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DETERMINANTS OF PROFITABILITY OF GENERAL INSURANCE COMPANIES PERFORMANCE IN POLAND

Abstract

Dynamic financial analysis has become an important tool for modeling operations of insurance companies. This analysis is used, among others, in revealing the main factors determining the financial performance of insurers. This paper identifies the determinants of the performance of general insurance companies in Poland using a panel dataset consisting of a firm specific factors and macroeconomic factors over the period 2006-2013. Six financial performance measures are used to capture different aspects of the insurance operations. These performance measures are related to nine cited business-specific and macroeconomic variables, chosen on the basis of relevant theory and literature. A weight least square (WLS) method and intergroup method for each of six performance models are used to estimate the parameters of these models. The empirical results prove that there is a statistically significant relationship between the following variables with profitability performance being- negatively affected by underwriting activity (represented the net claims ratio variable) and by the net operating expenses variable. It was also shown that the size of a company has positive relationship with its profitability. The study also confirmed a statistically significant and positive relationships between profitability ratio of technical activity and the macroeconomic variable (rate of GDP) as well as positive impact of the motor gross written premiums ratio variable on the profitability ratio of technical activity.

JEL Classification Code: **G22, G30.**

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Introduction

The insurance sector in Poland in the last 25 years has undergone a profound transformation as a result of privatization and de-monopolisation, foreign in-

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vestment flows, changes in equity, legal solutions – to adaptation to the EU requirements, and changes in the institutional framework, and the development of competitiveness.

The economic growth of the country was followed by accelerated growth in life insurance and stable development of the non-life insurance. At the same time, there has been a process of consolidation of companies mainly through M & As. The result of the consolidation of companies was, among other, things an increase in product competition and improved service quality.

The aim of the study is to demonstrate that there is a statistically significant relationship between profitability and business insurance companies specific factors and macroeconomic factors in the market of non-life insurance in Poland.

The paper is organized as follows: the first part of the paper analyzes the nature of the development of insurance industry in Poland in comparison with other EU countries. Section 2 focuses on literature review. Section 3 defines the character and the type of data and the methodology implemented. In the subsequent section empirical results are discussed and the final section includes conclusions.

Key development indicators in Poland insurance industry

Since 1990 a characteristic feature of the Polish insurance market was the process of its privatization and de-monopolisation together with certain restrictions for foreign entities on the entry to the market until 1999. Restrictions on entry of foreign capital have been abolished for foreign insurers from the EU after accession by Poland to the EU in 2004 and the adaptation of national legislation and the principles of functioning of insurance institutions to the EU requirements [Ortyński, 2010].

At the same time there was a steady process of de-concentration of the market (decrease in the market share of the former monopoly), but since 2004 an opposite process has begun, that is the consolidation of insurance companies through mergers and acquisitions. The process of consolidation mainly followed the decisions international insurance groups operating on the Polish market.

In turn, the occurrence of the global financial crisis (2008-2009) has placed before the European and national regulators the question of the validity of the paradigm of self-regulation of financial markets, including insurance [Monkiewicz, J., Monkiewicz, M., 2015].

The insurance market is conducive to raising the standards of quality and availability of insurance coverage, it affects price levels of insurance services, promotes aggregation of capital in the economy and facilitates the transformation of capital.

The development of the insurance market is connected to the economic growth. On the other hand, the development of insurance influences the growth and economic development of the country [Outreville, 2011].

The main measure of the degree of development of insurance in the national economy uses: gross written premium from direct insurance and indicators of density and insurance penetration and the size of the investment insurers.

Table 1. Gross written premium in insurance market according insurance branches in Poland 2006-2013

Years	Premium (€ billions)			The branch structure of premiums (%)		
	Total	L	NL	Total	L	NL
2006	9.8	5.5	4.3	100	56	44
2007	12.2	7.1	5.1	100	58	42
2008	14.2	9.4	4.8	100	66	34
2009	12.5	7.4	5.1	100	59	41
2010	13.6	7.9	5.7	100	58	42
2011	12.7	7.1	5.6	100	56	44
2012	15.2	8.9	6.3	100	59	41
2013	13.8	7.5	6.3	100	54	46

L – life insurance NL – non-life insurance.

Source: Statistics no 50-European Insurance Figures.pdf 2015, <http://www.insuranceeurope.eu/statistics-n%C2%B050-european-insurance-figures-dataset> (6.11.2015) and own calculation.

In the analyzed period the total gross premiums written showed no clear trends (periods of growth and periods of decline), however in 2013 compared with 2006 premiums increased by more than 40%. The main influence on the size of the total premiums written was written premiums of the life insurance industry. However, in the non-life insurance, there was a consistent growth trend in premiums (except for the year 2008) and in 2013 premiums grew by nearly 47% compared to 2006.

A characteristic feature of the Polish insurance market in that period was the dominant share of life insurance premiums in the whole insurance portfolio.

The dynamics of the amount of the premium per capita mainly results from the growth of gross written premium in total. In 2013, the density (premiums per capita) amounted to 357 €, of which 193 € was from life insurance and 164 € from non-life insurance. In total, the insurance density in 2013 increased by nearly 50% as compared to 2006.

The share of total gross written premium in GDP reached its maximum size in 2008 (4.6%), but in 2013 this indicator has returned to the level of 2006, which was, among other, things a consequence of higher GDP growth as compared to insurance.

Table 2. Density (premiums per capita) and penetration (premiums to GDP) according to insurance branches in insurance market in Poland 2006-2013

Years	Density (€)			Penetration (% of GDP)		
	Total	L	NL	Total	L	NL
2006	237	133	104	3.5	2.0	1.5
2007	277	161	116	3.7	2.2	1.5
2008	373	246	127	4.6	3.0	1.6
2009	324	191	133	3.8	2.2	1.6
2010	342	198	144	3.8	2.2	1.6
2011	354	198	144	3.7	2.1	1.6
2012	387	228	159	3.9	2.3	1.6
2013	357	193	164	3.5	1.9	1.6

L – life insurance, NL – non-life insurance.

Source: Statistics no 50-European Insurance Figures.pdf 2015, <http://www.insuranceeurope.eu/statistics-n%C2%B050-european-insurance-figures-dataset> (6.11.2015) and own calculation.

The insurance sector affects the process of capital accumulation in the economy and is becoming one of the major investors in the financial market, as a result of investment activities of insurers to broaden and deepen investment volume [Ward, Zurbruegg, 2000; Hass, Sümegi, 2008].

The source of financing investments of insurers are primarily technical provisions and their capital and own funds.

Table 3. Insurers' investment portfolio (Investments) according to insurance branches in Poland – 2006-2013

Years	L	NL	Total	
	(€ billions)	(€ billions)	(€, billions)	Investments/GDP (%)
2006	17.0	9.1	26.1	9.6
2007	21.2	11.4	32.6	10.5
2008	19.5	10.8	30.3	8.3
2009	20.4	10.5	30.9	9.9
2010	22.5	10.5	33.0	9.3
2011	19.0	10.2	29.2	7.9
2012	23.2	12.7	35.9	9.4
2013	22.9	12.9	35.8	9.2

L – life insurance NL – non-life insurance,

Source: Statistics no 50-European Insurance Figures.pdf 2015, <http://www.insuranceeurope.eu/statistics-n%C2%B050-european-insurance-figures-dataset> (6.11.2015) and own calculation

The years 2006-2013 were followed by a rise in the volume of investments, with the exception of the years 2008-2009 (due to the global financial crisis) and 2011 (due to a significant drop in the share of life insurance). In total, the share of investment in GDP insurers stood at 9-10%.

Table 4. Gross written premium (GWP), insurers' investment portfolio (Investments) and other key development indicators in Poland and selected European countries – 2013

	Poland	Portugal	Spain	Germany
GWP (total, € billions)	13.8	13.1	55.2	187.3
Density (total GWP per capita) (€)	357	1250	1182	2284
Penetration (total GWP/GDP) (%)	3.5	7.9	5.4	6.8
Investments (total, € billions)	35.8	35.8	252.9	1551.5
Total Investments/GDP (%)	9.2	21.6	24.7	56.7

Source: Statistics no 50-European Insurance Figures.pdf 2015 <http://www.insuranceurope.eu/statistics-n%C2%B050-european-insurance-figures-dataset> (6.11.2015) and own calculation.

In international comparisons the analyzed indicators of the development of insurance situate Polish insurance market at some emerging markets countries. These measures show insurance development in Poland is much lower than the markets in the compared European countries.

Literature review

The attention devoted in literature to the determinants of profitability in insurance industry has been low if compared to the extensive studies of the banking industry and the financial sector.

Because of the various results obtained from different studies exploring the determinants of profitability in the insurance industry, the studies will be subsequently presented together with their main empirical results.

Cummins and Nini (2002) studying the determinants of ROE of insurers operating in the US market over the period 1993 to 1998 showed that company size has a significant impact on this indicator and this is consistent with the argument that larger companies generate higher profits.

Adams and Buckles (2003) examine the determinants of corporate financial performance in Bermuda insurance market. They applied a model of panel data to 47 insurance companies for 1993-1997 and found positive relationship between type of risk and insurers' operational performance.

Shiu (2004) analyzed the determinants of general insurance companies in the UK for 1986-1999 using company-year data. Author revealed that liquidity, unexpected inflation, interest rate level were statistically significant determinants of insurer' performance.

Malik (2011) examining the results of 34 insurance companies in Pakistan in 2005-2009 confirmed the positive relationship between ROA and the size volume of capital and negative impact of the leverage variable and the loss ratio variable on ROA.

Kozak (2011) analyzed the determinants of three indicators of profitability (profitability of technical, profitability of investment activity and sales profitability) of 25 non-life insurance companies in 2002-2009 in Poland. The author showed in particular that the volume of gross written premiums significantly and positively influence the profitability of technical companies. Reducing the level of operating costs had a positive impact on the increase of the technical profitability of the insurance companies. Also, the share of motor insurance in the company's insurance portfolio negatively affected their profitability.

Pervan, Ćurak and Marijanović (2011) found that size, underwriting risk, inflation and equity returns had significant impact on the insurers' ROA.

Moro and Anderloni (2014) examined the results of 198 insurers in nine EU countries (ie. the old EU) for the years 2004 through 2012 and determined that ROA is impacted by variables related to operation of companies, it is negatively affected by asset size, combined ratio and variable referred to as internationalization (when shareholders are foreign companies or groups) and diversification (mixed companies operating both in non-life and in life insurance), while a positive impact was found for variables defined as reserves' dimension and asset turnover. Similar variables significantly influenced the size of ROE.

Data and methodology

Profitability is one of the most important objectives of financial management because one goal of financial management is to maximize the owner's wealth and profitability is a very important determinant of performance.

The subject of the study were the results of the 8 largest insurers in the non-life insurance sector that represented the three quarters to 85% of gross written premium in this market. The study used company-level data for the years 2006 through 2013. From 2012 the number of respondent insurance companies decreased to 7, because there was a consolidation of the two insurers as a result of a merger.

A panel dataset have been collected from Polish Financial Supervision Publications, Polish Insurance Association Publications and Central Statistical Office of Poland- Information Portal.

The general model to be estimated is represented by the following linear equation:

$$y_{i,t} = \alpha + \beta X_{i,t} + u_{i,t}$$

where $y_{i,t}$ is a vector of the profitability of the insurance firm i at time t , with $i = 1 \dots N$, $t = 1 \dots T$, α is the constant, $X_{i,t}$ is a matrix of k explanatory variables, β is

a vector of parameters of the k explanatory variables, and $u_{i,t}$ is the one-way error component model for the disturbances, with $\mathbf{u}_{i,t} = \boldsymbol{\mu}_i + \mathbf{v}_{i,t}$ where μ_i denotes the unobservable firm-specific effect and $v_{i,t}$ the idiosyncratic error.

The study used six measures of profitability activities of insurers operating in the non-life insurance, namely: profitability ratio of technical activity, assets profitability ratio, equity profitability ratio, sales profitability ratio, profitability of subscribed capitals and profitability of gross premium written. The detailed method of determining the variables representing profitability are given in Table 5.

Table 5. Financial performance ratios (dependent variables)

Firm specific characteristics	
PROFTECH - Profitability ratio of technical activity	Technical result/ earned premiums-net of reinsures
ROA – assets profitability ratio	Net financial result/assets
ROE- equity profitability ratio	Net financial result/capital and reserves
PROFSALE – sales profitability ratio	Net financial result/gross written premiums
PROFCAPITAL – profitability of subscribed capitals	Gross financial result/capital and reserves
PROFGWP – profitability of gross written premium	Gross financial result/gross written premiums

Source: own study.

The most common ratios used to evaluate operating performance are the loss ratios and the expense ratios. Moreover, the explanatory variables included variables reflecting the size of the insurance company (assets, investment, GWP), the share of gross written premium of motor insurance at the insurer's total premiums written, leverage and variable rate GWP and the rate of GDP. Detailed definitions of these variables are included in table 6.

Table 6. Independent variables included in the analysis

Firm specific characteristics	
ASSET (size)	natural log of total asset
INVEST (size)	natural log of total investment
GWP (size)	natural log of gross written premium
CRNET (net claims ratio)	claim incurred/earned premiums-net of reinsurance
COSTNET (net operating expenses ratio)	net operating expenses/earned premiums – net of reinsurance
MOTOR (motor gross written premiums ratio)	motor gross written premiums/gross written premiums total
LV (leverage – company financial structure)	gross technical provisions/capital and reserves
RATE GWP	the growth rate of gross written premium
RATEGDP	the growth rate of GDP

Source: own study.

To investigate the relationship between profitability and company specific factors and macroeconomic factors in the market of non-life insurance in Poland six panel models were constructed, defining the relationship between measures of profitability and the explanatory variables.

Empirical results

Model parameters were estimated using the method of weight least square (WLS) and intergroup method with the use of the GRETL program.

The estimation results of model parameters are presented in tables 7-12 for each of the models statistical tests were carried out to verify, the correctness of chosen method of parameter estimation and the choice of explanatory variables.

Table 7. The results of panel WLS estimation method of model 1, used 62 observations from 2006 to 2013 (Weights based on per-unit error variances)

Dependent variable: PROFTECH					
	Coefficient	Stand. Error	t-Student	p-value	Significance level
const	-0.436642	0.143147	-3.050	0.0035	***
CRNET	-0.740128	0.0415611	-17.81	9.93e-025	***
COSTNET	-0.405998	0.110866	-3.662	0.0006	***
Motor	0.0953863	0.0450094	2.119	0.0385	**
GWP	0.0459877	0.00503648	9.131	1.11e-012	***
RATEGDP	0.323640	0.152817	2.118	0.0386	**
Basic statistics for weighted data					
Sum of squared residuals		61.02845	Standard error of residuals		1.043932
R-squared		0.906069	Adjusted R-squared		0.897682
F(5,56)		108.0363	p-value of F		1.79e-27
The log of the reliability		-87.48457	Akaike info criterion		186.9691
Schwarz criterion		199.7319	Hannan-Quin criterion		191.9801
Basic statistics for the original data					
Arithm. mean of depended variable		-0.001284	Standard deviation of the depend variable		0.070962
Sum of squared residuals		0.044811	Standard error of residuals		0.028288
Test for normality distribution of residuals - the null hypothesis: random component has a normal distribution					
Test statistics: Chi-squared (2) = 0.529043 with p-value = 0.767573; critical value (Chi-squared tables (2)) = 9.210 34; level = 0.01					

*** Indicates significance: at 1% level, **at 5%, *at 10%.

Source: own calculation with the use of the GRETL program.

The results of the estimation model 1 indicate a statistically significant but negative impact of net claims ratio (underwriting risk) and net operating expenses ratio for the profitability ratio of technical activity. It confirmed a significant and positive relationship between profitability ratio of technical activity variables such as macroeconomic variable (rate of GDP) and motor insurance premiums in the total premium, as well as the positive impact of the size of total gross written premium (insurer's size).

Table 8. The results of panel intergroup estimation method of model 2, used 8 observations from 2006 to 2013

Dependent variable: ROA					
	Coefficient	Stand. Error	t-Student	p-value	Significance level
const	0.273098	0.291035	0.9384	0.4012	
CRNET	-0.467762	0.158874	-2.944	0.0422	**
COSTNET	-0.955499	0.260635	-3.666	0.0215	**
GWP	0.0173912	0.00765433	2.272	0.0855	*
Basic statistics for data					
Arithm. mean of depended variable		0.026852	Standard deviation of the depend variable		0.034934
Sum of squared residuals		0.000764	Standard error of residuals		0.013817
R-squared		0.910609	Adjusted R-squared		0.843565
F(4,57)		13.58238	p-value of F		0.014529
The log of the reliability		25.67583	Akaike info criterion		-43.35167
Schwarz criterion		-43.03390	Hannan-Quin criterion: -45.49487		
Test for normality distribution of residuals- the null hypothesis: random component has a normal distribution					
Test statistics: Chi-squared (2) = 4.77353 with p-value = 0.0919264					
critical value (Chi-squared tables (2)) = 9.210 34; level = 0.01					

** Indicates significance: at 5% level, *at 10%.

Source: own calculation with the use of the GRETTL program.

The estimation results of the above model is confirmed by a statistically significant negative relationship between changes in the size of ROA and changes in risk underwriting and net operating expenses ratio. However the insurer's size variable expressed in gross written premium has a positive effect on ROA.

Table 9. The results of panel WLS estimation method of model 3, used 62 observations from 2006 to 2013 (Weights based on per-unit error variances)

Dependent variable: ROE					
	Coefficient	Stand. Error	t-Student	p-value	Significance level
const	0.612884	0.247825	2.473	0.0164	**
CRNET	-1.07123	0.107768	-9.940	4.68e-014	***
COSTNET	-0.500830	0.252895	-1.980	0.0525	*
INVEST	0.308620	0.0836403	3.690	0.0005	***
ASSET	-0.289294	0.0875070	-3.306	0.0016	***
Basic statistics for weighted data					
Sum of squared residuals	60.87195	Standard error of residuals	1.033406		
R-squared	0.702732	Adjusted R-squared	0.681871		
F(4,57)	33.68660	p-value of F	2.03e-14		
The log of the reliability	-87.40497	Akaike info criterion	184.8099		
Schwarz criterion	195.4456	Hannan-Quin criterion	188.9858		
Basic statistics for original data					
Arithm. mean of depended variable: 0.099369; Standard deviation of the depend variable: 0.130741					
Sum of squared residuals: 0.390945; Standard error of residuals: 0.082817					
Test for normality distribution of residuals- the null hypothesis: random component has a normal distribution					
Test statistics: Chi-squared (2)= 3.96149 with p-value = 0.137966					
critical value (Chi-squared tables (2)) = 9.210 34; level = 0.01					

*** Indicates significance: at 1% level, **at 5%, *at 10%.

Source: own calculation with the use of the GRETL program.

The main determinants of ROE (table 9) are the above mentioned variables of underwriting risk and net operating expenses ratio: they all have the negative impact and significance as determinants of ROE. The variable volume of investments of insurers has a statistically significant positive relationship with ROE. Size (measured in terms of total assets) shows a negative effect: it remains statistically significant.

Underwriting risk and net operating expenses ratio significantly and negatively affected the sales profitability ratio, while the investment activity of the insurance company (size) acts on it positively.

Table 10. The results of panel intergroup estimation method of model 4, used 8 observations from 2006 to 2013

Dependent variable: PROFSALE					
	Coefficient	Stand. Error	t-Student	p-value	Significance level
const	0.239172	0.539521	0.4433	0.6805	
CRNET	-1.09088	0.322028	-3.388	0.0276	**
COSTNET	-2.54696	0.557927	-4.565	0.0103	**
INVEST	0.0637646	0.0116300	5.483	0.0054	***
Basic statistics for data					
Arithm. mean of depended variable		0.072142	Standard deviation of the depend variable		0.124075
Sum of squared residuals		0.003109	Standard error of residuals		0.027878
R-squared		0.971152	Adjusted R-squared		0.949516
F(3,4)		44.88570	p-value of F		0.001545
The log of the reliability		20.06040	Akaike info criterion		-32.12080
Schwarz criterion		-31.80303	Hannan-Quin criterion		-34.26400
Test for normality distribution of residuals - the null hypothesis: random component has a normal distribution					
Test statistics: Chi-squared (2) = 0.381349 with p-value = 0.826401					
critical value (Chi-squared tables(2)) = 9.210 34; level = 0.01					

*** Indicates significance: at 1% level, **at 5%, *at 10%.

Source: own calculation with the use of the GRETL program.

Table 11. The results of panel WLS estimation method of model 5, used 62 observations from 2006 to 2013 (Weights based on per-unit error variances)

Dependent variable: PROFCAPITAL					
	Coefficient	Stand. Error	t-Student	p-value	Significance level
const	0.689162	0.300923	2.290	0.0257	**
CRNET	-1.15368	0.141176	-8.172	3.16e-011	***
COSTNET	-1.01211	0.295863	-3.421	0.0011	***
ASSET	0.0235002	0.0115780	2.030	0.0470	**
Basic statistics for weighted data					
Sum of squared residuals		60.87654	Standard error of residuals		1.024498
R-squared		0.568522	Adjusted R-squared		0.546204
F(3,58)		25.47385	p-value of F		1.22e-10
The log of the reliability		-87.40731	Akaike info criterion		182.8146
Schwarz criterion		191.3232	Hannan-Quin criterion		186.1553
Basic statistics for original data					
Arithm. mean of depended variable: 0.122887; Standard deviation of the depend variable: 0.148582					
Sum of squared residuals: 0.707456; Standard error of residuals: 0.110442					
Test for normality distribution of residuals- the null hypothesis: random component has a normal distribution					
Test statistics: Chi-squared (2)= 13.727 with p-value = 0.00104524					
critical value (Chi-squared tables (2)) = 13.8155 level = 0.001					

*** Indicates significance: at 1% level, **at 5%, *at 10%.

Source: own calculation with the use of the GRETL program.

As expected, net claims ratio (underwriting risk) and net operating expenses ratio have a negative relationship with profitability of subscribed capitals and their impact remains statistically significant. Size (measured in terms of total assets) shows a positive effect.

Table 12. The results of panel WLS estimation method of model 6, used 30 observations from 2006 to 2013 (Weights based on per-unit error variances)

Dependent variable: PROF GWP					
	Coefficient	Stand. Error	t-Student	p-value	Significance level
const	-0.623010	0.290670	-2.143	0.0416	**
CRNET	-0.626847	0.100741	-6.222	1.39e-06	***
COSTNET	-1.02115	0.222078	-4.598	9.71e-05	***
INVEST (-4)	0.0680904	0.0130055	5.236	1.81e-05	***
Basic statistics for weighted data					
Sum of squared residuals	24.77433	Standard error of residuals	0.976145		
R-squared	0.770219	Adjusted R-squared	0.743705		
F(3,26)	29.05035	p-value of F	1.85e-08		
The log of the reliability	-39.69732	Akaike info criterion	87.39463		
Schwarz criterion	92.99942	Hannan-Quin criterion	89.18765		
Basic statistics for original data					
Arithm. mean of depended variable: 0.079307; Standard deviation of the depend variable: 0.169692					
Sum of squared residuals: 0.212375; Standard error of residuals: 0.090378					
Test for normality distribution of residuals- the null hypothesis: random component has a normal distribution					
Test statistics: Chi-squared (2)= 10.1102 with p-value = 0.00637676					
critical value (Chi-squared tables(2)) = 13.8155 level = 0.001					

*** Indicates significance: at 1% level, **at 5%, *at 10%.

Source: own calculation with the use of the GRETL program.

Variable profitability of gross written premium significantly and negatively impacted underwriting risk variables and net operating expenses ratio, while positive impact was related to the variable Assets delayed by 4 years.

Conclusions

The study provides new evidence on the determinants of six measures of profitability of insurers in Poland.

The analysis of the relationship between the measures of profitability and selected key factors (internal and external) for general insurance companies in Poland in 2006-2013 indicates the following facts:

- ❑ It finds that profitability performance is negatively affected by underwriting activity (as summarized by net claims ratio), and net operating expenses ratio.
- ❑ The cited firm-specific variables like size (measured in terms natural log of gross written premium, natural log of total assets or natural log of total investment) have a positive relationship with profitability ratio of technical activity, ROA, ROE (but at the same time negative relation with natural log of total assets), sales profitability ratio, profitability of subscribed capital and negative impact on profitability of gross written premium.
- ❑ It is worth mentioning the positive relationship of the variable rate of GPD with profitability ratio of technical activity.
- ❑ Show also be on the positive relationship of the variable motor gross written premiums ratio with profitability ratio of technical activity.
- ❑ In contrast, no significant statistical relationship has been noted between profitability and the following performance variables: LV (leverage) and Rate GWP.

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