

ANALYSIS OF THE RELATIONSHIP BETWEEN FINANCIAL INNOVATION AND THE PERFORMANCE OF TURKISH BANKING SYSTEM

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Abstract

This paper aims to examine the relationship between profitability of Turkish banking system and online banking, telephone banking and credit cards. In this study, total net profit for the period in Turkish banking system considered as an independent variable by trimesters, and online banking, telephone banking and credit cards, tested to see whether they influence this profitability, considered as dependent variables. Given data achieved from official sources between 2006Q1 and 2015Q2, simple regression analysis is used in this study. The results of the regressions show that only credit card usage has a significant positive impact on ROA, ROE and NIM. The positive impact on ROA and ROE imply that credit card usage increases the profitability and thus the performance of banking system, but the positive impact on NIM shows that banks charge their customers more for their credit card usage.

Key Words: Financial Innovation, Banking Performance, Turkish Banking System

Jel Classification: G2, G3

I. INTRODUCTION

Banking system has been growing with technological developments and innovative productions. Banks started to go beyond their basic scope, deposit-credit binary and payment functions with genesis of modern banking. This period has made progress above estimations with the help of computer and internet technologies, putting limitations away. Fast growing

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innovative investments and expense productions created a market in banking sector and the importance that banks attached to innovative activities just as traditional activities have gradually increased.

During the last two decades, the global financial system was characterized by a strong innovation in the secondary markets which gave birth to new financial products that the financial intermediaries could use to hedge their specific risk. (Kero, 2013) After global liberalization process there has been an increasing competition, both within and outside in the banking industry, and financial innovation. (Vives; 2001)

The Turkish financial system has undergone stupendous changes since 1980. Developing technology and changing macroeconomic guidelines improved the Turkish financial system and many reforms have been set about in the system. Over the last years, banks have been trying to increase their portions of productions, positively influencing profitableness like credit cards, telephone banking, and online banking as a result of reduction in net interest incomes in our country. The fact, consisting the hypothesis of the study, is the fact that innovative productions in Turkish banking system positively influence profitableness of banks.

II. FINANCIAL INNOVATION

Innovation is clearly an important phenomenon for any sector of a modern economy. Although standard microeconomic theory (rightly) focuses much of its attention on the issues of static resource allocation and economic efficiency, there is nevertheless a general appreciation that performance over time is driven by a variety of dynamic factors including innovation. (Frame, White, 2002) Innovation continues to be a driver of economic growth at the societal level and a performance differentiator at the industry and firm level (Gianiodis et al. , 2014).

Solans (2003) defined financial innovation as “both the technological advances which facilitate access to information, trading and means of payment, and the emergence of new financial instruments and services, new forms of organization and more developed and complete financial markets”. Financial innovation can also refer to the creation of new instruments and can be defined as the act of creating and popularizing new financial instruments, technologies, institutions, and markets (Lerner, Tufano, 2011).

Financial innovation is not an old term literature, but real sector innovation has been studied for a long time. Financial innovation and real sector innovation exhibits significant differences. First of all, financial innovation is on paper, there is no barrier for creating new financial instruments because there is no real resource used. Second, the innovation of a new financial instrument may not be considered as a change in a production function. On the other hand, financial instruments are extremely easy to imitate and their costs are comparatively low. Lastly, financial innovation is not only designed to fulfill the needs of customers, but may also reflect constraints of the suppliers of financial intermediation. (Akçaoğlu; 1998)

When defining financial innovation the usual approach is to categorize it into three groups, according to where innovation occur: (Vargas, 2007)

- *Process innovation* refers to new production processes that allow the provision of new or existing financial products and services.
- *Organizational innovation* encompasses establishing new institutions or organizational structures within institutions where the production process is held. This kind of institutional innovation can influence the financial system as a whole, spawning new types of intermediaries. Internet- only banking is a prime example of this type of innovation.
- *Product innovations* are creation of new products or services to meet market needs, thus constituting a client-focused kind of financial innovation.

When a functional approach to financial innovation is applied, introduction of new instruments and techniques have the potential to enhance the efficiency of the financial system. In principle, financial innovation, and particularly credit risk- shifting instruments has the potential to shift risk optimally to those who are most able and willing to absorb it. (Llewellyn, 2009)

Financial services industry eases to check the financial accounts or pay the bills online for customers. However, these innovations do not affect the core function of the financial sector, which is financial intermediation—moving funds from one place where they are not needed to another place where they are worth more (Johnson, Kwak; 2012).

Earlier heavily protected and regulated financial industry with its strong monopolies in banking, the IT revolution resulted in a polarization of innovation processes. On the one hand, smaller, nonbank financial corporations such as online brokers and financial services providers, and large internationally active investment banks, credit card companies, and diversified

universal banks are developing and driving financial innovation and internationalization (Schulz; 2005).

Financial innovations are primarily focused on profit generation for the organization and appear in the form of new products and modified practices and procedures aimed at maximizing shareholder wealth (Forrer, Forrer; 2015).

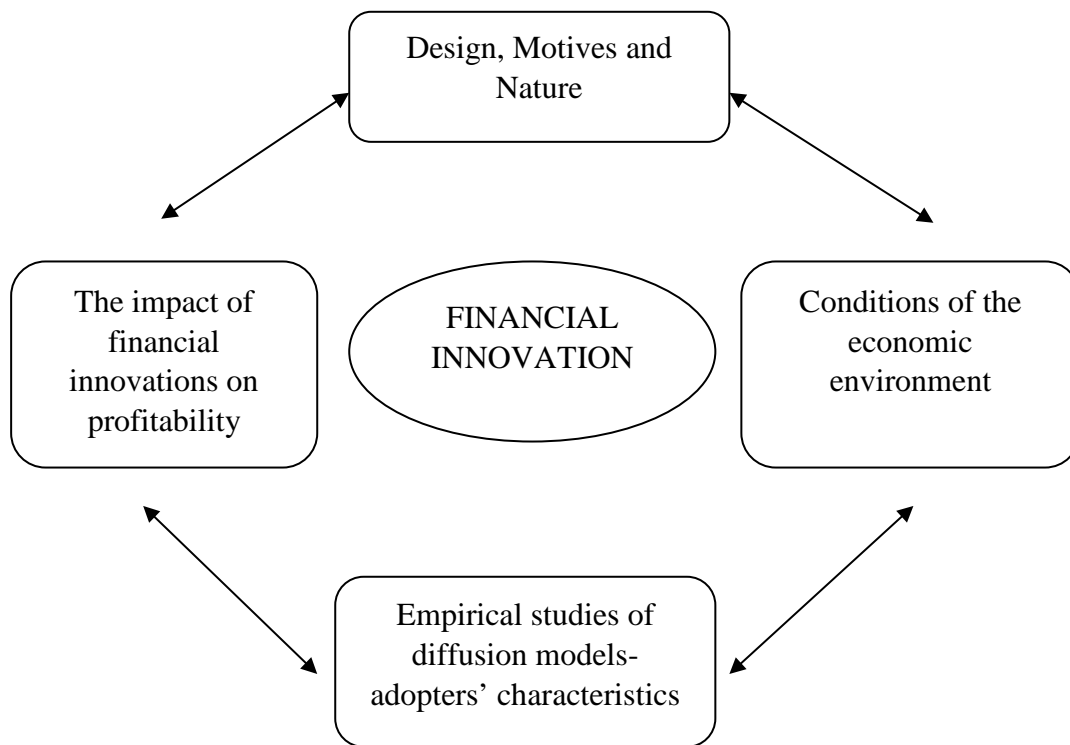


Figure I. The Spiral Process of Financial Innovations

Resource: Philippas, Siriopoulos, 2012:21

Figure I shows spiral effect process of classification. This refers to the design and nature of financial innovations, the conditions of the economic environment that acts upon financial innovations and vice versa, the empirical study of the diffusion models of a financial innovation and adopters' characteristics (investors, companies, consumers) and, the consequences of financial innovations on financial markets and economic activity (Philippas, Siriopoulos, 2012).

There is a list of common motivations for financial innovations includes the following: (Lumpkin; 2009)

- Innovation exists to complete inherently incomplete markets (i.e. financial unmet needs or preferences of clients); innovations

- Innovation exists to address inherent agency concerns and information asymmetries;
- Innovation enables parties to minimize search, transactions, or marketing costs;
- Innovation is a response to taxes and regulation (e.g. decoupling economic ownership or exposure from legal ownership – governance and tax implications);
- Innovation is a response to globalization and increasing risks;
- Innovation is the result of technological shocks.

Financial innovations occur because agents in market are searching for new ways to make higher profits. Economic conditions, technology and regulations led to emergence of new financial instruments which realized in very short span of time, provide higher profit (Koğar; 1995). These instruments are credit cards, internet banking instruments, mobile banking, ATM and developing other technologic financial instruments.

Financial innovations diminished the economic and political power of banks benefiting from geographic restrictions. In particular, a series of innovations lowered the costs of using distant banks. This reduced the monopoly power of local banks and weakened their ability and desire to lobby for geographic restrictions. For example, the invention of automatic teller machines (ATMs), in conjunction with court rulings that ATMs are not bank branches, weakened the geographical link between banks and their clientele. (Levine, Levkov, Rubinstein, 2013) Advances in technology have been critical not only in retail banking (e.g. automatic teller machine), but also to obtain, store and process data required to estimate statistical models (e.g. valuation and risk management) (Arnaboldi, Rossignoli, 2015).

Financial innovations can be grouped as new products (e.g., adjustable rate mortgages; exchange-traded index funds); new services (e.g., on-line securities trading; Internet banking); new "production" processes (e.g., electronic record-keeping for securities; credit scoring); or new organizational forms (e.g., a new type of electronic exchange for trading securities; Internet-only banks). (Frame, White, 2002:3) Some of important financial innovations in the global banking system are: automated teller machines (ATMs), credit card, debit cards, money market funds, indexed mutual funds, exchange traded funds, treasury inflation protected securities, credit scoring to assist in lending decisions, basic forms of securitization, venture capital funds interest rate and currency swaps.

Financial innovation is a resource consuming activity. In particular there are marketing costs for intermediated securities. Intermediaries must look for prospective buyers, find out their demands, explain their new products, etc. There are two types of marketing costs for a

new product; a fixed cost per customer and a cost proportional to the number of units sold (Pesendorfer, 1995).

There are many pros and cons of financial innovations. The pros are: The notion that financial innovation is good for economic growth is based on the idea that such innovations will improve the allocation of capital. Also, financial innovation has come up with various approaches to mitigate problems of information asymmetry. Another argued issue that a financial innovation could help solve the lemon problem. The security design literature provides several other examples of financial innovations that could resolve particular agency- and asymmetric information problems. In all these theories financial innovation is something good; it tries to mitigate or resolve a particular friction and benefits the underlying real activity. And the dark side of financial innovations: Financial innovations would then tend to worsen the allocation of capital. Financial innovations often cause harm by reducing transparency, and this might be deliberate (Boot, Marinc; 2010).

Table I shows the basics of financial innovation. the last few decades have seen the emergence of several innovative financial instruments including Bonus Debentures Commercial Papers (CP), Certificate of Deposits (CD), Cumulative Convertible Preference Shares (CCPS), Sukuk Bonds, Foreign Currency Convertible.

Table I: The Basics of Financial Innovation

New Products	GDR/IDR , CP, CD, mutual Funds, ETF, CDS, Derivatives, ULIP, ASBA, FCCB, FCEB, sukuk, Credit Cards, miFor, Debit Cards, gold loan
New Process	ATM, NEFT & RTGS, online banking, mobile banking
New Regulations	GAAR GST,FBT, Dividend Distribution Tax, retrospective, Taxation, DTAA
New Markets	Commodities, energy Trading , Carbon Credit, Future market, Forex
New Organisation Forms	IIP, huF, islamic banking, wholly owned subsidiary, Venture Capital, Pe Funds, one Person Company (oPC), section 25 Company, reiT, mFis, Chit Fund

Resource: Sanjay Banka, Financial Innovation: India’s Prowess?, ThinkTank, CFO Connect, 2013.

III. LITERATURE REVIEW

The literature focusing on the impact of innovation on bank performance reached to inconclusive results. On one hand, some researchers point to the positive effect of innovation on performance. De Young et al. (2007) found that internet adoption improved community bank profitability, largely through increased revenues from deposit service charges. Lerner and Tufano (2011) suggest that financial innovations like venture capital, equity funds, mutual and exchange traded funds and securitization lead the way to financial deepening and growth. Cherotich et al. (2015) found out that there is a strong relationship between financial innovations and financial performance in Kenya commercial banks suggesting that the innovation is also effective for undeveloped countries too.

Beck, Chen, Lin and Song (2012) searched the relationship between financial innovation in the banking sector and (i) real sector growth, (ii) real sector volatility, and (iii) bank fragility. They found that a higher level of financial innovation is associated with a stronger relationship between a country's growth opportunities and capital and GDP per capita growth and with higher growth rates in industries that rely more on external financing and depend more on innovation. On the other hand, they found that financial innovation is associated with higher growth volatility among industries more dependent on external financing and on innovation and with higher idiosyncratic bank fragility, higher bank profit volatility and higher bank losses during the recent crisis.

According to Arisa and Muturi (2015); internet banking has a very small impact on financial performance of commercial banks in Kenya and mobile banking was shown to have a good opportunity for financial providers. Boot and Thakor (1997) found that the evolution of a financial system is likely to be path-dependent, well developed financial systems provide stronger incentives for financial innovation and develop faster.

Berk (2002) researched the link between financial innovation and central banking and concluded that in a world characterized by ongoing financial innovation, reserve requirements will allow the central bank to control overnight rates, provided the former are implemented in a market-oriented fashion. Roberts and Amit (2003) researched the relationship between innovation and the emergence of differentiated competitive positions in Australian Retail Banking. They found that innovative activity significantly affects its current financial performance.

Abir and Chokri (2005) examined the adoption of the financial innovations of products and of process within the Tunisian banking industry during the period from 1987 to 2008. They concluded that the legal framework influences in a large way the innovative behavior of the Tunisian banking system. Nodern, et al. (2012) argued that this is consistent with banks passing on risk management benefits to corporate borrowers but not with alternative channels through which credit derivative use may affect loan pricing. They found that the magnitude of the risk management effect remained unchanged during the crisis period of 2007-2009.

Domeher et al. (2014) investigated the factors influencing the adoption of financial innovation in Ghana's banking industry. Surveys were conducted involving 405 clients of the six major banks in the country. Using logistical regression, the results amongst other things show that innovation attributes such as lack of complexity, compatibility and perceived usefulness provided by financial innovation, increase the likelihood of e-banking adoption.

Şimşek (2013) analyzed the channels by which financial innovation affects portfolio risks in an environment with both risk sharing needs and belief disagreements. He found that financial innovation that increases portfolio risks also exacerbates the negative externalities, and might lead to an inefficiency.

Domeher et al. (2014) emerged that the ease with which customers can use the innovation, the compatibility of the innovation with customers' needs, the perceived usefulness thereof, the amount of information provided on the innovation and the level of customers' education all have a significant positive impact on the adoption of e-banking innovations in the Ghanaian banking industry. Dash et al. (2014) found innovation attributes i.e. trialability and compatibility has significant impact on the attitude whereas the relative advantage is not significant in the Indian banking system.

Chava et al. (2013) found that the increase in local market power of banks after intrastate deregulation had a negative effect on the innovative activity of young, private firms. Both the level of innovation and the risk of innovation decreased significantly after intrastate banking deregulation. Mugane (2015) investigated the effect of financial innovations on financial performance of commercial banks in Kenya. The study concluded that the relationship between product innovation and financial performance of commercial banks is negative and significant.

Arnaboldi and Rossignoli (2015) studied the determinants of financial innovation in 81 listed commercial banks in Europe and in the United States from 2005 to 2008. They found

that product innovation prevails both in Europe and in the US, but innovation falls from 2005. Not only banks innovate in less categories, but also less banks engage in innovation. When banks have a higher market share in less concentrated and more efficient banking systems, they enjoy a preeminent position which leads to innovation.

IV. TURKISH BANKING SYSTEM

In Turkish banking system, it can be seen that since 1980 there has been a significant number of entries and exits. There were two major reasons for foreign bank entry. The first was that when Turkey liberalized its economy in the 1980s, the second reason was that Turkey pressed ahead with liberal policies, opening its capital account in 1989 and there was no policy reversal. (Denizer; 1999)

Turkish financial system underwent significant structural changes and gained dynamism as a result of the liberal policies adopted starting from 1980 onwards. Along with deregulation measures introduced, such as removal of selective credit policies, free determination of interest rates on deposits and credits, and liberalization of foreign exchange transactions, efforts to increase the level of compliance of the legislations with the international norms also played a contributing role in this development. (BRSA; 2001)

After the economic crisis in February 2001, Turkey has made a substantial change in its economic policies by announcing a “program for transition to strong economy” (“Program”) in May 2001. Main components of the Program were determined as follows: (TBAT; 2009)

- Implementation of a monetary policy that will ensure price stability in addition to an efficient fight with inflation,
- Implementation of a disciplined finance policy,
- Strengthening of the financial structure of financial sector; mainly the banking sector,
- Realizing the basic structural regulations that will ensure efficiency, flexibility and transparency in all economic units.

Table II: Number of Banks and Branches in Turkey on 07.04.2016

	Number of Bank	Branches in Turkey	Branches Abroad
The Banking System in Turkey	53	12224	83
<i>Deposit Banks</i>	<i>34</i>	<i>11066</i>	<i>80</i>
State-owned Deposit Banks	3	3657	34
Privately-owned Deposit Banks	9	4271	29
Banks Under the Deposit Insurance Fund	1	1	0
<i>Foreign Banks</i>	<i>21</i>	<i>3137</i>	<i>17</i>
Foreign Banks Founded in Turkey	15	3129	17
Foreign Banks Having Branches in Turkey	6	8	0
<i>Development and Investment Banks</i>	<i>13</i>	<i>42</i>	<i>0</i>
State-owned Development and Investment Banks	3	23	0
Privately-owned Development and Investment Banks	6	15	0
Foreign Development and Investment Banks	4	4	0
<i>Participation Banks</i>	<i>6</i>	<i>1116</i>	<i>3</i>

Recourse: http://www.tbb.org.tr/en/modules/banka-bilgileri/banka_sube_bilgileri.asp, (07.04.2016)

Table II shows number of banks in the Turkish banking system by types. On 07.04.2016, Turkish banking system has 53 banks. 34 of them are deposit banks and there are 3 state-owned deposit banks, 9 privately-owned deposit banks. 21 foreign banks are in Turkish banking system, 15 founded in Turkey and 6 foreign banks having branches in Turkey. Number of development and investment banks are 13 and despite of having a common Islamic religious belief, there are only 6 participation banks in Turkey.

On the other hand, the total assets of Islamic banks in Turkey showed a remarkable growth performance especially during the post 2000-2001 Turkish financial crisis period. During 2002-2014 period average annual growth rate of the asset size for these banks is almost 29% where the overall banking sector's is 18.5%. However, even with this exceptional growth the share of Islamic banks in Turkish banking system has reached at 5.2% by the year end 2014.

(Sakarya; 2016) Financial innovations played a role in the financial crisis of 2007-2008. By the time of the financial crisis, some financial innovations were sufficiently widespread that the financial difficulties were bound to touch them and have additional effects because of them. (Dwyer; 2011)

V. DATA AND METHODOLOGY

The aim of the paper is to analyze the impact of financial innovations on the performance of the banks. In order to run the analysis, the data should be defined first. It is believed that the adaptation of the technology should enhance the profitability of the banks. The performance of the banks can be measured by using the return on asset (ROA) and return on equity (ROE). ROA and ROE are the most common measures of profitability. Moreover, net interest margin (NIM) is another determinant that shows not only the performance, but also the efficiency of the banking system. NIM shows the difference of interest income and interest expense divided by total assets. It is believed that more efficient banking systems have lower margins, and as the efficiency decreases banks charge higher markups from their clients. ROA, ROE and NIM will make up the dependent variables that will proxy for the performance of the banking sector.

There are many channels that a bank can adopt innovation. It may exist in the form of different distribution channels. One of the innovation that is assumed to have an effect on bank performance is internet banking usage and it is proxied as internet banking usage over total assets (IntB). Automated Teller Machines (ATMs) are another channel that decrease the costs of the banking system. Instead of allocating a physical building and personnel, banks place ATMs to increase their accessibility. In order to proxy for the preference of ATMs over branches ATM to total branch ratio is used (ATMB). Credit cards are another factor that is likely to affect the performance of banks. Credit card usage over total assets ratio (Cards) is used to consider the effect of credit cards on performance.

Other factors that are assumed to have an impact on bank performance are also analyzed. Since the main aim of the banks are collecting deposits and creating loans, the size of the loans should have an increasing effect on performance. On the other hand, non-performing loans should have a deteriorating effect on the profitability and increase the margins. To account for their effects total loans to total assets ratio (Loans) and non-performing loans to total loans ratio (NPL) are used as independent variables. Other than the traditional

banking activities the banks may benefit from the off-balance sheet activities they perform and off-balance sheet items to total assets ratio (OBS) is used in the regressions.

Schumpeter (1950) notes that larger banks are more likely to exercise innovation, because of the scale of economies inherent in larger organizations. To control for the effect of size on performance natural logarithm of banks' assets are adopted (LNASSETS).

The data for internet banking on a bank level is not available in Turkey, so the analysis will cover an aggregate level data and it leads to the use of ordinary least squares. The regression model used is as follows:

$$Per_t = \alpha_t + \beta_1 \log(ATMB_t) + \beta_2 \log(Cards_t) + \beta_3 \log(IntB_t) + \beta_4 Loans_t + \beta_5 NPL_t + \beta_6 OBS_t + \beta_7 Size_t + \varepsilon_t$$

To analyze the effects of technological innovation on bank performance, the quarterly financial statement data for the Turkish Banking system for the period between 2006Q1 and 2015Q2 is collected from the website of Turkish Banking Association (TBA) statistical reports section. Table III lists the descriptive statistics for the data sample.

Table III :Descriptive Statistics

	Atmb	Branch	Crede	Intern	Loans	NPL	OBS	ROA	ROE	NIM	Logassets
Mean	2,610	3,913	4,494	5,319	0,496	0,038	0,720	0,014	0,115	0,028	8,833
Median	2,501	3,943	4,518	5,306	0,499	0,037	0,688	0,014	0,113	0,027	8,848
Maximum	3,079	3,993	4,719	5,609	0,556	0,054	1,019	0,025	0,195	0,052	9,064
Minimum	2,381	3,799	4,248	5,039	0,406	0,026	0,532	0,005	0,040	0,009	8,615
Std. Dev	0,216	0,061	0,133	0,140	0,039	0,007	0,141	0,006	0,049	0,013	0,129
Skewness	0,901	-0,507	-0,204	0,344	-0,418	0,473	0,454	0,092	-0,023	0,028	0,062
Kurtosis	2,449	1,856	2,0185	2,770	2,474	2,326	2,194	1,748	1,770	1,601	1,927
Observations	23	23	23	23	23	23	23	23	23	23	23

The results of the regressions are presented at Table IV. According to the results, among the innovation measures only credit card usage has been found statistically significant in explaining the performance of banks. The 1 percent increases in the credit card usage has a 0.66% increasing effect on the ROA, 5.28% increasing effect on the ROE and 1.2% increasing effect on the NIM at 1% statistical significance. Actually, the offering of credit cards has been reflected as higher margins, suggesting a cost reflection on the margins asked by the banks. It is possible to conclude that this increasing impact on NIMs is detrimental for the bank customers.

Among the other factors the increases in loan portfolios has a negative impact on performance in all regressions. The increase in loans had also narrowed the NIM. This suggests that the narrowing interest margins may be reflected on the lower profitability, namely ROA and ROE. This impact should be analyzed as a further research. Size of the banks has a negative impact on ROA and ROE, mostly due to the economies of scale. On the other hand, as the size of the banking system increases, the margins charged from the customers become less.

Table IV: Regression Results

Dependent Variable	ROA		ROE		NIM	
	Coefficient	Std, Error	Coefficient	Std, Error	Coefficient	Std, Error
ATMB	0,002	0,033	-0,070	0,248	-0,046	0,079
CREDC	0,668***	0,158	5,289***	1,192	1,207***	0,401
INTERN	0,013	0,059	0,125	0,458	0,080	0,141
LOANS	-0,584*	0,284	-5,035**	2,187	-1,310*	0,641
LOGASSETS	-0,579***	0,106	-4,370***	0,793	-0,963***	0,287
NPL	-0,851	0,690	-8,387	5,317	-2,109	1,447
OBS	0,019	0,023	0,134	0,170	0,019	0,055
C	2,357***	0,454	17,187***	3,350	3,526***	1,123
R-squared	0,524		0,523		0,408	
Adjusted R-squared	0,301		0,300		0,132	
F-statistic	0,005		0,041		0,013	
Prob (F-statistic)	0,000		0,025		0,002	

VI. CONCLUSION

The last decades was characterized by innovations in the financial system. Following the deregulation policies, financial institutions, especially banks, witnessed competition for the first time. These developments led them to focus on cost reduction and revenue maximization. To increase their revenues banks relied on service innovation or financial innovations. They provided new sorts of services to their clients to differentiate themselves from their peers. Or

they relied on technology to decrease their costs and to provide a user friendly and easily accessible systems to their customers.

Turkish Banking System is one of the most emerging banking industries in the world. Following the 2000 and 2001 crisis, the system has gone through huge structural changes. These changes include the adoption of innovation. The motivation of this paper is to analyze the possible impacts of financial innovations on the performance of Turkish Banking system.

The analysis covers the quarterly data between 2006 and the second quarter of 2015 from the website of Turkish Banking Association. Since internet banking data is not available at the bank level, the data is on the aggregate level. The paper adopts a least squares model and the performance indicators are selected to be ROA, ROE and NIM. To measure the innovation practices of banks number of ATMs to total branches, credit card usage to total assets and internet banking usage to total assets are used.

The results of the regressions show that only credit card usage has a significant positive impact on ROA, ROE and NIM. The positive impact on ROA and ROE imply that credit card usage increases the profitability and thus the performance of banking system, but the positive impact on NIM shows that banks charge their customers more for their credit card usage. This effect is probably due to excessive use of credit cards by the customers. It is noted that people fail to meet their credit card obligations on time and pay penalty interests for their deferred payments. Among the other determinants loans and size of the banks has a negative impact on performance indicators.

The results suggest that internet banking and ATM usage do not have a significant impact on performance. The managers of the banks should employ policies to increase the usage of these distribution channels to decrease their costs and thus increase their performance. These policies may cover to modify the technology to be more user friendly and to give educational practices to their clients.

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