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Determinants of Non-Life Insurer Profitability in Turkey [*]

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Erhan ÇANKAL [***]

Abstract: *Profitability is important for insurance companies as it is indicator of whether they are able to continue their activities and fulfill their obligations to policyholders. The aim of this study is to find out most important firm-specific and macroeconomic variables affecting profitability of non-life insurance companies in Turkey. The study for non-life insurance companies covers the period between 2006 and 2017 for 21 companies. ROA is used as measure of profitability. According to the fixed effects panel data model results: there is statistically significant positive relationship with size, liquidity, investment yield, age, GDP growth rate, interest rate and profitability while there is negative relationship with premium growth rate, loss ratio, leverage ratio, solvency and profitability.*

Keywords: *Insurance, Panel data, Profitability, ROA, Finance.*

Türkiye'deki Hayat-dışı Sigorta Şirketlerinin Karlılığının Belirleyicileri

Öz: *Karlılık sigorta şirketleri açısından faaliyetlerini devam ettirebilmeleri ve sigortalılara karşı yükümlülüklerini yerine getirbilmeleri konusunda bilgi vermesi nedeniyle önemlidir. Bu çalışmanın amacı Türkiye'deki hayat-dışı sigorta şirketlerinin karlılığını etkileyen en önemli firmaya özgü ve makroekonomik değişkenlerin bulunmasıdır. Çalışma 2006-2017 dönemini ve 21 hayat-dışı sigorta şirketini kapsamaktadır. Aktif karlılığı karlılık ölçütü olarak kullanılmıştır. Sabit etkiler panel veri modeli sonuçlarına göre karlılık ile büyüklük, likidite oranı, yatırım getirisi, yaş, GSYİH ve faiz oranı arasında olumlu yönde; prim büyüme oranı, hasar prim oranı, sermaye yeterliliği oranı ve kaldıraç oranı arasında olumsuz yönde ilişki tespit edilmiştir.*

Anahtar Kelimeler: *Sigorta, Panel veri, Karlılık, Finans.*

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I. Introduction

Insurance has been providing protection for people against damages of unwanted events such as flood, fire, car accident, earthquake or storms for years. People transfer the risks stemming from unwanted events to insurance companies in exchange for premiums. Insurance companies create pools through collected premiums and indemnify the people exposed to unwanted events from these pools.

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[*] Bu çalışma Analysis of Factors Affecting Profitability of Insurance Companies in Turkey: Panel Data Approach adlı doktora tezinden çıkarılmıştır.

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Insurance has been very effective way of risk transfer because of its functions. By paying affordable premiums during comfortable times people mitigate negative effects of unwanted events via insurance. In this way, insurance makes people get rid of anxieties, make plans more bravely. Insurance helps entrepreneurs develop new businesses by giving security. By creating huge funds via premiums and channeling them through financial markets, insurance finances those who need funds for creating new businesses or expanding existing businesses. As a result, insurance sector contributes to economic growth and welfare (Öner Kaya, 2015).

In order that insurers can keep providing coverage and meet their obligations to policyholders, they need sound financial performance. Companies having good financial performance can cope with difficulties, attract capital for growth opportunities and hence maximize shareholder wealth.

Profitability is constantly used as a measure of financial performance. It demonstrates how well a company has performed financially in previous periods and gives an insight about the company's future outlook. Potential investors, lenders, current stockholders, clients, regulators and the management benefit profitability in their analyses about the company. For those reasons and its importance, insurance company profitability has been attracting attention of researchers in recent years.

There are different measures as indicators of profitability. Return on Assets (ROA), Return on Equity (ROE), Technical Profitability Ratio, Profit Margin, Return on Invested Capital (ROIC) and Embedded Value Approach (EVA) are important profitability measures used by different stakeholders. ROA is frequently used as indicator of profitability in studies as the data needed to calculate it is easy to obtain and calculation of it is not difficult.

Literature review on the profitability of Turkish insurance sector has shown that there is no remarkable number of studies regarding the issue despite its importance. The aim of this study is to examine the factors affecting insurance company profitability in Turkey. It is believed that detecting these factors will help managers of insurers, investors, regulators and potential policyholders in making their decisions. For this purpose, this study is seeking the answer of this question: Which factors affect profitability of insurance companies in Turkey?

The hypothesis of this study is:

H_0: There are significant relationship between non-life insurer profitability and firm-specific factors and macroeconomic factors.

II. Assessment of Turkish Non-Life Insurance Industry

There are 63 active insurance, reinsurance and pension companies in Turkish insurance industry at the end of 2019. 59 of 63 companies operating in 2019 are stock companies, 2 of them are mutual company and 2 of them are the branches of international companies. Out of those 63 companies, 38 of them are non-life insurance companies, 5

of them are life insurance companies, 17 of them are life&pension companies and 3 of them are reinsurance companies (Ministry of Treasury and Finance, 2019).

High growth potential has been drawing attention of foreign investors in Turkish insurance industry. The ratio of foreign capital, which was around 7.5% in 2002, reached to 71.94% peak level in 2013 and again decreased to 67.89% in 2018. The number of companies whose equity consists of minimum 51% foreign share reached to 42 in 2018 from 12 in 2003 (Ministry of Treasury and Finance, 2018).

Nominal premium production of insurance industry in 2018 was 54.6 billion TL. The nominal premium production has been rising in an average annual rate of 18.75% since 2003 which was 4.96 billion TL. The real premium production, on the other hand, has been rising in an average annual rate of 7.93% since 2003 (Ministry of Treasury and Finance, 2018).

Assets of insurance, reinsurance and pension companies in 2018 are 178.42 billion TL. Assets of non-life companies are 60.8 billion TL, life companies are 1.8 billion TL, life & pension companies are 111.9 billion TL and reinsurance companies are 3.9 billion TL (Ministry of Treasury and Finance, 2018).

In 2018, 69.3% of financial assets were held in Government Bonds/Treasury Bills, 1.7% in stocks, 24.3% in other financial assets and 4.8% in mutual funds (Ministry of Treasury and Finance, 2018)

In Turkey, insurance activities are classified as life and non-life, in line with the regulation in the World. Insurance companies can operate either in life or no-life branches. Share of non-life premium production in total production has been very high in comparison to life for years. In 2018, 84.11% of total gross premium is underwritten in non-life branches, 15.89% was underwritten in life branches (Ministry of Treasury and Finance, 2018).

In total non-life premium production, 33.2% was produced in Motor Vehicle Liability branch, 16.4% in Land Vehicles (Kasko) branch, 14.6% in Fire and Natural Forces, 13.1% Sickness/Health, 11% in General Damages and 8.6% in other branches in 2018 (Insurance Association of Turkey, 2018). Motor Vehicle Liability branch consists of mandatory third party liability insurance (traffic insurance), facultative third party liability insurance and green card. Traffic insurance gets the highest share in this branch which is 94.3%. The reason why traffic insurance gets the highest share in total premium is that ownership and usage of motorized land vehicles are associated with high risks and the regulator obligates it in line with the most countries in the World. In most of the developing countries, Motor Vehicle Liability branch has been the main factor of development of insurance sector. Share of branches is shown in Figure 1.

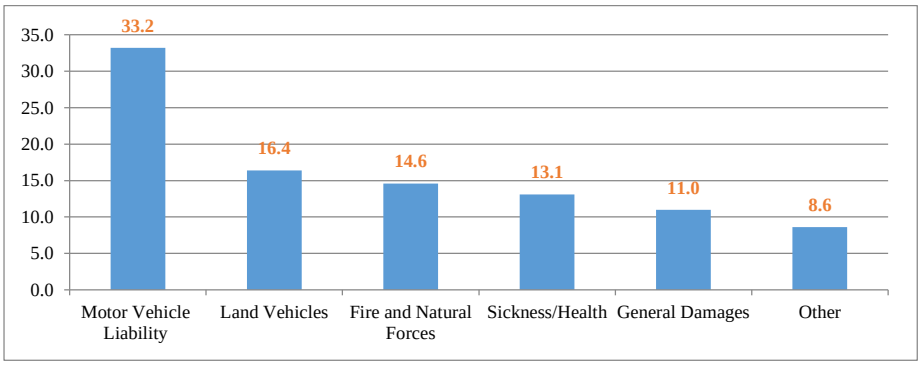

Figure 1: Share of branches in non-life premium production (%)
Source: Insurance Association of Turkey

Figure 2 shows us the fact that technical profits of motor vehicle liability branch and total-non life move together. We can also see from the figure that there is technical loss in motor vehicle liability branch in 10 of last 11 years. This branch pulls overall technical profit of companies down. Despite this situation, 30 out of 38 non-life insurers have license at this branch as of 2018. Most of the companies operate at this branch to increase recognition and it is easy to produce premium as the competition is based on price.

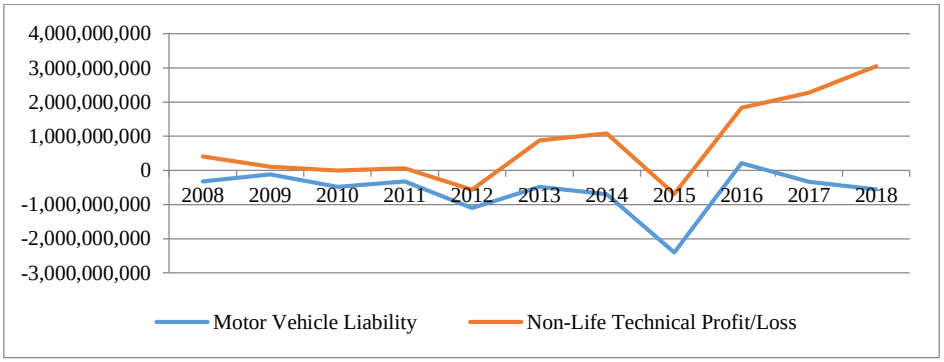

Figure 2: Technical profit data of motor vehicle liability branch and total non-life (TL)
Source: Ministry of Treasury and Finance

As it can be seen from Figure 2, technical profit of non-life insurance companies has been quite volatile during the period 2008-2018. The main reasons for this are 2008 global financial crisis which drove the demand for insurance products down, the verdict of Supreme Court (Yargıtay) in 2011 about the coverage of traffic insurance which caused technical provisions to go up, amendments in regulation about technical provisions in 2010 and 2015 which changed the estimation method of technical provisions for IBNR (Incurred But Not Reported), publication of Traffic Insurance General Conditions which started to cover value losses of vehicles after accidents in

2015, the premium volatilities because of high competition and price cap in motor vehicle liability branch and formation of Risky Insureds Pool (Pool) in July 2017 which was applied to the policies written after April 2017.

3. Literature Review

(Adams & Buckle, 2003) empirically examined the determinants of corporate financial performance among insurance/reinsurance companies operating in Bermuda by using panel data for the period 1993-1997. According to the results, financial performance is positively and significantly influenced by the leverage, type of company and underwriting risk. In contrast, liquidity has a negative and significant impact on financial performance. Moreover, company size and scope of operations are not significantly correlated with financial performance.

(Pervan et al., 2012) have investigated the determinants of profitability in the Bosnia and Herzegovina insurance industry between the years of 2005-2010 by using a dynamic panel model. According to the study, age of company, market share and past performance are positively and significantly related with current profitability. Claims ratio has a negative and significant influence on profitability. It is also found that foreign-owned companies perform better than domestically owned companies. There is no significant relationship between diversification and profitability.

(Mehari & Aemiro, 2013) have analyzed the impact of firm-specific factors on the ROA of nine Ethiopian insurance companies during the period from 2005 to 2010. According to the results, the financial performance of Ethiopian insurance companies is significantly and positively influenced by the size of the company, tangibility of assets and leverage while loss ratio has a negative and significant influence on financial performance. The results also show that the age of the company, growth in written premium and liquidity are not significantly related to financial performance.

(Burca & Batrinca, 2014) have investigated the factors that influence the financial performance of 21 insurance companies operating in the Romanian insurance market during the interval 2008-2012. ROA has been used as an indicator of the financial performance. By applying specific panel data techniques, the authors have shown that the determinants of the financial performance in the Romanian insurance market are financial leverage in insurance, company size, growth of gross written premiums, underwriting risk, risk retention ratio and solvency margin.

(Lee, 2014) primarily focused on the investigation of the firm-specific factors and macroeconomic factors that affect the profitability of Taiwanese property-liability insurance companies for the period 1999-2009. The study shows that operating ratio and ROA are affected significantly by the underwriting risk, reinsurance usage, input cost, return on investment and a member of a financial holdings group. Additionally, the economic growth rate has a statistically significant relationship with operating ratio. The results also show that the market share has a negative and significant effect on operating ratio while financial leverage is significantly and negatively related to ROA. Moreover,

firm size, firm growth, diversification, and inflation rates are not significantly correlated with operating ratio and ROA.

(Dorofti & Jakubik, 2015) empirically investigated the link between the macroeconomic environment and life and non-life insurers' profitability using 30 European countries' aggregate data for the period 2005-2012 by using dynamic panel approach. The results for non-life insurers show that GDP, stock market index, interest rate have positive; inflation has negative impact on ROE as well as ROA. The results for life insurers show similar results for ROE but the results of the models for ROA are a bit mixed not allowing a conclusion.

(Jadi, 2015) analyzed the determinants of financial performance of insurance companies based on their financial strength rating performance for 57 insurers in the United Kingdom over the period 2006-2010. The analysis include 8 firm-specific variables, which are leverage, profitability, liquidity, size, reinsurance, growth, type of business and organizational form. Rating transition matrices and regression models are employed in the study. The study establishes that profitability, liquidity, size and organizational form are statistically significant determinants of financial performance of insurance companies in the United Kingdom.

(Hailegebreal, 2016) has analyzed the effects of firm specific factors on ROA of Ethiopian insurance industry over the period 2004-2014. The study found that underwriting risk, technical provision, leverage and inflation have negative and significant effect whereas premium growth, age of the company, solvency ratio and GDP have statistically significant and positive relationship with the profitability of Ethiopian insurance industry.

(Berhe & Kaur, 2017) analyzed the effects of internal and external factors on ROA for 17 Ethiopian insurance companies for the period from 2005-06 to 2014-15. Results of the regression analysis revealed that size of insurance, capital adequacy, liquidity and GDP growth were the major factors that significantly affect the profitability of insurance companies. On the other hand, leverage ratio, loss ratio, market share and inflation rate were found to have insignificant effect on insurance companies' profitability.

(Veleva, 2017) analyzed the relationship between ROA and firm-specific factors for 23 non-life insurance companies in Bulgaria for the period 2006-2014 by using panel data. The study found that capital ratio, age and market share positively affects ROA while leverage ratio and loss ratio negatively affects ROA. Size of company seems to have no statistically significant effect on ROA.

(Ahmad & Prasetyo, 2018) analyzed the determinants of ROA for non-life insurance companies in Indonesia for the period 2011-2014. By using fixed effects model panel data approach, the study found that premium income, underwriting income and risk-based capital have positive and significant impact on ROA. Meanwhile, liquidity and growth variables have positive but no significant effect on the ROA.

(Doğan, 2013) examined the influence of firm-specific factors on ROA of insurance companies listed on the Istanbul Stock Exchange for the period 2005-2011. According to the results of multiple regression and correlation methods used in the study, there is a positive and significant relationship between the size and ROA of insurance companies. However, ROA is influenced significantly and negatively by loss ratio, leverage ratio, current ratio and age of the company.

(Öner Kaya, 2015) investigated the firm-specific factors affecting the profitability of 24 non-life insurance companies operating in Turkey for the period 2006-2013 by using panel data. In the study, profitability is measured by technical profitability ratio and sales profitability ratio. According to the study, the firm-specific factors affecting the profitability of Turkish non-life insurance companies are size of the company, age of the company, loss ratio, current ratio and premium growth rate.

(Öner Kaya & Kaya, 2015) investigated the firm-specific factors affecting the ROA of 17 life insurance companies operating in Turkey for the period 2008-2013 by using panel data. According to the study, it has been identified that age of company and gross written premiums have a significant and positive effect on ROA. However, the size of company, current ratio, and insurance leverage ratio have significant and negative impact on ROA.

IV. Empirical Analysis

A. Econometric Background

"Panel data refers to pooling of observations on cross-section of households, countries, firms, etc. over several time periods" (Baltagi, 2005, p. 1). Panel data consists of values of N number of units for different time periods. In other words, it combines cross section and time series data. The number of units is expressed as "N" and the number of periods is expressed as "T".

Advantages of panel data are increasing efficiency, controlling for individual heterogeneity, giving more informative data, decreasing multicollinearity problem, and establishing more comprehensive models. Limitations of panel data are short time series problem, collecting data problem and cross-sectional dependence.

Panel data contains data of units and each unit has individual-specific features. The variables reflecting features of units are called individual-specific effect. Individual-specific effect is a variable that change over units but is fixed over time. Skills for persons or manager skills for firms are examples of individual-specific effect. Every time period may also have specific features. The variable reflecting features of time is called time effects such as financial crises, earthquakes. "Time effect is a variable that is fixed over units but change over time" (Yerdelen Tatoğlu, 2018, p. 5).

While working with panel data, detection of individual-specific effects and time effects and whether these effects are one way or two way determine the type of panel data model.

Panel data regression is different form cross-section or time-series regression because double subscript is used on panel data variables.

$$Y_{it} = \alpha + \beta_{1it} X_{1it} + \beta_{2it} X_{2it} + \ldots + \beta_{kit} X_{kit} + u_{it} \quad i=1,\ldots..,N \; ; \; t=1,\ldots..,T$$

where i denotes units such as individuals, firms, households, countries (cross-section dimension) and t denotes time (time series dimension). α is constant term, β_{kit} is Kx1 and X_{it} is the *it*th observation on K explanatory variables. u_{it} is error term which is assumed that it is identically and independently distributed with zero average and constant variance for all time periods and units.

$$u_{it} = \mu_i + \lambda_t + \upsilon_{it}$$

where μ_i denotes the unobservable individual-specific effect that is time invariant and not included in the regression, λ_t denotes unobservable time effects which is individual invariant and not included in the regression and υ_{it} denotes the remainder stochastic disturbance term. Most of the panel data models contain individual-specific effects but not time effects and therefore most of the panel data models are one way error component model. For this reason, the remaining of this study will continue according to one-way error component model.

In fixed effects panel data model, the individual-specific effects are assumed to be fixed parameters to be estimated. Independent variables are assumed to be uncorrelated with error term (υ_{it}) but can be correlated with individual-specific effects (μ_i). In fixed effects model, by transforming variables μi is eliminated from the model. Transformation is done by averaging variables over time and subtracting average values from the initial values.

In random effects panel data model, the individual-specific effects are assumed to be random parameters to be estimated. Independent variables are assumed to be uncorrelated with error term (υ_{it}) and individual-specific effects (μ_i). Contrary to fixed effects model which inserts individual-specific effects into constant term, random effects model inserts individual-specific effects into error term (u_{it}).

B. Data and Descriptive Statistics

The scope of the empirical analysis for Turkish non-life insurers is a period of 12 years between 2006 and 2017. Depending on the existence of data, 21 out of 38 non-life insurance companies active in Turkey as of 2017 was selected for the study. These companies represent 82% of the Turkish non-life insurance industry in terms of premium size in 2017. To obtain balanced data, companies having data for all years were included in the study. Stata 13 has been used to obtain results.

ROA is used in this study as the profitability measure for non-life insurance companies. ROE is not used because it fluctuates extremely for the determined period causing regression to generate inaccurate results.

Annual data of non-life insurance companies were used in the study. The data was obtained from Ministry of Treasury and Finance, Turkish Statistical Institute and Central

Bank of Turkey. The data of 21 non-life insurance companies operating in Turkey in 2006-2017 period were brought together to obtain 252 observed panel data sets.

C. Definition of variables

Return on Assets (ROA) is used as measure of profitability in this study as it is widely used and the data is available. It is calculated by dividing net income by total assets. It shows how much profit has been generated by one unit of asset and it is indicator of how efficiently assets are used. The greater the ROA, the better the company performs. It is utilized by comparing other companies' ratios or industry average and it is easy to calculate.

The firm-specific and macroeconomic drivers of profitability used in this study are as follows:

Loss Ratio: "Loss ratio, which is also expressed as the underwriting risk in the relevant literature, demonstrates the effectiveness of the underwriting activities of insurance companies" (Öner Kaya, 2015, p. 517). Loss ratio is one of the most important determinants of insurers since it includes both the claims payments expected to be the biggest source of cash outflow and the insurance premiums expected to be the biggest source of cash inflow to the insurance company. It is calculated by diving incurred claims to net premiums (earned premiums).

Premium Growth Rate: Premiums are the most important source of income for insurers. Premiums are collected from clients after an insurance contract is made and invested in different kinds of instruments such as treasury and corporate bonds, stock markets, savings account. Premiums generate income for insurers till claims payments are made. Premium levels have to be determined in accordance with the risk levels of policyholders. Aggressive premium production which is not compatible with the risks taken could cause high loss payments, depletion of equity capital and thus financial distress costs. Premium growth is expected to increase profitability as long as related costs are lower than generated income.

Liquidity: Liquidity signifies a company's power to repay its short-term liabilities. While high liquidity gives power to pay short-term liabilities and hence financial strength, it may also cause waste of sources and affect company's profitability negatively. In normal economic circumstances, fixed assets generate more investment returns than current assets do (Sayılgan, 2010). Having high liquidity means surrendering more profitable investments. If a company misses more profitable investment opportunity, then it will generate less cash in the future meaning that its financial strength will be affected negatively. The balance should be established considering financial strength and profit opportunities.

Leverage ratio: Trade-off Theory states that the value of a levered firm is equal to the value of an unlevered firm plus the value of any side effects, which include the tax shield and the expected costs due to financial distress (Brigham & Ehrhardt, 2011). According to this theory there is a trade-off between tax advantage and increasing probability of

financial hardship resulting from debt repayments. Insurance companies assign technical provisions for probability of paying claims resulting from policies sold. Liabilities of insurance companies mostly consist of technical provisions (82% for non-life insurers, 73% for life insurers in 2018 in Turkey). Insurance companies pay back policyholders in the form of claims only if the risks covered in the policies happen and the time of payment is uncertain. Equity capital plays buffer role in the event that net claims incurred exceed premiums plus investment return. Thus, leverage ratio gives us the capital structure and financial soundness of a company. It is calculated by dividing liabilities to capital. It shows us what percentage of capital is acquired by liabilities. Total liabilities consist of short term liabilities and long term liabilities. Total capital consists of total liabilities and equity.

Size: Major insurance companies are expected to respond quickly to changes in the market conditions compared with small companies, diversify the risks they accept in an effective way, employ more qualified labor power in an easier way, and in particular, benefit from the economies of scale concerning labor cost (Shiu, 2004).

Age: Age of the company is expected to affect profitability in positive ways. Experience and corporate reputation increase with an increase in age of a company. Moreover, firms develop their capital and brand names as time passes (Kakani et al. 2001).

Solvency: Greater solvency ratios are indicators of financial strength and greater ability to meet responsibilities. Greater solvency enables good reputation for insurers and increases their sales which could raise profitability. However, greater solvency may be costly for insurers as holding sources in reserve funds could prevent productive use of sources.

GDP growth rate: During high GDP growth periods, unemployment is expected to decrease and stock market is expected to perform well. In this way, demand for insurance products and stock market return for insurers rise. Therefore, GDP growth is expected to affect profitability positively.

Interest rate: When interest rates increase, investment income of insurance companies also increases as they heavily invest in interest-bearing financial instruments.

D. Descriptive Statistics

Table 1 shows that the mean of ROA is negative and highly volatile. The main reasons for the volatility were stated in above. Premium growth rate is also highly volatile ranging between -92% and 1400%. High volatility in loss ratio, expense ratio, current ratio, leverage ratio and solvency also reflects the condition of the market for 2006-2017 period. Lastly, the mean value of current ratio which is 1.42 demonstrates that the market is liquid and investments are on short term.

Table 1: Descriptive statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
ROA	252	-0.01	0.11	-1.17	0.13
SIZE	252	0.21	0.27	-0.68	2.72
PREMIUM	252	0.25	1.05	-0.93	14.72
LOSS	252	0.74	0.17	0.26	1.56
LIQUIDITY	252	1.42	0.59	0.62	7.20
LEVERAGE	252	0.71	0.15	0.13	1.54
INVEST	252	0.07	0.04	-0.24	0.20
SOLVENCY	252	1.40	0.93	-1.50	8.68
AGE	252	44.73	26.32	5.00	101.00
GDP	252	0.05	0.04	-0.04	0.11
INTEREST	252	0.12	0.03	0.08	0.18

ROA: Return on Assets; SIZE: Asset Growth Rate of the Company; PREMIUM: Premium Growth Rate; LOSS: Loss Ratio; LIQUIDITY: Current Ratio; LEVERAGE: Leverage Ratio; INVEST: Investment Yield; SOLVENCY: Solvency Ratio; AGE: Age of the Company; GDP: Real GDP Growth Rate; INTEREST: 1-Year Interest Rate; Source: Results obtained using Stata13.

Before defining the variables, whether the series are stationary was tested. The panel unit root test by Levin, Lin and Chu (LLC) was used in this study to test if the series are stationary. The null hypothesis in LLC test is that panels contain unit roots. Based on the results of LLC test, because the probability values calculated are lower than the significance level of 5%, the null hypothesis was rejected for all variables.

Table 2: Unit root test results

Variable	*t*-statistic	p-value
ROA	-5.09	0.0000
SIZE	-7.59	0.0000
PREMIUM	-6.51	0.0000
LOSS	-3.18	0.0007
LIQUIDITY	-12.13	0.0000
LEVERAGE	-5.04	0.0000

INVEST	-6.27	0.0000
SOLVENCY	-10.52	0.0000
AGE	-	-
GDP	-8.8	0.0000
INTEREST	-9.63	0.0000

Source: Results obtained using Stata13.

Table 3 shows the correlation coefficients between the independent variables. According to the table, as there is no correlation equal to or above 0.8, we can say there is no multicollinearity. As a result, we can keep all the independent variables in our regression model.

Table 3: Correlation matrix

	SIZ	PRE	LOSS	LIQ	LEV	SOL	INV	AGE	GDP	INT
SIZE	1.00									
PREM	0.51	1.00								
LOSS	-0.07	-0.06	1.00							
LIQ	0.21	0.17	0.08	1.00						
LEV	-0.11	-0.13	0.19	0.61	1.00					
SOLV	-0.02	0.00	-0.18	0.45	-0.73	1.00				
INV	0.05	0.00	0.11	0.11	-0.21	0.15	1.00			
AGE	-0.13	-0.09	0.18	-0.09	-0.05	0.00	0.12	1.00		
GDP	-0.07	-0.03	0.01	-0.11	0.18	-0.12	-0.24	0.02	1.00	
INT	0.22	0.13	0.04	0.19	-0.22	0.14	0.27	-0.08	-0.48	1.00

SIZE: Asset Growth Rate of the Company; PRE: Premium Growth Rate; LOSS: Loss Ratio; EXP: Expense Ratio; LIQ: Current Ratio; LEV: Leverage Ratio; SOL: Solvency Ratio; INV: Investment Yield; AGE: Age of the Company; GDP: Real GDP Growth; INT: 1 Year Interest Rate; Source: Results obtained using Stata13.

4.5. Specification of the Model

The model used to measure the impact of both firm-specific factors and macroeconomic factors on the profitability of non-life insurers in Turkey is as follows:

$$ROA_{it} = \alpha + \beta_1 SIZE_{it} + \beta_2 PREMIUM_{it} + \beta_3 LOSS_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 LEVERAGE_{it} + \beta_6 SOLVENCY_{it} + \beta_7 INVEST_{it} + \beta_8 AGE_{it} + \beta_9 GDP_{it} + \beta_{10} INTEREST_{it} + u_{it}$$

To choose the correct model, firstly, if there is individual-specific effect was examined. F test and Score test were conducted for this purpose. H_0 hypothesis, all individual effects equal zero, is tested in F test. The test result demonstrates that H_0 is rejected meaning there is individual-specific effect. H_0 hypothesis, standard deviation of individual-specific effect equals zero, is tested in Score test. The test result demonstrates that H_0 is rejected meaning there is individual-specific effect.

After detecting there is individual-specific effect, Hausman test was conducted to choose between fixed effects model and random effects model. H_0 hypothesis, there is no correlation between independent variables and individual-specific effect, is tested by Hausman test. According to Hausman test result, H_0 is rejected, and fixed effects model is appropriate. The results of these three tests are stated in Table 5.

Table 4: Definition of variables

	Dependent Variable	**Formulas/Explanations**	
	ROA	net income/total assets	
	Independent Variables	**Formulas/Explanations**	**Expected Signs**
1	Asset Growth Rate (SIZE)	(current year assets-last year assets)/last year assets	+
2	Premium Growth Rate (PREMIUM)	(current year GWP-last year GWP)/last year GWP	?
3	Loss Ratio (LOSS)	incurred claims/net premiums earned	-
4	Current Ratio (LIQUIDITY)	current assets/current liabilities	?
5	Leverage Ratio (LEVERAGE)	total liabilities/total assets	?
6	Solvency (SOLVENCY)	solvency ratio calculated in accordance with formula in the regulation	?
7	Investment Yield (INVEST)	total investment return/total invested capital	+
8	Age of the Company (AGE)	the number of years during which the non-life insurance companies have been operating in the Turkish insurance industry	+
9	Real GDP Growth (GDP)	(current year real gdp-last year real gdp)/last year real gdp	+

10	Interest Rate (INTEREST)	1 year deposit rate	?

Source: Results obtained using Stata 13.

Table 5: F test, Score test and Hausman test results

	F/Chi-Square Statistic	**Probability**
F test	4.72	0.0000
Score	175.88	0.0000
Hausman test	63.63	0.0000

Source: Results obtained using Stata 13.

4.6. Regression Results

According to the results presented in Table 6, negative relationship between loss ratio and ROA is determined at 1% statistically significance level, as expected. This result is in line with the findings of (Öner Kaya, 2015), (Doğan, 2013), (Veleva, 2017), (Burca & Batrinca, 2014) and (Pervan et al., 2012). However, (Adams & Buckle, 2003) found that financial performance of insurance companies in Bermuda was positively related to underwriting risk. Our finding about loss ratio shows that losses are very important determinant of profitability. The losses comprise a significant part of insurer cash outflows and it reflects underwriting risk. The losses consist of paid claims and outstanding loss provisions. Both components have been increasing in Turkey in recent years. Non-life insurer actuaries have to set prices in accordance with risk levels to reduce loss ratio. Insurers should also increase efficiency in claims management process to reduce loss ratio.

Table 6: Regression results

Variable	**Coefficient**	**t value**
SIZE	0.0320	2.04**
PREMIUM	-0.0100	2.22**
LOSS	-0.5215	7.27***
LIQUIDITY	0.0194	2.21**
LEVERAGE	-0.3059	2.27**
SOLVENCY	-0.0186	1.83*
INVEST	0.4950	2.25**
AGE	0.0099	3.38***

GDP	0.1849	2.95***
INTEREST	0.7885	3.42***
Constant	-0.0016	0.03
Observations	252	
R-squared	0.7493	

Notes: 1) *, **, *** indicate significance at 10%, 5% and 1% respectively. 2) Autocorrelation problem in the model is thought to be serious as the result of Durbin-Watson (DW) test by Bhargava, Franzini and Narendranathan is 1.70 and the Locally Best Invariant (LBI) test by Baltagi and Wu is 1.93 which are below two (Yerdelen Tatoğlu, 2018, p. 226). 3) According to the results of Pesaran's test, Friedman's test and Free's test, as the null hypothesis is not rejected at 1% statistically significance level, there is no cross-sectional dependence in the model. 4) As p-value of Modified Wald test is 0.0000, there is heteroscedasticity in the model. 5) The estimator suggested by Arellano (1987), Froot (1989) and Rogers (1993) generating robust standard errors in existence of heteroscedasticity and autocorrelation by clustered standard errors was applied. Source: Results obtained using Stata 13.

Negative relationship between premium growth rate and ROA is determined at 5% statistically significance level. This should be because of the high risks undertaken and pricing policy. This result is supported by (Burca & Batrinca, 2014) for Romania. However, this finding conflicts with the findings of (Öner Kaya, 2015) and (Doğan, 2013). It is thought that the confliction stems from the specific features of the empirical period. There have been significant developments causing volatility in ROA of insurers in 2006-2017 period such as amendment in Regulation related to technical provisions and the publication of Traffic Insurance General Conditions. In this period, competition among insurers drove down premium per policy causing mistakenly pricing of risks. Implementation of price cap on traffic insurance policies also drove down average premiums. Our findings and the developments emphasize the importance of pricing and aggressive risk taking.

The negative relationship between leverage ratio and ROA is determined at statistical significance of 5%. This is because increasing technical provisions cause reduction in profitability because it is reflected in income statement as cash outflow reducing net profit of insurer. On the other hand, technical provisions have an advantage of tax shield. Our finding is supported by (Doğan, 2013), (Veleva, 2017), (Lee, 2014) and (Burca & Batrinca, 2014). However, it was not supported by (Berhe & Kaur, 2017). Leverage ratio is an indicator of capital structure and financial strength. The notion that is low leverage ratio means higher financial soundness is supported by our finding. Also the notion that is increased debt usage as capital decreases profitability because of financial distress costs is supported. Leverage ratio is very important for our country as technical provisions have been playing significant role in Turkey causing volatility in profitability in recent years. Ministry of Treasury and Finance gives freedom to insurance companies in estimation of technical provisions such as selection of estimation method. They should be calculated by actuaries of insurance companies properly in order to avoid decline in profitability and hence need for additional equity capital.

The positive relationship between age of insurer and ROA is determined at 1% significance level supporting the idea that increasing experience and reputation raises the company's profitability. This finding is in line with the results of (Pervan et al., 2012). However, it is contrary to the findings of (Doğan, 2013) and (Öner Kaya, 2015). It is concluded from our finding that shareholders should be patient in getting return from their investments in insurance business. The finding also emphasizes the importance of experienced managers and workers.

The positive relationship between interest rate and ROA is found at 1% significance level. It is concluded that Turkish insurers are exposed to interest rate risk. This is because insurance companies in Turkey invest most of their funds in interest income generating financial instruments. This finding is in line with findings of (Dorofti & Jakubik, 2015) and (Shiu, 2004). Positive relationship between interest rates and ROA is good for insurers when interest rates are high and bad when interest rates start to fall. Diversification of their investment portfolio will help reduce the risk.

The positive relationship between investment yield and ROA is found at 5% significance level as expected. As investment yield is a source of income, it causes increase in net income and hence profitability. Insurers should direct premiums collected to profitable investments as our finding states that investment yield is important for insurers.

The positive relationship between real GDP growth and ROA is observed, and it is statistically significant at 1% level. This finding is in accordance with the findings of (Dorofti & Jakubik, 2015) and (Pavic Kramaric et al., 2017). It is not supported by (Berhe & Kaur, 2017), (Burca & Batrinca, 2014). Our finding suggests that non-life insurance industry is susceptible to macroeconomic environment.

A positive relationship between size of company and ROA is found at 5% significance level. This finding is in line with the those of (Doğan, 2013), (Öner Kaya, 2015), (Berhe & Kaur, 2017) and (Burca & Batrinca, 2014). However, it is not supported by (Veleva, 2017) and (Lee, 2014). Our finding supports the suggestion that bigger companies make use of economies of scale. Insurers should evaluate merger and acquisition opportunities to get bigger.

The positive relationship between liquidity (current ratio) and ROA is determined and it is statistically significant at 5% level. This means that liquidity increases profitability as it reduces default risk of insurers. The finding is supported by (Shiu, 2004) and (Jadi, 2015). The finding conflicts with the findings of (Doğan, 2013), (Öner Kaya, 2015), (Ahmad & Prasetyo, 2018) and (Berhe & Kaur, 2017). Liquid assets are converted into cash quickly and without losing its value. Volatility in Turkish economy makes long term investments disadvantageous. Insurers should stay liquid based on our finding.

A negative relationship between solvency ratio and ROA is determined at 10% significance level. This result supports the suggestion that holding sources in reserve funds could prevent productive use of sources.

When we look at the coefficients of the independent variables for the model; interest rate has the top influence degree, loss ratio has the second and investment yield has the third.

Table 8 shows variance inflation factor (VIF) values of independent variables which is another measure of multicollinearity. "Marquardt (1970) uses a VIF greater than 10 as a guideline for serious multi-collinearity. Mason et al. (1989) cite a VIF of greater than 10 as reason for concern" (O' Brien, 2007, p. 16). As all VIF values are under 10, we can say there is no multicollinearity among our independent variables.

Table 7: VIF values

Variable	VIF	1/VIF
LEVERAGE	3.21	0.31
SOLVENCY	2.27	0.43
LIQUIDITY	1.89	0.53
SIZE	1.48	0.67
INTEREST	1.47	0.68
PREMIUM	1.39	0.72
GDP	1.35	0.74
LOSS	1.25	0.80
INVEST	1.17	0.85
AGE	1.14	0.88
Mean VIF	2.20	

Source: Results obtained using Stata 13.

5. Conclusion

Insurance has been an efficient way of protection from risks for years. Insurers have to ensure certain level of profitability in order to continue their activities and meet their responsibilities. For this reason, it is important to study the factors affecting profitability of insurers.

The results of our empirical analysis demonstrate that while interest rate, investment yield, Real GDP growth rate, size, liquidity and age are positively related to non-life ROA; loss ratio, leverage ratio, solvency and premium growth rate are negatively related.

According to industry analysis and the empirical results; the negative relationship between profitability and premium growth rate indicates that premium levels are not set in accordance with the risk levels. Thus, pricing should be made by using actuarial

techniques. The non-life insurers should focus on reducing loss ratio and leverage ratio in specializing risk estimation, claims management and fraud detection. They should improve their cross-selling activities to increase diversification. They should also utilize mergers and acquisitions because of the positive effect of size in profitability. Young and small firms should limit their traffic insurance share and should not use traffic insurance as means to grow and to increase recognition. Non-life insurers are susceptible to macroeconomic environment. They should diversify investment portfolio and employ strategies to reduce prices to prevent reduction in demand during low GDP growth periods.

Finally, our analysis does not cover newly established firms after 2006 and the ones leaving the industry. Using additional profitability measures such as profit margin and technical profitability ratio will be useful in comparison. Covering wider time range and examining effects of other factors such as human capital, customer satisfaction, share of foreign capital in total capital and diversification of product portfolio on profitability will enhance the literature.

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