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The Effect of the Banking Business Model on Financial Stability of Banks in Iran

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ABSTRACT: This study investigates the effect of the business model on financial stability of banks operating in Iran. For this purpose, based on the economic approach of the banking business model, two financing structures (ratio of non-deposit financing to total liabilities) and income structure (ratio of non-interest income to total operating income) are used to measure the business model. Next, the impact of these measures and other explanatory variables on the stability of banks (standard deviation of asset returns) was estimated by a multivariate regression model using random effects model and the panel data of 22 banks (17 private banks and 5 state banks) for the period 2010-2016. The results show that an increase in the ratio of non-interest income raises the bank stability index. Therefore, the more banks rely on non-interest income, the more stable they will operate in terms of profitability.

KEYWORDS: banking stability, business model, non-interest income, non-deposit financing

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1. INTRODUCTION

Financial stability, as one of the key indicators of the operation of financial and credit institutions such as banks, has always been of interest. Financial stability is said to be a situation where systematic financial crises do not threaten the stability of the macro economy. A financial crisis refers to a sudden and rapid change in all or most financial indicators, including short-term interest rates and asset prices (securities, stocks, real estate, land) and bankruptcy and collapse of financial institutions. According to Hoffman (2011), a healthy and stable banking system can better withstand shocks and play a stronger role in the sustainability and stability of the financial system. Despite the positive role of banking stability in the economy, some thinkers of the country's monetary and banking economics believe that currently, the country's banking system does not have an efficient, coherent, transparent and stable structure, and consider the structural issues of the country's banking system as the main cause of its economic and social underdevelopment. They believe that this has also caused difficulties and challenges in establishing the economic stability and banking system profitability, and as a result, failing to effectively attain the goals of the economy, especially those of the resistive economy.

Considering the importance of financial stability in banks, identification of the variables and ratios affecting the financial stability of the bank is imperative. Identifying these variables and ratios and planning in this area can improve financial stability in banks. In this connection, one of the factors affecting banking stability is the use of the banking business model.

The business model is the logic of a bank in how to create, deliver and acquire value. In fact, achieving a desirable competitive position in all industries is only possible with the help of adopting an appropriate business model, by strengthening the response to the increasing environmental changes and making high managerial decisions. The bank's business plan, as a result linked to its strategic plan, is a set of choices that affect the risk, asset-liability structure, capital, income and stability of banks. In this regard, Altunbus et al (2011) and Beltratti and Stulz (2012) have shown that banks that do not have the business model and strategy necessary to carry out activities are more vulnerable in the face of financial and banking crises compared to banks that do have a specific framework of action to improve and stabilize the financial performance of their activity. Therefore, the efforts of bank managers is that by making a choice of the main logic underlying the activities and strategies to achieve goals through the preparation and formulation of appropriate business models, so that the factors affecting the stability of banks are identified and the maximum possible benefits are obtained.

Based on this background, and given the lack of necessary studies on business models in banks and their effect on banking stability, this study is conducted aiming to reduce the current research gap and provide new insights into this field. In addition, due to the more competitive environment of the banking industry and the reforms made in the banking regulations, especially Basel III, banks are obliged to renew their financial strategy, and pricing and risk management policies to improve their financial stability by applying a thoroughly documented framework and structure. The study of the impact of the banking business model on banking stability can be a useful guide for policy makers in the financial and banking fields. Hence, the main goal is to examine the state of banking stability of 24 banks in the country during the years 2010-2016 and the impact of the business model on it in the framework of a panel data econometric method. This article is organized as follows. After the introduction, the research background and literature regarding the business model and its impact on banking stability are reviewed. Next, the research methodology and the research model specification are presented. Finally, based on the analysis of the model estimation, the paper is concluded and suggestions are made.

2. LITERATURE REVIEW

Economic experiences, especially in the last two decades, have shown that the economic stability of countries owes to their financial stability. Meanwhile, the financial stability of banks, as the core of monetary and financial activities, is crucial.

According to many economists in the monetary and banking field, and among the most prominent of them, Goodhart, financial crises are often centered round financial instabilities in banks. According to Davies (2001), although policymakers are more concerned about systemic financial crises, individual bank risk can also be a concern, as various systemic banking crises are triggered by individual bank crises (the contagion effect). In particular, the failure of large banks can have major consequences for the financial system in the form of a country-wide lending crisis.

In studies related to concentration and stability, various measures have been considered for measurement of bank stability, focusing on the individual risk of the bank. Two common indicators which measure the probability of bank distress are the z-score and the ratio of nonperforming loans (Boyd et al, 2006). The z-score is an important indicator of financial health, which has an inverse relationship with the probability of bank bankruptcy. The second index, NPL ratio, shows the gross value of the loan (as recorded on the balance sheet) divided by the total value of the loan portfolio. Unlike the z-score, which measures the overall risk of a bank, the NPL ratio indicates credit risk or loan portfolio risk.

At a general level, a business model is a state, a version, a presentation, architecture, a conceptual model or tool, a structural pattern, a method, a framework, a pattern, and a set (Zott et al, 2011). Therefore, the banking business model, taking into account fee-based income, emphasizes the amount of short-term funding and securitization (Gambacorta & Ibanez, 2011).

Although the four structures of asset, budget (financing), capital and income can be examined to evaluate the business model in a bank, based on the aforementioned definition of the business model and its emphasis on income, the income structure that actually also reflects income diversification is prioritized. To measure the income structure, in most empirical studies, the ratio of non-shared (non-interest) income to total income is used (Altunbus et al, 2011). From the perspective of the budget structure, the higher the share of deposits in the total liabilities of a bank is, the more the bank's dependence on customer deposits will be, and this issue can affect their profitability and profitability stability (Gatev et al, 2009). In addition, the asset structure in the business model reflects the extent of the bank's involvement in traditional financial intermediation activities (Diamond, 1984), and the capital structure reflects the bank's ability to absorb unforeseen losses (Mariathasan and Merrouche, 2014).

Ayadi et al (2011), in a study titled Business models in European banking: before and after the crisis, and Ayadi et al (2012), in another study titled European banking law and business models : Towards a new paradigm, investigated the issue of how the business model affects the performance of European banks. They, first, using cluster analysis, divided banks into two categories of the pre- and post-crisis according to the business model. They found that banks that

operated on a diversified, retail scale faced less crises as they managed the liquidity risk better. On the other hand, banks that operated on a wholesale scale faced many problems due to the lack of optimal liquidity risk management during the crisis.

James et al (2013) investigated the relationship between financial stability and banking competition in 10 African countries using data from 2005 to 2010. The results showed a positive sustained relationship between market power and financial stability.

Xiaoqing et al. (2014), using data from 14 Greater Asian economies for the period 2003 to 2010, assessed the impact of banking competition, concentration, and regulation on individual bank fragility as measured by the probability of bankruptcy and bank z-score index. Their results showed that higher concentration increased financial fragility, and low valuation power caused bank risk-taking (after controlling for the effect of macroeconomic factors, bank characteristics, and industry factors).

Abid et al (2014), in a study titled Macroeconomic and Bank-Specific Determinants of Household's Non-Performing Loans in Tunisia: a Dynamic Panel Data, using the data of 6 Tunisian banks, examined the factors affecting the non-performing loans of these banks for the years 2003 to 2012. The results indicated that not only macroeconomic factors such as gross domestic product, inflation and interest rate, but also mismanagement had an effect on non-performing loans.

Köhler (2014), in a study titled Which banks are risky? The impact of business models on banking stability, examined the impact of business models on banking stability in 15 European Union countries during 2002-2011. The results showed that during a period of financial crisis, retail banks that had income diversity were more stable compared to investment banks. On the other hand, investment banks, whose share of non-deposit funds was higher, were more stable compared to retail banks.

Frederik and Vander (2015) also, in a study titled Business model and its impact on bank performance: A long-term perspective, investigated the effects of bank business models on the performance of 500 banks from 30 European countries during the years 1998 to 2013. They used a panel data method of fixed effects. Their findings confirmed the effect of the business model on performance of the banks, but the condition of none of the banks was not better in all dimensions.

3. METHODOLOGY

In this research, in order to investigate the effect of the banking business model on bank stability, the panel data of 24 Iranian banks (19 private banks and 5 state banks) in the years 2011 to 2017 were used. The required data were collected using library research and note taking whereby the banking variables were extracted from the country's banks performance report and the macroeconomic variables were collected by examining the economic time series information available in the website of the IRI Central Bank.

The analysis of the available statistics was performed using the panel data econometric method. The model definition used in this study to investigate the impact of the banking business model is based on the approach adopted in Köhler (2014) as follows:

(1)

$$SDROA_{it} = \beta_0 + \beta_1 NDFS_{it} + \beta_2 NIIS_{it} + \beta_3 RGDP_{it} + \beta_4 INF_{it} + \beta_5 ER_{it} + \beta_6 BSIZE_{it} + \beta_7 BSTR_{it} + \varepsilon_{it}$$

In this model, $SDROA_{it}$ is the dependent variable and indicates bank stability. In this research, it is measured based on the approach of Miglani et al (2015) using Ziemski's inverse z-score. The explanatory variables consist of two groups. One group of indicators are related to the business model. In order to quantify the business model in banks, a series of economic indicators are mainly used, which are primarily focused on the diversification of income and the tendency of banks towards non-interest income sources, among which it can be referred to the ratio of non-interest income to total income ($NIIS_{it}$) and the ratio of non-deposit financing to total liabilities ($NDFS_{it}$) (Koehler, 2014). In this connection, it should be mentioned that, in Iran, the income of banks is divided into two general categories, shared and nonshared (fee) income, so that shared income is the same as the income from the interest of granted facilities and the profit from investments and deposits, and the non-shared income includes any type of income other than the mentioned items such as income from foreign exchange transactions, fees received, attorney's fees for the use of deposits, etc. Therefore, when calculating this ratio for Iranian banks, the ratio of non-shared income (as non-interest income) to total income is considered. Another group of the explanatory variables are control variables, which are divided into two groups of macroeconomic conditions such as economic growth (*RGDP*), inflation rate (*INF*) and exchange rate (ER_{it}) and bank specific conditions such as ownership structure ($BSTR_{it}$) and size of banks ($SIZE_{it}$). Bank size is measured as the logarithm of total bank assets. The ownership structure is included in the model as a dummy variable, assuming zero (0) for 5 state banks and one (1) for 17 private banks. In addition, U_{it} denotes the error term. The subscript *i* denotes banks in the statistical sample consisting of 5 state banks (namely Bank Melli, Bank Sepah, Bank Kashwarsi, Bank Maskan and Post Bank) and 17 private banks (namely Mellat Bank, Refah Bank, Bank Saderat, Tejarat Bank, Parsian Bank, Pasargad Bank, Shahr Bank, Karafarin Bank, Sarmayeh Bank, Sina Bank, Saman Bank, Eghtesad Novin (EN) Bank, Ansar Bank, Hekmat Iranian Bank, Tourism Bank, Ayandeh Bank, and Ghavamin Bank), and *t* indicates the understudy years from 2011 to 2017.

Therefore, since ib this study two variables are used to quantify the business model, two hypotheses proposed, which are:

H1. The ratio of non-deposit financing to total liabilities has a significant effect on bank stability in Iran.

H2. The ratio of non-interest income to total income has a significant effect on bank stability in Iran.

4. FINDINGS

Model estimation

At first, the F test was used to choose between the tabular and pooled structure, the results of which are presented in Table 1.

Table 1. Results of F-test for bank stability model

Description	Statistic value	df	Probability	Test result
F-statistic	10.75	(20 - 120)	0.000	H1 accepted

Based on the results of Table 1, considering that the probability value of the F test statistic is less than five percent, therefore, the null hypothesis suggesting the equality of the intercepts is rejected and the panel data method is chosen.

In the next step, to choose between the two methods of fixed effects and random effects, the Hausman test is used. In this test, the null hypothesis (H0) suggests the choice of the random method and the alternative hypothesis (H1) of the fixed effects method. Therefore, if the null hypothesis is rejected, the fixed effects method is accepted. The results of the Hausman test are presented in Table 2.

Table 2. Results of Hausman test for bank stability model

Description	Statistic value	df	Probability	Test result
$\chi 2$	5.23	7	0.000	H0 acceped

In Table 2, the probability value of the chi-square statistic (χ^2) is greater than 5%, hence the null hypothesis cannot be rejected. Therefore, the model estimation using the panel data with fixed effects method is more efficient than the random effects method. As the results of the F and Hausman tests suggest, the appropriate method for estimating the banking stability model is the use of panel data with the fixed effects method. Therefore, the model is estimated using the fixed effects method with the panel data of 24 banks in the years 2011-2017. The model estimation results are summarized in Table 3.

Table 3. Banking stability model estimation using panel data with fixed effects method

Variables	**Coefficients**	**Statistic**	**Probability**
Intercept	-4.023	-5.29	0.0000
Ratio of non-deposit financing to total liabilities	0.19	1.04	0.3171
Ratio of non-shared income to total operating income	0.66	2.35	0.0128
Exchange rate	-0.003	-2.99	0.0033
Economic growth	-0.0006	-0.29	0.7696
Inflation rate	0.008	3.26	0.0014
Ownership structure	0.01	1.34	0.7591
Bank size	0.42	6.34	0.0000
$R^2 = 0.89$		F = 37.2 p-value = 0.000	

Based on the model estimation results in Table 3, the coefficient of determination of the model is equal to 0.89 and indicates the good explanation of the explanatory variables in the model. This means that 89% of banks' stability is explained by the explanatory variables in the model. The F statistic is equal to 2.37 and its probability value is zero (less than 5%), which means that the whole regression model is significant. The t-statistic of the ratio of non-deposit financing to total debts is equal to 1.04 and its corresponding probability value is equal to 0.3171, so this coefficient is not statistically significant. Therefore, it can be said that at 5 percent significance the first hypothesis that "the ratio of non-deposit financing to total debts has a significant effect on the stability of banks in Iran" is not accepted. Therefore, whether banks operate based on their business model or not, it will not affect their stability. The t-statistic of coefficient of the ratio of non-common (non-shared) income to the total operating income of banks is equal to 2.35 and its corresponding probability value is equal to 0.0128, so this coefficient is statistically significant. Therefore, it can be said that at 5 percent significance the second hypothesis that the ratio of non-interest income to total operating income has a significant effect on the stability of banks in Iran is accepted. In addition, given the positive coefficient of the aforementioned variable, if the banks move towards non-shared income based on the income earning approaches in the business model, their banking stability will increase, so that with one percent increase of non-shared income to the total operating income in the country's banking system, their stability will increase by 10 percent. Among bank-specific control variables, i.e., bank size and bank structure, only bank size has a significant and positive effect on the stability of banks, and the private or state ownership of banks has no effect on their stability in Iran. Among the macroeconomic control variables, the economic growth rate at 5 pe5 significant level has no significant effect on the

stability of banks, while the two variables of exchange rate and inflation rate have a significant, negative and positive effect on the stability of banks in Iran.

6. DISCUSSION AND CONCLUSION

Considering the importance of financial stability in banks, it seems necessary to identify the variables and ratios affecting the financial stability of the bank. Identifying these variables and ratios individually can improve financial stability in the banking system. In this connection, the factors affecting banking stability can be divided into two categories, including the conditions and characteristics of banks' activities and environmental and institutional conditions. In the meantime, the business model is considered as one of the first category factors, which can affect banking stability based on income, financing, budget, and asset structures. For this matter, the question we seek to answer in this study is whether the business model has had a significant impact on the stability of banks in Iran in the years 2011 to 2017. For this purpose, the factors affecting banking stability along with the business model have been estimated in the form of a multivariate regression model and using panel data and fixed effects model of 24 banks during the mentioned period. According to the estimation results, the variables bank size and the ratio of non-shared income to total operating income had a positive and significant relationship with the variable bank stability. The variable exchange rate had a negative and significant relationship with the variable banking stability. Meanwhile, the variables ownership structure and economic growth had no significant relationship with the variable bank stability. These results are consistent with the findings of James et al (2013), Xiaoqing et al (2014), and Abid et al (2014).

According to the obtained results in this study, it is suggested that policymakers and bankers plan to control and manage these variables in order to increase banking stability, including paying special attention to exchange rate and inflation rate, and creating conditions for economic stability in this field can be very effective. Because these two variables fluctuate a lot in the understudied period, affecting the economic standing of people.

In addition, it is necessary to review the model and method of customer validation in the banking system so that along with proper and accurate validation of the information of companies and individuals, it is possible to identify the right customers and reduce moral hazards.

7. SUGGESTION

Further, it is suggested:

- Supervision of the system of granting bank facilities as well as the full implementation of the Basel guidelines should be taken into consideration by the Central Bank and other banks.
- The full implementation of the bank deposit interest rate guidelines should be paid attention to by the banks, so as to control interest payments and increase banking stability.

- The central bank should provide solutions and instructions to prevent banks from overextending their activities to other businesses and their entry into certain economic activities.

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ETHICAL CONSIDERATION

Authenticity of the texts, honesty and fidelity has been observed.

AUTHOR CONTRIBUTIONS

Planning and writing of the manuscript was done by the authors.

CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.

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