POLICY STUDIES

# Why Invest in Payment Innovations?

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**Abstract**

In this paper, we provide a framework to study the creation and adoption of innovations by payment providers and processors. We identify several motivating factors for banks and nonbanks to invest in payment innovations. In addition, we discuss the evolutionary process of payment innovations from inception to commoditization recognizing that innovations differ in the time necessary to evolve from proprietary technology to commoditization and some may never evolve completely. Finally, we consider a snapshot of payment innovations at different stages of development. We compare proprietary versus nonproprietary innovations and their profitability. Our 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.

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## I Introduction

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. 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? 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 observe that successful payment and payment-related innovations tend to follow a predicable product life cycle, which we describe as the *innovation time line*. 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.

## II. Preliminary considerations

Let us begin by clearly defining some terms and drawing some distinctions that play a pivotal role in our argument.[1] 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*.[2] Thus, payment is made by debiting the payor's account and crediting the payee's account. Both payor and payee are known as transactors. While the payor and payee may have the same bank, in general they do not, and then either (a) banks have to cancel offsetting claims between them (i.e., netting occurs) or else (b) an *interbank payment* or *settlement* must be made on the books

[1] For a list of definitions of payment terms, see Committee on Payment and Settlement Systems (1999).
[2] We use *bank* in a broad sense to denote depository institutions.

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 both the 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 to value-added services and providing payment system access to underserved markets. New innovations allow nonbanks to identify market segments and deliver targeted products, including clearing services and the delivery of payment-related information, in competition with banks. Recent developments include account aggregation, electronic bill presentment and payment (EBPP), and online peer-to-peer (P2P) payments.

Payment innovations can be divided into two distinct categories.[3] 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. For example, the use of loyalty enhancements 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.

## III. Strategic Incentives to Adopt Innovations

In this section, we will discuss the types of institutions that create and 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 1 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

[3] A payment innovation is a subset of a financial innovation. Frame and White (2002, p2) define a financial innovation as "something new that reduces costs, reduces risks, or provides an improved product/service/instrument that better satisfies participants' demands."

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.

### *A. 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.[4] 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 (precursor to Visa) when it implemented its BASE I (BankAmericard Service Exchange) in 1973 and BASE II systems in 1974 (Nocera, 1994, chapter 5). BASE I, a computer-based authorization system, cost $3 million and saved NBI members over $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 would appear in joint venture and consortia/decrease cost cell in Figure 1.

[4] For competitive markets, expected net present value need only be non-negative.

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 have not always resulted in immediate cost savings.[5] 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.

**Increase Revenue**

Increase in revenue may result from the introduction of new products.[6] Based on our interviews, the offline debit, also known as signature-based, product generates sizable revenue for issuers. Some interviewees noted that similar revenue potential would be required for greater promotion of online debit, also known as PIN-based, and ACH payment products by banks. Offline debit card transactions use credit card networks and have interchange fees similar to credit cards that are attractive to banks that offer them whereas online debit card transactions use ATM networks to authorize and clear transactions and have significantly lower interchange fees.[7] Because offline debit cards are promoted by small and large banks along with the card associations, they would appear in the increase revenue column in three cells—small bank, large bank, and joint venture—in figure 1.

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 reflecting their underlying costs and revenues associated with each type of

[5] 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).

[6] Note that an increase in revenue does not necessarily imply an increase in profits. While credit cards initially increased bank revenue, it took many years for them to be profitable. Bank of America lost close to $20 million in the first 15 months after the launch of the BankAmericard (the precursor to the Visa card) (Nocera, 1994, chapter 1). Others left the industry only to come back later.

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 twenty 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 not offered by other payment products. 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 1. However, a loyalty program may also be key a customer retention tool.

**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 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: "the cost of acquiring a customer is $400 … compared with $50 to retain one" (Bach, 2002). However, such cost assessments are extremely volatile and often subjective.[8]

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[7] Interchange fees are paid by the merchant's bank to the cardholder's bank.

[8] 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 which may be significant.

New products and services offered to increase customer retention are expected to be "sticky," implying they bind the customer more closely to the bank 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.[9] Automatic ACH debit payments would appear in the customer retention column in both the small and large bank cells in figure 1.

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] The marketing and industrial organization literature addresses the issue of loss-leaders. Lal and Matutes (1994) observe loss-leader strategies employed by grocers to increase profits. Rochet and Tirole (2001) suggest that firms selling goods that are characterized as two-sided network goods may sell certain components below their marginal cost.[11] 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. Issuers adopt such a strategy either to increase card usage resulting 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.[12] In our interviews, most banks suggested that they

[9] In addition to card issuers, merchants benefit from such stickiness.
[10] 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] Goods are called network goods if the increase in the number of users of a good benefits other users. In the case of payment instruments, they are generally two-sided network goods because users of payment services benefit from an increase in acceptors of the payment instrument and vice versa.
[12] A chicken-and-egg problem exists in the adoption of new payment products because both consumers and merchants must adopt simultaneously, otherwise there is little incentive for consumers or merchants to embrace the new instrument.

bundled EBPP, account aggregation, and peer-to-peer payment services with other products.[13] Loss-leaders may also increase stickiness of the customer relationship allowing payment providers to profit from the bundle of products.

## B. Payment Innovators, Providers and Processors

In this section, we discuss the types of institutions that create and/or adopt payment innovations.

### 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 payments revenue ranges from 9 percent to 42 percent of operating revenue (Radecki, 1999 and Rice and Stanton, 2003). While 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.[14] Many small banks provide non-payment-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 off-the-shelf products that offer relatively homogenous 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

[13] On the other hand, one large bank suggested that it changed its strategy to implement stand-alone return-on-investment calculations for all payment innovations. However, it found that many of its technological innovations had difficulties in meeting these standards. Part of the decision was based on the change in market conditions resulting in more conservative technology budgets.

[14] A small bank interviewee noted that they specialized in processing lease payments for large property managers.

improvements in payments processing such as check imaging for their own check volumes and potentially to provide correspondent services to other similarly sized banks.

While 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 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 payment 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 refereed to the ACH department where the matter was resolved. Such problems may result in customers changing their financial institution.

**Non-Bank Innovators**

We define nonbank innovators as relatively small firms that create and market new payment or payment-related products. PayPal, an example of a nonbank innovator, successfully developed a peer-to-peer electronic payment vehicle.[15] A key part of PayPal's success is 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. While there have been other attempts to offer P2P payments, none to date have achieved PayPal's transaction volume.[16] Initially, PayPal's strategy was to focus on customer acquisition via cash giveaways to users.

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. While 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 non-bank aggregate consumer financial information. Initially, providers of this technology tried to market aggregation tools via internet portals directly to consumers. Now, suppliers of aggregation tools are selling their services to financial institutions that in turn provide 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.

**Non-Bank Data Processors**

Today, large data processors are playing an increasing role in processing payment-related information for financial institutions and other payment system participants.[17] 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 processing, and credit and debit card processing services. Data processors that we interviewed

[15] For a discussion on peer-to-peer payments, see McHugh (2002).
[16] Recently, PayPal, founded in 1999, was purchased by E-Bay for an estimated $1.5 billion.
[17] First Data, Fiserv, and Metavante (wholly-owned by Marshall and Ilsley Corporation) are examples of large data processors.

stated that their extensive information network with financial institutions allow them to leverage their expertise in processing other types of payments.

While 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. Probably the most recognizable joint ventures are MasterCard and Visa.[18] While 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), and industry trade groups such as the National Automated Clearing House Association (NACHA) also continue to introduce new products and services.[19]

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 non-financial institutions have been successful primarily because their members' strengths could be adequately leveraged. However, recent joint ventures among similar types of

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

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 a joint-venture with competitors suggested that they were reluctant to discuss the business case and underlying profit opportunities primarily because of antitrust concerns.[20]

## IV. The Innovation Timeline

In the previous section, we discussed investment strategies for payment innovations. These investments may occur at different points in the evolution of the innovation to commoditized product. The rationale for investment in innovaitions changes over time as a function of opportunity and necessity. A successful innovation faces three distinct phases of investment as it matures. This evolutionary process we identify as the *innovation timeline*. In figure 2, 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.

The economic literature has identified several reasons why firms innovate. There are two strands of economic literature that provide some useful insights into the creation and adoption of innovations. The first strand focuses on the entry of firms into new business areas. Porter (1980, ch. 16) suggests reasons for new firms to enter a given industry. New firms may reduce the production cost by improving or changing the underlying technology. In the payments context,

[19] CHIPS and EPN are both operated by the Clearing House, formerly known as the New York Clearing House.
[20] Two of the most successful joint ventures—MasterCard and Visa—seem to be under constant antitrust scrutiny around the world. For a discussion of this scrutiny, see Chakravorti (2003).

improvements in information processing and computing have led to the entry of new players. Second, they can offer a superior product. Chakravorti (2001) suggests three necessary conditions for the market adoption of new payment instruments. In addition to overcoming the chicken-and-egg problem and security and liability issues, new instruments should provide superior benefits to most participants and not decrease net benefits to any participant in a given payment segment to gain market acceptance. Third, new entrants generally serve new niche markets. Some niche payment-related markets are discussed below. Fourth, new entrants may introduce a marketing innovation. One payment innovator interviewed gave away cash to both payors and payees to promote usage instead of using the more traditional advertising channels to market their product. Fifth, they leverage their existing distribution channel to deliver new products. As discussed above, payment networks can be leveraged to deliver an array of payment services.

The second strand of the literature focuses on innovation generally and financial innovation specifically. While the literature on innovation is relatively large, the literature on financial innovation is relatively small. Frame and White (2002) provide an overview of the literature noting the lack of empirical and theoretical studies on financial innovation.

### *A. Innovators: The First Phase*

The first phase of investment on the innovation timeline involves banks and nonbanks seeking 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. 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 *et al,* 1984).[21]

Both banks and nonbanks seek competitive advantage by investing in innovations. Banks usually leverage innovations internally, unless there is greater profit potential spinning-off the technology into a stand-alone business. Spin-offs may be necessary when further development requires significant investment, or if potential customers are banks wary of buying from a competitor. Nonbanks seek to maximize profits by licensing new technology to as many banks as possible, or by charging a premium for exclusivity. Two nonbank innovator interviewees stressed the importance of being first-to-market as a key factor in their viability especially in the recent technology sector downturn.

There is a body of economic literature that suggests that new entrants are more likely to introduce new products. 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. Many large banks have moved away from developing new products in-house, but are willing to invest in firms once the product has some level of market penetration. In the height of the nineties technology boom, some large banks created internal technology incubators, but most have abandoned them today.

### *B. Followers: The Second Phase*

The second phase comes as competitors enter the market. Banks and nonbanks 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

[21] On the other hand, if markets are contestable, potential firms could make similar investments and enter the market. The threat of entry prevents the existence of rents. Thus, the lack of competitors does not necessarily imply

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.

As competitors enter the market, the first mover's competitive advantage erodes. However, if the new technology has been effective in setting a new threshold for competition, spurring a new technical trajectory, other banks are obligated to acquire the technology.[22] Followers may focus on customer retention and brand image, often moving quickly to adopt the new technology.[23] Consumers' benefits are thought to increase if competitors can not only imitate but improve on the original innovation (Levin *et al*, 1987). This can range from developing new product bundles and pricing schemes, to investing in technology innovation for a counteroffensive.

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. ATMs, web-based banking, account aggregation, EBPP, and P2P payments are all examples of retail payment innovations that were quickly matched by competitors.

However, sometimes the best strategy may be a delayed response.[24] Charter One Financial, Inc. of Cleveland, ironically, stands out as late to online banking and proud of it due to the relatively slow growth in customer demand (American Banker, 2002). Charter One took a

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rent opportunities.

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

[23] 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 manufactures buy key components from their competitors and leverage their well-established brand.

[24] Nelson (1981) suggest that it can be rational for firms to choose to wait to adopt a new technology until they can fully evaluate the outcomes of the firms employing the technology.

risk, introducing e-banking in late 2000 after Wells Fargo set the pace becoming the first U.S. bank to offer online banking in May 1995. Charter One's management thought that it could climb the learning curve as quickly as Wells Fargo, and avoid unnecessary research and development costs. Rather than wait for market demand to develop for existing products in the market, Charter One became an innovator itself, responding with an integrated product that brings together online banking, wireless account access, and EBPP. Therefore, competition also improves the underlying product or service taking advantage of breakthroughs made by earlier entrants.

### *C. Economies of Scale & Outsourcing: The Third Phase*

The third phase is confined to banks and nonbanks seeking 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 turning to bank or nonbank service providers to outsource or license data processing software and hardware. 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. Payment processors that we interviewed suggested that their investment strategies relied on economies of scale and scope. Some payment processors, we spoke with continue to acquire firms in similar and related business. These interviewees purchased firms with innovations that have attained a level of market acceptance.

### *D. Managing Risk and Innovation*

Innovation frequently requires substantial investment in both product and market development before sufficient demand materializes to achieve an acceptable return on

investment in the long-term. 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 (see Dosi, 1988).

Banks and nonbanks seek to mitigate their risks either by acquiring in-process technology or by seeking partners for technology development.[25] Other options include taking an equity interest in an innovative firm; participating in a joint venture either with other banks, technology firms or both; and participating in an alliance or association development efforts. Banks and technology providers also collaborate in non-profit consortia to bring new technologies to market, reducing the cost and risk associated with basic research and market trials. Such efforts also may be attempts by participants to avoid being put at a disadvantage by working against a proprietary technology dominating the market. This strategy can also be seen in standards-setting efforts in which rival firms or industries square off in an effort to deny competitors a potential advantage.

### *E. Innovation, Barriers to Entry, and Rents*

Innovators face a higher investment risk than those that wait to invest in a proven technology. Rents are the innovator's reward. 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).

[25] 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.

The potential return on investment to innovations involves many variables. If given a window of exclusivity, an innovator introducing an effective product to strong demand can capture a controlling market share before competitors enter the market. Even if the product or the market is not ready, getting a head start up the learning curve provides an innovator with a competitive advantage.

There are several ways innovators are able to extract rents. The most effective methods to protect innovation are patents, trademarks, and copyrights.[26] These legal protections reduce competitive forces that may erode potential rents and recovery of investment in research and development.[27] In recent years, however, innovators have been successful winning controversial patent protection for business methods and processes rather than for technological innovations.[28] In addition, building strong brand awareness allows innovators or those that buy the rights to their products access to rents.

## V. 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

[26] The economic literature on R&D competition does not generally support this view, especially for process innovations. There are quite a few surveys of industries indicating that factors like moving down the learning curve, lead times, and secrecy are much more effective tools in extracting the returns from innovation. However, none of these surveys looks at the financial sector (for more details, see Cohen and Levin, 1989).

[27] Many firms are able to profit from patents. For example, IBM is granted an average of ten patents per work day (Jones, 2000) and earns more than $1.5 billion annually in licensing fees alone (Bennett, 2002).

[28] An example is Amazon.com's one-click checkout and Open Market's online shopping basket.

represent proprietary and non-proprietary 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 barrier to entry 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.

### *A. 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.[29] 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

[29] Similarly, wireless payments, including radio frequency identification (RFID) and payments via mobile phone, P2P payment systems for transactions other than online auctions, and digital cash services are all payment innovations in search of sustaining demand.

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. While account aggregation has been around for a long time, the use of screen scrapping technology to gather information from institutions where customers have accounts is relatively new. Initially, the target market for this product were consumers who could view all their financial information in one location. However, providers of this technology quickly changed their strategy to selling their product to financial institutions. One large bank told us that they were using account aggregation to aggregate all the accounts of their customers in a central place. Account aggregation provides a short-term solution to integrating various internal systems that are associated with demand deposit accounts (DDAs), credit card accounts, and loans. However, most banks we spoke with are questioning its value. One account aggregator is now marketing a product that allows their clients, mainly large banks, to better utilize the consumer information for cross-selling other products.

Account aggregators have also started to change their target market and offer related products.[30] 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 peer-to-peer 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 find a niche. 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 limited number of types of merchants—has benefited merchants. In addition, stored value has gained greater acceptance at universities and military bases.

### *B. 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, 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 (Freeman, 2002). However, Siegel (2002) also reports that almost two-thirds of the customers of check-cashing outlets have traditional bank accounts suggesting that these services are also valued by customers who have access to mainstream financial services.[31] 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 peer-to-peer payments, were not well suited for online

[30] The following information is derived from interviews with three account aggregator vendors.

payments among participants that were not familiar with one another. Traditionally, remote payments, where buyer and seller do not physically meet, 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 e-Bay, the most popular online auction cite, were not able to accept credit card payments. PayPal was among the first companies to adapt checking and credit card accounts to facilitate 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 peer-to-peer market have not have been as successful.

Competition in successful niches often is characterized by greater customization. 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, speeding the 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 over 40 percent of their wholesale business was derived from their wholesale lockbox business.

### *C. 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

[31] 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.

processing, economies of scale can potentially lead to rents.[32] Thousands of financial institutions connect directly to the ACH, 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 over 80 percent of credit card receivables.[33] 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. In fact, a large issuer left the board of one card association because it wanted to promote its own brand over the card association's brand. Even more concentrated is the number of credit card networks which spend significant resources promoting their brand and maintaining their brand's reputation.[34]

Similarly, a relative handful of ACH originators dominate ACH processing. In 2001, the top ten ACH originators accounted for 54 percent of network transaction volume. If we assume these dominant originators, which include the largest banks in the country, also account for most, if not all, of the on-us ACH transactions, then these top ten originated as much as 86 percent of the ACH transaction volume in 2001 (NACHA, 2002). Another example of a mass-market success is the maintaining of a check fraud database dominated by nonbanks due, perhaps, to the

[32] 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 potentially eliminating rents without even entering the industry.
[33] Budde (2001).
[34] There are four major credit card networks in the United States—American Express, Discover, MasterCard, and Visa.

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 database, all invest in promoting their brands to consumers and retailers. While many of these brands are associated with banks, many nonbanks have established brand value in the payments arena as well.

### *D. 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, which is acquired through acquisitions.

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 lockbox has embraced technology in order to standardize the processing of great volumes of remittances, squeezing costs – but also profits – out of what has become a

commoditized business. To speed processing 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.

## V. Conclusion

While 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. While banks and nonbanks may compete with one another, they also are 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.[35] Throughout the paper, 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 the services 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 mapped the innovation timeline with expected profits at each phase of the innovation life cycle. We found that banks and nonbanks can benefit from being first movers by targeting niche markets, or improve an existing product or process. We note that while many banks have been successful in creating such an environment within their institutions, most have significantly reduced such efforts today. In the second phase of the timeline, followers enter the market and the path to commodization has begun. However, some firms are able to create brand awareness and maintain profitability. Finally, in the last phase, the innovation has been commoditized.

Third, 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 has been 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 technology or 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

[35] While not addressed in this study, merchants are starting to develop new payment solutions often partnering with others.

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 paper has provided 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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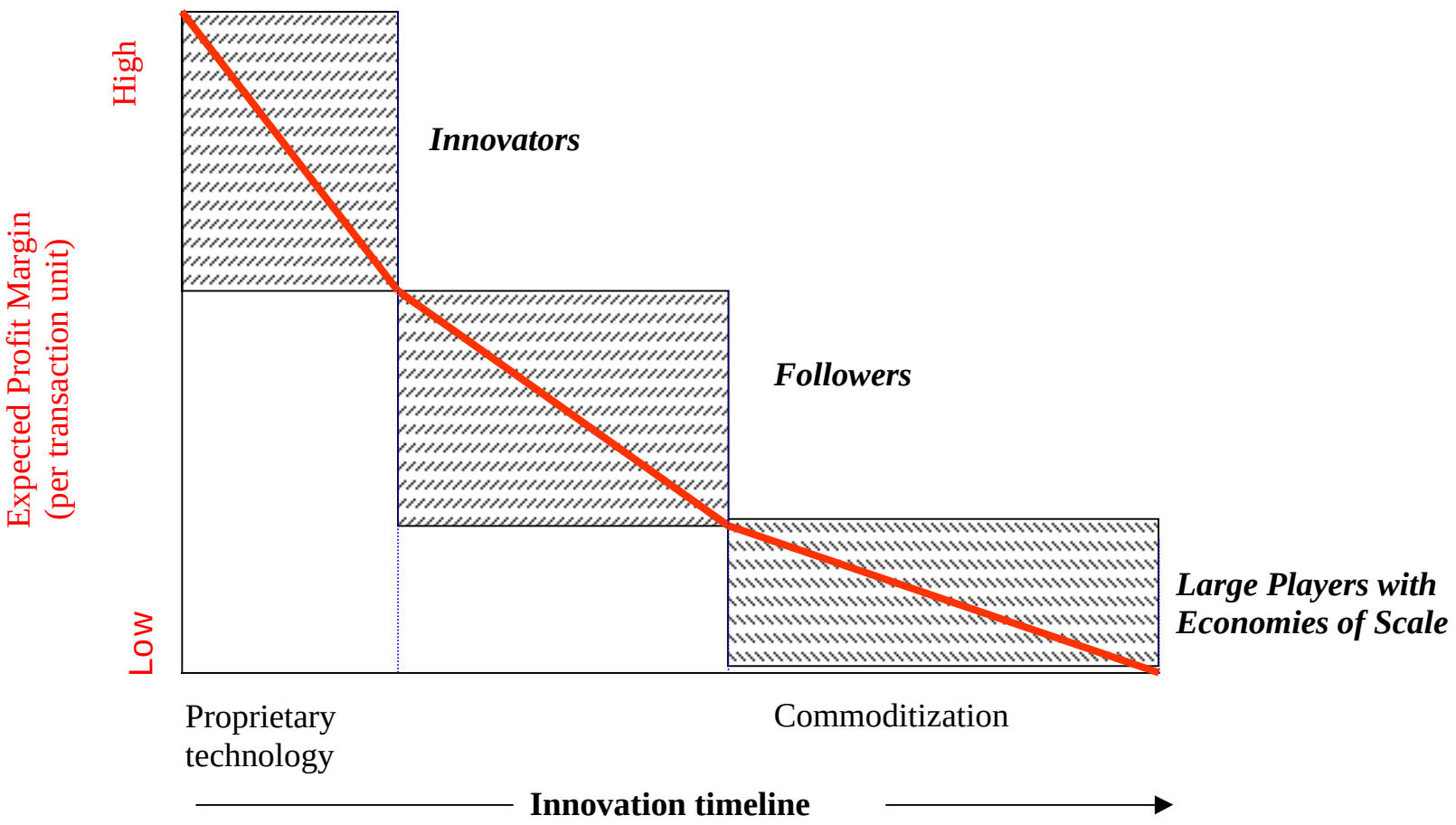
**Figure 1: Strategic Incentives to Adopt Innovations and Payment Innovators, Processors, and Providers**

| | ***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 Cards | Automatic ACH Debits EBPP |
| **Nonbanks** *Innovators* | | | P2P Online Auction payments | |
| **Nonbanks** *Data processors* | Provide Payment Processing Services | | | |
| **Joint Ventures and Consortia** | Computer-based card Authorization Systems | Promotion of Offline Debit Cards | | |

## Figure 2: The Innovation Timeline



## Figure 3: The Profit Matrix