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## Measuring the Impacts of Internet Banking to Bank Performance: Evidence from Vietnam

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### **Abstract**

Internet banking is an innovative service in the banking industry. However, researching about the impact of internet banking to bank's performance is rarely seen. In Vietnam, no research has been found recently by researchers. The main objective of this study is to evaluate the impact of internet banking to performance (profitability ratios, noninterest operating expenses and incomes) of

banks in Vietnam in the period from 2009-2014. The study uses random effect model (REM) and fixed effect model (FEM) to estimate the relationships between Internet indicators and bank's performance. The results from the regression model showed that internet banking had an impact on bank profitability through an increase of income from service activities. However, the impact level was low and had a lag time of over 3 years, which is longer than findings from previous studies.

**Keywords: Internet banking; Commercial bank; Performance ratios; Service channel**

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## **INTRODUCTION**

The competition is fierce in the economy and particularly in banking sector. Banks will fully exploit all factors available to help banks gain market share and retain customers, which become increasingly hard in the digital age. Consumer is shifting from tradition channels to digital ones and the multichannel model now is the popular trend in the banking industry. As the earliest-adopted digital channel, Internet banking is currently the feature can be expected to find at a commercial bank. Since it was implemented, customers were able to do their banking with the speed, convenience and control more than ever. As a result, banks enhance customer satisfaction and increase their user loyalty—the ultimate goals of all banks in current situation. On the other side, Internet banking is a service with great potential. It would become a decent source of profits for banks; reduce bank's operating expenses so ultimately enhance bank performance. To date, Internet banking is not just an element to compete for market share but becomes an essential service to provide, if not banks would face the chance of losing their market share or bad effects to their brand.

There are good reasons to expect that Internet banking will spread expeditiously and have a great impact on banks performance. However, it seems not to be the case in Vietnam. Though available in since 2004, the scale of Internet banking is relatively small. Till 2014, total users of this service have only reached 6 million, equivalent 17% of total Internet users which is even lower than the average of Asia-Pacific. Therefore, commercial banks are facing the risk of not meeting customer's expectations especially when e-commerce is gradually developing which caused the rising need of online payment mechanisms. According to estimates, total value of online shopping increases more than 57 million dollars annually. This is an opportunity for both e-commerce enterprises and financial service provider. In fact, according to Vietnam ICT Index 2014 report, 13/25 surveyed commercial banks reported a ratio of digital transaction (through

Internet banking, mobile banking) value less than 2% while these channels have been offered before 2004. The data suggests that banks have not valued properly or had an effective strategy to exploit the huge potential of these channels, especially the Internet banking platform. In order to shed a light on that problem, the question of how internet banking affects banks' performance in Vietnam needs to be addressed. However, to date few empirical studies are available regarding the impact of Internet banking on the financial performance of commercial banks in Vietnam.

The purpose of this paper is to identify and estimate the impact of Internet banking from the commercial banks' perspective. To be specific, this study attempted to examine the impact on profit, operating cost, and profitability of the adoption of the Internet as a distribution channel. A sample of 20 banks, accounted for about a half of the total number of commercial banks, which is approximately 70% of total asset of Vietnam banking sector over the period 2009–2014 is used. From the regression results, the authors hope to provide practical recommendations for banks to improve and develop that delivery channel in an optimal way. The results suggest that Internet banking adoption affects the income and consequently the profitability of commercial banks in Vietnam. This impact is gradual and takes a time lag of three years to be statistically significant.

This article is divided in four parts. First, the introduction presents an overview of the article. The second part describes theoretical basis and methods of analysis. Part three provides results from regression analysis and discussion. The fourth part offers some conclusions and recommendations for commercial banks in Vietnam.

## **THEORETICAL BASIS AND METHODS**

### **Theoretical basis and analysis framework**

Internet banking is a service of electronic banking (E-banking). According to Comptroller's Handbook [1], it enables bank customers to access accounts and general information on bank products and services through the Internet. Besides existing channels such as ATM, PC banking, Home banking, the adoption of Internet banking adds another delivery channel and forms the multichannel model seen widely in banking industry nowadays. Internet banking holds huge potential as a convenient and efficient delivery which has not been provided before by banks. At its ultimate end, Internet banking may become a new business model totally different from the traditional one (Internet-only model – bank with no branch, all banking activities is performed online).

The applications of technology and Internet banking in particular have brought great changes to the banking industry. Agboola [2] emphasized that banks have

to invest in technology, modernize their systems to improve quality, efficiency and speed in delivering services; otherwise they may lose their positions in the competitive race with the rivals. Customer expectations are changing and shifting due to advances in technology. To satisfy those subtle needs, multichannel delivery model is applied and proven to be a success. Such a system employs a unified interface across all channels. Customer's preferences and activities are transferred across mediums and thus ensure functionality remains reliable regardless of the customer's preferred device. This forms and enhances customer's trust and loyalty to the banks which is increasingly important to Vietnamese banks in the integration trend. Besides from those indirect impacts, a modern service such as Internet banking can have direct impacts on banks' performance such as bank income, operating costs, and in turn bank profitability. First, considering the impact of Internet banking to bank's income, banks themselves have different opinions and there is no consensus on this issue. Some feel, in essence, Internet banking lowers their marginal profit. Providing Internet banking is only a measure to satisfy big customers who need to do their banking online [3]. Other banks argue that this channel increases noninterest income if banks provide services customers need through the Internet. DeYoung et al. [4] analyzed operations of more than 400 banks in United States and concluded that Internet banking increases bank's revenues from deposit service charges. Other researches in developing countries such as Iran and Kenya recently show that Internet banking increase bank's profit [5,6].

Banks expect the application of information and technology reduces operating expenses due to the decrease in the number of employees needed in bank's daily operations. Hernando and Nieto [7] found that operating expenses increase after the adoption of Internet banking, then it gradually decrease over time and become significant three year after adoption. However, DeYoung [4] found no evidence that Internet channel is a low-cost substitute for the physical branch delivery. Moreover, there is evidence showing that the Internetrelated costs increase, for example the cost for call center that supports customer 24/7 or higher average wages for a more skilled labor force to run the more sophisticated delivery system.

Due to the inconsistency in the above results, it is hard to predict the impact of Internet banking on bank's profitability. Sullivan [8] found no systematic evidence that banks were either helped or harmed by offering this channel. Furst et al. [9] examined a larger number of banks which offer the Internet channel, found that the return on equity (ROE) tended to be higher for banks with Internet banking.

A number of studies showed a positive relationship between the adoption of Internet banking and bank's profitability [4,10]. This effect is expressed gradually and becoming significant two to three years after the adoption, in other words, there is a time lag on the impact of Internet banking. In that period, banks may experience a drop in profits due to the high initial investment cost for a new delivery system.

In general, studies in developed countries shows that the Internet channel has a positive impact on non-interest income reduce operating expenses and as a result, enhance bank's profitability. However in developing countries, these effects were ambiguous. Malhotra and Singh, Khrawish and Al-Sa'di [11,12] found no evidence of the relationship between Internet banking and bank performance. Furthermore, the study concluded that the Internet delivery channel have affected negatively to some bank profitability due to the higher operating expenses.

## METHODS

**Hypotheses:** Same with developing countries, due to a relatively low level of information and communication technology infrastructure, Internet banking in Vietnam's banking sector has developed somewhat late and still considered a new way to do banking. The level of competition is not so fierce and drives down all the profit from this service, thus there are reasons to assume Internet banking increase income for commercial banks in Vietnam. Relating to operating cost, this is always a motive for banks to invest in infrastructure, Internet banking is not an exception. If the above assumption holds, the adoption of Internet banking would consequently increase the profitability of banks.

Therefore, research questions and hypotheses are given as follows:

Question 1: Does Internet banking have an impact on profitability of commercial banks in Vietnam? How is the level of that impact?

Hypothesis H1: Internet banking has a positive impact on profitability of commercial banks in Vietnam.

Hypothesis H0: Internet banking does not have a positive impact on profitability of commercial banks in Vietnam.

Question 2: Does Internet banking have an impact on operating expenses in Vietnam? How is the level of that impact?

Hypothesis H2: Internet banking reduces operating expenses of commercial banks in Vietnam.

Hypothesis H0: Internet banking does not reduce operating expenses of commercial banks in Vietnam.

Question 3: Does Internet banking have an impact on income of commercial banks in Vietnam? How is the level of that impact?

Hypothesis H3: Internet banking increases income of commercial banks in Vietnam.

Hypothesis H0: Internet banking does not increase income of commercial banks in Vietnam.

**Data:** The dataset used in this study includes 20 commercial banks in Vietnam in the period 2009 – 2014, of which, 2 are stateowned commercial banks and 18 are joint-stock commercial banks. Joint venture banks and foreign bank branches

are not included due to foreign factors which may cause the analysis results to be biased. The selected banks are accounted for about a half of the total number of commercial banks, which is approximately 70% of total asset of Vietnam banking sector. Thus this sample can be considered as the representative for Vietnam banking industry with 3 large banks (total asset over 500 trillion VNĐ), 7 medium banks (total asset 100 – 300 trillion VNĐ), 10 small banks (total asset under 100 trillion VNĐ). These banks have completed financial reports in the study period and the Internet banking information.

Commercial banks in Vietnam have adopted the Internet delivery channel since 2004 beside traditional channels such as branch. Due to the relatively weak technology conditions, Vietnam banks need a long period to test and improve the channel. Previous studies showed that the impact of Internet banking has a time lag of at least two years [7,10]. Moreover, 2009 is the year commercial banks in Vietnam started adopting Internet banking broadly. Therefore, the research period starts from 2009 and lasts until 2014 to account for the above facts, ensure a sufficient number of observations as well as capturing more contemporary data.

**Regression analysis model:** From the assumptions above, we propose a 3-variable linear regression model to evaluate the impact of the Internet banking service to operational efficiency of Vietnamese commercial banks.

The regression equation takes the following form:

$$\text{PERFORMANCE}_{i,t} = \alpha + \sum_{j=1}^4 \beta_j * \text{MULTI}_{i,t}^j + \sum_k \delta_k * X_{i,t-1}^k + \sum_{t=1}^5 \theta_t * \text{timedump}_t + \varepsilon_{i,t}$$

(i, t are bank index and time of observation, respectively)

PERFORMANCE<sub>i,t</sub> is the indicator of the operational efficiency of the bank i at time t, including the profitability ratio (ROE, ROA), operating costs (NIE/A), non-interest income (NONII/A).

$X_{i,t-1}^k$  Consists of 3 variables controlling the performance indicators of the bank i at time t: ln(A) (asset size), Deposit/A (deposits / total assets ratio), Loan/A (loans / total assets ratio). This group index will explain the difference between the scale, operational and business structure between banks and data lagged 1 year was taken to avoid endogenous effects which may occur in the model.

$\text{MULTI}_{i,t}^j$  includes 3 dummy variables which represent the time period when commercial banks started to transact on Internet banking to year t: MULTI1 (the impact of new Internet banking when put into use), MULTI3 MULTI4 (impact of Internet banking with latency 3 years and more than 4 years).

timedumt: dummy variables for each year to eliminate the influence of the macro-economic conditions (e.g. crisis, business cycle) to the bank performance over the period.

**Methods of regression model:** Due to the banking sector in Vietnam as some banks occupy large market share as well as the impact of experience effect in the application of new technology, after running OLS regression model, we conduct Breusch- Pagan and Hausman tests. The test results showed that the homocedasticity error exists in the pattern and the random effects models (REM) fit 2 models of ROA and NONII/A, the fixed effects model (FEM) fit 2 models of ROE and NIE/A. So we decided to use REM quantified by means of generalized least squares (GLS) to correct the homocedasticity for 2 model ROA and NONII/A. The remaining 2 models ROE and NIE/A using FEM. Before that, we will perform Wilcoxon's rank-sum test to a preliminary measure of the influence of Internet banking on the Vietnamese commercial banks performance.

## FINDINGS

Preliminary evaluation of the influence of internet banking on the Vietnamese commercial banks' performance is shown in Table 1.

Table 1: Descriptive Data

	<b>N</b>	<b>Minimu m</b>	<b>Maximu m</b>	<b>Mean</b>	<b>Std. Deviation</b>
ROA	120	.0003	.0475	.0108	.0064
ROE	120	.0039	1.5839	.1224	.1466
NONII_A	120	-.0034	.0120	.0031	.0023
NIE_A	120	.0047	.0444	.0182	.0055
DE_A	120	.5099	.9647	.7281	.0928
LO_A	120	.2104	2.7164	.5731	.2433
LN_A	120	15.5889	20.1722	17.9653	1.1532
MULTI <sup>1</sup>	120	0	1	.11	.312
MULTI <sup>3</sup>	120	0	1	.13	.341
MULTI <sup>4</sup>	120	0	1	.37	.486

Previous researches showed that the impact of Internet banking take a time lag at least 2 years so the authors try to do similar test [7,10]. The indicators of banking performance from 2009 to 2011 will be tested and they are divided into 2 groups: Group 1 (group has Internet banking) and group 2 (group has no Internet banking) in the period 2009 - 2011. If results show any differences between 2 groups, it suggests that Internet banking affects operations of banks with a lag of 2 years.

Due to the characteristics of the banking sector in Vietnam with some strong banks dominate market share, the data is likely under skewed distribution form, and thus, Wilcoxon's rank-sum test (a nonparametric test) will be used in this evaluation instead of t-test. The null hypothesis is that there is no difference between banks performance of two groups (Table 2).

**Table 2:** Results of Wilcoxon rank-sum test for bank performance 2009 – 2011

	<b>W</b>	<b>p-value</b>
ROA <sub>2011</sub> – ROA <sub>2009</sub>	36	0,8784*
ROE <sub>2011</sub> – ROE <sub>2009</sub>	33	0,6451*
NONII/A <sub>2011</sub> – NONII/A <sub>2009</sub>	38	1*
NIE/A <sub>2011</sub> – NIE/A <sub>2009</sub>	41	0,798*
Ln(A <sub>2011</sub> ) – Ln(A <sub>2009</sub> )	26	0,2327

\* *estimated value*

Results in Table 1 (with p-value > 0.05) showed no evidence of the influence of Internet banking on bank performance during the period 2009-2011 or internet banking would not affect a bank's performance after 2 year of adopting. Results are similar to those of other studies in developing countries [11,12] as well as in developed countries in the new era of Internet banking life [8,9]. That suggests two cases which may occur: Internet banking has not affected bank performance or the impact of Internet banking has larger latency than two years. This is also the basis for group selecting the dummy variable Internet banking MULTI in the regression model.

The test shown above provides a preliminary picture of the impact of Internet adoption on the performance of banks operating multichannel in Vietnam. That effect is best represented by the estimated coefficients in the multivariate analysis below since the regressions including control variables for other effects might cause biased to the final result in Table 3.

The regression results show that the variables MULTI3 and MULTI4 are statistically significant only in the model of ROE and NONII/A, which means Internet banking has a positive impact on profitability and non-interest income of banks but with the time lag 3 years and very small degree of influences (beta MULTI3 is 0.000791, beta MULTI4 is 0.000859). Findings also reject the



hypothesis that Internet banking reduces operating costs. Some of the control variables ( $\ln(A)$  and  $\text{deposit}/A$ ) show statistically significant. To summarize, two out of three hypotheses are proven to be true and the argument about a greater time lag is verified.

## **DISCUSSION**

Internet banking is a promising delivery channel in Vietnam and the purpose of this article is to fill the gap of the lack of studies in this particular discipline. In the previous studies, researchers found no evidence of the link between Internet banking and banks' performance with a two-year' time lag in some developing countries. This article, use data of commercial banks in Vietnam, strengthen and expand these findings. The results of the constructed regression model show that Internet banking has positive impacts on banks' income and in turn, banks' profitability. These effects are gradual, becoming significant three years after the adoption of Internet banking. In other words, this is the evidence to prove that, in developing countries, digital channels such as Internet banking still bring benefits to banks though these effects are observable after a longer period than in developed countries.

The scale of the impact on income is relatively small (less than 0.1% increase after 3 years adopting Internet banking). It suggests another conclusion. Internet banking functions as a delivery channel to satisfy the increasingly complicated demand of customers, who in turn feel trust in and loyalty to the bank, not as a main source the bank can profit from.

The relatively small size of Internet banking, total number of users to be specific, is also a reason to explain for the low level of impact this channel contributes to banks' performance. According to statistics, total users of this service have only reached 6 million in the first half of 2014, merely 17% of total Internet users which is even lower than the average of Asia-Pacific, not mentioned that Internet banking has been adopted in Vietnam for a relatively long time. The number suggests that banks have not appreciated and have a proper plan to develop this delivery channel. Products and services currently offered through Internet banking in Vietnam is not diversified and attractive to customers; the complicated in register procedure and using process also prevent a large part of potential user. The result is only 12% of total number of banks' current accounts are using Internet banking, this is a great loss which can turn to real profit if banks have better plan to exploit their customer base.

Beside an increase in profit, banks also expect the adoption of Internet banking to reduce operating costs due to cutting spending for operations and fixed assets at the bank branches. The research results indicate the operating expenses have not been affected by the new channel. Added to the low impact of Internet banking on banks' income, these results suggest that Internet banking functions

as a complement not a substitute for traditional distribution channels such as branch. This would be investigating more in future studies.

Table 3: Summary results of regression models

	ROE	ROA	NIE/A	NONII/A
MULTI <sup>1</sup>	0.048641	0.001300	-0.001789	0.000039
	0.316	0.424	0.115	0.927
MULTI <sup>3</sup>	0.103327 *	0.000277	0.001680	0.000791 *
	0.056	0.866	0.180	0.082
MULTI <sup>4</sup>	0.138733 **	0.000929	0.001381	0.000859 *
	0.030	0.593	0.348	0.098
ln(A) <sub>-1</sub>	-0.000592	-0.001525 **	-0.007936 ***	-0.000084
	0.989	0.041	0.000	0.772
Deposit/A <sub>-1</sub>	0.200347	-0.003406	0.008735 *	-0.001945
	0.319	0.576	0.064	0.253
Loan/A <sub>-1</sub>	-0.042596	0.000884	0.000287	-0.000249
	0.489	0.659	0.841	0.641
R-squared	0.1820	0.2891	0.5242	0.1535
Prob (F-statistic)	0.0655	0.0000	0.0000	0.0000
Durbin-Watson	1.728609	1.954305	1.763637	1.731718

*p-value is italicized. \*p < 0.1. \*\*p < 0.05. \*\*\*p < 0.01*

Also, the time period selected to study (2009–2014) coincides with the global economic crisis when most banks have been going through restructuring. This also potentially affects banks' income and expenses and consequently blurring the impact of Internet banking on the performance of Vietnamese commercial banks.

Like previous studies, in the new adoption period of online banking, the study of Sullivan and Furst et al. showed no evidence of the impact of this service to the bank performance, then the studies by DeYoung and Hernando [7-9,13] discussed how Internet banking service can affect bank performance. Those effects are clearer in developed countries than in developing countries. Therefore, with the source of data and the current level of technology in Vietnam, it is understandable that Internet banking has had little effects on Vietnamese bank performance although researchers have selected longer latency (3 years and more than 4 years) compared with the appearance of online banking.

However, with the level of Internet infrastructure is improved and so is the demand for payment, online transaction of customers, Internet banking still has lots of potential for development.

The above results do not take into account the intensity in the use of Internet banking. Further studies in this discipline should include variables representing such intensity, for example, the ratio of total value transacting through the Internet channel over total transaction value, to produce more accurate result. Moreover, future analysis about the impact of digital channels (Internet banking, mobile banking...) on banks performance would benefit if banks' financial information is categorized by delivery channel.

## **CONCLUSION AND POLICY IMPLICATION**

### **Conclusion**

Being almost the first study in Vietnam using the quantitative method for verifying the influence level of Internet banking on the performance of Vietnamese commercial banks in the period 2009- 2014, the research results show that Internet banking has the positive impact of non-interest incomes and thereby increasing the profitability of commercial banks but this effect takes a time lag after 3 years and has a relatively small degree.

In addition, this study provides more insight into the impact of Internet banking on banks' performance in the developing countries. Some earlier studies in developing countries found no evidence of the relationship between Internet banking and banks' performance with a time lag of two years. This research provides evidence to prove that Internet banking does has an impact on banking operation in developing countries, which are income and profitability to be specific, though this influence takes a longer period of time to be observable and statistically significant than in developed countries.

Moreover, the research reveals the real situation of Internet banking in Vietnam. While in developing countries, the adoption of digital channel such as Internet banking reduces operating expenses, increases non-interest income, and consequently increases banks' profitability. In Vietnam, not only the effect on operating cost is not statistically significant, the increase in income is also relatively small. It indicates that Internet banking is a delivery channel more than a source of profit, banks can benefit greatly from. In addition, Internet banking function currently is a complement not a substitute for traditional distribution channels such as bank's branch. Banks would further profit from the increase in profit to the extent that the Internet delivery channel acts as a substitute for

traditional distribution channels.

Due to the limit of data sources in Vietnam, we cannot include more explanatory variables in the model especially ones indicating the intensity of the use of Internet banking, which would produce more detailed and interesting results. The sample size may not be sufficient. Also, the financial crisis 2008 and the global recession afterward, which have led to the third big restructuring in the history of Vietnam's banking system, affected greatly the dataset. In the future studies, we hope to improve the sample data and controls for another factor that might cause biased to the result.

### **Policy implication**

The regression results showed that Internet banking increases banks' income therefore the recommendations below is proposed for banks to improve and develop the Internet banking service in order to maximize profit. Moreover, the relationship between the asset size and most of the bank's performance variables are statistically significant thus the recommendations is proposed based on the characteristic each group of bank size has.

First, considering the group of large and medium-sized banks, one of the characteristics of banks in this group is a high rate of enterprise and corporate customers. Thus this bank group should focus on developing the banking services for customers in the corporate customer segment. Besides traditional services, one of the fastest growing markets these days which is related to online transactions is e-commerce. Large and medium-sized banks can enlarge the size and the value transacting through Internet banking by linking with e-commerce businesses, become the intermediary to bridge the gap between firms and customers and remove common barriers in online business such as fraud, security breaches.

In addition, there is a trend, associated with e-business, is becoming more crucial to online business is e-CRM (electronic Customer Relationship Management). This system uses electronic methods to gather data and analyze customer information and therefore brings firms opportunity to maximize the profit earned, reduce customer-service costs and most important, increase customer loyalty and customer retention. Large and medium-sized banks with the advantages of a developed IT infrastructure might integrate and benefit greatly from such a system.

For the small banks group, their main customer is individuals, thus the recommendation we proposed is to maximize the number of users using Internet banking over existing customer base. Previous studies such as Ahmad and Al-Zu'bi, Clemes and Du [14,15], pointed out factors affect customer choice of using online banking, the three most important factors are usefulness, convenience and security. About usefulness, besides default products or services, small banks

should expand and develop their “core” products; to be specific they are products or services with distinct and attractive features. The reason is that the needs of individual customer are so diversified, complicated and hard to satisfy with default services only. Distinct and useful products or services offered through Internet banking make customer willing to pay more. In terms of convenience, the simplification of registration procedure and using process is the easiest way to attract customers to use Internet banking. In present, the paperwork is still complicated in almost every commercial banks in Vietnam. If all the procedures can be reduced to minimum or at best, completely online, it would increase the number of users greatly. Along with increase the convenience using the service, banks still have to ensure the security of customers’ information.

The cost for investment in the technology is significant for commercial banks in Vietnam, especially for small banks. Thus, banks in this group should cooperate and build a shared IT infrastructure to minimize the cost and achieve long-term benefits when linking their products and services together.

Finally, young population structure in Vietnam is now very favorable for the development of Internet banking. These young clients (also known as generation Y) have the mobility in accessing modern information technology and willing to use new products. Encouraging these customers using online banking services will bring long-term profit, thus banks should build up marketing strategies consistent with the image and its services to attract customers, which increases income from fees.

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