

## CUSTOMER CAPABILITIES, SWITCHING COSTS, AND BANK PERFORMANCE

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*Customers develop switching costs when they invest time and effort to develop capabilities required to optimally use a given product. Such capabilities are likely to be firm specific and cannot be transferred perfectly to competitors' product offerings. Customers who face switching costs are likely to remain with the same firm and consume complementary products that meet their needs. Thus, firms can achieve competitive advantage by exploiting customers' switching costs. In this paper, we hypothesize that the extent to which firms can benefit from customers' switching costs is contingent upon the firms' internal cross-selling capabilities. We use online banking data to test our hypotheses and find that customers' switching costs contribute to banks' profitability only in the presence of high levels of internal cross-selling capabilities. Copyright © 2012 John Wiley & Sons, Ltd.*

### INTRODUCTION

The strategic management field is concerned with developing theories and providing theoretical explanations for how firms achieve and sustain competitive advantages (Rumelt, Schendel, and Teece, 1994). The switching cost theory is a framework that illustrates that firms can realize a competitive advantage by making it costly for customers to switch to competitors. One of the ways customers develop switching costs is by investing time and effort to develop capabilities required to optimally use a given product or a class of products at a specific firm (Wernerfelt, 1985; 1991; Klemperer, 1987; 1995). Customers' capabilities developed through learning-by-using (Stigler and Becker, 1977; Rosenberg, 1982; Wernerfelt, 1985; 1991; Helfat and Raubitschek, 2000) are likely to

be firm specific and they cannot be transferred perfectly (nontransferable) to competitors' product offerings (Wernerfelt, 1985; 1991; Klemperer, 1987; Greenstein, 1997). Once customers have developed firm-specific capabilities, they are reluctant to switch vendors because doing so would require them to reinvest time and effort in developing new capabilities. The investment required to learn new capabilities is a form of switching cost, which we term a *capability-based switching cost*. Customers can avoid switching costs by staying with and buying complementary products from the same firm. When customers purchase complementary products from the same firm in order to avoid the switching costs associated with learning new capabilities, the firm's profits will increase (Klemperer, 1987; 1995; Shapiro and Varian, 1999). Therefore, the switching cost theory predicts a direct, positive relationship between customers' switching costs and firm profitability.

What is ignored by the switching cost theory is that in consumer product markets customers not only face switching costs but also incur search

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costs (Stigler, 1961; 1962; Salop and Stiglitz, 1977). The time and effort spent by customers to find products that meet their needs and wants is known as a search cost. Customers rely on information offered by firms, such as advertising, to lower their search costs. When a multiproduct firm lacks the capability to inform customers about the variety of products it offers and to explain how its offerings will fulfill customers' complementary needs, customers may continue to purchase some products from that vendor and purchase complementary products from competitors that do inform them about their product offerings. A capability-based switching cost may help firms to retain customers (Klemperer, 1987), but the simple retention of customers may not automatically lead to an increase in firm profits. Firms that could also reduce customer search costs might be able to increase sales from retained customers and thereby increase profits. Therefore, firms with the ability to reduce customers' search costs will be more successful at taking advantage of customers' capability-based switching costs. In this paper, we hypothesize and empirically demonstrate that the extent to which firms can benefit from customers' switching costs is contingent upon firms' internal cross-selling capabilities. To summarize, we investigate the following two questions:

1. Do customers' firm-specific capabilities developed through learning-by-using act like a form of switching cost, thereby providing a firm with the opportunity to sell complementary products?
2. Is a firm with existing cross-selling capabilities more adept at exploiting opportunities presented by capability-based switching costs compared to its competitors without such capabilities?

We study the banking industry to investigate these two questions. We find that while capability-based switching costs contribute to firm revenue, they do not directly contribute to firm profits. A firm's cross-selling capabilities positively moderate the relationship between customers' capability-based switching costs and firm performance. In the following sections, we will review the switching cost literature, present testable hypotheses, and review and present research results. The paper concludes with a discussion of the findings.

## BACKGROUND LITERATURE

Klemperer (1987; 1995) defines switching costs as costs resulting from customers' desire for compatibility between their current purchases and previous investments in physical assets or capabilities. Customers are said to face switching costs when they have to make adjustments to their current investments, either physical assets or capabilities, to accommodate their future consumptions. Klemperer identifies six sources of switching costs. The two sources that are pertinent to our study are 1) learning characteristics of a product and 2) time and effort spent on developing capabilities required to use a product to its fullest (see Klemperer, 1995 for a full review). Customers develop product capabilities and the ability to link product characteristics to product performance incrementally through learning-by-using (Rosenberg, 1982; Urban and Von Hippel, 1988; Helfat and Raubitschek, 2000). Some of the capabilities developed by using a product can be transferred toward the consumption of future complementary products. Stigler and Becker (1977) termed the capabilities that can be applied toward the consumption of complementary products as *consumption capital*. Such capabilities increase the efficiency of future consumptions, thereby prompting customers to consume more products requiring similar capabilities. In the case of online banking, once customers develop capabilities to view their savings and checking account balances and pay bills via the Internet, they can also use their online banking capabilities to open retirement accounts and apply for consumer loans. Customer capabilities that can be applied toward the use of products requiring similar capabilities could influence firm performance by encouraging customers to consume more even when product prices remain constant (Stigler and Becker, 1977).

In this study, we focus on the time period during which knowledge of how to conduct banking transactions via the Internet was not widely understood by the general population. Customers needed time to become comfortable with the interface and build online banking capabilities. The commitment to develop online banking capabilities may not be a big expense for customers when they first adopt online banking technology, though it may involve an accumulation of trial and error and user time that develops a familiarity and user knowledge. Once that commitment is made, banks

have the opportunity to retain customers and sell complementary services because Internet capabilities developed by using online services can be applied toward the consumption of complementary products such as online bill paying, balance transfers, retirement account activation, credit card applications, and so on.

One may argue that a customer's capabilities may not positively influence a firm's performance when they can be applied toward the use of competitors' offerings as much as toward those offered by the customer's existing seller. For example, consumers who have developed online banking capabilities may open checking and savings accounts with one bank and use the same capabilities to open retirement accounts with a different bank. When customers' capabilities acquired through learning-by-using are fully compatible with products offered by competitors, customers will base their purchasing decisions on price. This implies that none of the firms, where all firms in an industry have similar production costs and product quality, will enjoy a competitive advantage.

Capabilities developed to use a given product may not be perfectly transferable toward the use of complementary products offered by competitors. Shankar and Bayus (2003) use this to think of network effects as demand externalities in which the utility of using a product increases with the number of users of that product. Wernerfelt (1985; 1991) and Shapiro and Varian (1999) argue that capabilities developed through either brand-specific training or learning-by-using are often firm specific. When switching to products offered by different firms, customers will have to invest a considerable amount of time and effort to learn to work with competitors' offerings with equal proficiency. For example, a customer who develops capabilities using a software product (e.g., Microsoft Word) would have to develop new ones when switching to another product (e.g., Word Perfect). Wiegner and Heins (1989) estimated that customers incur software learning costs equal to \$1,000 each time they switch to competitors' offerings or adopt a new software package. Therefore, the time and effort customers invest in developing capabilities for a particular software product serve as a form of switching cost because the adoption of a different, but similar, software product would require new investments in learning. Greenstein (1997) found that computer manufacturers took advantage of customers' firm-specific capabilities by offering

computers that were functionally identical except for the operating systems. Customers had a strong incentive to continue to buy machines from the same firm once they learned how to use the software that came on the computer. These works underscore the point that customers' firm-specific capabilities could act like a form of switching costs and may contribute to firms' performance by increasing profits.

When the cost of switching from one brand to another is substantial, customers are more likely to patronize the same sellers, thereby enabling firms to earn economic profits even in a competitive market (Klemperer, 1995; Wernerfelt, 1985; 1991; Shapiro and Varian, 1999). Shapiro and Varian (1999: 113) argue that in competitive markets where all firms in an industry have similar production costs and product quality, the profits firms earn from customers exactly equal customers' switching costs. When employed production technologies differ, firms' expected profits are equal to customers' switching costs plus operational effectiveness. A firm's ability to produce products more efficiently than competitors by exploiting valuable resources and capabilities is central to creating a competitive advantage in the resource-based view framework (Penrose, 1959; Wernerfelt, 1984; Barney, 1986; 1991; Dierickx and Cool, 1989; Peteraf, 1993).

Combining the insights of Stigler and Becker (1977), Wernerfelt (1985, 1991), Shankar and Bayus (2003), Klemperer (1995) and Rosenberg (1982) on firm-specific customer capabilities, we conjecture that customers make incremental investments in developing online banking capabilities that become substantial over time. Since customers' online banking capabilities are likely to be bank specific, customers will incur reinvestment costs if they switch to competing banks. Customers' capability-based switching costs could then be expected to encourage customers to use their familiar online banking service more frequently, thereby allowing banks to sell profitable complementary financial services that require customers to use the same capabilities.

## HYPOTHESES

### Revenue enhancement

In the banking industry, where convenience and location are important, banks operate in between

perfectly competitive and monopoly markets and are known as oligopolistic firms. Even though oligopolistic banks offer some level of differentiated products, the threat of competitors' reactions severely limits their ability to increase price when demand increases (Sweezy, 1939; Hall and Hitch, 1939; Bronfenbrenner, 1940; Scherer, 1980; Carlton, 1986). Given this price rigidity, a bank's capability to increase revenue is contingent on the extent to which it can increase the quantity of products sold by attracting new customers and/or selling complementary products to its existing customers. Our focus in this paper is on selling complementary products to existing customers.

Customers are more likely to purchase complementary products from the same firm when they face capability-based switching costs. In the banking industry, there are two ways that capability-based switching costs are created. First, the use of online banking requires customers to store personal and transaction related information, such as names and IDs for bill payments, on a bank's server. For example, customers enter their shipping and billing addresses and credit card numbers on Amazon's server when making purchases. By storing this information online, customers can avoid reentering it when they make future purchases. Customers who have stored transaction related information online can also take advantage of convenient '1-click' shopping procedure. Features like Amazon's '1-Click' shopping procedure could discourage customers from visiting competitors' Web sites and, subsequently, purchasing products from them (Latcovich and Smith, 2001). Customers might view reentering banking information on a different bank's server as an inconvenient and time-consuming task, thereby discouraging them from switching banks.

The second way that capability-based switching costs are created is when customers develop bank-specific online capabilities such as Web page navigation routines (Nelson and Winter, 1982) and acquire ability to use more functions attached to each product (Rosenberg, 1982: 123; Helfat and Raubitschek, 2000). Customers identify the functionality of online banking and develop capabilities to use the product to the fullest only after prolonged trial and error. For example, Microsoft's Internet Explorer and Mozilla's Firefox web browsers are functionally identical, but bookmarking a Web page in either browser requires a different process. Customers who are using

Firefox for the first time may have to click on a number of browser buttons and menus before determining how to bookmark a Web page. Customers who routinely use the Firefox web browser will have to go through similar capability development process if they migrate to Internet Explorer. Inconvenience and reinvestment of time and effort required to develop new capabilities to use a different product may discourage customers from switching. The investments devoted to develop new online capabilities are incremental, but over time these could become substantial (Stigler and Becker, 1977). Therefore, the longer the customers use online banking, the more they learn about it and hence the higher the switching costs they will face. Transaction costs economics provides parallel reasoning if customers make specialized investments over time to use the service without recognizing *ex ante* that there could be *ex post* switching costs, or simply if the benefits of using the service exceed the potential switching costs that are incurred (Williamson, 1985). A high level of switching costs will prompt customers to purchase complementary products from the same firm.

Figure 1 illustrates how cumulative demand for a bank's products could shift out as a result of customers' capability-based switching costs. Firms will experience improvements in revenue even under the conditions of price rigidity. Therefore, we hypothesize the following:

*Hypothesis 1a: Firms' service income per account (i.e. fee income or noninterest income per account) is positively associated with customers' firm-specific capabilities.*

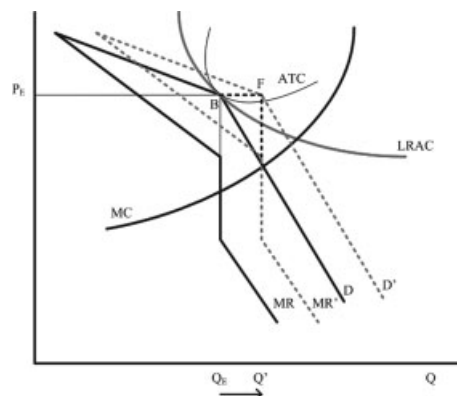


Figure 1. Capability-based switching cost, cross-selling, and firm revenue

Another form of cost customers face in the consumer product markets results from the need to invest time and effort searching for products that are compatible with their current capabilities and that fulfill their needs (Stigler, 1961). Generally, customers are not aware of all of a bank's offerings or information about the bank's offerings can only be obtained at a substantial cost. Not all banks have equal capability to make product offering information readily available and most customers spend a substantial amount of time searching for complementary products that meet their preferences (Stigler, 1961; Nelson, 1970; Stigler and Becker, 1977; Anderson and Renault, 1999). Customers want to reduce their search costs to save time and effort when purchasing complementary products. Anderson and Renault (1999) noted that firms can reduce customers' search costs through advertising (marketing). Similarly, Butters (1977) and Grossman and Shapiro (1984) argued that marketing is essential to inform consumers about the availability and characteristics/functionality of products before the purchase, thereby reducing their search costs. When customers incur search costs, they are more likely to settle for a product that satisfies their needs rather than searching for the best alternative product for consumption (Stigler, 1961). Therefore, banks that are more adept at reducing customers' search costs by informing them about product offerings and characteristics/functionality will benefit the most from customers' capability-based switching costs. Therefore, the issue that must be considered is which type of banks will be successful at reducing customers' search costs.

In the traditional banking model, the function of a bank is to accept deposits and use those funds to make loans. However, in recent years, some banks have abandoned this traditional banking model and rely on selling a wide gamut of complementary products such as credit cards, investment and asset management services, and insurance products to increase revenue (Crane and Bodie, 1996). We consider these banks to be following an aggressive strategy,<sup>1</sup> and they are more likely to have developed cross-selling capabilities. The banks following an aggressive

strategy are more likely to collect information about customers' needs and wants. The collected information can be used to anticipate and identify customers' complementary needs (Hitt, Ireland, and Hoskisson, 2009; Tanriverdi and Venkatraman, 2005) and inform customers about the banks' products that will fulfill their needs in a timely manner. Therefore, banks following an aggressive strategy are more likely to benefit from capability-based switching costs compared to those banks following traditional strategies because they will have developed better internal cross-selling capabilities.

*Hypothesis 1b: Firms' internal cross-selling capabilities will positively moderate the relationship between firms' service income per account and customers' firm-specific capabilities (as predicted in Hypothesis 1a).*

### Cost reduction

Online banking may reduce banks' operating costs and, subsequently, contribute to their overall performance. Polatoglu and Ekin (2001) reported that transactions conducted via the Internet cost as little as \$0.10 per transaction, whereas transactions conducted with the help of tellers cost \$2.10 per transaction. Similarly, Bainbridge, Meere, and Veal (2001) found that online banking transactions cost as little as 10 percent of traditional bank transactions. Analogous to automatic teller machines reducing banks' variable costs, we can expect a reduction in variable costs, such as tellers and back-office processing, with the adoption of online banking. However, banks' abilities to reduce operating costs through the adoption of online banking depends upon the extent to which customers are capable of using this service (Polatoglu and Ekin, 2001; Karjaluoto, Mattila, and Pentto, 2002). Kai-ming Au and Enderwick (2000) argued that the more experience customers have with online banking, the better understanding they will have about online banking technology. For example, during the early days of online banking, in an effort to develop customers' online banking capabilities through repeated product experience, banks in Finland offered these services for free and even provided computing classes free of charge (Karjaluoto *et al.*, 2002). Therefore, banks that have been offering online banking for a long period of time are more likely to have customers with higher levels of online banking capabilities and those

<sup>1</sup> Our measure of the aggressive strategy is the extent to which banks have departed from the traditional banking model. Two banks cited by Crane and Bodie (1996) as prime examples of nontraditional banks, First USA and Capital One, both have values of *strategic aggressiveness* above the ninety-ninth percentile.

customers are more likely to adopt online banking as their primary medium for conducting banking transactions. A customer's decision to adopt online banking and develop the necessary capabilities to use it could complement a bank's cost reduction efforts, thereby reinforcing both bank and customer performance outcomes (Milgrom and Roberts, 1990; 1995; Tanriverdi and Venkatraman, 2005; Tanriverdi and Lee, 2008; Adegbesan, 2009; Lee *et al.*, 2010).

Customers who have adopted online banking can conduct routine transactions such as transferring funds, paying bills, and checking available funds without involving bank personnel. Since online banking allows banks to shift certain banking functions to customers, there is less need for banks to establish and maintain a large number of brick-and-mortar service locations. Consequently, both salary and fixed asset expenses are reduced.

Figure 2 shows how the online provisioning of services could shift average total costs down and result in both a reduction of costs and increased profitability. Therefore, we hypothesize that:

*Hypothesis 2a: Firms' operating expenses per account (noninterest expense/account) will be negatively associated with customers' firm-specific capabilities, even when controlling for firms' service income per account (i.e., fee income or noninterest income per account).*

Hayes *et al.* (2005) argued that the cost structure of firms offering information-intensive products such as online banking is substantially different from that of firms offering physical products. The marginal cost of producing and delivering an additional unit of product online is very small, but the

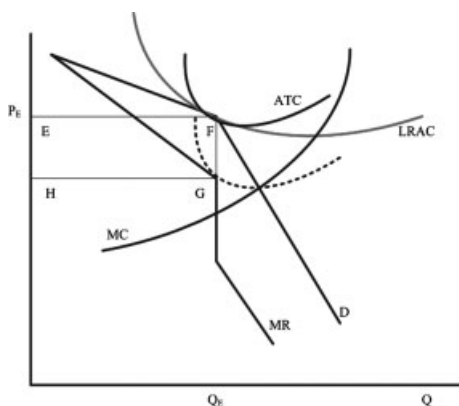


Figure 2. Online banking services and cost reduction

cost of setting up the infrastructure essential to conducting business online is substantial (Shapiro and Varian, 1999). Latcovich and Smith (2001) reported that online retailers incur higher fixed costs compared to their brick-and-mortar counterparts. Thus, banks incur a substantial amount of fixed costs when introducing online banking, but the cost of adding new online customer accounts is very low. Therefore, a bank's ability to benefit from online banking services depends upon the extent to which it can spread fixed costs over a large number of products. In other words, only those banks that are capable of selling a wide range of complementary products to existing customers will benefit from online banking.

So which banks are more likely to be adept at spreading their fixed costs over a large number of products? As discussed above, banks following an aggressive strategy offer a wide variety of products such as credit cards, investment and asset management services, and insurance products, whereas traditional banks limit their product offerings to deposits (savings and checking accounts) and commercial lending. Nontraditional banks will be more successful at spreading fixed costs because they offer a wide variety of products compared to their traditional banking counterparts.

*Hypothesis 2b: Firms' internal cross-selling capabilities will negatively moderate the relationship between firms' operating expenses per account and customers' firm-specific capabilities (as predicted in Hypothesis 2a).*

## Profitability

Combining the effects of Hypotheses 1a and 2a suggests that offering online banking leads to enhanced profitability when customers face switching costs and banks offer a variety of complementary products. Although there may be some fixed costs associated with online banking, we expect that banks that adopt online banking will eventually have higher profitability than those that do not. Similarly, Hypotheses 1b and 2b suggest that the relationship between customers' capability-based switching costs and profitability is moderated by banks' internal cross-selling capabilities.

*Hypothesis 3a: Firms' noninterest profit per account (net noninterest income/account) is*

positively associated with customers' firm-specific capabilities.

*Hypothesis 3b: Firms' cross-selling capabilities will positively moderate the relationship between firms' noninterest profit per account and customers' firm-specific capabilities (as predicted in Hypothesis 3a).*

The above hypotheses show the mechanisms by which we expect online banking to affect performance. Although all of the hypotheses above would suggest a positive impact on overall bank profitability, we also want to know if there are any other costs or revenue changes that we have not investigated that could affect profitability. Existing evidence is unclear about how online banking may impact banks' interest expense and total interest income. For example, with regard to checking services, online banking may provide banks with longer access to customer deposits than for traditional checking services. Customers who use online banking can schedule their bills to be paid electronically close to their bills' due dates. On the other hand, customers who pay their bills by writing checks usually need to write and mail their checks a week or more in advance of their bills' due dates to avoid late fees, thereby reducing the amount of funds banks can lend out. Since online banking allows banks to hold funds for a longer period of time and use the funds to make loans to investors, banks' interest income may increase when customers adopt online banking. The use of debit cards may result in reduced interest income because funds are deducted from customers' accounts immediately upon purchasing products. Apart from this, we have little basis for predicting how offering online banking might impact the interest side of operations. Therefore, we expect the effect of *net noninterest income/account* to carry through to *net income/account*, and so online banking will be positively associated with enhanced overall profitability over time as users develop greater capabilities in online banking. We also predict that banks' cross-selling capabilities will be an important moderator of this effect, with banks with higher level of cross-selling capabilities experiencing greater benefits.

*Hypothesis 4a: Firms' overall profit per account (net income/account) will be positively associated with customers' firm-specific capabilities.*

*Hypothesis 4b: Firms' cross-selling capabilities will positively moderate the relationship between firms' overall profit per account and customers' firm-specific capabilities and profits (as predicted in Hypothesis 4a).*

## METHODS

### Data sources

Financial data used in this study were obtained from the Commercial Bank Database (CBD) maintained by the Federal Reserve Bank of Chicago. The CBD contains financial data on an individual bank basis for all banks regulated by the Federal Reserve System, Federal Deposit Insurance Corporation, and the Comptroller of the Currency. This extensive database lists more than 2,800 variables covering over 10,000 individually chartered banks. The data were broken down on a quarterly basis from 1976 to 2010. We aggregate the quarterly data up to the year level to avoid the effects of seasonality. As we focus on the early days of online banking, only the period 1994 to 2000 was analyzed. We believe this focus is appropriate, however, because after this period, the target federal funds rate was much more volatile, the subprime mortgage market grew rapidly, and many banks dramatically increased their leverage.

The variables used in this study pertaining to the Internet banking offerings provided by each individual bank were obtained from the *Online Banking Report (OBR)*, written and published since 1995 by former banker Jim Bruene. This publication maintains a database detailing all of the banks offering online banking as well as the type of bank, its geographic headquarters, date of service initiation, and the name of the intermediary service provider. From this data source, we identified 598 banks that had been offering online banking services for at least a full year as of the end of 2000<sup>2</sup>. Although it is possible that this database may exclude some banks, extensive searching and comparisons have led us to believe it offers the most comprehensive account of the online banking market that was available. Furthermore, it is possible that some banks that offer online banking services may have been omitted from the dataset.

<sup>2</sup> To be listed as an online bank, banks had to offer at least the ability to view balances and transaction history.

Since it is more likely for banks that do offer online banking to be misclassified by the *OBR* as banks that do not offer online banking (rather than vice versa), the exclusion should only bias against our stated hypotheses.<sup>3</sup>

The database from the *OBR* was manually mapped onto the *CBD* by the name of institution and the location of the bank's headquarters. Records in the final dataset consist of annual observations for each bank in the *CBD* from the beginning of 1994 until the end of 2000. Since online banking did not appear until 1995, all hypotheses test the dependent variables for the window of 1995 to 2000. Data for 1994 was used because some variables were either lagged one year or required the computation of growth rates.

### Dependent variables

The *noninterest income/account* variable is our proxy for service income per account. It is computed as a ratio of total noninterest income and the total number of deposit accounts. For banks, noninterest income is not net of expenses, and thus is more akin to 'revenue' than 'income.' The total number of deposit accounts includes all demand, savings, and time accounts. *Noninterest expenses/account* is our proxy for operating expenses per account. It is computed as a ratio of total noninterest expense for the period and the total number of deposit accounts. This figure reflects total expenditures for all the physical assets of the bank as well as total wages. The variable *net noninterest income/account* is our proxy for banks' profit (i.e., noninterest income minus noninterest expense) for the period divided by the total number of accounts. Finally, *net income/account* is our proxy for banks' overall profit for the period divided by the total number of accounts. This measure of profitability goes beyond the narrower measure of net noninterest income/account since it encompasses all profits generated by the bank. Examination of the distributions of the dependent variables revealed that they were all highly skewed. Thus, the dependent variables were Winsorized at the top and bottom 0.1 percentile of their respective distributions.

<sup>3</sup> We would like to thank an anonymous reviewer for pointing this out.

### Independent variables

*Online banking years* is our proxy for customers' bank-specific online banking capabilities. This variable indicates the length of time customers could possibly have been using online banking as their medium to conduct banking transactions. Customers can use online banking only when it is offered by banks. Therefore, customers' online banking capabilities correlate with the length of time their banks have offered online banking services (Karjaluo *et al.*, 2002). Online banking years are transformed by taking the square root in order to give a diminishing capability effect over time, which is consistent with the literature on diminishing marginal return. We chose the square root rather than the natural log for this transformation so that the first year of online banking has a positive value rather than zero as would be the case with  $\ln(1)$ .

*Strategic aggressiveness* is our proxy for banks' existing cross-selling capabilities. Furst, Lang, and Nolle (2002: 108) suggest using the bank's ratio of total deposits to balance sheet assets as a proxy for the 'aggressiveness' of the bank's overall business strategy.<sup>4</sup> According to these authors, a high value of this ratio is indicative of a strategy in which the bank relies largely on traditional sources of funding, such as deposits. Furst *et al.* (2002) also used this measure as an indicator of whether banks would use Internet banking as a way to market fee-generating services, and as banks that are more likely to adopt innovative services as part of an overall aggressive business strategy. Conversely, reliance on other sources of funds (at market interest rates that generally exceed those of deposits) may require the bank to follow a more aggressive strategy with respect to generating loan and fee income. This measure of strategy is also similar to the one Zajac, Kraatz, and Bresser (2000) used to ascertain the extent to which savings and loans institutions followed a 'traditional' strategy.<sup>5</sup> We transform this variable by subtracting it from one so that increasing values of this

<sup>4</sup> These authors also suggest a second measure of strategic aggressiveness that is based on noninterest income/net operating revenue. We chose not to include this measure because of its similarity to some of our dependent variables. However, creating a composite proxy for strategic aggressiveness based on a factor analysis of both measures (at their 1994 values) yielded very similar results to those reported here.

<sup>5</sup> Zajac *et al.* (2000) used a measure of strategic change based on the ratio of residential mortgage lending to total assets.



measure correspond to increased 'aggressiveness.' This variable is lagged one year in order to avoid any potential endogeneity with the dependent variables. While this measure is admittedly only one aspect of a bank's strategy and there are many other dimensions along which a bank's business strategy may vary,<sup>6</sup> we feel that it is appropriate for this study because it is simple, parsimonious, specific to banking, and has precedence in the literature (e.g., Furst *et al.*, 2002).

### Control variables

In addition to the theoretical variables described above, a vector of control variables was also included in each equation to account for other factors that might plausibly impact the dependent variables. We control for the size of the bank with the natural log of total *assets*. *Urban* represents a dummy variable that indicates whether the bank is located in an urban area, which may be associated with a different mix of customers versus rural areas. *Age* controls for the length of time that the bank has been in operation. *Bank holding company (BHC) member* is a dummy variable that controls for whether or not the bank is part of a bank holding company, and *biggest in BHC* indicates whether the bank is the largest member of the bank holding company. *Intangible ratio* represents the bank's ratio of intangible assets to total assets, which in the banking industry tends to be primarily associated with past merger activity. Finally, in addition to being used as a dependent variable, *noninterest income/account* (i.e., fee income/account) is also used as a control variable in some models.

In addition to firm fixed effects, all models also included year fixed effects. We note that the models that use net income/account as the dependent variable go beyond the fee income or net noninterest expense/account tested in the other models. Hence, we considered putting in interest rates of different durations to control for the yield curve that could affect performance of the loan portfolio. However, because the interest rate is invariant across firms for the same year, the year fixed effects already control for the prevailing interest rate (and anything else that is invariant across firms for the same year). We also note that

multicollinearity did not present a problem in any of our models as the largest VIF in our dataset was a modest 2.92.

### Analysis

As our dataset contains multiple observations per firm, the potential confounding influence of unobserved heterogeneity due to firm-level effects was a concern. Thus, all models tested include fixed effects for the banks. Fixed effects were deemed preferred to random effects because our data encompasses most of a population (i.e., banks in the United States) rather than random draws from a population, thus undermining a key assumption of random effects (Wooldridge, 2003). Furthermore, a Hausman test indicated that there was a significant ( $p < 0.01$ ) systematic difference in the coefficients from random effects models versus fixed effects models, indicating that fixed effects models are more appropriate. This approach accounts for unobserved heterogeneity by allowing each bank to have a different intercept.

Another benefit to the fixed effects models is that they help to control for the potential endogeneity of the decision to offer online banking. Such selection bias is an omitted variables problem (Heckman, 1979). If all factors that influence the decision to offer online banking could be included in the hypothesis, there would be no selectivity bias. By using bank fixed effects, all stable characteristics of the banks that may influence the decision to offer online banking are controlled for and selectivity bias attenuated (Allison, 1994; Winship and Mare, 1992). Furthermore, we also employ dynamic fixed effects models that include a lag of the dependent variable, thereby helping to control the effects of omitted variables that change slowly over time. Specifically, we employ Bruno's (2005) corrected least squares dummy variable (LSDVC) approach, which corrects for the bias induced by including a lag of the dependent variable in fixed effects models.

Fixed effects and the lag of the dependent variable may not fully control for endogeneity problems. Therefore, we use the two-stage least square (2SLS) regression method to test for the presence of endogeneity. A combination of theorizing and exploratory regressions suggested that *BHC* and *urban* would serve as valid instruments for online banking years. We then performed 2SLS IV regressions on each of the four dependent

<sup>6</sup> Banks may also vary along such dimensions as cost leadership, differentiation, diversification strategy, etc.

variables using those instruments. Inclusion of more than one instrument allows us to conduct a test of overidentifying restrictions, which verifies whether the instrumental variables are correctly excluded from the second-stage regressions and instrumental variables are uncorrelated with the error term. However, it is important to note that 2SLS methods are inefficient compared to ordinary least squares because they produce large standard errors (Wooldridge 2003: 506–536). Therefore, a variable should only be modeled as endogenous if statistical tests indicate that endogeneity is a problem. Accordingly, we test to see if the decision to offer online banking services creates an endogeneity problem. The results of the 2SLS IV regressions were virtually identical to the ones we report in Table 2, and Davidson-MacKinnon tests of exogeneity revealed that online banking years did not create an endogeneity problem. Thus, our final analysis is conducted with the LSDVC fixed effects panel data model described above.

**Primary models tested**

1.  $Noninterest\ Income/Acct_t = \beta_1 OnlineBanking\ Years_t + \beta_2 Strategic\ Aggressiveness_{t-1} + \beta_3 Strategic\ Aggressiveness^*_{t-1} OnlineBanking\ Years_t + \beta_x [Controls]$
2.  $Noninterest\ Expense/Acct_t = \beta_1 OnlineBanking\ Years_t + \beta_2 Strategic\ Aggressiveness_{t-1} + \beta_3 OnlineBankingYears^*_t Strategic\ Aggressiveness_{t-1} + \beta_4 Noninterest\ Income/Acct_t + \beta_x [Controls]$
3.  $Net\ Noninterest\ Income/Acct_t = \beta_1 Online\ BankingYears_t + \beta_2 Strategic\ Aggressiveness_{t-1} + \beta_3 OnlineBankingYears^*_t Strategic\ Aggressiveness_{t-1} + \beta_x [Controls]$
4.  $Net\ Income/Acct_t = \beta_1 OnlineBankingYears_t + \beta_2 Strategic\ Aggressiveness_{t-1} + \beta_3 Online\ BankingYears^*_t Strategic\ Aggressiveness_{t-1} + \beta_x [Controls]$

**RESULTS**

**Revenue models**

Descriptive statistics for our dataset are supplied in Table 1, while Tables 2 and 3 present the results of our statistical analysis. Model 1 of Table 2 presents a baseline model, while Model 2 adds

Table 1. Descriptive statistics and correlation matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Noninterest inc./acct												
(2) Noninterest exp./acct	0.97											
(3) Net noninter. inc./acct	0.87	0.78										
(4) Net income/acct	0.84	0.83	0.82									
(5) Online banking years	0.04	0.01	0.00	0.01								
(6) Strategic aggressiveness	0.15	0.10	0.24	0.33	0.10							
(7) On. bank. yrs x strat. aggr.	0.01	0.06	0.00	0.04	0.79	0.24						
(8) Assets	2.31	1.16	-0.02	0.00	0.22	0.30	0.24					
(9) Urban	0.43	0.50	0.04	0.05	0.09	0.14	0.09	0.38				
(10) Age	65.43	38.10	-0.06	-0.06	0.02	-0.04	0.02	0.02	-0.32			
(11) BHC member	0.79	0.41	-0.05	-0.04	0.04	-0.02	0.04	0.19	-0.06	0.12		
(12) Biggest in BHC	0.56	0.50	-0.04	-0.04	-0.01	-0.08	-0.02	0.07	-0.07	0.12	0.59	
(13) Intangible ratio	1653	25 236	0.02	0.01	0.04	0.17	0.10	0.18	0.06	-0.03	0.02	-0.04

n = 52,210.

Table 2. Panel data estimation of revenue and expenses per account

Dependent variable:	Revenue models			Expense models		
	Noninterest income per account			Noninterest expense per account		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Lag-dependent variable	0.61***	0.61***	0.60***	0.09***	0.09***	0.09***
Online banking years		14.28*	-81.13***		-2.06	21.26***
Strategic aggressiveness		254.75***	212.12***		66.91***	77.04***
On. bank. yrs x strat. aggr.			475.09***			-115.78***
Noninterest income/acct				0.82***	0.82***	0.82***
Assets	-47.55***	-51.68***	-54.99***	-4.18	-4.60	-3.75
Urban	10.51	10.45	13.08	2.29	2.03	1.41
Age	0.03	-0.11	-0.08	-0.04	-0.07	-0.08
BHC member	-5.78	-5.98	-5.15	-3.04	-3.28	-3.47
Biggest in BHC	3.87	5.36	6.46	1.41	1.83	1.57
Intangible ratio	-1E-04*	-1E-04*	-2E-04***	-2E-04***	-2E-04***	-1E-04***
n	52,167	52,167	52,167	52,167	52,167	52,167
F-value	602.37***	524.11***	512.4***	13 285.6***	11 520.1***	10 815.2***
R <sup>2</sup>	0.1480	0.1499	0.1559	0.8058	0.8059	0.8061
F-test (change in R <sup>2</sup> )		58.28***	370.70***		13.44***	53.80***

Significance tests (two-tailed): \*\*  $p < 0.01$ ; \*\*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .  
All models also included year and firm fixed effects (not reported).

Table 3. Panel data estimation of profitability per account

Dependent variable:	Profitability models					
	Net noninterest income per account			Net income per account		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Lag-dependent variable	0.46***	0.46***	0.46***	0.48***	0.48***	0.48***
Online banking years		0.66	-1.60		1.29	-4.25**
Strategic aggressiveness		0.93	-0.14		11.41*	8.93
On. bank. yrs x strat. aggr.			11.05**			27.60***
Assets	-10.98***	-11.06***	-11.12***	-13.78***	-14.05***	-14.24***
Urban	2.38	2.40	2.45	3.23	3.25	3.41
Age	0.01	0.01	0.01	0.01	0.01	0.01
BHC member	0.20	0.21	0.23	0.02	0.03	0.08
Biggest in BHC	0.17	0.17	0.19	0.75	0.82	0.88
Intangible ratio	2E-05**	2E-05**	2E-05**	0.00	0.00	0.00
n	52,167	52,167	52,167	52,167	52,167	52,167
F-value	205.08***	175.85***	164.5***	256.13***	220.03***	208.21***
R <sup>2</sup>	0.0558	0.0559	0.0560	0.0688	0.0689	0.0698
F-test (change in R <sup>2</sup> )		2.76 <sup>+</sup>	5.53*		2.76 <sup>+</sup>	56.07***

Significance tests (two-tailed): <sup>+</sup>  $p < 0.10$ ; \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .  
All models also included year and firm fixed effects (not reported).

in the *online banking years* and *strategic aggressiveness*. As predicted, the *online banking years* variable is positively related to the revenue variable ( $p < 0.05$ ), supporting Hypothesis 1a, which stated that banks' service income per account is positively associated with customers' bank-specific online banking capabilities. We also hypothesized

that the effects of customers' capability-based switching costs would be more pronounced for banks with internal cross-selling capabilities. We tested this hypothesis (Hypothesis 1b) in Model 3 and found that the *strategic aggressiveness*\**online banking years* interaction had a significant positive effect on the noninterest income per account

Table 4. Marginal effect of *online banking years*

Value for strategic aggressiveness	Percentile	Revenue model	Expense model	Profitability models	
		Model 3 (T2) Noninterest inc. per account	Model 6 (T2) Noninterest exp. per account	Model 3 (T3) Net noninterest. income per account	Model 6 (T3) Net income per account
0.277	95 <sup>th</sup>	50.603	-10.843	1.469	3.401
0.220	90 <sup>th</sup>	23.610	-4.265	0.841	1.833
0.164	75 <sup>th</sup>	-3.209	2.271	0.217	0.275
0.126	50 <sup>th</sup>	-21.393	6.702	-0.206	-0.781
0.101	25 <sup>th</sup>	-33.043	9.541	-0.477	-1.458
0.086	10 <sup>th</sup>	-40.093	11.259	-0.641	-1.867
0.079	5 <sup>th</sup>	-43.394	12.064	-0.718	-2.059

Notes: T2 and T3 refer to Tables 2 and 3, respectively; marginal effects were calculated by taking the first derivative of the relevant regression model with respect to the variable *online banking years*.

variable ( $p < 0.001$ ), thus supporting our hypothesis. This suggests that banks following an aggressive strategy are in a better position to exploit opportunities presented by customers' capability-based switching costs.

Perhaps the most interesting finding in Model 3 is that the relationship between *online banking years* and noninterest income per account became negative after introducing the *strategic aggressiveness\*online banking years* term. The negative relationship between these two variables corroborates the switching costs theory predictions. According to the switching cost theory, if customers are likely to incur switching costs when they develop firm-specific capabilities, then banks may offer online banking at or below cost (Hess and Gerstner, 1987; Klemperer, 1995). However, the interaction effect offsets the negative direct effect for *online banking years* and increases noninterest revenue per account for banks that follow an aggressive strategy. Table 4 shows the marginal effect of *online banking years* and the *strategic aggressiveness\*online banking years* interaction terms. To illustrate this point, the first derivative of the Model 3 equation with respect to *online banking years* is equal to the following:  $\beta_1 + \beta_3^* \text{Strategic Aggressiveness}_{t-1}$ . At the seventy-fifth percentile of strategic aggressiveness (i.e., 0.164), this would be equal to  $-81.13 + (475.09 \times 0.164) = -3.209$ . Thus, at the seventy-fifth percentile (and below) of *strategic aggressiveness*, firms fail to see any revenue boost from offering online banking. Only at values slightly above the seventy-fifth percentile of *strategic aggressiveness* (i.e., to be precise, values greater than 0.171)

does the relationship turn positive and firms benefit from offering online banking. We infer from this result that unless banks have relatively strong internal cross-selling capabilities, customers may buy certain products, usually loss-leaders, from one bank and complementary products from competitors. This type of 'mix-and-match' purchasing will make markets more efficient compared to markets in which customers are locked-in to purchasing complementary products from the same firm.

### Expense models

Model 4 of Table 2 presents a baseline model, while Model 5 adds in the *online banking years* and *strategic aggressiveness*. We did not find support for Hypothesis 2a, which predicts a negative relationship between *online banking years* and noninterest expense per account. However, the main effect for *online banking years* on noninterest expenses became positive and significant after introducing the *strategic aggressiveness\*online banking years* variable in Model 6, and as predicted by Hypothesis 2b, this interaction term is negative and significant ( $p < 0.001$ ). This suggests that the effect of *online banking years* is moderated by the *strategic aggressiveness* variable. Furthermore, as Table 4 indicates, only those banks following highly aggressive strategies (i.e., above the seventy-fifth percentile) manage to reduce operating expenses once customers develop capability-based switching costs. Thus, contrary to the general belief that online banking directly contributes to banks' operational efficiency, we find that only those banks with a high level of cross-selling capabilities realize operational efficiency

from adoption of online banking. We interpret our findings as banks with a higher level of cross-selling capabilities are able to spread their fixed costs over a large number of products, thereby enabling them to achieve operational efficiency.

### Profitability models

Table 3 presents the results for our two different measures of profitability. As with Table 2, for each measure we initially present a baseline model (Models 1 and 4), then add *online banking years* and *strategic aggressiveness* (Models 2 and 5), and then finally add in the *strategic aggressiveness\*online banking years* interaction (Models 3 and 6). Model 2 reveals that the direct effect of *online banking years* on net noninterest income/account is insignificant and, hence, we fail to find support for Hypothesis 3a. We infer from this result, coupled with the earlier results for Hypotheses 1a, 2a, and 2b, that banks are able to increase noninterest income per account by selling complementary products to customers who face capability-based switching costs, but for many banks that increase in revenue is offset by increases in costs. Likewise, Model 5 reveals that the direct effect of *online banking years* on overall profit (i.e., *net income/account*) is also insignificant, thus failing to support Hypothesis 4a.

Models 3 and 6 reveal that the effect of the *strategic aggressiveness\*online banking years* term on both profit variables, (*net noninterest income/account* and *net income/account*) is positive and significant, thus supporting Hypotheses 3b and 4b. As Table 4 indicates, the net effect of *online banking years* on both profitability measures is positive for banks at slightly above the fiftieth percentile of *strategic aggressiveness*, but negative at lower levels. We infer from this that variation in banks' profits as a result of *online banking years* are heavily dependent upon the banks' internal cross-selling capabilities. Our findings challenge the predictions of the switching cost theory, which suggest that firms can increase profits *solely* by increasing customers' switching costs (Klemperer, 1987; 1995). In this paper, we show that only those banks that can successfully combine the firm's internal cross-selling capabilities with the customers switching costs can increase firm performance in terms of overall profit per account and net noninterest income per account.

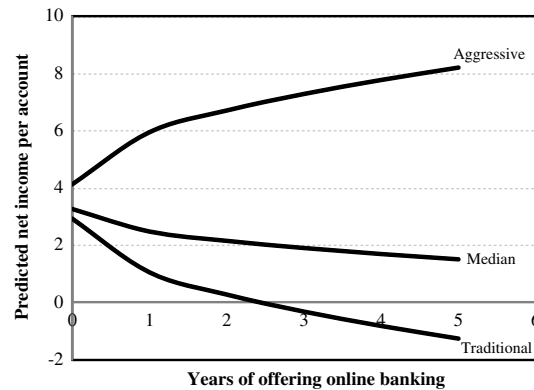


Figure 3. Predicted net income per account

Finally, in order to evaluate the economic significance of our results, we use Model 6 of Table 3 to produce predicted values for net income per account at varying levels of *strategic aggressiveness* and *online banking years*, and plot these relationships in Figure 3. For banks that do not yet offer online banking, strategy makes a relatively modest impact on overall net income per account. However, banks with a very traditional strategy appeared to lose money from offering online banking, at least during the early years. However, firms that had previously followed an aggressive banking strategy did appear to accrue significant benefits from offering online banking, presumably because of their ability to cross-sell more services to clients.

## DISCUSSION

In this paper, we demonstrate that customer capability-based switching costs can increase revenues, however switching costs are associated with profits only when interacted with banks' cross-selling capabilities. Even if the switching costs might have the expected effect of increasing revenue by retaining customers, they may not lead to an increase in profit unless the banks sell additional complementary products or services. Firms must have internal cross-selling capabilities to fully encourage customers to purchase complementary services. In the absence of firms' internal cross-selling capabilities, customers will engage in mix-and-match shopping behavior among different banks.

We tested direct and moderated effects of customers' capabilities on the revenue and expense

variables. We hypothesize a positive relationship between customers' firm-specific capabilities and performance variables. Consistent with our hypothesis, we found a significant relationship between customers' capability-based switching costs and service income per account (Hypothesis 1a). However, the direction of the direct effect on service income per account became negative once we introduced the *strategy\*online banking years* variable, while the moderating effect is positive.

In a cursory view, one may contend that customers who did not have access to the Internet switched to a different service provider. This conclusion is faulty because a majority of the banks that offered online banking did so as a supplementary channel to the traditional brick-and-mortar channel. Therefore, customers without Internet access still have the option to rely on the traditional channel to conduct their everyday transactions, thereby negating the need for switching service providers. Since the quantity of service provided is likely to be at least as much as the prior level, this negative relationship will exist only if banks are using online banking as a loss leader to incentivize customers to develop online banking capabilities. We informally surveyed banks in Indianapolis, Indiana, and found that banks not only provide online banking services for free, but also offer 'no minimum' balance saving and checking accounts when customers sign up for online banking services. One of the prominent banks in the area ran daily promotions to incentivize customers to adopt and increase usage of their online banking service. During the course of the promotion period, the bank randomly selected a customer and paid a bill that had been scheduled by the customer for online payment. As part of the promotion, the bank covered the cost of the bill rather than drawing the funds out of the customer's account.

One may question the logic behind paying customers to adopt online banking. We show that the loss-leader pricing theory and the capability-based view may provide answers to this question. The loss-leader pricing theory predicts that banks can sell additional services by increasing customers' switching costs. Traditionally, retailers advertise shopping goods (products) at or below marginal costs to attract customers and sell complementary impulse products that are priced above cost. Once the customers are in the store, retailers expropriate through high prices, customers' cost of traveling to competitors' stores. The cost of traveling is viewed

as a switching cost. In this paper, we show that the loss-leadership pricing strategy can also be used to incentivize customers to build bank-specific capabilities. Over time, such capabilities act like switching costs and prompt customers to purchase complementary services from the same bank. When switching costs are substantial, the benefits customers receive from switching banks will be less than the time and effort required developing new capabilities. Our results show that customer retention does not automatically lead to higher profits unless firms are successful at selling complementary services to their existing customers. When firms lack internal cross-selling capabilities, incentivizing customers to develop online banking capabilities actually reduces net profits.

Another reason banks might pay for customers to develop online banking capabilities could be that those customers are less likely to rely on brick-and-mortar branches to conduct routine transactions. Banks can become efficient if they can shift activities performed by bank personnel to customers. Although the cost reductions are viewed as a primary premise for offering online banking, our paper shows that online banking does not automatically lead to operational efficiency. Only those banks that can spread fixed costs among wide ranges of complementary products were able to reduce operating costs.

## CONCLUSION

Our findings show how customers' online banking capabilities influence specific components of the cost and revenue structure of banks. We show that online banking is not just a cost of doing business, but that it can alter the revenue composition and cost structure of firms. When we considered all banks offering online banking and did not distinguish them by their cross-selling capabilities, profits did not increase. However, for banks offering additional complementary services, the effects of online banking are quite different. For these banks, revenue is increased and operating expenses are reduced. The effect on net noninterest income per account is consistent with expectations that online banking will be profitable, though generally only for banks above the fiftieth percentile of cross-selling capabilities. The findings are consistent with our hypotheses that customers' online banking capabilities, developed

through product experience, act like a form of switching cost, prompting customers to purchase complementary products from the same firm. However, only those banks with internal cross-selling capabilities are likely to be in a position to take advantage of customers' capability-based switching cost and increase profits by selling complementary products.

Implications of our findings for managers are that improvements in performance are contingent upon firms' abilities to leverage cross-selling capabilities with customers' switching costs. Therefore, firms that plan to offer products via the Internet need to be aware of the significant constraints placed on firms by customers' capabilities. When the capabilities of firms and customers are interconnected, the minimum level of customers' capability-based switching costs could prevent firms from exploiting their internal capabilities.

Having outlined our findings and implications of our study above, we now discuss the limitations of this paper and provide a direction for future research. Ideally, we would have liked to examine whether these effects on revenue expansion and cost reduction act through the mediating variable of retaining customers. We were unable to find data on customer retention for the banking sample we investigated, and so an underlying assumption of our model is that the customers' capability-based switching cost is associated with customer retention. Therefore, the effects we hypothesized and tested assume that customers' capability-based switching cost is associated with the retention of customers, in which case the effects of higher revenues and lower costs due to learning-by-using effects would be observed. Consider a two-by-two matrix in which one dimension relates to either new or experienced customers, and the other corresponds to the selling of either new or existing services. According to this framework, the primary cell in which our theories apply would be selling new or additional services to existing or experienced customers with online banking. As long as this cell comprises a large proportion of the additional revenues associated with online banking, our models and hypotheses are developed appropriately. Though we do not have data on customer turnover directly, we would expect that where turnover is lower, the effects of customer capabilities developed through learning-by-using with online banking would be more prominent since the cell of existing customers buying new or additional

services would represent a higher proportion of the bank's customers. Although this limitation may not have influenced our results, we encourage future scholars to test the mediated effects of capability-based switching costs.

Another limitation of our study is that we use the *online banking years* variable as the proxy for customers' firm-specific capabilities. Banks must have the capacity to establish an online presence, but such capabilities reflect their *ex ante* abilities. In this paper, we are concerned with *ex post* capabilities and we believe that our proxy captures primarily customer capabilities. We draw this assumption based on the logic that once banks establish an online presence, they tend to make mostly aesthetic changes to their Web sites. Many of the tasks relating to establishing an online presence and making changes to Web sites are outsourced to third-party technology firms. Therefore, banks may not have to continually invest in online capability development after the initial offerings. On the other hand, customers who consume banking services via the Internet have to use the Web site on a regular basis and their capability development will occur after banks offer online services. Banks could develop internal cross-selling capabilities essential to leverage customers' online banking capabilities, and this difference in the ability to leverage customers' capabilities can explain differences in performance. This is the centerpiece of our manuscript and we show this by moderating the relationship between *online banking years* and performance by the *strategic aggressiveness* variable. However, though we think it is likely to be relatively small, we do not want to foreclose on the possibility that our proxy may also have captured some amount of banks' capabilities developed over time, which are not captured by our leveraging of offerings variable. Future studies might seek to separate customer learning from bank learning by including variables such as expenditures in information technology equipment or research and development. The inclusion of these variables will control banks' *ex post* learning capabilities that are not embodied in the customer base.

The final limitation of our paper is that since we use bank-level data ranging from 1994 to 2000 to test our hypotheses, our study does not capture the effects of reduction in costs of offering services via the Internet after the year 2000. After widespread diffusion of the innovation of online banking, the costs of online banking could have

declined substantially, as could the revenue that banks could derive from it. We acknowledge that the effects of online banking on bank performance may have been more pronounced prior to 2001, but we believe that our *theoretical* constructs are enduring. That is, capitalizing on a new opportunity (as online banking once was) will depend on both switching costs and cross-selling capabilities that moderate both the cost and revenue functions. Even if they moderate a smaller level of costs and revenues, it is possible that the magnitude of effects could diminish but we would expect the direction of effects to persist. Therefore we think the banks could still generate advantages from customer switching costs and cross-selling capabilities even as costs and revenues from online banking potentially diminished over time.

One could also expect customers' switching costs to decline as banks offer similar online banking interfaces, thereby increasing the possibility of customers switching banks. Reductions in customers' switching costs could further increase the importance of banks' cross-selling capabilities to sustain a competitive advantage. In some sense, banks' cross-selling capabilities could compensate for some diminution of customers switching costs. Since banks' cross-selling capabilities are subjected to 'time compression diseconomies' (Derickx and Cool, 1989: 1507), those banks that developed cross-selling capabilities sooner are more likely to have an advantage over those banks that developed them later. Indeed, the impact of industry evolution on these relationships is a worthy topic for further research.

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