The Impact of Non-Interest Income on Banks' Profitabilities

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Abstract—**For the year of 2011, non-interest income rates had positive significant impact on 205 countries banks' return on asset ratios. Moreover, for the period of 1999-2013, there was positive and significant relationship between high income countries' banks' profits and non-interest income rates. No relationship was found for medium and low income countries. According to Break Regression-OLS test, non-interest income had positive and significant impact on Turkish banks' profits for the all breaks of January 2003- July 2015. In addition, when Bayesian Impulse Response analysis was conducted, it was unearthed that one standard deviation shock plummetes Turkish banks' profits. Although Turkish banks' non-interest income rose fast in the long run, there are negative anomalies in short term. In addition to that, Turkish banks' net income has partial golden ratio behaviour and that golden ratio behavior derives from Turkish banks' non-interest income. Moreover, that golden ratio behavior has similarity with Sydney Opera House' architectural design which is based upon Golden ratio application.**

Index Terms—**non-interest income, net income, Turkish banks' profits, golden ratio, Sydney opera house**

I. INTRODUCTION

In recent years, non-interest income is important accounting component for banks' revenue. Interest rates diminished globally and operating expenses have been increasing. That circumstances led banks profits margins to plummet. Banks globally can succumb to systematics risk. Therefore, banks have to increase their reserve ratios and equities as much as possible. In the literature, it has been discussed that some banks have risks in non-interest income operations. Due to the overdiversification of non-interest revenue, banks can face with tail risks. The main objective of that research is to unearth the impact of non-interest income on 205 countries banks' profits and Turkish banks' profits and apply golden ratio technique on Turkish banks' net income.

II. LITERATURE REVIEW

Ref. [1] found an inverse relation between non-interest income and U.S. banks' profits from 1989-2011. Ref. [3] researched about the small capitalized European banks by taking into account income diversification. Inverse relation was diagnosed between non-interest income and profits of 755 European small banks for the time span of 1997 – 2003.

Ref. [4] unearthed a positive correlation between non-interest income and banks' default risk in small European banks between the period of 1996-2002.

Ref. [5] observed the relation by utilizing the U.S. banks' data. It was mentioned that income diversification augmented U.S. banks' risks.

Ref. [7] researched the correlation between income diversification and net income of Italian banks. It was indicated that income diversification could augment Italian banks' returns and that correlation was more transparent at big-asset sized banks between 1993-2003.

Ref. [8] unearthed a positive relation between European bank's revenue diversification and the market's expectation on future European bank's net income between the years of 1989-2004.

Ref. [9] unearthed that income diversification had a positive impact on profits of developing market banks.

Ref. [10] analysed the specific determinants of the banks in Turkey between the time span of 2002 to 2010. They indicated that non-interest income had a positive and crucial impact on Turkish banks' profitabilities.

Ref. [11] unearthed that higher fee-based income augmented German globalized banks' profits between the period of 1995-2007.

Ref. [12] mentioned that within last 30 years, non-interest income component of banks have been more important globally. By applying System-Generalized Method of Moment methodology, Ref. [12] indicated that non-interest income augmentation significantly rose risk adjusted Turkish banks' profits on assets and risk adjusted profits on equity between the years of 2005-2011.

III. THEORETICAL FRAMEWORK

Systematic risks led lower interest spread and high operating expenses globally and for Turkey. Due to the lower interest rate margins, Turkish banks and other countries banks' have many types of income generating service fee.

IV. HYPOTHESIS TESTS

A. For 205 Countries, hypotheses have been constructed.

Due to the systematic risk, interest rate spreads have been decreasing across the globe. That circumstance caused banks to increase their non-interest income facilities. The objective is to measure the 205 countries' banks' non-

interest income impact on 205 countries' banks' return on asset ratios.

Hypothesis 1: For the year of 2011, the impact of non-interest income/total income ratio had significant positive impact on 205 countries' banks' ROA ratio.

Hypothesis 2: 205 countries' banks' ROA ratios were significantly and positively related with 205 countries' non-interest income between the years of 2005-2011.

Hypothesis 3: Low income countries' ROA ratios were significantly and positively correlated with non-interest income from 1999-2013.

Hypothesis 4: Medium income countries' ROA ratios were significantly and positively correlated with non-interest income between 1999-2013.

Hypothesis 5: High income countries' ROA ratios were significantly and positively correlated with non-interest income from 1999-2013.

B. For Turkey, a Hypothesis Has Been Constructed.

Turkish banks have many non-interest income components. Nevertheless, many bank customers are not satisfied with extra payments to banks and there are many court issues between banks and consumers. Turkish Banking Regulatory Authority has enacted many regulations about bank's non-interest income components. Nevertheless, due to the diminishing rate of Turkish banks' interest rate spreads and operating cost increases, banks have to increase net income by non-interest income components.

Hypothesis 6: Turkish banks' non-interest income had significant positive impact on Turkish banks' net income from January 2003- July 2015.

V. The Relationship between Non-interest Income and 205 Countries' Banks' Return on Assets

Pearson correlation analysis was conducted between 205 countries banks' return on assets and non-interest income. Annual data were collected. The time period is 2005-2011.

TABLE I. Correlation Analysis

Pearson Correlation	Correlation Degree	P value
ROA-NONINT2005	,324	0,00
ROA-NONINT2006	,339	0,00
ROA-NONINT2007	,323	0,00
ROA-NONINT2008	-,103	,129
ROA-NONINT2009	,006	,925
ROA-NONINT2010	,178	0,0009
ROA-NONINT 2011	,301	0,00

According to Table I, it can be indicated that before global financial crisis (2008), there was significant positive correlation between 205 countries bank's return on assets and non-interest income. At 2008 and 2009, there were no correlations between 205 countries banks' return on assets and non-interest income. At 2010 and 2011, there were significant positive correlations between 205 countries banks' return on assets and non-interest income. It can be interpreted that after global financial crisis, interest rate spreads diminished worldwide. In order to increase profit margins, banks increased their non-interest income. After that analysis, for the year of 2011, 205 countries' data were

collected. Non-interest income impact on banks' return on asset ratios were measured for 205 countries. Cross sectional regression method was used. Cost to income, credit to deposits, private credits, banks Z scores were used as control variables. Table III indicates that non-interest income of 205 countries' banks had significant positive impact on 205 countries banks' return on assets ratios at the year of 2011.

TABLE II. Correlation Analysis

Correlations	Correlation Degree	P value
Low income	,107	,704
Medium income	-,104	,713
High income	,646**	,009

TABLE III. Cross Sectional Regression Analysis

Cross Sectional Regression For the World	Beta Coefficient	P Values
Constant		0.011
Cost to Income	-0.327	0.000
Credit to Deposit	0.143	0.032
Non-Interest Income/Total Income	**0.461**	**0.000**
Private Credit	-0.342	0.000
Z Score	0.257	0.000

**. Correlation is significant at the 0.01 level (2-tailed).

Table II. indicates about the correlation between non-interest income and banks' profits for low, medium, high income countries for the period of 1999-2013. It was found that there was no significant correlation between low and medium income countries' banks' non-interest income and profits. In addition, high income countries' banks' non-interest income rates are positively and significantly correlated with high income countries' banks' profits

VI. The Impact of Non-interest Income on Turkish Commercial Banks' Net income

OLS break regression test was conducted. Coefficient-covariance matrix was choosen as HAC. The Kernel was Quadratic Spectral. Bandwith was choosen as Andrews. For break selection, Global L breaks & none with unweighted max was used. Turkish banks' personal loans and commercial credits were used as non-breaking variables. According to OLS-Break Regression test (Table IV), non-interest income had significant positive impact on Turkish commercial banks' net income between the period of January 2003- July 2015. Both data were first differenced and stationary.

TABLE IV. OLS Break Regression Results

Independent Variable:Non-interest income	Monthly Interval	P value
D(NON-INTEREST)	2003M01-2004M10	0.01
D(NON-INTEREST)	2004M11-2007M01	0.00
D(NON-INTEREST)	2007M02-2009M01	0.00
D(NON-INTEREST)	2009M02-2010M11	0.00
D(NON-INTEREST)	2010M12-2012M09	0.00
D(NON-INTEREST)	2012M10-2015M07	0.00

VII. BAYESIAN IMPULSE RESPONSE ANALYSIS

Bayesian Impulse response analysis was conducted. Bayesian VAR analysis was done. Litterman/ Minnesota method was applied with Diagonal VAR estimate. Tightness lambda was adjusted to 1. Fig. I shows Bayesian impulse response analysis' result. It has been found that one standard deviation shock decreased Turkish banks' profits between the period of December 2002-July 2015. It can be argued that, at some intervals, negative non-interest income abnormalities had adverse influence on Turkish banks' profits.

Figure 1. Bayesian impulse response analysis result

VIII. APPLICATION OF GOLDEN RATIO ANALYSIS ON TURKISH BANKS' NET INCOME

In that application, Turkish banks' net income and Turkish bank's non-interest income relationship will be interpreted with golden ratio analysis technique.
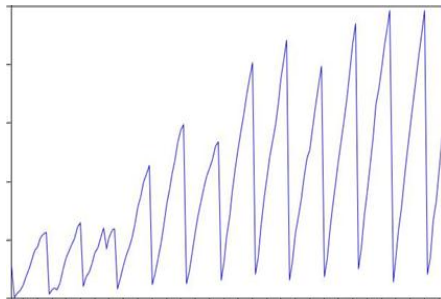

Figure 2. Turkish banks' net income

Golden ratio analysis was applied for the period of December 2002- July 2015. It can be interpreted that at some breaks, (Figure II), Turkish banks rose their net income fast by increasing their non-interest income fast. Moreover, radar plot analysis of Turkish banks' non-interest revenue and net income had implemented. In web spider graph (Figure III), golden ratio behaviours of series are clearly transparent.
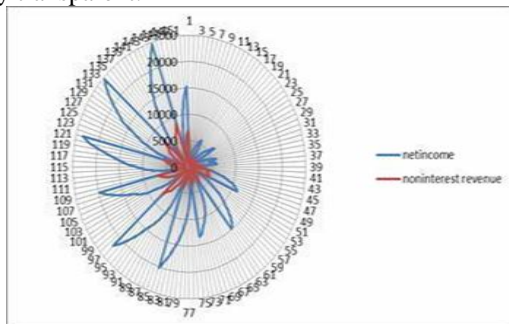

Figure 3. The relationship between non-interest income and net income

IX. SYDNEY OPERA HOUSE' GOLDEN RATIO BEHAVIOUR

Moreover, Turkish banks' non-interest income and net income have similar golden ratio structure with Sydney Opera House' golden ratio structure. Golden ratio technique had significant role for Sydney Opera House' design. When left consecutive three sharp surfaces of Sydney Opera House (Figure IV) analyzed from bottom to top, it can be clearly seen that golden ratio technique was used with "left or right Z trend". At Turkish banks' profits series (Figure II), there is also similar "left or right Z trend". After surface three from left, there is sudden decrease. First three surfaces have impulse behavior and last surface has corrective behaviour. It can be indicated that Sydney Opera House' architectural design has similarity with Elliot Wave theory. Similar trends have been found in Turkish banks' profits. Since Turkish banks' non-interest income has non-steady process, Turkish banks' net income has similar trend with Sydney Opera House' architectural design.
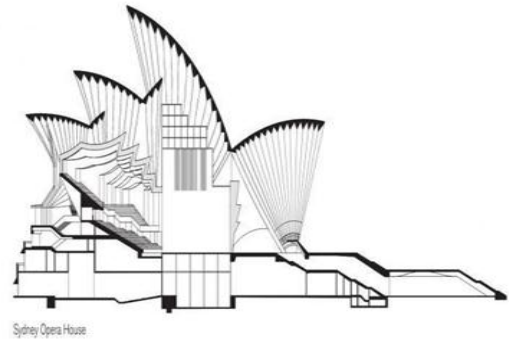

Figure 4. Sydney opera house

X. CONCLUSION

It can be indicated that non-interest income had important positive impact on banks' profits globally. There was positive and significant correlation between 205 countries' banks' return on asset ratios and non-interest income rates. Between the period of 1999-2013, the correlation between high income countries' banks' non-interest income rates and profits are significant and positive. No significant result was found for low and medium income countries. For Turkish banks, non-interest income is crucial for Turkish banks' profits for all breaks of January 2003-July 2015. The research result supports Ref [10]'s findings. They mentioned that from 2002-2010, Turkish banks' non-interest income had significant positive impact on Turkish banks' profits. It can be argued that non-interest income significance for Turkish banks' profits will continue. Although Turkish banks' non-interest income have been increasing in the long run, there are negative anomalies. In terms of non-interest income, Turkish banks have to be more stable. Lastly, that research indicates that Turkish banks' non-interest income and net income have partial

Fibonacci behaviour. Turkish banks' net income trends have similiarities with Sydney Opera House' golden ratio structure. That circumstance derived from the non-stable trend of Turkish banks' non-interest income. Research result shows that architectural techniques can be applied for financial research.

REFERENCES

[1] R. DeYoung and T. Rice, "Non-interest income and financial performance at U.S. commercial banks," *The Financial Review,* vol. 39, no. 1, pp. 101-127, 2004.

[2] ElliotWaveGraph, *Investopedia.* [Online]. Available: http://www.investopedia.com/ articles/technical/11140 1.asp

[3] S. Mercieca, K. Schaeck, and S. Wolfe, "Small European banks: Benefits from diversification?" *Journal of Banking and Finance,* vol. 31, no. 7, pp. 1975-1998, 2007.

[4] L. Lepetit, E. Nys, P. Rous, and A. Tarazi, "Bank income structure and risk: An empirical analysis of European banks," *Journal of Banking & Finance,* vol. 32, no. 8, pp.1452-1467, 2008.

[5] K. J. Stiroh, "Diversification in banking: Is noninterest income the answer?" *Journal of Money, Credit and Banking*, vol. 36, no. 5, pp. 853-882, 2004.

[6] Sydney Opera House Image- Sydney Living Museums. [Online]. Available: http://sydneylivingmuseums.com.au/public-sydney-drawing-city

[7] V. Chiorazzo, C. Milani, and F. Salvini, "Income diversification and bank performance: Evidence from Italian banks," *Journal of Financial Services,* vol. 33, no. 3, pp. 181-203, 2008.

[8] L. Baele, O. De Jonghe, and R. V. Vennet, "Does the stock market value bank diversification?" *Journal of Banking & Finance,* vol. 31, no. 7, pp. 1999-2023, 2007.

[9] S. Sanya and S. Wolfe, "Can banks in emerging economies. Benefit from revenue diversification?" *Journal of Financial Services Research,* vol. 40, no. 1-2, pp. 79-101, 2011.

[10] A. Deger and H. Anbar, "Bank specific and macroeconomic determinants of commercial bank profitability," *Business and Economics Research Journal,* vol. 2, no. 2, pp.139-152, 2011.

[11] R. Busch and T. Kick, "Income diversification in the German banking industry," Deutsche Bundesbank Eurosystem. Discussion Paper. Series 2: *Banking and Financial Studies.* No: 09/2009, 2009.

[12] A.O. Gürbüz, S. Yanik, Y. Aytürk, "Income diversification and bank performance: Evidence from Turkish banking sector," *BDDK Bankacılık ve Finansal Piyasalar*, cilt.7, ss.9-29, 2013.

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