

# Process Variation as a Determinant of Bank Performance: Evidence from the Retail Banking Study

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This paper explores the relation between retail banks' branch-based processes and financial performance. There are 11 processes included in this study, which represent the bulk of the activities performed in a typical retail branch (e.g., opening checking accounts). The first finding of this study is that the financial performance of banks that perform better across these processes tend to be better than that of other banks. In addition to the variation in process performance across banks, there is also substantial variation across processes within banks. That is, banks that performed well in one process often performed quite badly in another. We present an analytical model that shows that improvement in process variation can be more important than improvement in aggregate process performance when dealing with certain customer segments. Empirical evidence from the Wharton Financial Institution Center Retail Banking Study of bank holding companies in the United States provides support. (*Process Management; Retail Banking; Service Management*)

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## 1. Introduction

With competition, processes, and technological improvements in delivery, strategic focus in the retail banking industry has gradually shifted from price to service quality. Continuous improvement in service quality is considered a requirement for success at a time when the financial services industry is experiencing an extraordinary rate of change in organization, products, and delivery methods. The ability to support multiple service delivery channels with state-of-the-art technology is now key to financial service institutions' competitiveness.

This paper presents an empirical examination of the magnitude of service process variability and its impact on firms' financial performance (see Zenios and Harker 1998 for a collection of related work).

Heightened customer expectations and service customization have made service quality essential to an organization's success in many markets (Parasuraman et al. 1991, Soteriou and Zenios 1998). Even the definition of service quality is changing. Good service quality has traditionally meant that output conformed to the specifications set by process designers. In this paper, we enhance the concept of service quality to include uniformity of service output around an ideal (target) value determined by the customer. When the dimensions or performance of service output exceed allowable limits, the variation needs to be identified and the problem corrected.

Statistical methods traditionally have been used extensively to solve product variability problems in

manufacturing.<sup>1</sup> Among the solutions adopted to minimize process variability are the use of automation to eliminate operator intervention during system set-up and operation, process mapping to provide a common blueprint for all workers, and recruiting and retention policies that ensure that firms benefit from employees who have moved up the learning curve.<sup>2</sup> Before applying quality control methods developed in manufacturing to service operations, however, a more fundamental question needs to be addressed: How does process variation affect a firm's financial performance? The objective of this research is to use data from the retail banking study undertaken at the Wharton Financial Institution Center (Frei 1996) to arrive at a better understanding of process variation and its impact on firm performance. Eliminating unnecessary process variation is a necessary, but not sufficient, condition for improving performance. High levels of inherent variation that will continue to exist due to other factors must be managed even in the best scenarios.

#### **Evidence of Process Variation in Services**

Four major factors contribute to the substantial variation in service delivery: heterogeneous customers with different service expectations; lack of rigorous policies and processes; high employee turnover; and the nature of customization. Not all apply to all services, nor is this list exhaustive, but together these factors represent major explanations for the existence of process variation in services.

Due to the coproductive nature of most processes, the presence of heterogeneous customers introduces variation into service delivery. The principal reason for this is that a component of the production process (customer preferences and expectations) differs for each instance of service delivery. One customer, for example, might want fast service with no idle chatter, another might want to have a discussion amidst

service delivery. Serving these customers optimally requires different amounts of time, and thus introduces variation.

Variation is present in processes as well. For services, typically, not every step of the production process is rigorously defined. In fact, upper management unfamiliarity with process details and absence of institutional knowledge of process designs are not uncommon (Frei and Harker 1999a). In contrast, assembly plant managers are likely to carefully map out process details and rigorously adhere to the process maps. Services, a priori, are not subject to the same process discipline, hence, the often greater variation in the absence of formal policies and procedures. Many companies have developed specific policies and procedures for service design in an effort to reduce variation in service delivery. Banks, however, typically provide only general guidelines for service processes that tend to be delivered according to server experience modified by customer input. Servers often change the process on the basis of their level of expertise, proficiency, and past experience. Given these circumstances, the considerable variation we found in banks' delivery of financial services is not surprising.

Particularly in low-wage service delivery jobs, there is often high employee turnover. Employees are often ready to leave by the time they become more efficient and consistent at delivering service. It is in high-turnover industries that service firms often implement rigorous policies and procedures designed to speed up the training component of the job.

Finally, the nature of customization (e.g., relationship banking) is such that services are produced to meet the needs and expectations of individual customers. As customers change, so do their needs and expectations relative to the service delivery experience. A facet of many financial services, customization is an information intensive activity, yet many institutions lack the integration necessary to access information easily. Thus, a significant portion of service delivery variation reflects inadequate technology support.

The current study measures the level of branch-based service variability and explores the relation between this variability and a firm's financial perfor-

<sup>1</sup> Bohn (1995) describes one such application in semiconductor manufacturing.

<sup>2</sup> We are referring here to areas of manufacturing that benefit from reduced variation, as discussed in Bohn (1995). There exists a large body of literature that discusses the context in which variation in manufacturing can be helpful. However, we focus on environments in which variation is undesirable.

mance. It is beyond the scope of this paper to isolate each of these four factors and identify its individual effects on service variability. Rather, we develop a measure of process variation that likely results from (some of) the factors discussed above. Moreover, we do not suggest that these exhaust the causes of variability, including the level of capacity utilization, etc., but rather that they are representative of the more common causes of variability in services.

Specifically, we define process variation as variation in performance across a bank's individual, branch-based processes. As we describe in §3, we have collected data on 11 different processes across a large set of retail banks. We measure for each bank relative to the others the efficiency of the individual processes. Thus, for each bank we have up to 11 individual process performance ranks. We combine these individual ranks (as described in §4) to establish an aggregate, or overall, process performance rank for each bank. Lastly, we use the standard deviation of each bank's set of process ranks to arrive at a process variation score for each.

### **The Impact of Process Variation on Firm Performance**

Process variation has three important consequences for firm performance. First, customer dissatisfaction occasioned by process variance incurs economic losses arising from loss of customer goodwill, product replacement and rework, and negative perception of service quality. Second, high process variability complicates the management of day-to-day operations and, third, results in the institutionalization of practices essential to maintaining a service output within specification (e.g., reactive process repair, root cause analysis, and rework).

The remainder of the paper is organized as follows. Section 2 describes the analytical model, and §3 the data sample. Empirical results are presented in §4. Section 5 discusses the managerial implications of our results and suggests directions for future research.

## **2. Model**

The performance of a financial service institution is driven largely by its ability to attract and retain

customers who have an increasingly wide range of alternatives from which to choose. The question posed is whether a customer's decision to stay with a service provider is more sensitive to service variability than to level of service quality.

A customer's choice of a financial service firm can be viewed in a number of ways (see Krishnan et al. 1998 for a discussion of the causes of customer churn). Assume that a customer chooses a firm so as to maximize expected utility. If the mean and variance of each firm's service quality is known, the customer chooses once to optimize and then never switches. Risk-averse customers might optimally choose a firm with below average quality if the level of quality exhibits low variance.

A more interesting view of customer choice incurs some uncertainty with respect to the mean and variance of the firms' level of service quality. In this type of environment, the customer must learn about firms over time. Because an individual customer is an important input to service delivery, we expect a given firm to be able to service certain customers better than others. Thus, a customer's own experiences might be a better guide than summary statistics or the experiences of others to the mean and variance of the level of quality a particular firm can offer.

In a learning environment such as this, in which the mean and variance of a firm's service quality become apparent as a customer gains experience with the firm, that experience will update prior beliefs regarding the firm's quality distributions. Experience with one firm may provide information about the service quality of that firm, but it might also provide information about service quality in the industry as a whole.

Consider an environment in which there are two banks,  $a$  and  $b$ , that service customers through two processes, 1 and 2 (e.g., opening deposit and loan accounts), in each of two periods. We assume that the processes' respective service qualities are independent random variables, the distributions of which differ by process and bank. We also assume that these distributions are unknown to customers and constant over time.

Consider a customer with prior beliefs about the distributions of the service qualities for the two banks

and two processes, denoted  $F_i^a$  and  $F_i^b$ , where  $i \in \{1, 2\}$ . Assume that the customer's utility from service quality levels  $x_1$  and  $x_2$  in the two processes is  $u(x_1, x_2)$ , where  $u$  is increasing and concave, implying that the customer is risk averse with respect to service quality. It is easy to see why customers might have utility functions of this type. If, for example, variable service quality means variable waiting times, scheduling pressures might generate risk-averse utility functions.

The customer's prior beliefs are that bank  $a$  offers expected utility

$$\bar{u}^a \equiv E[u(x_1, x_2) | F_1^a, F_2^a]$$

and bank  $b$  offers expected utility

$$\bar{u}^b \equiv E[u(x_1, x_2) | F_1^b, F_2^b].$$

In the first period, the customer chooses bank  $a$  if  $\bar{u}^a \geq \bar{u}^b$  and bank  $b$  otherwise. After observing the service quality of the period-one bank, the customer can choose to switch to the other bank for period two. Suppose the customer's experiences with bank  $a$  in period 1 observes service quality  $\hat{x}_1$  and  $\hat{x}_2$ . We denote the customer's posterior distribution for service quality at bank  $a$  by  $G_1^a(\cdot | \hat{x}_1)$  and  $G_2^a(\cdot | \hat{x}_2)$ .<sup>3</sup> The customer switches to bank  $b$  if and only if

$$E[u(x_1, x_2) | G_1^a(\cdot | \hat{x}_1), G_2^a(\cdot | \hat{x}_2)] < \bar{u}^b.$$

If a bank can choose average service quality for its two processes and the cost of service quality is the same for the two processes (assume cost functions are weakly convex in service quality), then, because of the customer's risk aversion with respect to service quality, it is optimal for the bank to equalize average service quality across its two processes. If we interpret service quality as process performance, this model predicts that the benefits from more consistent performance exceed the benefits from improved process performance. Specifically, we hypothesize that the effect of process variation is greater than the effect of

aggregate process performance on financial performance.

### 3. Data

The data used in this paper are derived from the retail banking study undertaken at the Wharton Financial Institution Center. The study was aimed at understanding the drivers of firm performance and the relation between industry trends and the experiences of the retail banking labor force.

In the exploratory first phase of the study, open-ended and structured interviews were conducted with industry informants, including interviews with top executives; branch, human resource, and information technology managers; retail bank employees; and industry consultants. Thirteen retail bank headquarters were visited and numerous interviews were conducted with other managers and employees in remote and off-site locations. Data was collected from seven retail banks via two waves of structured questionnaires. Analyses of the data in these questionnaires was presented to management teams in six of the seven banks and used as the basis for the study's second phase, a large-sample survey of technology, work practices, organizational strategy, and performance in 135 U.S. retail banks.

The second phase of the study began with the compilation of a list of the 400 largest bank holding companies (BHCs) in the United States at the beginning of 1994. Merger activity, and the fact that a number of BHCs had no retail banking organization (defined as an entity that provides financial services to individual consumers), reduced the possible sample to 335 BHCs. Ultimately, the survey gained the participation of banks holding more than 75% of industry assets in 1994. Participation in the study was confidential, but not anonymous, enabling the team to match survey data with data from publicly available sources.

The study demanded substantial time and effort on the part of participating organizations. The 70 largest U.S. BHCs were approached directly and during the second half of 1994, the participation of one retail banking entity was sought from each. Of 57 BHCs that agreed to participate, seven engaged the participation of two or more retail banks, giving 64 retail banks in

<sup>3</sup> For example, if the customer's prior beliefs are that service quality at bank  $a$  is exponentially distributed with parameters  $\Theta_1^a$  and  $\Theta_2^a$  and that  $\Theta_1^a$  and  $\Theta_2^a$  have Gamma distribution with parameters  $(\alpha, \beta)$ , then the posterior distribution for  $\Theta_i^a$  is a Gamma distribution with parameters  $(\alpha + 1, \beta + \hat{x}_i)$ .

total. Each organization in the sample received multiple surveys which ranged from 10 to 30 pages and were designed to target the "most informed respondent" (Huber and Power 1985) in a number of areas, including business strategy, technology, human resource management and operations, and business process design. A telephone help line was made available to enable respondents to ascertain the meaning of particular questions.

Questionnaires were delivered to four top managers: the head of the retail bank; the top finance officer; the top marketing officer; and the top manager responsible for technology and information systems. Banks received questionnaires for one manager of a bank telephone center and for one branch manager and one customer service representative (CSR) in the "head office" branch, defined as the branch closest to a bank's headquarters. In addition, an on-site researcher gathered data about all business process flows in the head office branch. Identical questionnaires were mailed to five more branch managers (banks were instructed to choose sample branches such that, if possible, data was received from two rural, two urban, and two suburban branches).

Questionnaires mailed to CSRs in those branches requested that they map processes associated with home equity loans, checking accounts, certificates of deposit, mutual fund accounts, and small business loans. To facilitate the creation of process maps (Shostack 1987, Kingman-Brundage 1992) a worksheet was developed. The worksheets listed most of the potential steps in these processes so that CSRs needed only to indicate the orders of steps, persons responsible for their execution, type of technology involved, and amount of time required (Frei 1996). Adequate space was provided for the addition of steps unique to an institution. Process data was verified by comparing the worksheets filled out by bank employees with data collected by onsite research staff at 50 of the banks in the study. In all cases, the self-surveyed process data was identical to the data collected by the research staff.

Collectively, the retail banking survey covers 121 BHCs and 135 banks, which together comprise more than 75% of the total industry as measured by asset

size. Its scope and scale make the survey the most comprehensive to date on the retail banking industry.

For this paper, we analyze the set of retail banks for which we have complete data on process performance and financial measures. This reduces our sample to 44 retail banks.

### **Process Performance Measures**

The process performance measures used in this paper rely on the ability to rank each bank relative to the others for each individual process. That is, for each bank there are rankings for as many as 11 processes. The methodology used to grade the processes is described in Frei and Harker (1999a), who demonstrated an extension of Data Envelopment Analysis (DEA) to analyze the relative efficiency of a given business process across multiple organizations.<sup>4</sup> We determine the process-level efficiency score for each institution and convert the score to a ranking. We thus have up to as many as 11 individual process rankings for each bank.

Before we present our analysis, we need a formal description of a production process. Defined as the way in which work is organized and inputs are consumed in order to produce outputs, a production process might, for example, be the way in which a checking account is opened. The inputs consumed are labor (platform representative) and capital (information technology), the output produced is the opening of the account in a way that is convenient for the customer (in terms of time involved and when and where she has access to her money). To understand the process of opening a checking account we need to know the steps involved, their sequence, the ways in which people are involved, and the role of technology. For purposes of our analysis, we view a process as a mapping from inputs to outputs and identify the critical design issues that lead to greater value.

<sup>4</sup> The collection of this data is part of the work undertaken by the retail banking study at the Wharton Financial Institutions Center. One aspect of the data collection involved collecting data on 11 processes that represent the bulk of the work that occurs at a typical retail bank's branch. These processes span five products and represent opening of accounts, error correction on the part of the bank, and error correction on the part of the consumer. For a complete explanation of the retail banking study, see Frei et al. (1999).

Before determining the efficiency with which processes transform capital and labor into value for customer and bank, it is important to understand the impact process design has on value creation. That is, processes can be designed to explicitly affect one or more value measures. For example, to improve the convenience of a process, the design can be altered to remove or abbreviate as many steps as possible. But these adjustments might be at the expense of other value measures. Alternatively, a process can be designed to consume the least inputs (cost-focus), even at the expense of decreasing market penetration and, hence, revenue. That is, the process design can, in and of itself, create value. It is the intent of this section to determine the extent to which process performance creates value.

For each of the 11 processes considered in this study we have performed the efficiency analysis described in Frei and Harker (1999b). This analysis determines the efficiency with which a set of outputs is produced from a set of inputs using a frontier approach, each bank's distance from the frontier serving as its efficiency score. Categories of inputs and outputs for each process are shown in Table 1. Ranking the banks according to their efficiency score for each process yields what we term individual process performance ranks. These individual process analyses are then aggregated using the methodology described in Frei and Harker (1999b) into an institutional aggregate process efficiency rank. Briefly, the aggregation method determines the overall process performance score by combining tournament ranking techniques that accommodate missing data, as not every bank branch performed every process. The aggregated rank is used to analyze the role of process efficiency in describing each bank.

As can be seen in Table 1, process outputs are convenience measures (e.g., time); process inputs are cost measures (e.g., labor time and technology functionality). These being our only process-level measures, they are the only two value-creation measures represented in our individual process analysis. Other value-creation measures such as financial performance are bank-level data and are compared with aggregate process performance in §4. It should be

noted that we have explicitly chosen to use process efficiency as the process performance measure as opposed to process quality alone. That is, we are interested in considering not just the outputs but the inputs and outputs of the process simultaneously.

To explore the relation between process performance and overall financial performance we need to establish a measure of the latter. We use Return On Assets (ROA) as our measure of performance because, as we describe in the following section, we believe it best captures the effect of internal process improvements on a firm's financial performance. There being significant debate over the appropriateness of any one measure of financial performance, we replicated our analysis with other common measures of financial performance from which we obtained qualitatively similar results.

## 4. Results

In §2, we discuss a model in which it is optimal to invest resources to lower process variation rather than to invest resources unevenly in separate processes. In this section, we empirically validate that model. First, we present data that support its two primary assumptions: that (1) better process performance, and (2) better consistency improve financial performance. Second, we provide evidence that performance variation across different processes is more closely related to firm financial performance than is aggregate process performance.

### Does Process Efficiency Matter?

Although there exists a significant body of theoretical (Morroni 1992) and anecdotal (Davenport and Short 1990) evidence on the importance of process management, there is little statistical evidence that process management matters with respect to an institution's "bottom line." It is the intent of this study to analyze the claim that process performance and the way in which processes are collectively managed are related to firm performance.

*HYPOTHESIS 1. Banks with better aggregate process performance have better financial performance.*

We first consider the relation between a bank's process efficiency as measured by aggregate process

**Table 1** Summary of Process Inputs and Outputs

	Inputs	Outputs
<i>Open Checking Account</i>	Activity Time: The amount of time bank personnel spend in the process Checking IT Functionality: The level of IT used in the process as indicated by a relative score	Customer Time: The amount of time the customer spends in the process Check Cycle Time: The elapsed time from the start of the process until customers receive their checks ATM Cycle Time: The elapsed time from the start of the process until customers receive their ATM cards
<i>Open Small Business Loan Account</i>	Activity Time IT Functionality	Customer Time Approval Cycle Time: The elapsed time from the start of the process until the customer hears about the approval Money Cycle Time: The elapsed time from the start of the process until customers receive their money
<i>Open Certificate of Deposit</i>	Activity Time	Customer Time
<i>Open Mutual Fund</i>	IT Functionality	
<i>Open Home Equity Loan Account</i>	Activity Time IT Functionality	Customer Time Approval Cycle Time Money Cycle Time
<i>Correct A Checking Double Post</i>	Activity Time IT Functionality	Customer Time Correct Cycle Time: The elapsed time from the start of the process until the correction is completed
<i>Correct A Home Equity Loan Double Post</i>	Activity Time IT Functionality	Customer Time Post Cycle Time: The elapsed time from the start of the process until the correction is posted Notify Cycle Time: The elapsed time from the start of the process until the customer is notified about the correction
<i>Correct A Small Business Loan Double Post</i>	Activity Time IT Functionality	Customer Time Post Cycle Time Notify Cycle Time
<i>Redeem A Premature Certificate of Deposit</i>	Activity Time IT Functionality	Customer Time Redeem Cycle Time: The elapsed time from the start of the process until the redemption is completed
<i>Stop Payment on a Check</i>	Activity Time IT Functionality	Customer Time
<i>Replace A Lost ATM Card</i>	Activity Time IT Functionality	Customer Time Replace Cycle Time: The elapsed time from the start of the process until customers receive their new ATM cards

performance, and its financial performance. Because we are primarily interested in the impact of operational efficiency on financial performance we choose

ROA as our performance measure. The advantage of ROA is that it captures the efficiency of management's use of a firm's assets (White et al. 1997) independent of

**Table 2** Correlation Matrix

Variable	Count	Mean	Standard Deviation	1	2	3	4
1. ROA	44	1.96	0.21	1			
2. ln (Assets)	44	23.88	0.97	0.015***	1		
3. Aggregate Process Rank	44	16.78	4.21	-0.405***	0.210	1	
4. Process Variation	44	9.03	2.86	-0.483**	0.189	0.449***	-0.00

\*—Indicates significance at the 10% level.  
 \*\*—Indicates significance at the 5% level.  
 \*\*\*—Indicates significance at the 1% level.

the firm's capital structure and size. This is in contrast to Return On Equity (ROE), which evaluates both operational performance and capital structure.<sup>5</sup> Summary statistics are reported in Table 2.

Before assessing the relation between process performance and financial performance, we must consider the other drivers of financial performance which we need to control. To this end, we include in our model an independent variable of firm size (as measured by log assets), commonly believed to be the most significant determinant of financial performance. As can be seen in Table 2, ROA and assets are not highly correlated, demonstrating that, for our sample of banks, there is no clear relation between firm size and financial performance. This further motivates our exploration into process performance as a driver of financial performance.<sup>6</sup>

Table 3 reveals a significant relation between the banks' aggregate process performance and their financial performance. That is, financial performance improves (increases) as aggregate process performance rank improves (decreases). There are, of course, two explanations for this relation. Although it may be the case that better process performance does indeed

drive financial performance, it may also be that financially secure firms have the resources to be better process performers. Although our empirical study cannot determine conclusively that aggregate process performance affects firm financial performance, the evidence, in concert with theoretical and anecdotal evidence, suggests that process performance as we have measured it is positively related to financial performance.

The next step is to determine what causes the relation between process performance and firm financial performance. The service management literature (e.g., Rust and Metters 1996) suggests that the consistency may be more important than the absolute value of a service offered to consumers. A bank, like any organization, is a bundle of production or service delivery processes. Consumers are concerned with the quality of the set of service processes with which they interact; that is, no single process matters. Thus, it may be that performance consistency is as important as performance in and of itself.

We need to be clear that we are not advocating that consistently poor performance is a good strategy, but rather that if there is an additional resource to be invested in a firm the investment might profitably go to improving consistency rather than to moving a single process towards best in class. As will be seen from the results presented later in this section, it is the conjunction of good and consistent processes that yields the best results. To address this hypothesis, we now consider the issue of process variability, that is, the variability of the bundle of processes that an institution offers its customers.

<sup>5</sup> We also considered market measures such as market-to-book ratio and Tobin's Q. Any effect that process performance has on a bank's market value, however, is expected to arise indirectly through reported financial statements and ratios such as ROA, because process performance is not likely to be directly observable by investors, and cannot be capitalized directly into the market price.

<sup>6</sup> The work of Reichheld (1996) also demonstrates a loose correlation between firm size and financial performance. He concludes that customer retention is the better predictor of financial performance.

**Table 3 Firm Size, Process Performance, and Financial Performance**

Dependent Variable	Constant	Assets (log)	Aggregate Process Rank	Adjusted $R^2$
ROA	1.01	0.02	-0.02***	0.134

\*—Indicates significance at the 10% level.  
 \*\*—Indicates significance at the 5% level.  
 \*\*\*—Indicates significance at the 1% level.

**Process Variation**

When an institution performs a set of processes for a customer, there is undoubtedly going to be variation in the level of inputs consumed and the value provided to the customer. We define process variation as the variation in performance across the 11 individual process performance ranks for each bank. Specifically, we define process variation as the standard deviation for each bank across the set of up to 11 individual process performance rankings.

*HYPOTHESIS 2. Banks with less process variation have better financial performance.*

The issue here is whether process variation can help explain why process performance is related to financial performance. In other words, which is more important for a bank, to do a few things well and, hence, do other things not so well, or to provide a reasonably consistent set of service delivery processes? Which ultimately matters, occasional excellence or consistency? To address this question we examine the relation of aggregate process performance, process variation, and financial performance.

From Table 4 we see that, controlling for asset size and aggregate process performance, process variation is negatively correlated with financial performance for all five of our measures. That is, the more consistently a bank performs across a set of processes the better its financial performance. Moreover, both aggregate process performance and process variation are significantly correlated with financial performance. That is, financial performance improves with improvement in aggregate process performance, as well as with lower process variation. Thus, our next step is to test the hypothesis derived from our model in §2.

**Table 4 Firm Size, Process Performance, Process Variation, and Financial Performance**

Dependent Variable	Constant	Assets (log)	Aggregate Process Rank	Process Variation	Adjusted $R^2$
ROA	0.92	0.03	-0.01*	-0.03**	0.244

\*—Indicates significance at the 10% level.  
 \*\*—Indicates significance at the 5% level.  
 \*\*\*—Indicates significance at the 1% level.

*HYPOTHESIS 3. The effect of process variation on financial performance is greater than the effect of aggregate process performance on financial performance.*

Having demonstrated the relation between process performance, process variation, and financial performance, we next test whether process variation is a more important determinant of financial performance than process performance. To do so, we define banks with *good processes* to be those with better than average aggregate process performance and banks with *consistent processes* to be those with lower than average process variation. We choose average performance to be the breakpoint so that we have sufficient banks in each sample; however, our results also hold when using quartiles as breakpoints. To test the hypothesis we use a dummy variable for *good* process performance and another dummy variable for *consistent* process performance. These variables are set to one when the banks are better than average for each process measure.

Our new model examines the effect of the process dummy variables on financial performance, again controlling for asset size and including the interaction term of the two process measures for completeness. As can be seen from the results of these tests shown in Table 5, both *good* processes and *consistent* processes have a significant relation with ROA and the interaction term is not significant. The implication of these results is that financial performance seems to be better in banks that have *consistent* processes and in banks that have *good* processes. This result is consistent with the argument in the service quality literature (Rust et al. 1995) that firms that set and consistently meet expectations have

**Table 5** Banks with Good, Consistent Processes Have Higher Financial Performance

Dependent Variable	Constant	Assets (log)	Dummy Variable for Aggregate Process Rank	Dummy Variable for Process Variation	Interaction Term for Process Variables	Adjusted $R^2$
ROA	0.73	0.01	0.15*	0.28***	-0.18	0.239

\*—Indicates significance at the 10% level.  
 \*\*—Indicates significance at the 5% level.  
 \*\*\*—Indicates significance at the 1% level.

more satisfied customers and are more profitable. This result also suggests that it is not enough to deliver expected service, but that the consistency of service also matters.<sup>7</sup>

As a test of Hypothesis 3, we compare the coefficients of *good* and *consistent* processes. Consistent with Hypothesis 3, we find that the coefficient of *consistent* is significantly greater than the coefficient of *good*. This analysis suggests that with respect to the relation between process measures and firm performance there tends to be a stronger financial return for banks with *consistent* processes than for banks with *good* processes, reinforcing the analytical model presented in §2. That is, on the margin consistency may be more important than aggregate performance. But our analysis also clearly demonstrates the positive impact of improving along both lines. Considering both the analytical model and the data, we conclude that process variability is a compelling contributor to overall firm performance. In addition, we consider this to be strong evidence in support of the claim that firms with customers who interact across a bundle of processes should implement improvements to these processes collectively rather than process-by-process along the best-practices theme.<sup>8</sup>

<sup>7</sup> It is likely that the first place that firms will notice the effect of inconsistent service is in their inability to maintain high levels of customer retention. Unfortunately, we were unable to capture customer retention measures in this study.

<sup>8</sup> An alternative interpretation of this result is that customers judge a service organization by the standard of the worst process, not the mean or occasional excellence. We leave the testing of this hypothesis to future research.

## 5. Conclusion

In the banking industry there are conflicting points of view regarding the relation between process design and firm performance. In this paper, we address the impact of process performance on firm performance using data gathered from the Wharton Financial Institution Center Retail Banking Study.

We find that although aggregate process performance seems to have an effect on a firm's financial performance, it is variation performance that is the better predictor of process performance. In addition, we find that firms that have both above average process performance and below average process variation are likely to have better financial performance, which suggests that good, consistent service processes can increase firms' profits.

These findings suggest a shift in the nature of the debate about process design. If there is a negative performance impact of high process variability and competitors that are more consistent can minimize this penalty, it might make sense for a firm to focus holistically on the "basket" of processes rather than on optimizing individual processes. Firms should consider investing in process improvement and organizational capabilities that decrease process variation, rather than invest in improvements that make a firm "best of the breed" for a single process.

Clearly, understanding and measuring process variability is important given the advances in technology that are enabling banks to produce, service, and deliver custom retail products. Today's financial institutions employ multiple service delivery channels: branches; call centers; mail; ATMs; direct (PC) banking; Web-based banking; and sales kiosks (see Frei and

Kalakota 1997 for a complete description of these channels). These service delivery channels, subtly different, require different process designs to satisfy performance criteria. In high-volume channels such as branches, call centers, and mail, for example, virtually all service processes are initiated by data entry done by bank employees. With newer channels, consumers do the data entry that initiates the service processes. This change in process initiation has implications for managers as variation in service delivery is now closely associated with customers' participation. Financial institutions investing in the development of new service delivery channels need to understand the impact these channels will have on process variability and, ultimately, on firm performance.<sup>9</sup>

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