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Why Invest in Payment Innovations?

SUJIT CHAKRAVORTI AND EMERY KOBOR

This article provides a framework to study the creation and adoption of innovations by payment providers and processors. The authors identify several motivating factors for banks and non-banks to invest in payment innovations. In addition, they discuss the evolutionary process of payment innovations from inception to commoditization and recognize that innovations differ in the time necessary to evolve from proprietary technology to commoditization. Finally, the authors consider a snapshot of various payment innovations at different stages of development. The authors' main conclusions are the following: Payment innovators are more likely to be successful when they target niche markets. Banks often use innovations to add value to a bundled product offering. Payment networks and processors leverage their connectivity when creating or adopting innovations.

A critical part of electronic commerce is the payment component. Such commerce may require adoption of different technologies to better enable the secure transfer of payments. In this paper, we provide a framework to study the creation and adoption of payment innovations in the context of strategic decisions by payment providers. Recent payment innovations

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have stressed the conversion of information flows from paper-based systems to automated and electronic alternatives and the improvement of delivery channels that leverage greater connectivity afforded by advances in computing power and telecommunication technology along with greater usage of the Internet.

Based on interviews with market participants and a review of the relevant economic literature and trade publications, we answer the question: Why invest in payment innovations?¹ We present a matrix that organizes contemporary payment innovations by innovator (large bank, small bank, nonbank innovator, data processor and joint-venture) and by strategy of the payment provider (cost reduction, increase revenue, customer acquisition and customer retention). We categorize specific market participants and specific innovations in a profit matrix. This exercise demonstrates the fluidity of the market. Over time the types of institutions providing these services may change as the applications can move from niche specialty to market commodity.

Let us begin by clearly defining some terms and drawing some distinctions that play a pivotal role in our argument.² First, a *payment* is a transfer of *money* from the *payor* to the payee. The form of money that is relevant to this discussion is a balance in an account at a *bank*.³ Thus, payment is made by debiting the payor's account and crediting the payee's account. Both payor and payee are known as transactors. Although the payor and payee may have the same bank, in general they do not, so either (a) banks have to cancel offsetting claims between them (i.e. netting occurs) or (b) an *interbank payment* or *settlement* must be made on the books of a correspondent bank or central bank at which both the payor's and payee's banks have accounts.

A *payment system* is traditionally defined in terms of a system for making such interbank payments. Such a system may encompass a means for a transactor to initiate a payment: communications and computation infrastructure to carry each transactor's initiation message to its bank and also messages among banks to direct interbank payments to be made; contracts, laws, regulations and industry standards to establish rights and responsibilities of transactors and their banks and to facilitate coordination among them, and so forth. We interpret this definition broadly to include various value-added services that are complementary to the payment per se. Often broader technological innovations, such as account aggregation and electronic presentment of bills, are bundled with payment services. Business reasons to provide such services include profitable sale (either explicitly or else bundled with payment services) to existing customers, creating and satisfying demand among transactors who are otherwise unable or unwilling to be payment-service customers, and mitigating or managing risks borne by transactors and banks.

Although banks continue to control the settlement process, profit opportunities are shifting away from the transfer of funds to value-added services and providing payment system access to underserved markets. New innovations allow nonbanks to identify underserved market segments and deliver targeted products, including clearing services and the delivery of payment-related information. Recent developments include account aggregation, electronic bill presentment and payment (EBPP), online peer-to-peer (P2P) payments, and stored-value payment instruments.

Payment innovations can be divided into two distinct categories: They can be classified as technology or service innovations. Technology innovations use technology to modify an existing process or product, or create a new one. For example, new technology confers the ability to view and pay bills online. Service innovations are changes in the product or process that do not necessarily involve changes in the underlying technology such as frequent flyer miles on credit card products. Often innovations may be both technological and service-related.

With new technology being a focal point of payment system development, banks and nonbanks face a range of strategic options (e.g., proprietary research and development, joint ventures, venture capital investment and alliances). Each approach carries unique costs and benefits. These strategies are not mutually exclusive, however. Banks have pursued different investment strategies for different products and have even used different investment strategies for the same product at different stages of development.

Based on interviews with market participants along with other sources, we provide a framework to study payment innovations. We are able to identify what types of firms invest in creating innovations and how these innovations are brought to market and adopted by payment system participants. We also identify the strategic reasons why payment providers adopt payment innovations. Lastly, we discuss the evolutionary process of an innovation.

LITERATURE REVIEW

The economic literature has identified several reasons why firms innovate in general. Campbell (1988) suggests innovation is in response to four environmental factors: macroeconomic conditions, technological progress, regulation and tax law. Focusing on financial innovations, Frame and White (2002) extend these factors to include appropriability (the ability to profit and recover research and development costs of the innovation), presence of network externalities, economies of scale and scope, and standardization. Clearly, all of these

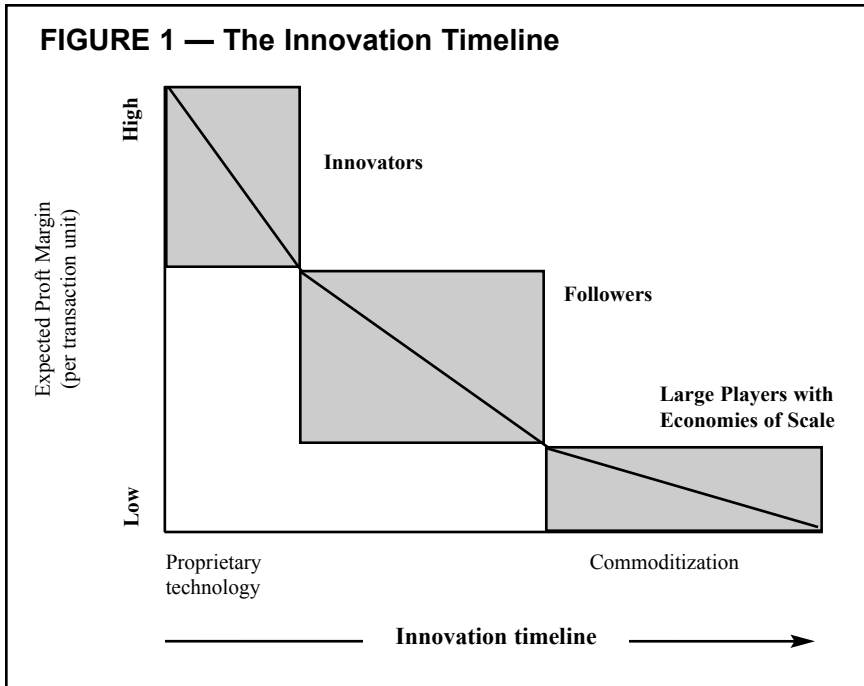
factors have and continue to affect payment innovation.

Frame and White also mention firm size and market power as a catalyst for innovation. The question of industry structure and its effect on innovation has spurred debate in the economics literature. Schumpeter (1950) argued that larger firms have advantages over smaller firms because of their size. However, recently several researchers have argued why new entrants may be more likely to introduce new products. Using empirical evidence, Scherer (1980) argues that small and medium-sized firms have played a significant role in creating new products and processes. Aron and Lazear (1990) argue that new entrants are more likely to take greater risks and reap the benefits from those investments. Prusa and Schmitz (1990) found that new firms had a comparative advantage over established ones in creating new software categories.

A successful innovation faces three distinct phases of investment as it matures. We show this evolutionary process in the *innovation timeline* and customize it for the payments industry. In Figure 1, we plot the transformation from proprietary technology to commoditization on the *x*-axis. The timeline stretches from the introduction of a successful proprietary technology to the point at which the technology succumbs to commoditization, which is when many suppliers offer an undifferentiated product. On the *y*-axis, we plot the level of expected profit per transaction unit of the payment product associated with the innovation. While expected profits are greater during the earlier stages of the innovation timeline, there is greater variance.

In the first phase of investment on the innovation timeline, innovators and new providers of the underlying technology seek a *first mover advantage* using innovations either to access an untapped market segment, or a product or process improvement in an established market. Being the first to market with a proprietary technology creates opportunities to earn rents in this early phase of market development, in part to compensate for the higher risk of bringing untested products to market. The economic literature suggests that firms generally are able to earn rents because they can obtain a competitive advantage through barriers to entry, lead times and learning curves (Levin, Klevorick, Nelson and Winter, 1984). First movers build brand awareness, enhance their marketing message and gain insights into product and market development through the innovation process, which can develop into increased market share and higher profits (Dos Santos and Peffers, 1995).

Innovation frequently requires substantial investment in both product and market development before sufficient demand materializes to achieve an acceptable return on investment. Relatively few banks are able to fund an ongoing research and development (R&D) effort. R&D can require skilled



staff, specialized materials and facilities, market research and experienced management. Proprietary R&D allows for the greatest control over product development and the greatest potential profit, but also carries the highest risk of failure (Dosi, 1988). Alternatively, banks may take an equity interest in an innovative firm; participate in a joint venture either with other banks, technology firms or both; or participate in an alliance or association development efforts. Banks and technology providers also collaborate in non-profit consortia to bring new technologies to market, which reduce the cost and risk associated with basic research and market trials.

The second phase of the innovation timeline comes as competitors enter the market. Firms that follow a successful innovator invest in a proven technology that has either redefined a given product or service, or in some other way raised the market's expectations. The importance of followers, or imitators, has received a lot of attention in the economic research on innovation (Cohen and Levinthal, 1989). A firm's ability to exploit competitors' innovations is essential in remaining competitive and is one of the main motivators of technical

change (Dosi, 1988). In this stage, followers invest to remain competitive and to retain customers. Even in those cases where the initial innovation was not immediately profitable but required a longer time horizon, there may have been benefits to either being first up the learning curve or associating the bank's brand with cutting edge product development.

As competitors enter the market, the first mover's competitive advantage erodes. However, if the new technology has been effective in setting a new benchmark for competition, spurring a new technical trajectory, other firms are obligated to acquire the technology.⁴ Followers may focus on customer retention and brand image, often moving quickly to adopt the new technology.⁵ Consumers' benefits are thought to increase if competitors can not only imitate but also improve on the original innovation (Levin, Klevorick, Nelson and Winter, 1987). This can range from developing new product bundles and pricing schemes to investing in technology innovation for a counteroffensive. Banks and nonbanks seek to mitigate their risks either by acquiring in-process technology or by seeking partners for technology development.⁶

In the third phase of the innovation timeline, firms seek economies of scale. As technology moves from innovation to commodity, competition tends to shift from product differentiation to product cost and service. Banks unable to demonstrate a competitive advantage with technology usually can lower their costs by outsourcing to or licensing data processing software and hardware from other banks or nonbank service providers. Banks and nonbanks amassing scale in commodity products do so to lower unit costs. Depending on the product and the speed of commoditization, the shift to outsourcing can follow rapidly behind the introduction of a market innovation.

Although there is a large amount of literature on innovation and their market adoption, the creation and adoption of payment innovations have some distinct characteristics. First, payment services are network goods. In other words, existing users of a service benefit from additional users joining the network. Often these benefits are not appropriately priced, resulting in network externalities. Second, payment services are two-sided. For example, both consumers and merchants must be convinced of the benefits of a new payment instrument before it achieves market adoption. Providers of two-sided goods must determine the optimal price structure for each distinct type of end-user.⁷ Third, providers of payment services leverage economies of scale and scope. Given relatively high fixed costs and relatively low per-transaction costs, payment processors benefit from scale. Given that at the root of payments processing is the exchange of information, payment processors also enjoy scope opportunities.

STRATEGIC INCENTIVES TO ADOPT INNOVATIONS

In this section, we will discuss the types of institutions that create market payment innovations along with strategic reasons why payment providers offer these new products and services to their customers. Such a framework allows us to discuss what types of innovations are more likely to be developed and/or adopted by each type of institution. Figure 2 is a matrix of payment innovators, providers and processors, and strategic incentives to implement payment innovations. The individual cells represent product innovations offered by a type of innovator and the strategic reason for payment providers to adopt them. Note that a particular payment innovation may simultaneously exist in more than one cell and may over time shift to another cell. First, we will discuss the strategic incentives for payment providers and processors to adopt payment innovations and then the types of payment innovators, providers and processors.

Strategic Incentives to Adopt Payment Innovations

Strategic investment decisions are made by payment providers and processors to increase their profits. Some investment decisions are based on immediate cost savings or greater revenue opportunities. However, many investments are made with a long-term view where firms' expected net present value of future earnings from the investment are greater than zero. In this section, we consider four investment strategies — decrease cost, increase revenue, customer acquisition and customer retention. Note that investment strategies are not necessarily mutually exclusive and may differ among payment providers and processors.

Decrease Cost

Payment providers and processors may invest in innovations because of potential cost savings. For example, immediate cost reductions were realized by National BankAmericard, Inc. (NBI) (precursor to Visa) when it implemented its BASE I (BankAmericard Service Exchange) in 1973 and BASE II systems in 1974 (Nocera, 1994). BASE I, a computer-based authorization system, cost \$3 million and saved NBI members more than \$30 million in the first year. BASE II, a computer-based interchange system for NBI members, cost \$7 million and saved members \$12 million in mailing costs alone in the first year. These types of innovations aimed at reducing costs and implemented by a joint-venture, appear in joint-venture and consortia/ decrease cost cell in Figure 2.

In other cases, cost reductions may require years to be realized especially if firms need to operate both the new system and the legacy system simultaneously. Recent decisions by payment providers to use check-imaging services or converting a check payment to an automated clearing house (ACH) payment in the United States have not always resulted in immediate cost savings.⁸ Such investment decisions could suggest that while net losses may occur during the early years of development and operation, firms expect a positive return on their investment in the long run. On the other hand, one of the reasons cited for the successful adoption of the Octopus payment solution, a stored value card solution used to make payments for public transportation services in Hong Kong, was the rapid transition from existing payment technology to the new one (Poon and Chau, 2001).

Increase Revenue

Increase in revenue may result from the introduction of new products. Based on our interviews, offline debit cards, also known as signature-based debit cards, generate sizable revenue for issuers. Some interviewees noted that similar revenue potential would be required for greater promotion of online debit cards, also known as PIN-based ones, and ACH payment products by banks. Offline debit card transactions use credit card networks. Online debit card transactions use ATM networks to authorize and clear transactions. Interchange fees, which are paid by the merchant's bank to the cardholder's bank, are significantly greater for offline debit cards than online cards. Because offline debit cards are promoted by small and large banks along with the card associations, they appear in the increase revenue column in three cells — small bank, large bank and joint-venture — in Figure 2.

Revenue may also increase by differentiating customers, such as credit card revolvers and convenience users. Some card issuers set shorter grace periods for convenience users and longer ones for revolvers that reflect their underlying costs and revenues associated with each type of user. Such differentiation is largely possible because of the advances in computing power along with greater automation in the processing of credit card accounts over the last 20 years.

Customer Acquisition

Payment providers may invest in technology to increase their customer base. These products can be niche products that have a clear competitive advantage over other products. For example, mobile payment devices such as toll tags for motorists using toll roads offer benefits over stopping at toll

booths. Similarly, mobile phones are used to pay for parking fees in Austria or bus fares in Finland. Alternatively, innovations aimed at increasing customer acquisition may be service enhancements to a relatively homogenous core product, resulting in greater product differentiation among competitors. For example, many card issuers have increased their customer base by promoting loyalty programs such as frequent flyer miles. Loyalty and frequent-use awards appear in the large bank/customer acquisition cell in Figure 2. However, a loyalty program may also be key a customer retention tool. The use of such incentives has drawn the attention of the Reserve Bank of Australia during its recent reforms of credit card networks (Reserve Bank of Australia, 2001).

Customer Retention

Payment innovations may also be adopted to retain customers. In our interviews, banks cited customer retention as the main reason they invest in payment innovations. Retaining existing customers and selling more to them is

FIGURE 2 — Strategic Incentives to Adopt Innovation and Payment Innovators, Processors and Providers

	Decrease Cost	Increase Revenue	Customer Acquisition	Customer Retention
Small Banks	Check Imaging	Promotion of Offline Debit Cards		Automatic ACH Debits
Large Banks	Check to ACH Conversion	Promotion of Offline Debit Cards	Loyalty Programs on Credit/Debit Cards	Automatic ACH Debits EBPP
Nonbanks Innovators			P2P Online Auction Payment	
Nonbanks Data processors	Provide Payment Procession Services			
Joint Ventures and Consortia	Computer-based Card Authorization System	Promotion of Offline Debit Cards		

thought to be more cost effective than investing in new customers. HSBC President and CEO Youssef A. Nasr told a 2001 conference on banking best practices: “[T]he cost of acquiring a customer is \$400 ... compared with \$50 to retain one” (Berry, 2000). However, such cost assessments are extremely volatile and often subjective.⁹

New products and services offered to increase customer retention are expected to be “sticky,” implying they bind the customer more closely to the bank, therefore effectively imposing high switching costs. For example, customers using automatic ACH debit to pay their recurring bills face high switching costs if they choose to move their demand deposit account to another institution. Often businesses require written notices in advance to stop payments from being automatically withdrawn. Similar stickiness issues exist on recurring bills that are paid by a credit card. In addition to card issuers, merchants may benefit from stickiness with their consumers. Automatic ACH debit payments appear in the customer retention column in both the small and large bank cells in Figure 2.

Payment providers may introduce new services at or below cost and make up the short fall in revenue from other products that are part of the bundled set of products.¹⁰ Issuers adopt such a strategy to increase card usage, which results in higher interchange fee income, and/or the potential revenue from finance charges. The use of loss-leaders may enable firms to increase their overall profits and, in the case of network goods, overcome the chicken-and-egg problems. Chakravorti and Shah (2003) and Katz (2001) suggest that convenience users of credit cards pay less than the marginal cost of the credit card services that they receive. In our interviews, most banks suggested that they bundled EBPP, account aggregation and P2P payment services with other products. Loss-leaders may also increase stickiness of the customer relationship, which allows payment providers to profit from the bundle of products.

PAYMENT INNOVATORS, PROVIDERS AND PROCESSORS

In this section, we discuss the types of institutions that create and/or adopt payment innovations. We limit our focus to banks, nonbank innovators and data processors, and joint-venture consortia. However, there are other types of institutions that may play a role. Merchants have also played a pivotal role in creating and adopting payment innovations, such as the introduction of ExxonMobil’s SpeedPass in the United States to enable customers to make purchases by waving key fobs, which are linked to their credit cards or checking accounts. In Austria, the largest mobile phone provider has entered the payments business

with the introduction of PayBox Austria, which allows remote payments to be made with a mobile phone.

Banks

Because of their unique access to interbank payment systems, banks play a key role in the provision of payment services. Some analysts have estimated that revenue from payments ranges from 9 percent to 42 percent of operating revenue (Radecki, 1999; Rice and Stanton, 2003). Although banks do not always develop innovations in-house, they play a pivotal role in their adoption. Generally, small banks differ from large banks in the type and timing of payment investments.

For the most part, small banks serve niche customer bases and are not innovators in the payments arena, although there are exceptions. Many small banks provide nonpayment-related customized services to niche customer bases. Small banks are not often the early adopters of new payment innovations. Instead, they generally choose to buy relatively homogenous, off-the-shelf products or outsource the processing of these products to third parties. Small banks generally view payment services as an essential part of a bundled good that is necessary to retain customers. However, we did speak with small banks that are investing in upgrading their check-processing technology for their own check volumes and potentially to provide correspondent services to other similarly sized banks. Such a strategy is interesting given that check volumes continue to decline in the United States.

Although it is difficult to generalize the strategic investment decisions of large banks, they are able to take advantage of their large and diverse customer base and the breadth of the products that they offer. Some banks choose to rely on in-house development, while others prefer to support nonbank innovators or purchase off-the-shelf products. Almost all the large banks that we spoke with stated that their firms were structured as independent product lines, commonly referred to as “silos.” According to several interviewees, such a corporate structure may limit synergies that may result if a more integrated strategy was developed. For example, the conversion of checks to ACH payments requires coordination across check and ACH product lines that have for the most part operated as separate units in terms of operating costs and revenue, customer service and strategic investment decisions. One bank explained the initial difficulties customers had when they called their financial institution to dispute a check transaction that had been converted to an ACH one. The check department could no longer trace the transaction and was unable to help the customer

resolve the matter. Eventually, the customer was referred to the ACH department where the matter was resolved. Such problems may result in customers changing their financial institution.

Nonbank Innovators

We define nonbank innovators as relatively small firms that create and market new payment or payment-related products. For example, PayPal, founded in 1999 and now owned by eBay, successfully developed a P2P electronic payment vehicle. A key part of PayPal's success resulted from focusing on a niche market — online auction sites. PayPal provided extremely small merchants, who were often individuals, access to payment networks, such as credit card and ACH that have generally been too costly or unreachable. Although there have been other attempts to offer P2P payments, none to date have achieved PayPal's transaction volume.¹¹ Initially, PayPal's strategy was to focus on customer acquisition via cash giveaways to users. Once critical mass was achieved, cash payouts were eliminated. Therefore, such a strategy was effective in overcoming the chicken-and-egg problem that exists for network goods.

Nonbank innovators have played a key role in developing online account aggregation. Account aggregation allows consumers to view their financial assets online in one place. Although account aggregation is not a payment product, it is often bundled with payment products such as demand deposit accounts. Many bank interviewees suggested that they would rather have a nonbank aggregate consumer financial information. Initially, providers of this technology tried to market aggregation tools via Internet portals directly to consumers. Then, suppliers of aggregation tools attempted to sell their services to financial institutions that in turn provided aggregation services to their clients. More recently, the target group has shifted from financial institutions, in general, to financial advisors that are able to better use the aggregated information to improve their sales and marketing efforts.

Nonbank Data Processors

Today, large data processors, such as First Data, Fiserv and Metavante, a wholly owned subsidiary of Marshall and Ilsley, are playing an increasing role in processing payment-related information for financial institutions and other payment system participants. Some of the larger data processors purchase innovations that have been introduced in the marketplace or partner with financial institutions to bring products to market. These entities take advantage of their economies of scale and scope. They may provide services such as check clearing, ACH process-

ing and credit/debit card processing services. Data processors that we interviewed stated that their extensive information network with financial institutions allow them to leverage their expertise in processing other types of payments.

Although it would appear that small and medium-sized financial institutions would be their main customers, some large data processors have gained sufficient economies of scale and scope that large banks are using their services as well because of potential cost savings. However, one large bank interviewee pointed out that even though providing the service in-house is more expensive, they may choose to keep it in-house to maintain customer relationships.

Joint Ventures and Consortia

Joint ventures may include members within the same industry or across industries. Innovations made by joint ventures generally have different characteristics than those developed by individual entities. Successful innovations by established joint ventures generally leverage existing financial infrastructure and brand recognition. The most recognizable payment industry joint ventures are MasterCard and Visa.¹² Although these card associations initially focused on credit cards, they have now expanded to other payment products. In addition, clearinghouses such as the Clearing House for Interbank Payments (CHIPS) and the Electronic Payment Network (EPN), both owned by the Clearing House, and industry trade groups such as the National Automated Clearing House Association (NACHA) also continue to introduce new products and services.

Many new joint ventures are formed to distribute costs and limit risk exposure. One interviewee suggested that new joint ventures are useful when the product is well-defined and there are clear impediments to unilateral implementation. Cross-industry joint ventures between financial and nonfinancial institutions have been successful primarily because their members' strengths could be adequately leveraged. However, recent joint ventures among similar types of institutions have had difficulty bringing products to market because members were reluctant to provide the necessary resources. Some interviewees that had previously been members of joint-ventures along with their competitors suggested that they were reluctant to discuss the business case and underlying profit opportunities primarily because of antitrust concerns.

PROFIT MATRIX

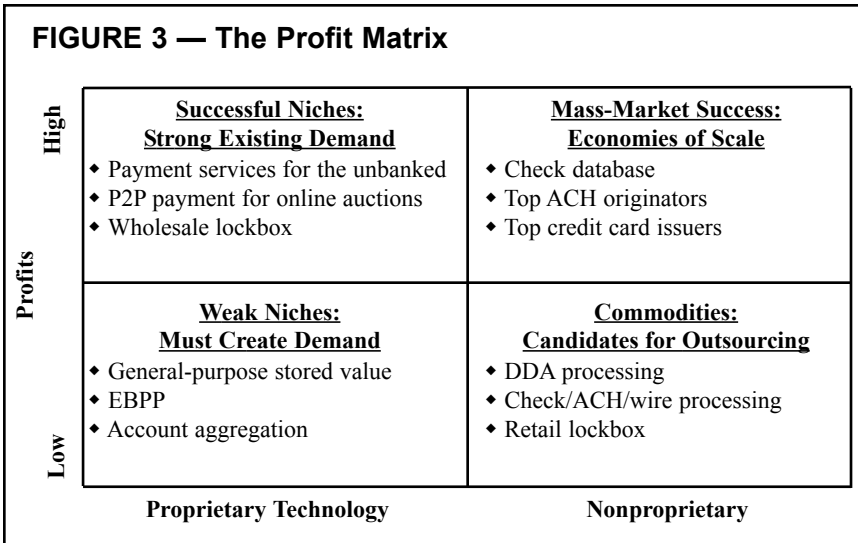
Thus far, we have discussed why firms invest in payment innovations and the life cycle of payment innovations. In this section, we will view a snapshot of the payment landscape and focus on products at different stages of profit

opportunities and market development. Successful payment innovations are ultimately measured by their profitability, even when payments are part of a bundled service offering. Our research finds that profits from payments are a function of demand, scale and proprietary technology. In Figure 3, we construct a matrix where the rows represent high and low profit opportunities for providers of those services and the columns represent proprietary and nonproprietary technology. Using these criteria, we have divided the market for payment technology into four cells: successful niches, weak niches, mass-market success and commodities.

Successful payment innovations may rely on some form of entry barrier to hold back would-be competitors. Most often this takes the form of proprietary technology, which may or may not be patent-protected. We interpret proprietary technology broadly in this context to include unique service offerings, such as customized processes.

Weak Niches

Weak niches are characterized by weak demand. This can be due to ineffective marketing, poor product development, inadequate demand forecasting or simply being too far ahead of the market. EBPP encountered weak demand when it was introduced. EBPP was introduced as a fee-for-service innovation that



would generate new revenue, lower costs by substituting electronic payments for check payments, and retain customers by creating high switching costs. Charging for a service few customers found compelling appears counterintuitive.

EBPP innovators, facing slack demand, had only two choices if they were to get any return on their investment: focus on those few customers willing to pay for the convenience EBPP offers or drop the fee with the expectation this would entice more customers to adopt the service, ultimately lowering the bank's costs and boosting customer retention. One bank we spoke with indicated that after offering EBPP without a targeted marketing effort and finding weak demand, the bank was now segmenting the market in an effort to find a responsive target market. In markets with weak demand, the bank basically provides EBPP services for free by bundling it with other products.

Direct deposit was in this category at one time. The product came to market without offering a clearly cost-effective convenience to a target market. Direct deposit has grown largely as a consequence of requirements that government employees must receive their pay via direct deposit. Private sector employers continue to perceive direct deposit primarily as an employee benefit (American Payroll Association, 2000). Nonetheless, it now is a mass-market success.

A technological innovation that is still trying to look for strong demand is account aggregation. Although account aggregation has been around for a long time, the use of screen-scraping technology to gather information from institutions where customers have accounts is relatively new. Account aggregators have also started to change their target market and offer related products.¹³ They have started to sell their product to financial planners and advisors that are more likely to benefit from their product. Some account aggregation firms are leveraging their technology and infrastructure and offering payment functionality, such as P2P payments and EBPP. Because of potential synergies among these payment offerings, these firms feel that they can add value to their customer base.

General-purpose stored value is another product that has yet to gain wide acceptance as a general-purpose payment tool.¹⁴ Some observers have often commented that stored value is a solution still looking for a problem. However, proprietary stored value — value that can be redeemed at a limited number of types of merchants — has benefited merchants. In addition, stored value has gained greater acceptance at universities and military bases but this is due largely to these being controlled environments where payment methods can be imposed on users. The Edge card in Bracknell Forest, England and the Octopus card in Hong Kong are stored value programs that started as payment mechanisms imposed for specific transactions (school lunches and library fines in Bracknell Forest and mass transit in Hong Kong).¹⁵ The programs now are

attempting to grow beyond their controlled environments in the hope that, having established a user base, merchants will accept the payment tools. Key factors that seem to drive adoption of stored-value solutions to date are: to capture a captive market where the product may be the sole payment instrument, to extend a successful product to other market segments, to gain critical mass of consumers and merchants simultaneously.¹⁶

Successful Niches

Successful niches are characterized by effective payment innovations meeting strong existing demand. In some cases, these niches are well-known to industry competitors but are not considered profitable or desirable. The unbanked, for example, are not customers traditionally courted by banks, but Siegel (2002) estimates that they represent a significant market niche at roughly 9 percent of U.S. households. The demand for payment system access among the unbanked, and for more convenient access among those with banking accounts, has created a profitable niche for nonbank check cashers who charge between 2 percent to 4 percent of the check amount for check-cashing services (Freeman, 2002). However, Siegel also reports that almost two-thirds of the customers of check-cashing outlets have traditional bank accounts, which suggests that these services are also valued by customers who have access to mainstream financial services. Silvestrini (2002) reports that some 6,000 check cashing locations cash more than 180 million checks annually with a face value of more than \$55 billion. Thus, nonbank check cashers are providing value-added services over existing bank products.

Another example of providing payment services to a niche market is PayPal. Cash and checks, the traditional options for P2P payments, were not well-suited for online payments among participants that were not familiar with one another. Traditionally, remote payments, where the buyer and the seller do not physically meet and may not know each other, were made with credit cards because of consumer protections and the greater likelihood that merchants would receive payment in a timely fashion. However, many small merchants and individuals that were selling products on eBay, the most popular online auction site, were not able to accept credit card payments. PayPal was among the first companies to adapt checking and credit card payments for Web-based P2P payments between individuals who do not know one another and are geographically separated. The payment tool has been particularly successful with buyers and sellers in online auctions. However, other entrants to the P2P market have not been as successful.

Competition in successful niches often is characterized by greater customiza-

tion. On the commercial level, the trend toward customization is evident in the evolution of the wholesale lockbox business. A wholesale lockbox service provider receives business-to-business payments on behalf of a customer, which increases the speed of deposit and processing the payment information. Wholesale lockbox service providers often specialize by industry, developing an expertise in managing their customers' remittance information in order to minimize exceptions. This can mean crafting a unique service to meet each customer's specific requirements. One large bank stated that more than 40 percent of their wholesale business was derived from their wholesale lockbox business.

There are several ways innovators are able to extract rents. The most effective methods to protect innovations are patents, trademarks and copyrights. These legal protections reduce competitive forces that may erode potential rents and recovery of investment in research and development. In recent years, however, innovators have been successful at winning controversial patent protection for business methods and processes rather than for technological innovations such as Amazon.com's one-click check out and Open Market's online shopping basket. In addition, building strong brand awareness allows innovators, or those that buy the rights to their products, to earn economic rents.

Mass-Market Success

Key elements to mass-market success are economies of scale and scope. As payments technology, both the transfer of value and information, shifts its dependence from paper to data processing, economies of scale can potentially lead to rents.¹⁷ Thousands of financial institutions connect directly to the ACH network, issue credit and debit cards, and process checks. However, few banks or nonbanks have the scale in any of these payment processes to make undifferentiated payment processing a core business. However, a handful of institutions, banks and nonbanks, have amassed sufficient scale, largely through acquisitions, to play a dominant role in specific payment systems.

The market for credit card issuers is fairly concentrated where the top 10 issuers account for more than 80 percent of credit card receivables (Budde, 2001). In most cases, cardholders choose to receive credit card services from institutions other than the one where they have a DDA relationship. Issuers compete vigorously to promote their brand and other affiliated brands, such as airlines. Even more concentrated is the number of credit card networks, which spend significant resources promoting their brand and maintaining their brand's reputation. The four major general-purpose credit card networks in the United States are American Express, Discover, MasterCard and Visa.

Similarly, a relatively small number of ACH originators dominate ACH processing. In 2001, the top 10 ACH originators accounted for 54 percent of network transaction volume. If we assume these dominant originators, which include the largest banks in the United States, also account for most, if not all, of the on-us ACH transactions, then these top 10 originated as much as 86 percent of the ACH transaction volume in 2001 (NACHA, 2002). Another example of a mass-market success is the maintenance of a check fraud database dominated by nonbanks because, perhaps, of the need for broad partnerships geographically and a large ongoing investment in data processing infrastructure.

What distinguishes mass-market successes from commodities is the brand value of the mass-market product or service offering. Large credit card issuers, the card associations and firms that maintain check fraud databases, all invest in promoting their brands to consumers and retailers. Although many of these brands are associated with banks, many nonbanks have established brand value in the payments arena as well.

Commodities

In banking, back-office payment functions have become commodities. These include DDA, check, ACH, wire, loan and credit card processing. Ironically, these core functions largely represent the tether that connects a bank with the payment system. Increasingly, banks are looking to outside service providers. Large banks look to outsourcers for potential cost savings, but smaller banks see outsourcing as an opportunity to keep up with technology. Outsourcers generally are able to provide commoditized services at low per unit costs as a function of their economies of scale.

Outsourcers' revenues have been growing. Outsourcing options now go beyond back office processing to include customer service, loan servicing, card programs and every other aspect of banking services, which suggests a baseline commodity service level exists for every aspect of banking. Dominant service providers are in a position to go beyond commoditized data processing, by harnessing the information in their databases to create new information reporting options or unique account aggregation services.

Retail lockboxes have embraced technology in order to standardize the processing of great volumes of remittances by squeezing costs — but also profits — out of what has become a commoditized business. To increase processing speed and reduce errors, retail remittances typically involve a machine-readable standardized form or coupon the customer returns with the payment. These payment coupons are common among utilities, mortgage lenders and other

high-volume billers. By contrast, wholesale remittances typically include payment documentation unique to the payer, necessitating discrete manual processing. This distinction has led to a fundamental difference in the nature and pricing of retail and wholesale lockbox services.

CONCLUSION

Although banks continue to have exclusive access to the payment system, nonbanks are playing a greater role in the provision of payment services. The role of banks and nonbanks has blurred as a result of new technology. Functionality, delivery network, transaction rules and customer interface are now interchangeable components of payments technology, so that it is difficult to know which aspects of a transaction are serviced directly by the bank and which are the work of an outside service provider. Although banks and nonbanks may compete with one another, they are also often partners in the provision of payment services.

In this article, we have provided a framework to study payment innovations. First, we investigated the strategic incentives to invest in payment innovations. We classified the players in the payments arena as small and large banks, nonbank innovators and processors, and joint ventures. Throughout the article, we highlighted various payment innovations created and adopted by these players. We found four main drivers to payment innovations—cost reduction, increase revenue, customer retention and customer acquisition. We identified payment innovations, such as EBPP and automatic ACH debit payments, that are adopted by banks to increase customer retention. Payment processors tend to leverage their scale and scope opportunities to provide payment services at lower costs to their clients than their clients could provide if the services were preformed internally. Nonbank innovators are able to provide products that target a particular niche market. We found that when nonbank innovators are successful, it is often because they develop payment mechanisms that go outside the technological paradigm (e.g., P2P). Payment processors and networks are able to leverage connectivity among participants using existing payment networks to improve the payment process.

Second, we constructed a profit matrix where we were able to categorize various payment innovations as weak niches, successful niches, mass-market success and commodities. Weak niche implies that sufficient market demand is not present at this time. Successful niches are able to tap previously unreachable markets. We found that the same technology can be applied differently to different niches. Yet even within this framework, competitors entering the market after the first wave of acceptance of an innovation seek to extend the tech-

nology or to augment it. This creates a process of continuous change driven by the opportunity to reach new market niches previously thought unprofitable or unreachable. Our two final cells — mass-market successes and commodities — study entities that are able to leverage their scale and scope opportunities. Mass-market successes differ from commodities because firms are able to distinguish themselves from their competitors and potential competitors.

Thus, our article provides a framework to study investments in payments, the evolution of payment innovations, and the profit opportunities available to different types of firms at different stages within the life cycle of payment innovations. We would encourage further case studies of different payment innovations to see how well they fit our framework.

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NOTES

¹ We interviewed seven large banks, three small and medium-sized banks, six technology innovators, three data processors and two joint-venture consortia. We generally spoke to senior executives at all the firms. In the case of small firms, we generally spoke with the CEO. In the case of large banks, we spoke to executives that head various product lines or lead the R&D efforts. We particularly focused on in-house technology development and, for payment providers, strategic reasons to adopt certain payment innovations and not others.

² For a list of definitions of payment terms, see Committee on Payment and Settlement Systems (1999).

³ We use *bank* in a broad sense to denote depository institutions.

⁴ The idea of technological progress moving on a natural trajectory is credited to Nelson and Winter (1977).

⁵ In other industries, a well-recognized brand may license the technology or buy components from the leader and compete with the innovator itself. For example, some well-known plasma television manufacturers buy key components from their competitors and leverage their well-established brand.

⁶ Evidence from another industry suggests that large firms may acquire products and processes from other firms in addition to internal research and development efforts. Mueller (1962) states that of DuPont's 25 important product and process innovations, only ten were based on inventions by DuPont's research and development staff.

⁷ For more on two-sided markets, see Armstrong (2004) and Rochet and Tirole (2004).

⁸ With respect to check processing in general, payment participants face the additional uncertainty

that the check business is shrinking, resulting in greater uncertainty in the recovery of initial capital investments. For a discussion of underlying incentives driving check usage, *see* Chakravorti and McHugh (2002).

⁹ A survey of 221 retailers by Shop.org found that pure-play Internet retailers spent \$82 per customer, brick-and-mortar retailers spent \$31, and catalog retailers spent \$11 (Hamblen, 2000). Ameritrade, in the second quarter of 2000, spent \$172 per new account versus \$438 the previous quarter (Berry, 2000). Note that these may be average cost estimates. Unlike marginal cost estimates, average cost estimates include fixed costs that may be significant.

¹⁰ The marketing and industrial organization literature addresses the issue of loss-leaders and bundling. Lal and Matutes (1994) observe loss-leader strategies employed by grocers to increase profits. For a discussion of bundling strategies across different markets where firms have market power, *see* Adams and Yellen (1976) and Bulow, Geanakoplos, and Klemperer (1985).

¹¹ For a discussion on P2P payments, *see* McHugh (2002).

¹² Recently, MasterCard changed its corporate governance structure to a private share corporation in connection with its merger with Europay.

¹³ The following information is derived from interviews with three account aggregator vendors.

¹⁴ *See* Chakravorti (2004), Clemons, Croson, and Weber (1997), and Van Hove (2001) for more details about U.S. general-purpose, stored-value trails.

¹⁵ For details on the expansion of Octopus to nontransit payments, *see* Ramstad (2004). For details about the Edge card, *see* Cross (2003).

¹⁶ Van Hove (2004) studies stored-value payment systems in Europe and suggests similar reasons why systems are successful in certain countries and not others.

¹⁷ On the other hand, the market for these services may be contestable, implying that other entrants making similar investments could put downward pressure on prices that could potentially eliminate rents without even entering the industry.