

REVENUE DIVERSIFICATION AND BANK PERFORMANCE: EVIDENCE FROM TURKEY

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Abstract

Over the last three decades, the financial industry in developed as well as in developing countries has experienced major changes. One of these changes is revenue diversification on banking sector. The main purpose of our study is to examine the effects of income diversification on bank performance. Scope of Research is taken as the sample deposit banks operating in Turkey. Using the data of 14 banks between 2010 and 2017, variables were analyzed with dynamic panel data. Because of Herfindahl–Hirschman Index (will be addressed as HHI fore after) widely used to measure diversification, we used HHI for analyzing the revenue diversification. In the model, the return on assets (ROA) was taken as the dependent variable representing the bank performance, and the criterion of revenue diversification was HHI (Harfindal Hirschman Index) as the independent variable and other control variables were added. The panel GMM technique was used because of its some features. According to the results; there is a negative significant relationship between HHI Index and bank performance. It means that revenue diversification has a positive effect on bank performance. Results of control variables are also largely consistent with expectations.

JEL Classification: G21

Keywords: Bank Performance, Income Diversification, Panel GMM

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1. Introduction

As the most important part of the financial system, banks play an intermediary role in lending surplus funds to deficit units. In this role, households, businesses and governments fall back on banks for credit. Thus, in well-functioning economies, banks tend to act as quality controllers for successful, capital-seeking projects, ensuring higher returns and enhancing growth.

Over the last three decades, deregulation and increased competition have led banks to expanding their activities and developing new lines of businesses besides their traditional interest activities. In relevant literature, such activities are known as diversification.

Banks' income diversification involves banks' activities to gain income not only from conventional interest sources, but also from non-interest sources, such as financial services provided by a bank to its customers, e.g., transfer and trading commissions, credit, e-banking, and so on (Syahyunan *et al.*, 2017).

In banking literature, it is known that revenue diversification, in general, reduces the risks of loan failure. This strategy leads to greater diversification of income sources, which might help banks reduce risks and stabilize profits. However, banking institutions may reach a point of disintermediation by expanding non-interest product activities. Some non-interest generating activities are associated with much higher risks than other income sources and, therefore, they could contribute towards the destabilization of both individual banks and the entire banking system (Brahmana *et al.*, 2018).

The impact of diversification on bank performance is neither theoretically nor empirically certain. According to the portfolio theory, diversified banks benefit from economies of scope that improve performance. Incomes from different sources, which are uncorrelated or imperfectly correlated with each other, result in steady and stable streams of overall bank profits. Otherwise, if the diversified activity is inherently riskier than traditional banking business, the costs of diversification may outweigh its benefits, and banks may become riskier and their overall performance may deteriorate (Nisar *et al.*, 2018). So, in our hypothesis, we will expect a positive relationship between revenue diversification and bank performance.

The essential motivation of this study is to test the effect of diversification on bank performance. In order to assess the effect of revenue diversification on bank profitability in emerging economies, we focused on the case of Turkey. This way, our results can be valid for similar countries, since banking systems in emerging countries have similar characteristics.

This study contributes to relevant literature by examining the strictly regulated Turkish banking sector with a new dataset. This relationship between bank performance and diversification has not been thoroughly examined for the case of Turkish deposit banks. In this aspect, our paper can bridge the gap in existing literature, as

it focuses on the effect of banking diversification in developed markets, yet neglects emerging markets like Turkey. To this end, we conducted our empirical investigation over 8 years using a sample of 14 commercial banks in Turkey.

In Turkey, the financial sector has grown at a tremendous rate over the last 35 years. During the 1990-2003 period, quite a high number of bank failures occurred due to structural problems of the Turkish economy and the fragilities of the Turkish banking sector. As of May 2018, there are a total of 50 banks in the Turkish banking sector, including 32 deposit banks, 13 development and investment banks and 5 Islamic banks (BAT, 2018). However, some bank data are not comprehensive. In addition, since some banks probabilities/profitabilities are negative, HHI is not an applicable measure for these banks. As a result, our sample consists of 14 banks.

We hope that this paper will contribute to relevant literature, especially concerning cases of emerging economies, by identifying the relationship between diversification and bank performance. It is expected to provide useful information about Turkey and similar emerging countries. This study proceeds as follows: literature review, data methodology and results of models.

2. Literature

There are two theories in relation to revenue diversification, namely, the resource-based theory and the risk reduction theory. The diversification decision may be related to the efficiency and risk management of a bank, where joint production of a wide range of financial services should increase the bank's efficiency due to economy of scale (Brahmana *et al.*, 2018).

Previous studies on bank revenue diversification have mainly focused on the benefits of diversification. Three aspects have been observed in literature. The first one concerns the relationship between income diversification and operating performance (Gürbüz *et al.* 2014; Meslier *et al.*, 2014; Alhassan, 2015; Brahmana *et al.*, 2018). The second one concerns the relationship between income diversification and bank risk (Zhou, 2014; Edirisuriya *et al.*, 2019). The third aspect of bank diversification is its effect on bank stability (Amidu and Wolfe, 2013; Nguyen *et al.*, 2012; Syahyunan *et al.*, 2017; Dwumfour, 2017; Abuzayed *et al.*, 2018) . We present a few studies below:

Chiorazzo *et al.* (2008) studied the correlation between non-interest revenue sources and profitability for Italian banks. They found that income diversification increases risk-adjusted returns.

Türkmen and Yiğit (2012) examined the effect of sectoral and geographical diversification on the performance of Turkish banks and tried to show how diversification affects it. The authors used ROA and ROE as measures of performance and Herfindahl Index (HI) as a measure of bank diversification. Results indicated that dependent variables are explained by diversification.

Nisar *et al.* (2018) investigated the impact of revenue diversification on bank profitability and stability in South Asian countries. Overall revenue diversification into non-interest income was found to have a positive impact on the profitability and stability of South Asian commercial banks.

Meslier *et al.* (2014) examined the impact of bank revenue diversification on the performance of banks in an emerging economy, and results indicated that foreign banks benefit more from such a shift than their domestic counterparts.

Alhassan (2015) investigated the non-linear relationship between income diversification and efficiency of Ghanaian banks. His results revealed high levels of efficiency in cost compared with profit to reflect high inefficiencies on the revenue side.

Sissy *et al.* (2017) analyzed the implications of revenue diversification and cross-border banking for risk and return in 29 African countries and results suggested that banks cross borders to diversify across revenue-generating activities. The authors' analyses further showed that banks in Africa derived absolute benefits from diversification if they cross borders while concurrently diversifying their revenue base.

Brahmana *et al.* (2018) investigated the diversification effect on banks' performance using Malaysian banks. In their study, panel regression results showed that income diversification increases a bank's performance confirming the risk reduction hypothesis.

Gürbüz *et al.* (2013) investigated the relationship between non-interest income generating activities and risk-adjusted bank performance; his investigation used GMM for Turkish deposit banks. Authors' results showed that income diversification increases the risk-adjusted financial performance of Turkish deposit banks.

There are a variety of studies that analyzed diversification and bank performance. Deregulating initiatives, which took place in both Europe and the U.S. during the last decades, resulted in an expansion of the scope of bank activities and a shift from traditional to non-traditional sources of income (Meslier *et al.*, 2014). So, a large body of research focuses on the impact of diversification for banks in developed countries, such as the U.S. and Europe (Chiorazzo *et al.*, 2008; Williams and Prather, 2010; Busch and Kick, 2009; Căpraru *et al.*, 2018). While in emerging economies a lot of papers analyze the effect of income diversification on bank performance (such as, bank profitability, risk, stability) in the case of developed countries, during the last years only a few papers have addressed this issue (Grassa, 2012; Nguyen *et al.*, 2012; Amidu and Wolfe, 2013; Adzobu *et al.* 2017, Alhassan, 2015; Sissy *et al.*, 2017; Khalatur *et al.*, 2018; Bapat, 2018; Nisar *et al.*, 2018). However, the empirical relationship between income diversification and bank performance has been found to vary in such studies (Chiorazzo *et al.*, 2008; Molyneux and Yip, 2013; Nisar *et al.*, 2018). Some studies have found evidence of a positive diversification effect on bank performance, like those by Busch and Kick, 2009; Turkmen and Yiğit, 2012; Gürbüz *et al.*, 2013; Gambacorta *et al.*, 2014. In contrast, there are other studies that did not

find any relationship between diversification and bank performance, such as those by Bapat, 2017; Adzobu *et al.*, 2017.

Our study is different from similar studies with regard to the methodology (both difference GMM and system GMM) and sample used.

3. Data and Methodology

Our database consists of 112 reports of annual bank data over the 2010-2017 period. Because of mergers, acquisitions, and banks being closed, it has been impossible to have some of the bank data from 2010-2017. And because of their different working principles, we removed Islamic banks from the sample population. In this manner, the sample finally consisted of 14 banks' annual data. Data came from Istanbul Stock Exchange (ISE) and from the banks' consolidated financial statements posted on their respective web pages for the years studied.

The endogeneity problem has been emphasized in some studies investigating bank performance and diversification, (Acharya *et al.*, 2006; Gürbüz *et al.*, 2013). One ignored variable (e.g., a management skill or the location of the bank) can affect both the income diversification level and the bank's performance. In addition, past and current performance can affect the decision to diversify and vice versa. The endogeneity problem can cause biased estimates in the analysis. In order to overcome a possible endogeneity problem in this study, we used dynamic panel data (Generalized Method of Moments-GMM), for several reasons. Primarily, the main purpose of using dynamic panel data is that the lagged values of dependent variables resulting from the fixed and random effects models and the estimators reached are inconsistent, since the lagged dependent variable is correlated with the error term when lagged dependent variables are used in the fixed and random effect models. This situation has also been observed in studies on this subject in relevant literature (Coşkun and Kök, 2011; Béjaoui and Bouzgarrou, 2014). Furthermore, the financial data used in the model can show highly dynamic effects depending on time (Tunay, 2014).

Differenced and system GMM estimators are considered appropriate for a dynamic panel dataset containing a small t (8 years) and a large N (14 banks), with unobserved fixed-effects and endogeneity between dependent and independent variables (Arellano and Bond 1991; Arellano and Bover 1995; Blundell and Bond 1998).

3.1 Empirical Model

The baseline regression for bank ROA is given by

$$ROA = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 DTA_{i,t} + \beta_3 ETA_{i,t} + \beta_4 HHI_{i,t} + \beta_5 LTA_{i,t} + \beta_6 NPL_{i,t} + \varepsilon_{it} \quad (1)$$

Description of the database is presented in the table below ;

Table 1. Description of Database

VARIABLE	SYMBOL	DEFINITION
BANK PERFORMANCE		
Return On Assets	ROA	The Ratio of Net Profit to Total Assets
DIVERSIFICATION		
HHI Index	HHI	The Sum of The Squares of the Share of Net Interest Income and the Share of Non-Interest Income over Net Operating Income
BANK-SPECIFIC CONTROL VARIABLES		
Bank equity	ETA	The Ratio of Equities to Assets
Bank deposit	DTA	The Ratio of Deposits to Assets
Bank size	LTA	The logarithmic for Total Assets
Non Performing Loan	NPL	The Ratio of Non-Performing Loans to Total Loans

We used HHI to measure diversification. This index is widely used for analyzing the diversification (Mercieca *et al.*, 2007; Gürbüz *et al.*, 2013; Amidu and Wolfe, 2013; Sissy *et al.*, 2017).

We used return-on-active (ROA) to test bank effectiveness and performance. ROA and other control variables are also used in various studies, such as those by Turkmen and Yiğit (2012), Beck *et al.* (2013), Acharya *et al.* (2006). In order to show profitability of all assets, we prefer ROA instead of ROE or NIM.

There are differences among sample banks with respect to assets, profitability, and other characteristic differences, which affect empirical results. By including control variables in the models, we tried to ensure that there is no independent variable, such as equity, deposit, size and NPL, excluded.

The asset variable is used to measure bank size. According to literature, larger banks may have better risk management and diversification opportunities; on the other hand, small banks are more flexible in their operations (Gürbüz *et al.*, 2013). There are a lot of papers that use the variable of bank size (Gürbüz *et al.*, 2013; Zhou, 2014).

To measure the financial leverage degree of a bank, the bank equity variable is added, following Gürbüz *et al.* (2013), Zhou (2014), Edirisuriya *et al.* (2019). A higher ratio of equity/total assets reflects risk aversion and protection against bank default risk.

The deposit variable is used to determine a bank's passive structure, following Zhou, 2014, Abuzayed *et al.* 2018. Besides, it is expected that the deposit amount has positive effect on bank performance.

NPL is a standard and widely used statistical value to measure the financial performance of a banking institution, as shown by Nguyen *et al.* 2012, Brahmana *et al.* 2018, Bapat 2018.

3.2 Empirical Results

Summary descriptive statistics of variables are shown in Table 2.

Table 2. Summary Statistics

VARIABLE	MEAN	STD.DEV.	MIN	MAX
ROA	0.012	0.007	-0.016	0.027
ETA	0.11	0.023	0.072	0.193
DTA	0.6	0.088	0.251	0.832
NPL	0.036	0.016	0.008	0.08
LTA	7.677	0.65	5.955	8.559
HHI	0.616	0.093	0.5	0.887

After determining the model the correlation between independent and dependent variables was tested. The matrix of correlation values for the series is shown in Table 3. There is no high correlation between variables.

Table 3. Correlation matrix

VARIABLES	ROA	ETA	DTA	NPL	LTA	HHI
ROA	1					
ETA	0.313	1				
DTA	0.12	0.197	1			
NPL	-0.07	0.199	0.004	1		
LTA	0.491	-0.27	-0.2	-0.17	1	
HHI	-0.24	-0.05	-0.2	-0.13	-0.35	1

First generation panel unit root tests were performed in order to determine the stability of the series.

Panel Unit root tests result are shown in Table 4. According to panel unit root test results, our variables are stable on their level values.

In order to decide whether or not there is cross-sectional dependence in the model, Pesaran's test of cross-sectional independence is performed. According to the results of this test, there is no cross-sectional dependence in either model.

In order to determine whether there is an autocorrelation problem between variables, Wooldridge test for autocorrelation in panel data was performed. According to the results of this test, no autocorrelation problem was found between variables.

Table 4. Panel Unit Root Tests

Variables	<i>Im Pesaran Shin</i>		<i>PP-Fisher ChiSquare Tests</i>	
	<i>Stat</i>	<i>prob</i>	<i>stat</i>	<i>prob</i>
ROA	-2.0411	0.0206	-6.1392	0.000
ETA	-4.4300	0.0000	-6.1724	0.000
DTA	-2.3314	0.0099	-1.9417	0.0275
NPL	-2.5522	0.0054	-6.6056	0.0000
LTA	-2.1133	0.0173	-6.6138	0.0000
HHI	-2.8258	0.0024	-4.0892	0.0001

To determine whether there is a heteroscedasticity problem between variables, Breusch-Pagan/Cook-Weisberg test for heteroskedasticity was performed. According to the results of this test, the heteroscedasticity problem is seen in our model.

Table 5. Heterocestasticity Autocorrelation Cross Sectional Dependence Problem

	Heteroscestasticity		Autocorrelation		Cross -Sectional Dependence	
	Breusch-Pagan / Cook Weisberg test		Wooldridge test for autocorrelation		Pesaran's test of cross-sectional independence	
	chi2(1)	Prob	F Value	Prob	Value	Prob
Model	0.84	0.3589	4.748	0.0483	6.331	0.0000

Based on all of these test results, it is possible to say our variables are robust. The results of our regression models are presented in table 6;

The first hypothesis of the Arellano-Bond test, which Arellano and Bond developed to test for the presence of autocorrelation of dynamic panel data models, is “no autocorrelation”. In order for GMM estimators to be effective, there should be no second-order autocorrelation in the remains (Tatoğlu, 2012). According to the findings, there is no first and second order autocorrelation in the remains of either model. The Sargan test deals with the validity of instrumental variables and it is a test involving overidentifying restrictions. The calculated values of Sargan test also support the analysis. Both lag values for profitability are statistically significant. It means that the previous year profitability is a factor in estimating the current year performance.

According to GMM results, the HHI variable is statistically significant for bank performance. In addition to HHI, with the exception of the NPL, all control variables are important for bank performance.

According to system GMM results, the HHI variable and all control variables are statistically significant on ROA.

According to both models, banks should make revenue diversification for their profitability. Compared to both models, it is seen that system GMM results are more valid than difference GMM ones.

Table 6. Regression Results

INDEPENDENT VALUES	DEPENDENT VARIABLE:	ROA		ROA	
		DIFF. GMM		SYSTEM GMM	
		Coef	prob	Coef	prob
	ROA (t-1)	0.313	0.025**	0.185	0.010**
ETA	0.216	0.000***	0.190	0.000***	
DTA	(0.013)	0.075*	(0.015)	0.056**	
NPL	(0.064)	0.370	(0.093)	0.058**	
LTA	0.009	0.095*	0.003	0.092*	
HHI	(0.026)	0.006***	(0.013)	0.028**	
Cons	(0.057)	0.156	(0.015)	0.378	
Specification Tests					
Number of Groups	14		14		
Number of Obs	84		84		
Wald x^2	70.57		106.39		
ProbChi2	0.000		0.000		
Sargan Test	26.44		11.33		
P Value	0.1518		0.99		
AR(1)	0.1147		0.1493		
AR(2)	0.6896		0.8451		

All models are estimated using GMM and System GMM, which are significant in all cases AR (1): a test of null of zero first-order serial correlation, distributed $N(0, 1)$ under the null. AR (2) test of null of zero second-order serial correlation, distributed $N(0, 1)$ under the null. Wald statistics: the test is a way of testing the significance of particular explanatory variables in a statistical model. Sargan test for validity of over-identifying restrictions, distributed as indicated under null. This test of over-identifying restrictions is asymptotically distributed as χ^2 under the null of instrument validity.

***Denote significance at 1%, respectively. $p < 0.01$,

**Denote significance at 5%, respectively. $p < 0.05$

*Denote significance at 10%, respectively. $p < 0.1$

4. Conclusion

Especially in recent years, deposit banks have diversified their incomes all around the world, including Turkey. So, there are a lot of papers investigating the effect of diversification on bank performance.

The paper examines the impact of income diversification and some control variables (such as deposit/total asset, equity /total asset, credit/total asset and the log of total asset and non-performance loans) on bank performance. To this end, our study concentrated on the micro bank-level. We used data about 14 deposit banks for the 2010-2017 period. Depending on previous studies in relevant literature, we

use HHI for analyzing diversification. We used ROA as a performance dimension. We used the panel GMM technique due to both its advantages and our data characteristics.

According to results, there is a negative effect of HHI Index on bank performance indicator ROA. It is important that the results of both models are similar. By its formula, the fall of HHI is meant to reflect an increase in diversification. It means that there is a positive relationship between diversification and bank performance. As we expected, in addition to HHI, there is a positive significant effect of the ratio of equity to assets on bank performance. It has been shown that there is a negative relationship between the ratio of deposits-to-total assets and bank performance. There is a negative significant effect of non-performing loans to banks performance on system GMM. Similarly, it has been shown that there is a positive significant effect of the log of total assets on bank performance. Results of control variables are also largely consistent with expectations.

Our analysis findings have one main implication for regulators, bank managers and investors concerning income diversification in Turkish banks. The positive effect of income diversification on banking performance may be a result of increased income of the bank or reduced operating costs of the bank brought about by diversifying operations.

Lastly, it should not be ignored that we have a relatively limited sample period and all sub-categories of non-interest income generating activities as a whole are limited, too. In future studies on the effects of income diversification, a longer sample period can be used and the effects of sub-categories of non-interest income generating activities can also be investigated. In addition, investigations should make a distinction between highly diversified revenue and low diversified revenue.

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