The Fit of IT with Banking Strategies for Improving Management Performance*

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This research investigates the fit of IT level with management strategy for improving three performance measures; market share, cost efficiency, and profitability. Regression models are used to test hypotheses regarding impacts of: (1) strategic fit between IT levels and types of market focus, and (2) interaction between IT investment level and banking strategy, on the three performance measures.

The findings are as follows. First, IT investments significantly reduce payroll expenses if IT levels and market focus are well-matched; i.e., high IT-based nationwide banks and low IT-based regional banks as compared to those that are mismatched. On the other hand, operating expenses or total expenses are not reduced. Market share and profitability are significantly increased for the well-matched banks compared to those that are mismatched. Second, increased IT investments by retail banks have a greater impact on increasing market share and profitability than those of wholesale banks.

The evidence suggests two important strategic implications. First, if banks effectively match IT investment level to market focus (nationwide versus regional) and retail/wholesale banking strategy, they are likely to reduce payroll expenses and increase market share as well as profitability. Second, changes in the cost structure may occur with the substitution of fixed technology expenses for variable payroll expenses. This implies that banks can effectively use IT to change the firm's cost structure. Which expense item (variable or fixed) is more important to improve a firm's competitive advantage may vary among firm's management environments since cost-volume-profit relationships can be changed due to the use of IT.

Key words: IT investments, retail/wholesale banking, market focus strategy, bank's business performance

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Ⅰ. Introduction

Banks are information-intensive organizations and are heavily dependent on information technology (IT) as a core technology. They have moved into on-line banking systems using IT such as CD/ATM (cash dispenser and automated teller machines), ARS (automated response systems), Home/Firm banking and Internet banking to better provide financial services to their customers. IT investment by banks is analogous to investing in R&D for manufacturing industries. For banks, this IT investment is critical for increasing operational efficiency, customer satisfaction, market share, revenue enhancement and profitability. Additionally, IT investment is essential for developing and providing new financial services or products to enhance customer satisfaction; thereby, sustaining or increasing the bank's competitive advantage.

Several prior studies have investigated the economic impact of IT on the banking industry. In the main, most of these prior studies investigated whether IT investment provided positive economic benefits. While the early evidence appears mixed, some studies have provided evidence that the 'IT productivity paradox' disappears when in-

vestment and use of IT is well-aligned with business strategy (e.g., Porter, 2001; Peffers and Tuunainen, 2001; Hitt, Frei, and Harker, 1998).[1] The issue of whether or not investment in IT pays off is no longer the question of import. More importantly, the issue or question now should be: "under what conditions will IT investment significantly increase business performance?" For instance, in the banking industry, positive economic returns due to IT investment may depend upon how well individual banks are able to make IT investment and utilization as an integral part of their business strategy. Then, it is important to understand how strategically adopted IT leads to greater economic benefits. However, only limited evidence thus far has been provided in the literature. One such study, Peffers and Tuunainen (2001), provides empirical evidence concerning the strategic fit between IT scope and business strategy with its associated impact on business performance for the banking industry.

The principle objective of this study is to provide additional empirical evidence on how IT investment planning and utilization can be matched to management strategy for increasing the firm's performance. Specifically, we investigate how different relationships between levels of IT investments (or

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1) Chan (2000), Sircar, Turnbow and Bordoloi (1998), Simmons (1998), and Brynjolfsson and Yang (1996) provide a comprehensive review of the literature concerning the effects of IT investment on financial performance.

levels of IT, the term is interchangeably used for simplicity) and firm strategy impact financial performance. Examined are effects of different strategies (a nationwide versus a regional market focus and a retail versus a wholesale banking strategy) and the level of IT investments upon market share, cost of operations, and profitability.

This current study builds upon the path-finding works of prior studies such as Peffers and Tuunainen (2001), Thatcher and Oliver (2001), and Alpar and Kim (1990). They have argued that IT investment can provide increasing returns due to economies of scale by reducing average cost per product or customer. This study extends their exploratory work by using panel data to empirically test formal hypotheses using nine years (1990-1998) of data for 24 commercial banks in Korea.[2] Examined are the interaction effects between levels of IT and types of market focus. Tested also are the interaction effects between IT investment levels and banking strategy (i.e. retail-oriented versus wholesale-oriented banks). While they examined national versus global geographic scope as a means for attaining greater advantages in economy of scale, we examine the scope issue within a single country. Will a market focus

(scope) within a single country give similar (if more limited) advantages due to scope? We term the management strategy of nationwide versus regional as "market focus" to distinguish it from their geographic scope variable. Further, we examine three different groups of performance measures, including the market share issue which prior studies did not address.

This study would be considered as worthwhile to the domestic banks in that it can provide a guidance in making their strategical choices specially at the turbulent time of market. The domestic banking industry has been in the middle of restructuring through merge and acquisition(M&A) since the foreign currency crisis in 1997, and furthermore competitive boundaries in financial market have become more and more blurring in recent days. Confronted with those market changes, the banks have had to choose either efficiency through becoming big or effectiveness through concentrating on certain markets. In some cases the domestic banks might have to pursue two choices at the same time. And this restructuring is still in the progress even at faster speed. Therefore research results of this study could be considered as good directions to improve

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2) In 1990's domestic commercial banking industry consisted of 25 banks (15 nationwide and 10 regional banks). This study uses data of 24 banks because data of one bank is not available at all. After the foreign currency crisis in 1997, five banks were liquidated and several bank were merged after the year of 1998. In the year of 2006, 9 commercial banks (6 nationwide and 3 regional banks) are left. This is why this study limited the sample year to 1990-1998.

bank's competitive advantage.

II. Theoretical Framework and Hypotheses Development

2.1 Impacts of IT on Bank's Market Share and Financial Performance

Several studies (e.g., Lee and Kim, 2006; Hwang and Kim, 2005; Kim and Davidson, 2004) provide evidence on whether IT investments have a positive impact on organizational structure and economic performance of a firm. Advances in IT allow management to change and improve significant aspects of a firm's structure and operations. IT enables a firm to enhance its competitive advantage by improving its bargaining power with suppliers and customers, lowering operating and processing costs, enhancing product differentiation, changing competitive scope, and/or increasing barriers to entry (Porter and Millar, 1985).

The specific examples of IT utilization in the banking industry are various. IT utilization helps banks to better serve their customers by delivering financial services in a more timely and convenient manner. This will not only improve current customer satisfaction but also will act as a vehicle for attracting new customers. Prior studies

(e.g., Banker and Kauffman, 1991; Saloner and Shepard, 1992) have consistently shown a positive impact of IT investments on market share. They find that there is a positive association between IT utilization (e.g., ATMs) and the benefits to depositors. The use of IT such as on-line banking systems not only increases the number of customers served in a given market but also, aids in expansion into new geographic areas and thus a bank's market share (Hannan and McDowell, 1990). Therefore, the use of IT such as on-line banking systems should have a positive impact on market share and revenue as a result of increasing market share since it gives customers easy access to banking services.

Banks also use IT to produce management information about cost of financial products and services they provide, profitability analyses by customer groups and by services they offer, and management performance evaluation of each branch (Ernst and Young, 1995). That is, banks use IT to make and deliver financial services (i.e., products) as well as to manage their business. Thus the expectation is that IT-based on-line banking and management control systems should lead to decreased total costs of operation, and thus increase firm's profitability. To date, the empirical results on IT performance in the banking industry appear mixed (Brynjolfsson and Hitt, 1998). Paradoxically, Banker and

Kauffman (1991) shows that the utilization of IT (e.g., ATMs) does not increase labor productivity, while Alpar and Kim (1990) finds that IT utilization such as CD/ATM and computerized bank functions enables banks to reduce labor cost. Haynes and Thompson (2000) also finds statistically significant productivity gains associated with the use of IT such as ATMs.

As suggested by these studies, the use of IT in the banking industry tends to improve market share but may or may not increase its financial performance. Thus, the research question asked in this paper is: under what conditions are the economic consequences of IT investments higher? How can the use of IT be matched with business strategy (e.g., market focus and retail/wholesale banking strategies) to increase business performance?

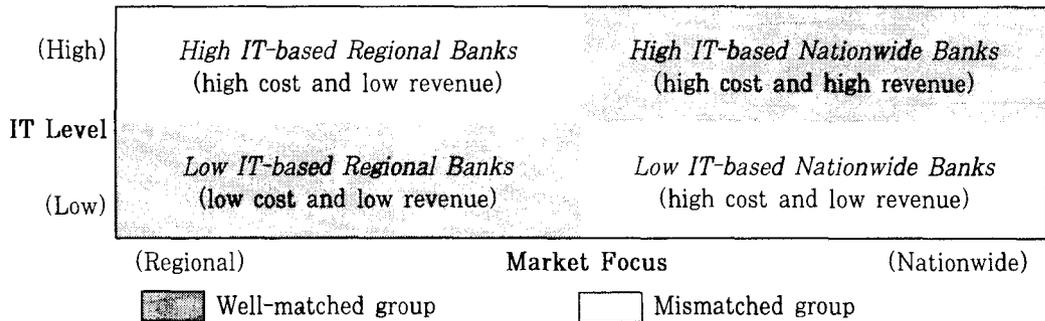## 2.2 Impacts of IT and Market Focus Strategy

IT investment itself may not increase firms' financial performances but rather IT will perform better when it is well fitted with business strategy (Porter, 2001; Lee, 2004; Sung, 2004). Since the banking industry has become highly IT-intensive, bank managers then must decide how to strategically use IT

to maintain (or increase) their competitive advantage. The IT investment decision should be aligned with other strategies of the firm to better enhance the financial performance (Croteau and Bergeron, 2001).

The market focus (i.e., nationwide versus regional) is one of the bank's key strategies. The level of IT also needs to be aligned with a bank's market focus strategy in order to increase its business performance. Peffers and Tuunainen (2001) provide a comprehensive theoretical background for developing their 'IT/Geographic Scope Matrix (IGSM)' used in testing the relationships between IT scope and national versus global geographic scope. They also demonstrate that the economic impacts of IT vary with the bank's strategic position within this matrix. Our study draws on their theoretical framework to investigate the interaction effect between IT level and market focus on business performance. However, for our study, the market focus variable is limited to a nationwide market versus a regional market within a single country, Korea. This differs from their IGSM matrix. The modified framework is shown in Figure 1.

In this 2x2 matrix, the IT level[3] is related to different IT operating cost as suggested by

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3) IT level can be measured with IT investments, the number of CD/ATMs, the ratio of IT expense to total expense, the number of IT employees, the number of computerized bank functions, IT capital, or the number of IT-based banking services. This study uses IT investments because this variable has the highest correlation among those variables. For more detail of IT level, see section 3.3.

(High)	*High IT-based Regional Banks* (high cost and low revenue)	*High IT-based Nationwide Banks* (high cost and high revenue)
IT Level		
(Low)	*Low IT-based Regional Banks* (low cost and low revenue)	*Low IT-based Nationwide Banks* (high cost and low revenue)

(Regional)   **Market Focus**   (Nationwide)

▨ Well-matched group   ☐ Mismatched group

⟨Figure 1⟩ Strategic Fit Between IT Level and Market Focus

Alpar and Kim (1990). That is, banks with high IT level will spend more money on running their IT-based banking equipments than banks with low IT level. The market focus is also related to different levels of operation costs. Nationwide banks spend more money to run their nationwide branches than regional banks do. Thus, the costs of operation should be higher; but, they should also generate more revenue. Then one would expect there to be trade-off effects between higher revenue and higher cost of operation for nationwide banks. Higher profitability depends on determining optimal size of market focus. Nationwide banks will have higher profitability if the marginal revenue from having a larger market focus exceeds the marginal cost.

Prior studies also suggest that IT-based banking tools can be good enablers to operate globally and effectively (Dewan, Michael and Min, 1998; Peffers and Tuunainen, 2001). Analogously, IT can have greater economy of scale (size) effects in a nationwide market compared to a regional market. Economy of scale is one of main interaction effects between IT level and market focus. It affects market share, revenue, cost of operation and thus the bank's profitability. The more the customers use IT, the marginal cost of using IT is reduced. Thus, the average cost per customer served becomes lower (Gilligan, Smirlock and Marshall 1984; Mitchell and Onvural 1996). The impacts of IT utilization on increasing market share and financial performance should be greater for a group of banks which are well-matched on IT level and market focus than those which are mismatched (see Figure 1). This leads into the first alternative hypothesis:

H1: The impacts of IT investments on increasing market share and profitability and reducing expenses are greater for well-matched banks (i.e., a group of high IT-based nationwide

banks and low IT-based regional banks) than for mismatched banks (i.e., high IT-based regional banks and low IT-based nationwide banks).

2.3 Impact of IT and Retail/Wholesale Strategy

In addition to aforementioned market focus strategy, another key management differentiation strategy in the banking industry is the target customers served; individuals versus corporations. The retail banking strategy focuses on individuals, small and medium companies as its target customers; where as, a wholesale banking strategy focuses mainly on large corporations. Thus retail banks need to provide a larger product mix of financial services to satisfy various groups of individuals. This product diversification may be a reason why retail banks need more IT support than wholesale banks (Dewan, Michael and Min, 1998).

Another distinction between retail and wholesale banks is that retail banks have a large number of transactions which involve smaller financial amounts compared to those of wholesale banks. These many small transactions cause an increased cost of operation for retail banks. For retail banks, advances in IT such as CD/ATM and Internet banking tools make it possible to produce variety of financial products and deliver them in a timely and convenient manner to their customers (Channon, 1998). Costs of developing and delivering these financial products and services are reduced by IT utilization. Ceteris paribus, the impact of IT on reducing cost of developing and delivering financial products is greater for banks with a large product mix. This is a good example of the economy of scope (product mix) effect in utilizing IT. The economy of scope is defined as: $C(S1, S2) < C(S1, 0) + C(0, S2)$. The $C(S1, 0)$ and $C(0, S2)$ are cost functions for two financial products (S1 and S2), produced separately, and $C(S1, S2)$ is a joint cost function for two products produced at the same time using same IT. That is, the economy of scope effect in using IT is that the more IT used in producing financial products, the less average cost per financial services produced.

Prior studies have also suggested that the use of IT may create an economy of scope (Gilligan, Smirlock and Marshall, 1984; Mitchell and Onvural, 1996). If economy of scope effect is realized in the banking industry, retail-oriented banks should have greater impacts of IT investment because they provide a larger product mix. Economy of scope is one of the main interaction effects. Since the average cost of financial services produced is affected so is the bank's profitability. To identify the economy of scope effects from IT investments, this study investigates the interaction effect between IT

level and banking strategy (i.e., retail versus wholesale) on firm's performance. If the use of IT produces economy of scope effects, then the economic impact of IT investment should be greater for retail banks than wholesale banks. This leads into the second alternative hypothesis:

H2: The impacts of IT investments on increasing market share and profitability and reducing expenses are greater for retail banks than for wholesale banks.

In sum, the hypotheses in this study test the interaction effects between IT level and bank's management strategies using three different groups of business performance measures (i.e., market share, cost and profit measures). The first hypothesis tests whether there is any existing economy of scale (size) effect from IT investments. To do this, this study tests whether the relationships between IT levels and market focus strategies (i.e., size of market: nationwide vs regional) have significantly different impacts on the three business performance measures. The second hypothesis tests whether retail banks realize economy of scope (product mix) effects from IT investments. To test this hypothesis, this study analyzes whether the relationships between IT investment levels and banking strategies (i.e., retail vs wholesale) have

significantly different impacts on the three business performance measures.

III. Research Design

3.1 Regression Model for Hypothesis 1

The first hypothesis tests for economy of scale effects from IT investments. It is expected that IT investments have greater impact on market share and financial performance for banks well-matched on IT level and market focus strategy than for mismatched banks. The equation is:

$$DV_{it} = \alpha_0 + \alpha_1 INTSPR_{it} + \alpha_2 EQTR_{it}$$
$$+ \alpha_3 TA_{it} (\text{or } NOSTR_{it}) + \alpha_4 ITINV_{it}$$
$$+ \alpha_5 MGDIT_{it} + \varepsilon_{it} \quad \cdots\cdots\cdots\cdots\cdots (1)$$

Notation of DV_{it} represents dependent variables of firm i at the end of fiscal year t. They are: market share of deposits ($MSDP_{it}$), market share of loans ($MSLN_{it}$); administrative expenses ($ADMEX_{it}$), payroll expenses ($PAYEX_{it}$), operating expenses ($OPREX_{it}$); operating income as a profitability measure ($OPINC_{it}$). Four measures of dependent variables on costs of operation and profitability (i.e., $ADMEX_{it}$, $PAYEX_{it}$, $OPREX_{it}$, $OPINC_{it}$) are deflated by the number of

branches owned by each bank.

The $INTSPR$, $EQTR$, TA and $NOSTR$ are control variables. $INTSPR_{it}$ denotes interest spread between loan and deposit (i.e., margin). $EQTR_{it}$ represents the equity ratio using BIS (Bank for International Settlements) standards. $NOSTR_{it}$ denotes number of stores (i.e., branches) each bank operates. TA_{it} and $ITINV_{it}$ are respectively total assets and IT investments of firm i at the end of fiscal year t and these two independent variables are deflated by a proxy for firm-size (number of branches owned by each bank).[4] $MGDIT_{it}$ represents the interactive dummy variable between $ITINV_{it}$ and a matched group dummy (MGD) for the matched pair between IT level and market focus. The MGD is an indicator variable where a group of high IT-based nationwide banks and low IT-based regional banks (i.e., well-matched group in Figure 1) equal 1 and a group of high IT-based regional banks and low IT-based nationwide banks (i.e., mismatched group in Figure 1) equal 0. Therefore, the regression model (1) is run six times using six different DVs and each regression model uses a different set of control variables depending upon DV used in the model. For example, the model with DV of market shares measure uses $INTSPR$,

$EQTR$, $NOSTR$ variables as independent variables (IVs). On the other hand, the model using DV of cost measures uses a TA variable as a control variable. For more details of variables used in the regression model, see Table 2.

The α_0 is an intercept term and α_1 through α_5 are regression coefficients on indicated variables. The ε_{it} is a stochastic disturbance term. The expected sign of α_1 for the model using DV of market share measures should be negative since the market share is increased at the lower $INTSPR_{it}$. The sign of α_1 for the model using operating income measure could be either negative or positive depending upon how much the market share is increased by the lower $INTSPR_{it}$. The impact of the equity ratio on market share and profitability should be positive and thus the sign of α_2 is also positive because the equity ratio of each bank ($EQTR_{it}$) is used as one of safety measures by BIS (Bank for International Settlements). The expected sign of α_3 should be positive and statistically significant since the size of market share, expenses and operating income are positively affected by number of branches or total assets employed.

The key components of the regression

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4) The number of branches is used as a deflator because the Korean banking industry spent a large portion of IT investments installing CD/ATM into branches they operate.

model (1) are α_4, the estimated coefficient of IT investments, and α_5, the estimated coefficient of the interactive dummy variable between $ITINV_{it}$ and a matched group dummy *(MGD)*. These coefficients provide evidence as to whether a well-matched group has greater impact on increasing market share and financial performance (i.e., reducing cost of operation and increasing operating income). Therefore, the α_4 and α_5 provide evidence regarding economy of scale effects from IT investments.

3.2 Regression Model for Hypothesis 2

The second hypothesis tests any existing economy of scope effects from IT investments. The expectation is that the impact of IT investments on financial performance will be significantly different depending on the varieties of financial services they provide to their customers (i.e., management strategies-retail versus wholesale). Retail banks may benefit more from IT investments since they provide a larger mix of financial products to their customers than do wholesale banks. The equation is:

$$DV_{it} = \beta_0 + \beta_1 INTSPR_{it} + \beta_2 EQTR_{it}$$
$$+ \beta_3 TA_{it} (or\ NOSTR_{it})$$
$$+ \beta_4 ITINV_{it} + \beta_5 BSDIT_{it} + \varepsilon_{it} \cdots (2)$$

All variables (i.e., $DVs--MSDP_{it}$, $MSLN_{it}$, $ADMEX_{it}$, $PAYEX_{it}$, $OPREX_{it}$, $OPINC_{it}$; $IVs-- INTSPR_{it}$, $EQTR_{it}$, TA_{it} or $NOSTR_{it}$) other than $BSDIT_{it}$ are the same as explained in the model (1) above. The $BSDIT_{it}$ represents the interactive dummy variable between $ITINV_{it}$ and banking strategy group dummy *(BSD)*. The *BSD* is an indicator variable where retail-oriented banks equal 1 and wholesale-oriented banks equal 0. Thus, the regression model (2) is also run six times in the same manner as explained in the model (1).

The meaning and expected sign of coefficients for the control variables (i.e., β_1 - β_3) should be the same as the sign of α_1 through α_3 because the model (2) uses the same *DVs* and *IVs* except for the interactive dummy variables (i.e., $MGDIT_{it}$). The β_4 is the estimated coefficient of IT investments and the β_5 is the estimated coefficient of the interactive dummy variable between $ITINV_{it}$ and strategic group indicator *(BSD)*. These coefficients provide evidence on whether retail banks have greater economic impacts of IT investments.

3.3 The Sample Data and Measure of Variables

This study uses the panel data for 24 com-

mercial banks (out of 25 banks) for a nine year period (1990-1998).[5] Note that each bank has a same fiscal year-end. The six performance measures of three groups (i.e., market share, cost of operation, and profitability) are used as dependent variables (DVs) in this study. Market share of deposits ($MSDP_{it}$) is calculated by the deposits of each bank divided by the total deposits of commercial banking industry at the end of fiscal year t. Market share of loans ($MSLN_{it}$) is calculated in the same manner as $MSDP_{it}$. Administrative expense ($ADMEX_{it}$) is calculated by combining payroll expense ($PAYEX_{it}$) and operating expense ($OPREX_{it}$) at the end of each fiscal year for each firm. These three variables are divided by the number of branches (i.e., stores), a proxy for firm-size. Operating income as a profitability measure ($OPINC_{it}$) is also deflated by the number of branches. These data are taken from the financial statements at the end of fiscal year t.

Data for the independent variables (IVs) are collected from three different sources. Total assets (TA_{it}) are collected from the financial statements of each firm in the banking industry and are deflated by the number of branches owned by each firm. The interest spread called margin ($INTSPR_{it}$) number of stores ($NOSTR_{it}$) and the equity ratio ($EQTR_{it}$) are collected from the "Business Statistics in Korean Banking Industry" published every year by the Bank of Korea. The key independent variable in this study, IT investments ($ITINV_{it}$), and other IT-related measures are collected directly from every commercial bank in Korea by authors because some of those figures were not publicly available.

IT Level: There are several ways to measure IT level of banks. Prior studies (e.g., Peffers and Tuunainen, 2001; Banker and Kauffman, 1991; Alpar and Kim, 1990) use IT investments, the number of CD/ATMs, the ratio of IT expense to total expense, the number of IT employees, the number of computerized bank functions, IT capital, or the number of IT-based banking services. Like the previous studies, this study uses IT investments because this variable has the highest correlation among the number of IT employees, the amount of IT capital, the number of CD/ATMs, the

5) As mentioned before, domestic commercial banking industry consisted of 25 banks (15 nationwide and 10 regional banks) in 1990's. But five banks were liquidated and several bank were merged after the foreign currency crisis in 1997. In the year of 2006, 9 commercial banks (6 nationwide and 3 regional banks) are left. If the sample year is expanded to the current year such as 2006, financial figures of the domestic banks' operational and market performances could be severely twisted due to merge and acquisition (M&A) in banking industry. Then validity of the study might be lowered heavily. Hence given the purpose of this study regarding the fitness of IT with banking strategies for improving management performance, a data set between 1990 and 1998 were adopted.

number of fully IT-based stores serving 24 hours and whole year around, IT investments, and a composite index using a rank of those variables. And furthermore, when a firm invests in IT, it is natural that IT employees such as system developers, integrators, maintainers become increased and also IT capitals such as fixed and/or variable assets are being accumulated. For example, in recent past years many IT investments of the domestic banking industry were heavily concentrated in CD/ATMs. Hence, there will be causal relationships between IT investment and those variables.

The Pearson correlations of IT investments with other variables range from 0.67 (with number of IT employees) to 0.97 (with amount of IT capital expenditures) and all of those coefficients are statistically significant at 1% level. Thus, this study uses IT investments as an independent variable as well as a classification measure for high and low IT level. IT level is calculated by a bank's IT investments per branch for the sample year 1990-1998. The classification between a high IT level bank and a low IT level bank is made by the level of IT investments among all domestic commercial banks. A high IT level is assigned to firms exceeding the mean

of all banks' IT investments per branch and a low IT level for others.

Market Focus: This study defines market focus as the extent to which firms geographically sell their products and/or services and thus it can be differentiated by local and nationwide market. Domestic commercial banks can be divided by two distinct groups: nationwide banks (i.e., large banks) versus regional banks (i.e., small banks) by their company names. That is, some banks have branches in all areas of the nation and provide nationwide banking services. Other banks have branches in different areas but concentrate on providing banking services in a specific provincial market only. The combination between market focus (i.e., nationwide versus regional banks) and level of IT (i.e., high versus low) provides the 2 x 2 matrix of Figure 1, which is similar to 'IT/Geographic Scope Matrix (IGSM)' used by Peffers and Tuunainen (2001). An indicator variable for matched group between IT level and market focus is assigned using Figure 1. That is, matched group dummy (*MGD*) between IT level and market focus is assigned to 1 for well-matched banks and 0 for mismatched banks.[6] Thus, an interactive

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6) Out of 24 commercial banks (15 nationwide and 9 regional), Eleven sample firms are classified into the well-matched group. They consist of 7 high IT-based nationwide banks (N-1, 2, 5, 8, 11, 13, 14) and 4 low IT-based regional banks (R-1, 3, 7, 8). Thirteen banks are classified into the mismatched group. They consist of 8 low IT-based nationwide banks (N-3, 4, 6, 7, 9, 10, 12, 15) and 5 high IT-based regional banks (R-2, 4, 5, 6, 9). The serial number is used to conceal the real name of banks.

dummy variable, $MGDIT_{it}$, is calculated by IT investments ($ITINV_{it}$) multiplied by an indicator variable for MGD 1 or 0.

Banking Strategy: The nationwide commercial banks in Korea used to be placed into two groups according to their major banking strategies for the sample year period: retail-oriented versus wholesale-oriented banks.[7] Retail banking is defined as banking strategy which focuses on financial needs of individuals and small companies. Therefore, we use the amount of loans made to individuals and small companies to distinguish between a retail and a wholesale bank. This data is taken from the "Business Statistics in Korean Banking Industry." If the amount of loans to individuals and small companies is above the mean value of total sample firms for the sample period, the firm is classified as a retail bank and otherwise it is classified as a wholesale bank. An indicator variable for banking strategy (BSD) is assigned to all nationwide banks, which is assigned to 1 for retail-oriented banks and 0 for wholesale-oriented banks. Thus, an interactive dummy variable, $BSDIT_{it}$, is calculated by IT investments ($ITINV_{it}$) multiplied by an indicator variable for BSD 1 or 0.[8]

IV. Empirical Analyses and Results

4.1 Differences on IT Investments and Business Performance by Group

The summary statistics of sample data are shown in Table 1.[9] Note that the amount of IT investments per branch is higher for retail banks than for wholesale banks. This indicates that IT support is needed more by the retail banks than the wholesale banks. While market shares of both deposits and loans are different between the two groups, no importance can be attributed to this difference because bank size cannot be controlled for in the T-test. One interesting result in this T-test is that the mean of payroll expenses ($PAYEX$) is lower for the

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7) The domestic regional banks are more likely focusing on financial needs of their local publics and companies rather than implementing either retail or wholesale strategy. Thus, this study uses only nationwide banks to test for second hypothesis. Another reason for using only nationwide banks in testing the second hypothesis is to control for the economy of scale (size) effect.

8) Out of 15 nationwide banks, 7 banks (N-1, 2, 3, 8, 11, 12, 14) are classified into retail-oriented and 8 banks (N-4, 5, 6, 7, 9, 10, 13, 15) are classified into wholesale-oriented.

9) Total firm-year observations should be 216 (i.e., 24 firms times 9 years); but 201 firm-year observations are used for analyses. Five banks were liquidated and several banks were merged in the year of 1998. IT investments for those liquidated banks are not available for some of year 1994-98 and financial data for three banks are not available for years of 1990-92 since they were not listed in the stock market for those years.

⟨Table 1⟩ Summary of Descriptive Statistics and T-Test (1990-1998 Pooled Data)

Variables	Means (Std Dev.) (N=201)	Matched Group Between IT level and Market Focus			Group by Banking Strategy		
		High IT National & Low IT Regional (Well-Matched Banks) (N=101)	High IT Regional & Low IT National (Mismatched Banks) (N=100)	T-Test (t-value)	Retail (N=57)	Wholesale (N=64)	T-Test (t-value)
ITINV	96.9 (62.8)	100.7	93.1	0.86	125.3	99.4	2.04**
MSDP	4.34 (4.1)	3.27	5.41	-3.81***	6.31	6.04	0.34
MSLN	4.32 (4.0)	3.31	5.34	-3.63***	6.86	5.55	1.64*
ADMEX	825 (219)	823	826	-0.11	936	937	-0.04
PAYEX	424 (103)	409	439	-2.06**	460	474	-0.76
OPREX	401 (129)	414	387	1.45*	476	463	0.61
OPINC	490 (890)	588	391	1.6*	711	577	0.80

1) Variable names are in the body of the paper. Std Dev. = Standard Deviation. N = the number of sample observations.
2) MSDP and MSLN = percent (%) per branch. All other variables represent data per branch since they are deflated by the numbers of branch as a proxy for firm-size. The monetary unit for all other variables is millions in Korean Won. Only nationwide banks are used for grouping by banking strategy.

group of high IT-based nationwide banks and low IT-based regional banks (i.e., well-matched group) than for the other group (i.e., mismatched group). But the mean of operating expenses (*OPREX*) is opposite. That is, mean of *OPREX* is higher for the well-matched group than for the mismatched group. This may indicate that the cost structure is changed due to the strategic use of IT. Operating (fixed) expenses are being substituted for payroll (variable) expenses by the IT investments.

The results of t-statistics show whether the means are significantly different, but it does not control for effects of other variables. Thus, it is not possible to determine whether the strategic use of IT causes greater operating expenses or whether the greater expenses are due to uncontrolled factors.[10] Therefore, a regression analysis is used to examine the interaction effect between IT investments and management strategies on firm's financial performance. Before hypothesis testing, Anderson-Darling normality tests were run on each independent variable. The results show that no independent variable violates normality (INTSPR, p=0.071; EQTR, p=0.140, TA, p=0.122, NOSTR, p=0.074; ITINV, p=0.150). And multicollinearity tests were also run across the predictor variables. Generally not to be violated in multicol-

linearity, recommendations are that correlation should not be over 0.85 and VIF (Variance Inflation Factor) must not be over 10(Nunnally and Bernstein, 1994). The results show that there is no violation of multicollinearity among variables with the maximum correlation of 0.412, VIF of 1.942, which met the suggested points.

4.2 Impact of IT and Market Focus on Financial Performance

The results of the regression testing the first hypothesis are shown in Table 2. The regression using equation (1) is run six times using three categories of different dependent variables (*DVs*): i) measures of market share; market share of deposits ($MSDP_{it}$), market share of loans ($MSLN_{it}$), ii) costs of operation; administrative expenses ($ADMEX_{it}$), payroll expenses ($PAYEX_{it}$), operating expenses ($OPREX_{it}$), and iii) a measure of profitability; operating income ($OPINC_{it}$). These *DVs* are used to determine the condition under which the strategic use of IT has a positive impact on business performance. After each run of regression analysis, Anderson-Darling normality test of the residuals were conducted. The results show that no residual violates normality with the minimum signi-

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10) The results of Mann-Whitney U statistics, a non-parametric test, were very similar to those of the t-statistics.

⟨Table 2⟩ Business Performance of IT Investment and Market Focus

⟨Regression Coefficients of Model (1)⟩

$$DV_{it} = a_0 + a_1 INTSPR_{it} + a_2 EQTR_{it} + a_3 TA_{it}(or\ NOSTR_{it}) + a_4 ITINV_{it} + a_5 MGDIT_{it} + \epsilon_{it} \quad \cdots (1)$$

Dependent Variables(DV)	a_1	a_2	a_3 (TA)	a_3 (NOSTR)	a_4	a_5	Adj-R^2 (F-value)
MSDP	-0.079 (-2.81) ***	0.034 (1.10)	—	0.950 (31.4) ***	-0.153 (-4.16) ***	0.139 (3.73)***	0.862 (251.3)***
MSLN	-0.136 (-3.80) ***	0.049 (1.27) *	—	0.895 (23.5) ***	-0.126 (-2.73) ***	0.138 (2.97) ***	0.781 (143.8)***
ADMEX	—	—	0.742 (15.4) ***	—	0.096 (1.54) *	0.006 (0.09)	0.616 (108.2)***
PAYEX	—	—	0.680 (11.8) ***	—	0.082 (1.09)	-0.153 (-2.13) **	0.447 (54.9)***
OPREX	—	—	0.719 (16.2) ***	—	0.098 (1.71) **	0.132 (2.39) ***	0.674 (138.8)***
OPINC	-0.256 (-3.82) ***	0.502 (7.27) ***	0.190 (2.52) ***	—	0.111 (1.31) *	0.054 (0.64)	0.276 (16.3)***

1) Variable names are in the body of the paper. The coefficients are standardized beta values and T-values are in parenthesis.
2) ***, **, * mean significant at the 1%, 5%, 10% level (one-tail test), respectively and 201 observations are used in statistical analyses.
3) The regression models use a different set of control variables depending on DVs used in the model and thus the empty column indicates that the independent variable(s) is not used for the regression.

ficance of 0.139(the model using MSDP as a DV) and the maximum of 0.619(the model using MSLN as a DV). Hence the detailed analysis were followed.[11]

4.2.1 Impact of IT on Market Share

The interpretation of the result is as follows. In case that IT level is fitted with market focus, MGDIT becomes "1", otherwise "0". When the IT level is not fitted, the coefficient of ITINV (α_4), in which an indicator variable is assigned to 0, is applied. That is, the estimated coefficient of α_4 is used to determine how the strategic use of IT by the mismatched group impacts on dependent variables used in equations. The coefficient of MGDIT(α_5) indicates whether the effects of IT utilization between two groups are different. The sign and magnitude of estimated coefficient (α_5) of $MGDIT_{it}$ indicate that the effect of IT utilization for the group in which an indicator variable is assigned to 1 is different or not. A combined coefficient of both $ITINV_{it}$ and $MGDIT_{it}$, α_4 plus α_5, explains how the strategic use of IT by the well-matched group impacts on

dependent variables (Studenmund and Cassidy, 1987, pp. 158-161). Hence, the result of hypothesis testing depends on the coefficient of MGDIT. In other words, if the estimated coefficient of the dummy variable is positive and statistically significant, the hypothesis can be determined as supported.

The results of the regression using market shares of deposits ($MSDP_{it}$) and loans ($MSLN_{it}$) are shown in first two rows of Table 2. Note that both signs of the estimated coefficient (α_1) are negative(t-values = -0.079 & -0.136) and statistically significant, indicating that the lower interest spread ($INTSPR_{it}$) contributes more to increasing market shares of deposits and loans. The equity ratio, a safety measure in banking industry, somewhat contributes to increased firm's market share as expected. The signs of the estimated coefficient (α_2) on the equity ratio ($EQTR_{it}$) are positive (t-values = 0.034 & 0.049) and marginally significant. The numbers of stores are also positively associated with firm's market share of deposits and loans as expected. The estimated coefficients of α_3 are positive (t-values = 0.95 & 0.895) and statistically

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11) Any statistical implication from OLS can be drawn only if the basic assumptions for OLS are met. Several tests are also conducted to ensure that our analysis did not violate basic assumptions. The value of studentized residuals was checked to see if there were any influential outliers. All observations are found to be in the acceptable range with the absolute value of studentized residuals smaller than three. The Belsley's condition indices indicated that multi-collinearity was not a problem (Belsley et al. 1980). White's (1980) test also indicated that the assumption of homoscedastic residuals was not seriously violated.

significant.

As mentioned above, key components of regression equation (1) are α_4 and α_5, the estimated coefficients of variables $ITINV_{it}$ and $MGDIT_{it}$. The estimated coefficient of α_4 is used to determine how the strategic use of IT by the mismatched group (i.e., a group of 'low IT-based nationwide banks and high IT-based regional banks' in which an indicator variable equals 0) impacts on dependent variables used in equation (1). The sign and magnitude of estimated coefficient (α_5) of $MGDIT_{it}$ indicates whether the effect of IT utilization between two groups is different. That is, the estimated coefficient of $MGDIT_{it}$ (α_5) is a net effect of IT investments on the dependent variable for the group in which an indicator variable is assigned to 1, in this case 'well-matched group' (Studenmund and Cassidy, 1987).

The estimated coefficient of α_5 is positive (t-values = 0.139 & 0.138) and statistically significant, indicating that the impact of IT investments on increasing market shares for the well-matched group is significantly greater than that of the mismatched group. The estimated coefficient of α_4 is statistically significant, however they are negative (t-values = -0.153 & -0.126). This shows that increase of market share by well-matched group is gained by a loss of market share by the mismatched group.

4.2.2 Impact of IT on Costs of Operation.

The second category of dependent variables in regression equation (1) includes measures for costs of operation: • administrative expenses ($ADMEX_{it}$), • payroll expenses ($PAYEX_{it}$), • operating expenses ($OPREX_{it}$). These variables are used to determine how the strategic fit of IT affects the cost structure of operations. The sign of the estimated coefficient on total asset (α_3) in Table (2) is positive(t-values = 0.742, 0.68 & 0.719) and statistically significant for all three expense measures ($ADMEX_{it}$, $PAYEX_{it}$, and $OPREX_{it}$). This implies that banks operating with more financial assets spend more money on payroll and operating activities.

As explained before, key components of equation (1) are α_4 and α_5, the estimated coefficients of variables $ITINV_{it}$ and $MGDIT_{it}$. As shown in Table 2 the estimated coefficient of $MGDIT_{it}$ (α_5) is negative(t-value = -0.153) and statistically significant when payroll expense variable ($PAYEX_{it}$) is used as a DV. On the other hand, the estimated coefficient (α_5) is significantly positive (t-value = 0.132) when operating expense variable ($OPREX_{it}$) is used as a DV. This indicates that the effect of IT investments on decreasing payroll expense for the well-matched group is significantly greater than

that of other banks. However, IT investments for well-matched group increase more operating expenses than those for mismatched group. One possible explanation is that IT utilization changes the firms' cost structure, partially substituting operating (fixed) expenses for payroll (variable) expenses. This finding is similar to that observed by prior studies (e.g., Thatcher and Oliver, 2001; Alpar and Kim, 1990).

4.2.3 Impact of IT on Profitability.

The third category of dependent variable in regression equation (1) includes a measure of profitability: operating income ($OPINC_{it}$). The result of the regression using operating income ($OPINC_{it}$) as a DV is shown in the last row of Table 2. Note that sign of the estimated coefficient (α_1) is negative (t-value = -0.256) and statistically significant. This result may indicate that the lower interest spread contributes more to increasing market shares and thus profitability, although we are not certain whether this is the case in the banking industry or whether the regression model is misspecified.[12] However this is not a main focus of this research. This variable is included in the

model as a control variable. The equity ratio and the total assets are positively associated with firm's profit, as expected. The signs of both estimated coefficients on the equity ratio ($EQTR_{it}$) and the total assets (TA_{it}) are positive(t-values are 0.502 for EQTR and 0.19 for TA) and statistically significant.

Key components of regression equation (1) are α_4 and α_5, the estimated coefficients of variables $ITINV_{it}$ and $MGDIT_{it}$.. The estimated coefficients of both α_4 and α_5 are positive but only α_4(coefficient for the mismatched group) is marginally significant (t-value = 0.111, significant at 10% level), a result not expected. The expectation was that the estimated coefficient of α_5 would be statistically significant fully supporting the hypothesis. To test for possible misspecification of equation (1), several other variables were included such as bad loans. But the results were the same. One possible explanation is a general declining profit in domestic banking industry during four years of sample period (1995 through 1998). The combined coefficient of α_4 and α_5, a measure to determine impact of IT for a group in which an indicator variable equals 1 (i.e., well-matched banks), is 0.16 and its recalculated t-value is 2.27 which is signi-

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12) To test for possible misspecification of equation (1), this study detailed several other variables such as bad loans in equation (1). But the results are the same, indicating that the lower interest spread may contribute more to increasing market shares and thus profitability.

ficant at 1% level. The estimated coefficients of α_4, α_5 and combined coefficients (α_4 plus α_5) indicate that the use of IT increases a firm's profitability.[13]

4.3 Impact of IT and Banking Strategy on Market Share, Cost, and Profit

The second hypothesis tests for economy of scope effects from IT investments. That is, IT investments for retail banks (i.e., banks that provide a larger product mix to their customers than wholesale banks) are expected to contribute more to market share and financial performance. The results of testing the second hypothesis are shown in Table 3. The regression equation (2) uses the same dependent and independent variables with equation (1) except for substituting $BSDIT_{it}$ (an interactive dummy variable for $ITINV_{it}$ and BSD - a group indicator for retail versus wholesale banks) for $MGDIT_{it}$. Note that the sign and statistical significance of the estimated coefficients on control variables $INTSPR_{it}$, $EQTR_{it}$, TA_{it} or $NOSTR_{it}$ (i.e., β_1, β_2, and β_3) are similar to the ones on those variables (i.e., α_1, α_2 and α_3) in equation (1), respectively. Therefore the statistical meanings of these coef-

ficients are the same as explained in section 4.2.

The estimated coefficients for variables $ITINV_{it}$ and $BSDIT_{it}$, β_4 and β_5, test for impacts of IT on financial performance for retail versus wholesale banks. The estimated coefficient of β_4 is used to determine how the use of IT by wholesale banks impact on market share, costs of operation, and profitability. The sign and magnitude of estimated coefficient (β_5) of $BSDIT_{it}$ indicate whether the impact of IT utilization between retail and wholesale banks is different. After each run of regression analysis, Anderson-Darling normality test of the residuals were conducted. The results show that no residual violates normality with the minimum significance of 0.096(for the model using MSDP as a DV) and the maximum of 0.612(ADMEX model). Hence the detailed analysis were followed.[14]

As shown in Table 3 the estimated coefficients of β_5 to dependent variables on market share ($MSDP_{it}$ and $MSLN_{it}$) are positive(t-values = 0.099 & 0.241) and statistically significant, indicating that the impact of IT investments on increasing market shares for retail banks is significantly greater than that of wholesale banks.

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13) For a discussion of more detail statistical procedures, see Studenmund and Cassidy (1987).
14) The Belsley's condition indices indicated that multi-collinearity was not a problem (Belsley et al. 1980). White's (1980) test also indicated that the assumption of homoscedastic residuals was not seriously violated.

⟨Table 3⟩ Business Performance of IT Investment and Banking Strategy

⟨Regression Coefficients of Model (2)⟩

$$DV_{it} = \beta_0 + \beta_1 INTSPR_{it} + \beta_2 EQTR_{it} + \beta_3 TA_{it}(or\ NOSTR_{it}) + \beta_4 ITINV_{it} + \beta_5 BSDIT_{it} + \varepsilon_{it} \cdots (2)$$

Dependent Variables(DV)	β_1	β_2	β_3 (TA)	β_3 (NOSTR)	β_4	β_5	Adj-R^2 (F-value)
MSDP	-0.052 (-1.28) *	0.065 (1.51) *	–	0.921 (21.4) ***	-0.146 (-3.09) ***	0.099 (2.14) **	0.818 (108.9) ***
MSLN	-0.132 (-2.65) ***	0.108 (2.03) **	–	0.884 (16.8) ***	-0.198 (-3.44) ***	0.241 (4.25) ***	0.728 (65.3) ***
ADMEX	–	–	0.628 (8.54) ***	–	-0.002 (-0.03)	0.229 (2.81) ***	0.435 (31.8) ***
PAYEX	–	–	0.536 (6.34) ***	–	-0.131 (-1.33) *	0.182 (1.94) **	0.253 (14.5) ***
OPREX	–	–	0.611 (8.86) ***	–	0.111 (1.38) *	0.235 (3.07) ***	0.502 (41.3) ***
OPINC	-0.239 (-3.24) ***	0.574 (7.52) ***	0.164 (2.08) **	–	-0.068 (-0.72)	0.146 (1.67) **	0.378 (15.6) ***

1) The meanings of notations are the same as explained in the Table 2 and only nationwide banks (121 observations) are used in statistical analyses for the model (2).

The estimated coefficients of α_4 to market share variables are statistically significant, however they are negative(t-values = -0.146 & -0.198). This shows that increase of market share by the retail banks is gained from loss of retail market share by the wholesale banks.

The estimated coefficients of β_5 to dependent variables on costs of operation ($ADMEX_{it}$, $PAYEX_{it}$ and $OPREX_{it}$) are positive(t-values = 0.229, 0.182 & 0.235) and statistically significant. These indicate that IT does not appear to reduce expense items such as payroll or operating expenses for retail banks. This is not expected. Several additional statistical analyses are used to test for possible misspecification of equation (2). The results are basically the same. These analyses however indicate that administrative expenses ($ADMEX$) are increasing every year but payroll expenses ($PAYEX$) are decreasing every year after year 1995. Also the average increasing rate of payroll expenses (22%) is lower than the average increasing rate of operating expenses (33%) in the four years of sample period (1995 through 1998). In addition, IT investments by retail banks are negatively associated with a ratio of payroll expenses to total administrative expenses and positively associated with a ratio of operating expenses to total administrative expenses. This may indicate that IT utilization does not decrease firm's expenses but changes the firms' cost structure, partially substituting operating (fixed) expenses for payroll (variable) expenses. This increases operating leverage.

The estimated coefficient of β_5 to the dependent variable on operating income ($OPINC_{it}$) is positive(t-value = 0.146) and statistically significant, implying that the impact of IT investments on increasing operating income for retail banks is significantly greater than that of wholesale banks. Overall, the results shown in Table 3 demonstrate that the strategic use of IT does not help to reduce payroll expenses or total expenses but rather increases market share and profitability for retail-oriented banks. These results partially support the hypothesis two. However, the greater economic benefits of IT investments by retail banks can be the combined effects of both market focus and banking strategy. To make a strong statistical implication on interaction effects on IT level and banking strategy (i.e., economy of scope effect), market focus factors must be controlled before testing for the scope effect. Although this study uses a homogenous group as sample firms (i.e., nationwide banks only) to control for the effect of market focus, this may not be sufficient to control for possible confounding effect. The cost and profitability data by products should be

available to test for pure economy of scope effects. Therefore, the results of the second hypothesis must be interpreted subject to this limitation.

Ⅴ. Summary and Conclusion

The principal objective of this study is to provide empirical evidence on how IT investment planning and utilization can be matched to management strategy for increasing a bank's operating and financial performance. The panel data is for 24 domestic commercial banks (out of 25) for a nine year period (1990-1998). Examined are impacts of different levels of IT investment on market share, payroll and operating expenses, and profitability under different market focus (nationwide versus regional) and banking strategy (retail versus wholesale). Economy of scale (size) effect is tested with the nationwide/regional focus; whereas, economy of scope (product mix) effect is examined using the retail/ wholesale strategy.

First, the findings reveal that IT investments significantly reduce payroll expenses if IT levels and market focus are well-matched; i.e., high IT-based nationwide banks and low IT-based regional banks as compared to those that are mismatched. On the other hand, operating expenses or total expenses are not reduced, confirming results of Thatcher and Oliver (2001) and Alpar and Kim (1990). Second, market share and profitability are significantly increased for the well-matched banks compared to those that are mismatched, supporting the Peffers and Tuunainen study. This evidence suggests that the strategic use of IT creates economy of scale effects when properly fitted to a market focus. Finally, there appears to be economy of scope benefits. Increased IT investments by retail banks have a greater impact on increasing market share and profitability than those of wholesale banks. The results of this study suggest that the economic benefits of IT investments do not automatically accrue. Rather, the IT planning and implementation must be an integral part of not only banking strategy (i.e., retail versus wholesale financial services), but also market focus (nationwide versus regional).

There are at least two additional important strategic implications. First, banks can effectively use IT to change the firm's cost structure; possibly substituting operating expenses (fixed) for payroll (variable) expenses. Which expense item (fixed or variable) is more important to improve a firm's competitive advantage may vary among firms since cost-volume-profit relationships can be changed due to the use of IT. Management must be willing to accept the positive and possible negative consequences of this changed

cost structure (i.e., operating leverage) on business performance under changing economic conditions. Second, since there appears to be both economy of scale (size) and scope (financial products or services mix) impacts on market share and profitability, bank managers can advantageously use IT as an important component of their operational strategy. Banks need to invest in IT prior to promoting mega-banking and/or retail banking strategies as a means of improving competitive advantage and financial performance.

Possible limitations of this study include the selection of dependent variables. Market share in terms of deposits and loans, expense items, and operating income are used as the dependent variables. These measures of operating and financial performance could be affected by additional factors not included in the regression models, creating a missing variable problem. Future studies could use revenue figures created directly from the use of identifiable IT equipments and systems (e.g., commissions paid by on-line banking users) to test the association between financial performance and particular IT investments. Additionally, activity based cost systems (ABC) would help to more precisely identify attributable IT costs to certain financial services. Such further refinements may give additional insight into the better alignment of IT levels with management strategy, market focus, and product line

profitability. This of course requires the ability to gain such information directly from sample firms. Such data is not publicly available.

Another possible limitation is the selection of the variables used to classify levels of IT and banking strategy. This study uses IT investment per branch as a classification measure of IT level. Other variables or combinations of variables might be used such as the number of IT personnel, CD/ATMs, workstations, computer equipment, computerized services, and hours of computer use. However, it is not apparent that findings would be significantly different for these other measures. IT investment is used in this study since it has the highest inter-correlations with other IT related variables.

In terms of productivity paradox, the issues involved are boiled down to two major debates. First, correlations reflecting relationships between IT investment and productivity do not necessarily imply causation, particularly if the correlations are based on financial data only. Brynjolffson and Hitt (1998) argued that while the average returns to IT investment are solidly positive, there are huge variations across organizations. Some have spent vast sums on IT with little benefit, while others have spent similar amounts with tremendous success. To maximize the benefits of IT investment, they recommend the complementary invest-

ments such as reengineering, restructuring, redesign. In the same token, Mahmood and Mann(2000) recommend addition of human factor in the model. Hence, in that the core of this study is to verify if banks' performances increase when IT investments are fitted with strategy, not by IT investment itself, this study can be considered as one step-forward effort toward solving the issue of the productivity paradox.

Second is about time perspective in using cross-sectional data. Like many other studies, this study uses cross-sectional data set. So, a question in using those data could be raised from the premise that the benefits of IT investments can be realized only over longer period of time. However Mahmood and Mann(2000) argued that it is possible, indeed likely, that in many instances IT has the potential to provide important benefits within the same year the investment is made. Because of the above reason, Brynjolffson(1993) and Loveman(1994) asserted that study by time-lagged data might not be valid in its results. However, in any event, research reflecting relationships between IT investment and organizational productivity might be more convincing if it were based on IT investment in both current and earlier periods. Hence, a future study based on two of the data could be more valuable.

Despite of these limitations, the study

identifies key IT capabilities in the banking industry which can be key factors in improving business performance. Findings show that the relationships between levels of IT investment and business performance differ significantly depending upon market focus and banking strategy for the sample firms. These support results by Peffers and Tuunainen (2001). Also, the findings of Thatcher and Oliver (2001) and Alpar and Kim (1990) that operating expenses are not necessarily decreased although payroll expenses can be reduced through IT utilization are confirmed. Cost structure and operating leverage are changed by the investment in IT. Importantly, this study's results suggest that IT investment then should be an integral part of planning and implementing the bank's strategy.

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경영성과 증대를 위한 정보기술과 은행전략의 적합성

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요 약

본 연구는 은행의 정보기술 수준과 경영전략의 적합성이 시장점유율, 비용효율성 및 수익성으로 측정된 3가지 성과지표에 미치는 영향을 실증적으로 분석하였다. 회귀분석모형을 이용하여 (1) 목표시장(전국 대 지역)의 형태와 정보기술 수준의 적합성, (2) 정보기술 투자와 금융전략(소매 대 도매금융)의 상호작용이 3가지 성과지표에 미치는 영향을 검증하였다.

가설검증 결과를 요약하면 다음과 같다. 첫째 목표시장(전국 대 지역)의 형태와 정보기술 수준의 적합성이 높은 그룹은 정보기술 투자가 인건비를 절감하고 시장점유율과 수익성을 증대시키는 것으로 나타났다. 반면 운영비와 총비용은 절감하지 못하는 것으로 나타났다. 둘째 소매금융전략을 사용하는 그룹의 경우 도매금융전략을 사용하는 그룹에 비하여 정보기술 투자는 시장점유율과 수익성을 증대시키는 것으로 나타났다.

본 연구결과는 2가지 측면에서 전략적이고 실무적인 의미를 가진다. 첫째 만일 은행이 정보기술 투자수준과 목표시장 전략(전국 대 지역) 및 금융전략(소매 및 도매)의 조화를 이루면 인건비를 줄일 수 있을 뿐만 아니라 시장점유율과 수익성을 증대시킬 수 있다는 것이다. 둘째 정보기술 수준과 전략의 적합성을 증대시킴으로서 고정비 성격의 정보기술 투자비용은 다소 증대되지만 변동비 성격의 높은 인건비를 절감할 수 있는 것으로 나타났다. 이는 은행이 정보기술을 이용하여 비용구조를 개선할 수 있음을 의미한다. 정보기술 사용으로 인하여 비용구조가 바뀌면 원가-조업도-이익(CVP)의 관계가 바뀌기 때문에 은행의 경쟁력을 강화하기 위하여 고정비와 변동비 중 어떤 비용을 더 중시해야 하는가는 조직이 처한 경영 환경에 따라 달라질 수 있다.

주제어: 정보기술 투자, 소매 및 도매금융 전략, 목표시장 전략, 은행의 경영성과

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