customer relations and loyalty programs.

*Relevance.* Mobile commerce and payments allow merchants to collect customers' personal information and data on their shopping and payment behavior. Consumers provide personal information, such as name, address, email address, and mobile phone number, to merchants when signing up for loyalty programs, mobile payments, promotions, or digital receipts. Using mobile commerce and payment applications,

merchants may collect customers' purchase histories and other behavioral data—for example, when, where, and what they purchased, whether they used coupons, and whether they reacted to promotions.

These data help merchants in various ways. Merchants can tailor marketing to individual customer preference and manage customer relations and loyalty to meet individual customer needs. Based on analyses of customer behavioral data, merchants may make better decisions on pricing, product placement, and staffing.

The data provide significant benefits not only to merchants but also to others.<sup>23</sup> Depending on mobile payment methods, other players in the mobile payment supply chain may be able to use the data. In some mobile payment applications, it is not clear who owns which part of the data. Third-party mobile wallet providers can at least observe consumers' payment behavior—including what amount, when, and at which merchant payment was made. If providers own this information, or ownership is unclear, the information may potentially be shared with or sold to other entities.

*Merchants' perspectives.* Customer data control is the third most-cited attribute: about 75 percent of interviewed merchants view this attribute as either a primary benefit, a primary concern, or both. About a quarter of merchants, mostly restaurant operators, view access to customer data as a primary benefit of mobile commerce or payments. Control or ownership of customer data is considered a primary benefit by slightly more than 30 percent of merchants, many of whom already have access to customer data through loyalty programs. These merchants tend to prefer mobile applications that clearly define merchants' ownership of customer data. Typically, such applications are either proprietary to an individual merchant or developed jointly by merchants.

About 35 percent of merchants, however, are concerned about who owns customer data, especially for mobile payments offered by third-party providers. For merchants who have built trust with third-party mobile payment providers, control of customer data is of less concern. Many merchants, however, have not developed a trusted relationship with third-party providers. These merchants are more concerned about how customer data may be used by third-party providers or others, including rival merchants. They are concerned not only that data of consumers who shopped with them may be used to help

rival merchants' sales but also that misuse of data may create serious privacy considerations.<sup>24</sup>

*Conclusion.* Although accessing more detailed customer data will benefit merchants, there is uncertainty about ownership and control of customer data captured by third-party mobile payment providers. This uncertainty raises concerns about potential misuse of data and consumer privacy and leaves unclear who is responsible for customer data security, as discussed below.

### *Security*

Merchants must consider two aspects of security for mobile payments. One aspect is payment security and the other is security of customer data.

*Relevance.* Mobile payments have potential to significantly reduce fraudulent transactions at the POS compared with currently used magnetic-stripe cards. Unlike magnetic-stripe cards (especially cards that can be used without a PIN), mobile phones and mobile payment applications are protected with passwords; and thus, only legitimate users may access and use mobile payment applications. In addition, advances in mobile technologies, such as location and biometric technologies, enable new forms of authentication, which provide an additional layer of security.

Merchants have an obligation to protect customer data. For payment-related data, the payment industry requires merchants to maintain a high level of security. For example, payment card networks developed the Payment Card Industry Data Security Standards. These standards require, among other things, that merchants build and maintain a secure network, encrypt transmission of cardholder data, and store cardholder or transaction data only as long as necessary to process a transaction (McGregor). Failure to comply with these requirements adds costs to merchants, such as paying fines to card networks, reimbursing card issuers for reissuing cards, and reimbursing customers for fraudulent transactions.

The payment industry has no security requirements for other customer data collected through merchants' mobile commerce or payment applications used for loyalty programs or tailored marketing. However, the Federal Trade Commission (FTC) has issued recommendations on

appropriate information security policies and procedures for customer data collected by businesses. The FTC can bring legal actions against businesses that violate consumers' privacy rights or that fail to secure sensitive consumer information.

*Merchants' perspectives.* Approximately 75 percent of interviewed merchants view security as an important attribute of mobile payments. Only a few merchants view improved payment security as a primary benefit, whereas three of four merchants view payment security and/or customer data security as primary concerns.<sup>25</sup>

Although the majority of merchants expect mobile payments to improve payment security over currently used magnetic-stripe cards, many merchants remain concerned, or at least cautious, about mobile payment security. A few merchants are concerned about the security of consumers' mobile devices, such as whether and how sensitive personal information will be stored in consumers' mobile devices and whether information transmitted from consumers' mobile devices will be encrypted. Also, some merchants are concerned about a potential shift in liability. As explained above, it is uncertain if transactions initiated via mobile payment applications that use payment cards as funding sources will be treated as CP or CNP transactions. Today, losses from fraudulent CP transactions at brick-and-mortar merchants are generally borne by card issuers, but if mobile payments are treated as CNP transactions, liability will shift from issuers to merchants.

Security of customer data is of concern, especially when mobile payments are offered by third-party providers. Ownership of data is uncertain when third-party providers become involved, and this leads to further uncertainty about who is responsible for customer data security. In addition, data may be less secure if more parties are granted access to the data by third-party providers. Data breaches involving consumers' purchase histories at certain merchants may harm those merchants' reputation even if they do not own the data.

*Conclusion.* Likely improvement of payment security with mobile payments will be a benefit for merchants. However, customer data security may be a concern if parties involved in mobile payments cannot clearly define ownership and control of customer data and determine who is responsible for data security.

### *Fragmented markets*

In a fragmented market, several parties, technologies, and applications coexist, and no single party, technology, or application exerts enough influence to move the industry in a specific direction.

*Relevance.* U.S. mobile payment markets are quite fragmented: more technologies have become available, and more applications have been offered in recent years. This fragmentation makes mobile payment adoption difficult for both merchants and consumers. Consumers may have little incentive to adopt mobile payment applications unlikely to be widely accepted by merchants. Merchants may also be reluctant to accept certain mobile payment applications when consumer adoption of the applications is uncertain.<sup>26</sup> Adoption of NFC-based mobile payments may be especially difficult because they require both merchants and consumers to make a larger investment than other technologies.

Coexistence of multiple mobile payment technologies provides more flexibility in mobile payment applications. If a single mobile wallet uses multiple technologies, the wallet may potentially be accepted by a wide range of merchants. Grocery stores may easily accept the wallet's barcode-based payments, gas stations may accept the wallet's cloud-based payments, and a public transit may accept the wallet's NFC-based payments. This wallet may also be attractive to certain consumers, especially those who want to easily track spending and manage finances. But other consumers may find it burdensome to learn several ways to use the mobile wallet.

Whether fragmentation of mobile payment applications remains a significant barrier to mobile payment adoption depends on how industry participants compete and collaborate. So far, competition among NFC-based mobile wallet applications has led to slow adoption. The three mobile network operators of Isis, for example, do not allow their phones to have Google's mobile wallet because of a security concern. However, the industry can overcome market fragmentation by collaborating in setting standards for security and customer data ownership. This will reduce merchant and consumer concerns about mobile payments and encourage their adoption of mobile payments.

*Merchants' perspectives.* Market fragmentation is the fifth most-important attribute of mobile payments cited by interviewed merchants. About 35 percent of merchants are concerned about this attribute

(Chart 2). However, fragmentation is of less concern for merchants who have a significant market share in their retail category.

Merchant concerns include increased investment and difficulty selecting the right mobile payment applications from more than 100 applications. Even if applications use technologies that do not require investment in equipment, the cost of integrating those applications with other operating and accounting systems increases as merchants accept more applications. Evaluating which mobile payment applications best meet a merchant's needs is demanding, especially when applications vary in areas of security, customer data ownership, or flexibility in integrating with loyalty programs and coupon redemption. A related concern is a lack of standards on security and consumer privacy.

A few merchants are also concerned that market fragmentation confuses consumers about the value of mobile payments and thus slows their adoption. Fragmentation may also make it cumbersome for consumers to learn how to use mobile payments. But merchants are addressing these concerns. Merchants' enhancement of the value of mobile commerce may help consumers realize the value in mobile payments that are integrated with mobile commerce applications. Consumers may also learn to use mobile payments relatively quickly if many merchants adopt common or similar mobile payment applications.

*Conclusion.* Market fragmentation is likely to be a concern for merchants at least in the short term. Setting standards for security, ownership of customer data, and consumer privacy will take time. Meanwhile, fragmented mobile payment technologies and applications will require greater investment and make merchants' business decisions more difficult.

### III. SUMMARY AND CONCLUSION

Although adoption of mobile payments has been slow in the United States, recent developments have improved the outlook. New mobile payment technologies, such as barcode, QR code, and the cloud, now compete with NFC. Merchants generally view these new technologies as providing more benefits than NFC. Thus, merchants are more actively developing and implementing mobile payment applications using the new technologies.

The article finds among five attributes examined, the effects on merchants of two attributes are clear while three are unclear. Two attributes with clear effects on merchants are customer shopping experience and fragmented markets. Mobile payments and commerce will provide benefits to merchants through customer shopping experience. Enhanced shopping experiences will then encourage consumer adoption of mobile payments and help merchants stay competitive. In contrast, near-term market fragmentation will be a concern. With fragmented technologies and applications, merchants will need to invest heavily and will have difficulty selecting mobile applications suited for them.

The effects of three other attributes—cost, customer data control, and security—are uncertain. Whether mobile payments will provide cost savings to merchants depends on the technology and funding sources used for mobile payments. If consumers widely adopt code- and cloud-based mobile payments funded from bank accounts via ACH or from proprietary pre-funded accounts, merchants may be able to reduce payment processing costs with little or no investment in equipment. If, instead, NFC-based mobile payments funded from credit cards are widely adopted, merchants will incur significant investment costs and will be unable to reduce payment processing costs.

Whether merchants gain control or ownership of customer data depends on who provides mobile payments. Some mobile payment applications, such as merchants' proprietary applications and those developed by merchants jointly, define merchants' ownership of customer data. However, when mobile payment applications are offered solely by third-party providers, uncertainty about who owns or has access to customer data becomes a concern.

Mobile payments will likely improve payment security over magnetic-stripe cards but heighten concerns about customer data security. Customer data may potentially be more vulnerable when ownership or control of data is not clearly defined and thus more parties have access to the data.

The findings of this article have implications for industry participants and policymakers. First, mobile payment technologies and applications that gain wide adoption will likely be ones that let merchants easily integrate mobile payments with other parts of the consumer shopping experience. These enhancements may include

digital coupon redemption, self-checkout with mobile payments, and pre-order and payment before item pickup. Designing flexible mobile payment and commerce applications can be achieved by collaboration among industry participants. Second, mitigating uncertainty about customer data ownership, data security, and consumer privacy is a necessary step toward mobile payment acceptance by merchants as well as adoption by consumers. A viable solution could be setting standards—including effective enforcement—for ownership and security of customer data and consumer privacy, which could be achieved by the industry alone or may require government involvement.

## ENDNOTES

<sup>1</sup>See Hayashi (2012c) for more details about the overall fee merchants pay for a card transaction. U.S. payment card interchange fee trends are compiled by the Payments System Research Department at the Federal Reserve Bank of Kansas City and are available at [http://www.kansascityfed.org/publicat/psr/dataset/US\\_IF\\_August2013.pdf](http://www.kansascityfed.org/publicat/psr/dataset/US_IF_August2013.pdf).

<sup>2</sup>Merchants on average paid 2.02 percent on Visa and MasterCard credit card transactions, 2.29 percent on American Express card transactions, and 1.87 percent on Discover credit card transactions in 2010 (Nilson Report). These include fees paid to card networks and payment processors, in addition to interchange fees.

<sup>3</sup>The cost of processing a cash transaction was eight cents in 1997, the least expensive of all payment methods (Food Marketing Institute). Today, cash is still the least expensive method for many interviewed merchants. The cost of processing a check transaction was 45 cents in 1997, but since then the cost may have declined because checks are now processed electronically.

<sup>4</sup>The Dodd-Frank Wall Street Reform and Consumer Protection Act allows merchants to offer a discount based on whether payment is by cash, check, debit card, or credit card. An antitrust settlement between the Justice Department and Visa and MasterCard allows merchants to offer a discount based on the payment method, brand, and product. After the preliminary approval of the proposed class action settlement between merchant groups and the card networks and their large issuers, Visa and MasterCard allow merchants to impose surcharges on their credit card transactions. Discover has been allowing merchants to impose surcharges, while American Express still prohibits merchants from imposing surcharges.

<sup>5</sup>MasterCard introduced a security hierarchy in which fraud liability will shift to the party with the highest risk environment. In this hierarchy, MasterCard considers an EMV card used with a personal identification number to be more secure than an EMV card used with a signature (Smart Card Alliance).

<sup>6</sup>According to the Federal Reserve Board (2013a), debit card issuers bore 83 percent of counterfeit fraud losses and 67 percent of lost and stolen fraud losses in 2011.

<sup>7</sup>Google has changed its focus from NFC-based mobile payments at brick-and-mortar merchants to cloud-based mobile person-to-person payments (Adams 2013a).

<sup>8</sup>Unlike a proprietary mobile payment application accepted by a single merchant, an open-loop mobile payment application may be accepted by multiple merchants.

<sup>9</sup>MCX also plans to use cloud technology along with QR codes.

<sup>10</sup>PayPal is developing a QR code-based mobile wallet application (Adams 2013b).

<sup>11</sup>Hayashi (2012a) used studies on consumer payment preferences to analyze consumer adoption of mobile payments. Arango and Taylor; Mallat and Tuunainen; and Jonker examined merchant payment preferences.

<sup>12</sup>To encourage participation and detailed responses, interviewed merchants were promised confidentiality.

<sup>13</sup>Some merchants were directly solicited by the authors while others were contacted through trade associations.

<sup>14</sup>The top 100 retailers list is available at [www.stores.org/2013/Top-100-Retailers](http://www.stores.org/2013/Top-100-Retailers).

<sup>15</sup>Some merchants have participated in proprietary mobile payment pilot programs or those of third-party mobile payment providers.

<sup>16</sup>The lack of compelling benefits of mobile payments for U.S. consumers has been suggested by several studies (for example, Crowe, Rysman, and Stavins).

<sup>17</sup>Some consumers do not like to receive offers or promotions, partly due to privacy concerns (Federal Trade Commission 2013).

<sup>18</sup>Consumers also increasingly value merchants' mobile commerce applications. Flurry Analytics found the time spent on retailer applications by U.S. consumers grew 525 percent from December 2011 to December 2012 (Pillar). And a consumer survey in early 2013 found 49 percent of respondents had downloaded at least one mobile application from a brand or a retailer (Digital Research).

<sup>19</sup>Convenience is a critical attribute for consumers to adopt mobile payments (Hayashi 2012a).

<sup>20</sup>Merchants may pay processing fees to a third-party service provider if their proprietary pre-funded methods are processed by the provider. But fees are likely to be lower than processing costs of general-purpose cards.

<sup>21</sup>Furthermore, department stores generally have a relatively large proprietary card share in their sales, and processing costs of proprietary cards are smaller than for general purpose cards.

<sup>22</sup>Many quick service restaurants and gas stations do not plan to adopt EMV because the cost of doing so will likely exceed the potential reduction in fraud losses. For quick service restaurants, the expected return from investing in EMV is very small because their fraud losses are generally very small. Gas stations, on the other hand, have higher fraud loss rates, but EMV terminals needed for gas pumps are generally more expensive than typical EMV POS terminals.

<sup>23</sup>Katz discusses values and multiple uses of customer data.

<sup>24</sup>Consumers' privacy concerns overlap merchants' concerns about ownership and control of customer data. A best practice for businesses is that the collection and use of consumer data by merchants and other parties are based on consumer choice and consent. But, it is difficult for consumers to make decisions if data practices of mobile payment applications are not transparent.

<sup>25</sup>Security is the most-cited reason why consumers have not adopted mobile payments (Federal Reserve Board 2013b).

<sup>26</sup>Mobile payments at brick-and-mortar merchants are characterized as a two-sided market of two distinct end users—consumers and merchants. Each end user side needs the other for the market to operate.

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