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Article

Examining the impact of multidimensional economic factors on performance: Evidence from the Tunisian insurance companies

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Abstract: This paper aims to investigate the determinants of performance for insurance companies in Tunisia from 2004 to 2017. Namely, we consider three dimensions of determinants; those related to firms' microenvironment, macroenvironment and meso or industry environment. The performance of insurance companies is measured using three criteria: Return On Assets (ROA), Return On Equity (ROE), and Combined Ratio. The independent variables are categorized into three groups: microeconomic variables (Firm Size, Financial leverage, Capital management risk, Volume of capital, and Age of the firm), meso-economic variables (Concentration ratio and Insurance Sector Size), and macroeconomic variables (Inflation, Unemployment, and Population Growth). The General Least Squares (GLS) regression technique is employed for the analysis. The study reveals that the financial performance of Tunisian insurance companies is positively influenced by firm size, capital amount, and risk capital management. On the other hand, it is negatively influenced by leverage level, industry size, concentration index, inflation, and unemployment. In terms of technical performance, the capital amount of the firm, industry size, age of the firm, and population growth have a positive impact. However, firm size, leverage, concentration index, and risk capital management negatively affect technical performance. This paper contributes to the existing literature by examining the determinants of performance specifically for insurance companies in Tunisia. Besides the classical proxies of performance, this paper has the originality of using the technical performance which is the most suitable for the case of Insurance companies.

Keywords: technical performance; unemployment; insurance; inflation; ROE; ROA; Combined Ratio

1. Introduction

The insurance sector is among the most important sectors in any economy. It plays an important role within the financial sector by promoting entrepreneurship, risk-taking and market development. By sharing risks and mitigating the impact of large losses, the sector reduces the amount of capital required to cover losses and encourages production, innovation, and competition. The economic importance of insurance is estimated based on global insurance premium levels valued at $5,193 million or 6.1% of global GDP in 2018 (Sigma, Num 3/2019). In Tunisia, total insurance premiums in 2018 are estimated at 2.25 billion dinars or $860 million (CGA, Annual Report, 2018).

Over the past few decades, several studies have attempted to identify the factors that influence the performance of financial institutions, but most have focused on

banks. Regarding the insurance sector, most studies have been conducted in developed countries. Recently, some studies like Tegegn et al. (2020), Hsan et al. (2019), Abebe and Abera (2019), and Tesfaye (2018) are interested in examining the situation in developing countries. Note the lack of research in the Tunisian context, in the filed since, few studies have been carried out on this subject. Meanwhile, all these studies focused on financial performance, none of them examined economic and technical performance. Our study is therefore one of the pioneering studies combining financial, economic and technical aspects of insurance company performance. Hence, the aim of this paper is to analyse the impact of micro, meso and macro-economic factors on economic, financial, and technical performance, in the case of insurance companies. The rest of this article is organized as follows. Section 2 presents a review of the prevailing literature. Section 3 explains the research methodology and adopted models. Section 4 presents the empirical results and discussion, and finally, section 5 concludes.

2. Literature review

Vojinović et al. (2020) investigated the internal determinants of the performance of 19 Serbian insurance companies from 2008 to 2016 and identified three dependent variables: ROA, ROE and return on total premium (ROTP). Their results showed that liquidity and risk negatively impact ROA, ROE and ROTP. The regression results revealed that liquidity and risk exposure negatively affect ROA, ROE and ROTP. Loss ratio negatively impacts ROA and ROE. Market penetration, firm size, and specialization dummy variables have a positive impact on the three dependent variables. Productivity does not affect the performance of Serbian insurance companies.

Hasan et al. (2019) investigated the impact of macroeconomic variables on the performance of non-life insurers in Bangladesh over the period 2009–2015, using ROA and ROE as performance indicators. Using three macroeconomic variables, i.e., inflation rate, GDP growth and interest rate and eight firm-specific variables: firm age, firm size, claims ratio, solvency margin, tangible assets, liquidity and debt ratios, and management capability index. Results showed that, except for interest rates, none of the other macroeconomic variables were statistically significant. Regarding company-specific variables, age has a positive impact on ROA and a negative impact on ROE. Firm size and asset availability variables adversely affect ROA and ROE. On the other hand, the management capability index has a positive effect on ROA and ROE. Claims ratio negatively impacts ROA and an insignificant impact on ROE. No other variables affect the performance of Bangladesh life insurers.

Abebe and Abera (2019) also examined nine Ethiopian insurers over the period 2010–2015 to examine key drivers of insurer performance. They integrated two of macroeconomic variables into the study: inflation and GDP growth. They found a significantly positive relationship between capital adequacy variables and ROA, and a negative relationship with ROE. Liquidity and company size have a positive impact on ROA and ROE. Leverage has a negative impact on ROA, but no significant impact on ROE. Loss rate and company age have a negative impact on both ROA and ROE. Macroeconomic variables (inflation and GDP growth) do not affect the financial performance of Ethiopian insurance companies.

Similarly, Ajao and Ogieriakhi (2018) examined the impact of firm-specific factors on the performance of 12 insurance companies listed on the Nigerian Stock Exchange during the period 2009–2017. ROA was used as the dependent variable. As a result, they found that the age of the firm has a positive impact on its performance. On the other hand, company size and growth rate have a negative impact on business performance. Variables such as leverage, asset tangibility and premium growth do not affect the performance of Nigerian insurers.

Tesfaye (2018) has studied the factors affecting the financial performance of Ethiopian insurance companies. He categorized these factors into company-specific factors, industry-related factors, and macroeconomic factors. The variable used to measure financial performance is ROA and the sample is made of twelve Ethiopian insurance companies for the period 2011 to 2016. The results of this study indicated that past financial performance and volume of capital have a positive effect on financial performance. However, the solvency margin and the loss ratio have a negative effect on performance. The past GDP growth ratio and current inflation have a positive impact on ROA. On the other hand, past inflation and the exchange rate have a negative influence on performance.

Mulchandani et al. (2018) studied the impact of macroeconomic variables on the financial performance of life insurance companies in India. Twenty-three life insurance companies were used in this study for the period from 2009 to 2014. Financial performance was measured by two ratios, ROA and ROE. The authors used three macroeconomic variables namely GDP, interest rate and inflation as independent variables. Their results have shown that all macroeconomic variables have a negative but non-significant effect on the financial performance of life insurance companies in India.

Berhe and Kaur (2017) carried out a study on seventeen insurance companies in Ethiopia for the period from 2005 to 2015. They have included both internal and external or macroeconomic variables of the firm. They found that size and capital adequacy have a positive effect on financial performance as measured by ROA. The liquidity ratio and GDP growth negatively affect ROA. Leverage, loss ratio, market share and inflation have no effect on performance.

Getahun (2016) examined the effect of firm-specific factors on the performance of insurance companies in Ethiopia during the period from 2004 to 2013 and concluded that leverage, size, tangibility and business risk have a significant impact on the performance of insurance companies measured by ROA. Leverage and tangibility have a negative effect while size and business risk have a positive effect. Growth opportunities and liquidity variables have no significant effect.

Ullah et al. (2016) have conducted a study to analyze the determinants of the performance of non-life insurance companies in Bangladesh. They used a sample of eight insurance companies for the period from 2004 to 2014. The study concluded that solvency margin, expense ratio and growth have a positive influence on performance as measured by ROA. On the other hand, firm size and underwriting risk have a negative impact on ROA.

Datu (2016) investigated the effect of firm-specific and macroeconomic variables on the profitability of non-life insurance companies in the Philippines for the period 2008 to 2012. The empirical results revealed that underwriting risk, the use of

reinsurance, the size of the company, the leverage effect and the cost of inputs have a significant effect on the performance while the GDP and the rate of inflation do not have a significant impact on performance. the performance.

3. Materials and methods

To test the relationship between the independent variables and the performance of insurance companies, we performed a multiple linear regression on panel data. Panel data has the property of combining two dimensions, the transverse, i.e., individual, dimension and the longitudinal, i.e. temporal, dimension.

Our two-dimensional model is generally defined by the following linear relation (See Equation (1)):

$$Y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it} \quad (1)$$

where:

Y_{it}: represents the dependent variable measured by the ROA, the ROE and the Combined Ratio.

(i, t) indicate insurance company and time respectively.

α_i: is the constant.

x: represents the vector of the independent variables.

ε_{it}: represents the error term.

We have noticed, through the review of the literature, that almost all previously carried studies on the determinants of the performance of insurance companies have focused on the microeconomic and macroeconomic dimensions; the mesoeconomic dimension has been neglected. Hence, in our study, we have integrated this dimension into our models to consider the characteristics of the insurance industry.

Thus, we proceed, first, by estimating the basic performance equation including the explanatory variables usually used in previous works, in particular variables related to Size, Leverage, Capital Management Risk, Volume of Capital, and Age of the firm. Then we introduce the following mesoeconomic variables namely Concentration Index and Size of the insurance industry. Finally, we introduce the macroeconomic variables which are Inflation, Unemployment and Population Growth.

Model 1:

$$P_{it} = \alpha_i + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CRM_{it} + \beta_4 VOC_{it} + \beta_5 AGE_{it} + \varepsilon_{it} \quad (2)$$

Model 2:

$$P_{it} = \alpha_i + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CRM_{it} + \beta_4 VOC_{it} + \beta_5 AGE_{it} + \beta_6 CIR_{it} + \beta_7 INDSIZE_{it} + \varepsilon_{it} \quad (3)$$

Model 3:

$$P_{it} = \alpha_i + \beta_1 SIZE+_{it} + \beta_2 LEV_{it} + \beta_3 CRM_{it} + \beta_4 VOC_{it} + \beta_5 AGE_{it} + \beta_6 INF_{it} + \beta_7 CH_{it} + \beta_8 POP_{it} + \varepsilon_{it} \quad (4)$$

To measure the performance of insurance companies (P), we use the ROA to represent economic performance, ROE to represent financial performance and the Combined Ratio to represent technical performance.

The variables presented below (**Table 1**) are used to test our research hypotheses.

Table 1. Presentation of variables.

Variables		Measures	Expected signs		
			On ROA	**On ROE**	**On the Combined Ratio**
Dependent variables					
Asset profitability	ROA	Net income/Total assets			
Return on equity	ROE	Net income/Equity			
Combined Ratio	CR	Loss ratio + Expense ratio			
Independent variables					
Microeconomic variables					
Firm size	SIZE	LN of total assets	+	+	−
Financial leverage	LEV	Total debts/Equity	−	−	+
Risk capital management	CRM	Capital and reserves/Total assets	−	−	+
The amount of capital	VOC	LN of Equities	+	+	−
The age of the firm	AGE	LN of firm age	+	+	−
Mesoeconomic variables					
The concentration index	CIR	Premium for the first three insurances/Total premiums	−	−	+
The size of the insurance industry	INDSIZE	Total insurance sector assets/GDP	+	+	−
Macroeconomic variables					
Inflation	INF	Inflation rate	−	−	+
Unemployment	CH	Unemployment rate	−	−	+
Population growth	POP	Annual population growth rate	+	+	−

The sign (+) refers to a positive relationship between the independent variable and the dependent variable.

The sign (−) refers to a negative relationship between the independent variable and the dependent variable.

4. Results and discussion

4.1. Descriptive statistics

As shown by **Table 2**, descriptive statistics indicate that Tunisian insurance companies are generally profitable economically and financially. Indeed, they respectively have an average ROA of 1.74% and an average ROE of 7.31%. They are also technically profitable because they have an average Combined Ratio of 89.58% (less than 100%). Besides, according to the median and the interquartile values of dependent variables, it appears that there is no variability between all Tunisian insurance companies in terms of ROA, ROE and of Combined Ratio (CR).

For the independent variables, we notice that the financial leverage has an average value of 79.13%, so we can conclude that for the Tunisian insurance companies, the debt constitutes an important part of their equity. This finding is confirmed by the close values of the median and the interquartile. The average value of the concentration index is equal to 47.03%, close to 50%, so the market is

considered as concentrated, which is also confirmed by the values of the median and of the interquartile of 47.18% and 7.91%. Thus, the first three insurance companies hold almost half of the premiums in the sector. The industry size (INDISIZE) has a minimum value of 4.15% and a maximum value equal to 6.45%. Thus, we can note that the contribution of insurance sector assets in GDP is still low in Tunisia. The average inflation rate in Tunisia, during the period 2004–2017, is equal to 4.75%. This rate is high compared to other countries such as the United States which has an inflation rate equal to 2.1%, France with 1.2% and Morocco with 0.8%. The average unemployment rate in Tunisia is equal to 14.96%. This rate is high compared to other countries such as the United States (4.4%), France (9.4%) and Morocco (10.2%). Population growth has a minimum value of 0.8% and a maximum value of 1.2%. This rate is not high compared to other countries such as Morocco (1.3%) in 2018 and Canada (1.4%). This could be explained by the fact that Tunisia has adopted a family planning policy since the 1960s.

For the Skewness and Kurtosis coefficients, we notice that most Skewness values are less than 0, so the distribution of the variables is left-skewed. We also notice that most values of Kurtosis are greater than 3, so the distribution of variables is Leptokurtic.

Table 2. Descriptive statistics.

	Mean	Min	Max	P50	IQR	SD	skewness	kurtosis
ROA	0.0174	−0.3389	0.0888	0.0215	0.0193	0.0403	−5.0113	36.7086
ROE	0.0731	−7.2310	2.2907	0.1161	0.0846	0.5840	−8.2657	100.7264
CR	0.8985	0.1999	4.1928	0.8957	0.2089	0.2984	5.2893	58.1671
SIZE	19.2995	15.0558	21.0799	19.3812	1.1227	0.9070	−0.7574	4.2860
LEV	0.7913	−3.0991	6.7622	0.6023	0.7356	0.9993	1.8905	12.9632
CRM	0.1677	0.0245	0.8678	0.1556	0.0944	0.0961	2.8715	19.4294
VOC	16.3327	0	19.8114	17.5630	1.8626	4.7656	−2.9631	10.4040
AGE	3.3979	0	4.3438	3.5408	0.7696	0.7099	−1.6438	7.0813
CIR	0.4703	0	0.6237	0.4718	0.0791	0.0843	−1.5255	12.1009
INDISIZE	0.0530	0.0415	0.0645	0.0561	0.0132	0.0075	−0.2845	1.7019
INF	4.7589	2	8.3	4.5	2.2	1.5655	0.3964	2.6029
CH	14.9638	12.4	18.3	15.2	2	1.6437	0.1406	2.3856
POP	1.0033	0.8	1.2	1	0.3	0.1507	−0.2017	1.5578

ROA is asset profitability, ROE is return on equity, CR combined ratio, SIZE is firm size, LEV is financial leverage, CRM is risk capital management, VOC is the amount of capital, AGE is the firm age, CIR is the concentration index, INDISIZE is the size of the insurance industry, INF is inflation rate, CH is the level of unemployment, POP is population growth.

4.2. Stationarity test

Before starting the analysis, it is necessary to test whether the series are stationary. Hence, we perform the unit root test of Levin et al. (2002).

As shown by **Table 3**, all the variables are stationary in level at the 1% threshold.

In order to test the different correlations between the variables of our study, we use the Pearson test. S shown by **Table 4**, the study of the correlation matrix shows that excepting the correlation value between the Industry Size (INDSIZE) and the

Annual Population Growth (POP) which is equal to 0.8480, all the other values do not exceed the limit value of 0.8. As maintained by Kennedy, (2003), If the correlation value between the variables exceeds this value, there is a serious problem of multicollinearity. In our case, we then have a problem of multicollinearity between the variable INDSIZE and POP. To thwart this problem, we will not use these two variables in the same model, and we will use them separately.

Table 3. Unit root test.

Variable	***t*-Statistics**	**Probability**
ROA	−5.1952	0.0000
ROE	−4.3156	0.0000
CR	−3.8317	0.0001
SIZE	−4.6337	0.0000
LEV	−25.0217	0.0000
CRM	−2.6064	0.0046
VOC	-4.9541	0.0000
AGE	−25.3278	0.0000
CIR	−6.9546	0.0000
INDSIZE	−3.2489	0.0006
INF	−3.1346	0.0009
CH	−3.4245	0.0003
POP	−10.7243	0.0000

Table 4. The correlation Matrix.

Variables	**SIZE**	**LEV**	**CRM**	**VOC**	**AGE**	**CIR**	**INDSIZE**	**INF**	**CH**	**POP**
SIZE	1.0000									
LEV	0.0756	1.0000								
CRM	−0.0498	−0.0842	1.0000							
VOC	0.4042	0.4150	0.2960	1.0000						
AGE	0.5230	0.0352	0.1475	0.2069	1.0000					
CIR	−0.2003	−0.0653	-0.0244	−0.1623	−0.1359	1.0000				
INDSIZE	0.5631	−0.1118	0.0732	0.2393	0.2575	−0.4646	1.0000			
INF	0.3657	−0.0698	0.0081	0.1185	0.1678	−0.2391	0.5963	1.0000		
CH	0.3390	−0.0495	0.0477	0.1441	0.1412	−0.1913	0.7128	0.1966	1.0000	
POP	0.4815	−0.1679	0.0627	0.1695	0.2354	−0.3972	**0.8480**	0.6094	0.4381	1.0000
VIF TEST	**3.43**	**1.60**	**1.33**	**1.66**	**1.60**	**1.85**	**8.49**	**2.85**	**2.82**	**1.28**

Before testing our different models, we must ensure that there is no multicollinearity bias between the independent variables. Then, we perform the VIF test.

As shown by **Table 5**, we notice that all the variables have values of VIF lower than 10 and values of 1/VIF higher than 0.1 and that the means of VIF are lower than 2. Thus, we can conclude that we have not problems of multicollinearity between the independent variables. The result of this test corroborates the result of the Pearson test.

Table 5. VIF test results.

Variable	LIVELY	1/VIV
Model 1		
VOC	1.78	0.560526
SIZE	1.76	0.569471
AGE	1.45	0.689033
LEV	1.32	0.756968
CRM	1.29	0.773784
Mean VIF	1.52	
Model 2		
SIZE	2.34	0.426477
INDSIZE	1.95	0.512186
VOC	1.79	0.557304
AGE	1.47	0.681165
LEV	1.38	0.722455
CIR	1.32	0.755115
CRM	1.30	0.766380
Mean VIF	1.65	
Model 3		
SIZE	2.18	0.457998
POP	2.15	0.464170
VOC	1.79	0.559143
INF	1.63	0.611847
AGE	1.46	0.686056
LEV	1.39	0.719797
CRM	1.30	0.769359
CH	1.29	0.772799
Mean VIF	1.65	

According to **Table 6** results, we can deduce that in the case of the endogeneity tests for ROA, ROE, and CR, all three variables have extremely high *p*-values ($p > 0.05$). This indicates that the null hypothesis, which assumes exogeneity (no endogeneity), is accepted. Hence, there is no problem of endogeneity.

Table 6. Endogeneity test.

Number of observations :203	chi2	*p*-value
ROA	Waldchi2(6) = 1.15	Prob > chi2 = 0.8540
ROE	Waldchi2(6) = 2.71	Prob > chi2 = 0.8439
CR	Waldchi2(6) = 2.63	Prob > chi2 = 0.9793

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity.
Assumption: Normal error terms.
H0: Constant variance.

4.3. Analysis based on ROA and ROE

The results of the estimations of our models carried out with the GLS method are presented in **Table 7**.

Table 7. Results of the regression of economic performance and financial performance.

Variables	ROA			ROE		
	(1)	(2)	(3)	(4)	(5)	(6)
SIZE	0.0003055	**0.0066544** ***	0.0034231	−0.0271149	0.008025	−0.0035522
	(0.875)	(0.005)	(0.183)	(0.355)	(0.806)	(0.918)
LEV	**−0.0065579** ***	**−0.0084894** ***	**−0.0080446** ***	**−0.0639946****	**−0.061915*****	**−0.0608413****
	(0.000)	(0.000)	(0.000)	(0.013)	(0.010)	(0.015)
CRM	**0.030053** **	**0.0473932** ***	**0.0327678** **	**−0.3558737****	**−0.3097923***	**−0.3043963***
	(0.021)	(0.000)	(0.022)	(0.044)	(0.077)	(0.091)
VOC	**0.0022196** ***	**0.0023319** ***	**0.0019405** **	0.0139852	0.0120628	0.0121075
	(0.009)	(0.004)	(0.012)	(0.146)	(0.189)	(0.159)
AGE	0.0003233	−0.0013889	0.0002908	0.0159617	0.0043974	0.0120953
	(0.885)	(0.531)	(0.912)	(0.573)	(0.895)	(0.725)
CIR		**−0.0335415** *			−0.1297028	
		(0.058)			(0.412)	
INDSIZE		**−0.9934122** ***			**−4.533495****	
		(0.000)			(0.047)	
INF			**−0.0031064** **			-0.0103537
			(0.018)			(0.461)
CH			**−0.0030967** ***			**−0.0144136***
			(0.000)			(0.061)
POP			**0.0219757** *			0.0544027
			(0.066)			(0.679)
Constant	−0.0221052	**−0.0736096** **	-0.0400412	0.4580426	0.143589	0.2382809
	(0.464)	(0.036)	(0.300)	(0.301)	(0.758)	(0.621)
R^2	20.34	22.32	27.92	9.06	10.02	11.86
Comments	182	182	182	182	182	182

***, **and *correspond respectively to the significance levels of 1%, 5% and 10%.
The values in parentheses are the *P*-Values.

In model (1), firm size has no effect on the ROA of Tunisian insurance companies. By introducing the mesoeconomic variables (Concentration Index and Size of the sector) into Equation (2), the SIZE variable becomes one of the best indicators of the financial performance of Tunisian insurance companies. This could be explained by the fact that the structure of the market allows large firms to benefit more than small firms because they have market power and have easier access to capital markets, which allows them to seize investment opportunities. This result corroborates Amato and Wilder (1985) findings. In addition, a large size of the firm allows more diversification, reduces risks, and give the ability to react more quickly to changes in market conditions. Moreover, large insurance companies can also divide fixed costs over a larger volume of services and thus obtain increasing economy of scale; thus, financial performance could be raised. This result is consistent with those of Abebe and Abera (2019), Almajali et al. (2012), Bawa and Chattha (2013), Beard and Dess (1981), Charumati (2012), Chen and Hambrick (1995), Dey et al. (2015), Gonga and Sasaka (2017), Mboga (2015), Malik (2011), Mintzberg (1979), Tegegn et al. (2020) and

Vojinović et al. (2020), who find a positive and statistically significant relationship between the size of firm and financial performance.

By introducing the macroeconomic variables (Inflation, Unemployment and Population growth) into Equation (3), the size variable loses its significance. So, in the presence of macroeconomic factors, size has no effect on the financial performance of Tunisian insurance companies. This result is in concordance with that of Al-Mutairi et al (2020), Daare (2016) and Mwangi and Iraya (2014) who find a non-significant relationship between the size of the insurance company and the ROA. Similarly, the effect of size on ROE is statistically insignificant in the three Equations (4)–(6).

$$ROE_{it} = \alpha_i + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CRM_{it} + \beta_4 VOC_{it} + \beta_5 AGE_{it} + \beta_6 CIR_{it} + \beta_7 INDSIZE_{it} + \varepsilon_{it} \quad (5)$$

$$ROE_{it} = \alpha i + \beta 1\ SIZE{+}it + \beta 2\ LEV\ it + \beta 3\ CRM\ it + \beta 4\ VOC\ it + \beta 5\ AGE\ it + \beta 6\ INF\ it + \beta 7\ CH\ it + \beta 8\ POP\ it + \varepsilon it \quad (6)$$

So, the size does not affect the ROE of Tunisian insurance companies. This corroborates the results of Musah and Kong (2019) and Batool and Sahi (2019).

Regarding financial leverage, it has a negative and statistically significant impact on financial and Economic performance (ROA and ROE). Hence, the increase in the debts in relatively to equity leads to a decrease the financial performance of Tunisian insurance companies. This could be explained by the fact that Tunisian insurance companies are heavily levered which leads to an increase in financial expenses relative to interests' payments that implies a decrease in both economic and financial performance of the firm. This is in concordance with the results of Ayele (2012), Ahmed et al. (2011), Al-Shami (2008), Charumathi (2012), Dey et al. (2015), Flamini et al. (2009), Hailegebreal (2016), Majumdar and Chhibber (1997), Malik (2011), Rao et al. (2007), Sambasivam and Ayele (2013) and Tegegn et al. (2020), who find that financial leverage has a negative effect on financial performance.

Regarding Risk Capital Management, it has a positive and statistically significant effect on ROA. This positive relationship is explained by the fact that for an insurance company, the increase in the amount of premiums leads to an increase in the amount of claims and to meet its commitments. In fact, an insurance company must allocate further sums of money called reserves. Thus, there is a positive relationship between the increase in the part of capital and reserves and insurance income. The more the insurance company has income, the better will be its financial performance, since it will have the opportunity to make portfolio investments. However, this variable has a negative and statistically significant effect on ROE. Thus, a large part of capital and reserves relatively to total assets negatively affects the economic performance of Tunisian insurance companies measured by ROE. Hence, companies with the lower part of capital and reserves relatively to their assets are subsequently more efficient. This result is consistent with that of Wani and Dar (2015). This is also specific to insurance companies since the leading factor of their economic performance is not the amount of capital but their reserves for insurance and their investment contracts.

Concerning Capital Volume, it has a positive and statistically significant impact on ROA. This result is in line with those of Ayele (2012), Al-Shami (2008), Benali and Feki (2017), Bawa and Chattha (2013), Charumathi (2012), Malik (2011), Sambasivam and Ayele (2013) and Wani and Dar (2015) who show that financial performance is positively affected by the volume of capital. Hence, insurance

companies with more equity are more financially efficient than insurance companies with less. This could be explained by the fact that when the insurance company has a large volume of equity, it is more financially sound and can cover losses resulting from excessive customer claims, for example in the case of a natural disaster. In addition, an insurance company can use part of its equity to create new branches or to develop international activity, which allows it to increase its financial performance. The effect of capital volume on ROE is positive but not significant, so this variable does not affect the ROE of Tunisian insurance companies. This result is consistent with that of Kripa and Ajasllari (2016).

The age of the firm does not affect the financial performance of Tunisian insurance companies represented by the ROA and the ROE. This is in alignment with findings of Almajali et al. (2012), Ayele (2012), Ahmed et al. (2011), Hamal (2020), Mwangi and Murigu (2015), Mehari and Aemiro (2013), Malik (2011) and Sambasivam and Ayele (2013) who find that the age of the firm has no effect on the performance of insurance companies. But this is also in contradiction with the results of Ajao and Ogieriakhi (2018), Hailegebreal (2016) and Pervan et al. (2012), who conclude that the age of the firm is positively related to its financial performance and the results of Hasan et al. (2019), Öner Kaya (2015), Tegegn et al. (2020), Taha (2015) and Doğan (2013) who confirm that older insurance companies are characterized by weaker financial performance.

For the first mesoeconomic variable, namely the concentration index, it has a negative and statistically significant effect on the ROA. This result means that concentration is less beneficial in terms of profitability for Tunisian insurance companies. This could be explained by the fact that concentration leads to a quasi-monopolistic situation that constitutes a real obstacle to profitability and performance as maintained by Nouaili et al. (2015). This finding also corroborates the results of Ben Naceur (2003), Gaur and Mohapatra (2020) and Staikouras and Wood (2004) showing that a high market concentration leads to a weak financial performance of the firm. This is also in contradiction with the results of Bajtelsmit and Bouzouita (1998), Bourke (1989), Berger (1995) and Njegomir and Stojić (2011), concluding that concentration positively affects company performance. The effect of this variable on ROE is not significant. This result is in harmony with that of Belkhaoui et al. (2012).

Regarding the second mesoeconomic variable, the industry size, it has a negative and statistically significant effect on the ROA and ROE of Tunisian insurance companies. This could be interpreted by the fact that the increase in the size of the sector, relatively to the size of the economy in general, reduces the field of action of insurance companies and reduces the size of their market and by the way its financial performance.

Concerning the macroeconomic variables, the first variable studied is inflation. It has a negative and statistically significant effect on the ROA of Tunisian insurance companies. This could be explained by the fact that the increase in the inflation rate leads to an increase in costs and therefore a decrease in the company's income as maintained by Rasiah (2011). Similarly, as argued by Asrat and Tesfahun (2016), inflation affects the results of underwriting premiums because insurance policies are not periodically adjusted so costs increase faster than revenues. This result is in line with those of Akpan et al. (2017), Batool and Sahi (2019), Browne et al. (2001),

Christophersen and Jakubik (2014), Doumpos et al. (2012), D'Arcy and Gorvett (2000), Guru and Shanmugam (2002), Hailegebreal (2016), Pervan and Kramarić (2010), Shiu (2004) and Taha (2015), who show that inflation is negatively linked to performance. The effect of this variable on ROE is negative but not significant, this result is in agreement with that of Adelopo et al. (2018), Berhe and Kaur (2017), Chinorwadza et al. (2020), Datu (2016), Hasan et al. (2019), Hussain (2015), Lee (2014), Mulchandani et al. (2018), Mazviona et al. (2017) and Srijanani and Rao (2019), who find a non-significant relationship between inflation and corporate performance of insurance.

The second macroeconomic variable is unemployment. The effect of this variable on the financial performance (ROA and ROE) of Tunisian insurance companies is negative. And statistically significant at respectively 1 and 5% for ROA and ROE. This result is consistent with the work of Lenten and Rulli (2006), Savvides (2006) and Mantis and Farmer (1968) who find a negative relationship between unemployment rate and the demand for life insurance. It also confirms the results of Eling and Schaper (2017) maintaining that unemployment is an unfavourable factor in the demand for life insurance and that in the presence of a high unemployment rate, employers must pay higher wages. Hence, high wages during periods of low income could increase production costs and thus could reduce profitability.

Population growth is the third macroeconomic variable chosen in our study. In line with our expectations, the effect of this variable is positive and statistically significant on ROA. This result is consistent with that of Feyen et al. (2011). This could be explained by the fact that population growth generates an increase in the number of potential customers and subsequently an increase in demand for both life and non-life insurance, which positively affects the financial profitability of companies. However, the effect of this variable on ROE is positive but statistically insignificant. So, population growth does not affect the ROE of Tunisian insurance companies.

4.4. Analysis based on the Combined Ratio: The technical performance

We are now interested to the analysis of the results related to the estimations devoted to the technical performance of the Tunisian insurance companies. To represent the technical performance, we use the Combined Ratio. It should be noted before, that the Combined Ratio and the technical performance evolve in opposite directions, when the Combined Ratio decreases, the technical performance increases. We test the following relations:

Model 1:

$$CR_{it} = \alpha_i + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CRM_{it} + \beta_4 VOC_{it} + \beta_5 AGE_{it} + \varepsilon_{it} \quad (7)$$

Model 2:

$$CR_{it} = \alpha_i + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CRM_{it} + \beta_4 VOC_{it} + \beta_5 AGE_{it} + \beta_6 CIR_{it} + \beta_7 INDSIZE_{it} + \varepsilon_{it} \quad (8)$$

Model 3:

$$CR_{it} = \alpha_i + \beta_1 SIZE+_{it} + \beta_2 LEV_{it} + \beta_3 CRM_{it} + \beta_4 VOC_{it} + \beta_5 AGE_{it} + \beta_6 INF_{it} + \beta_7 CH_{it} + \beta_8 POP_{it} + \varepsilon_{it} \quad (9)$$

Results are reported in the following **Table 8**.

Table 8. Results of the technical performance regression.

Variables	**Combined Ratio**		
	(7)	**(8)**	**(9)**
SIZE	**0.0970224*** **	**0.1533735*** **	**0.1470448*** **
	(0.000)	(0.000)	(0.000)
LEV	**0.0485752*** **	**0.0545228*** **	**0.0524363*** **
	(0.000)	(0.000)	(0.000)
CRM	**0.3143956** **	**0.5434848*** **	**0.5325395*** **
	(0.021)	(0.000)	(0.000)
VOC	**−0.0185933*** **	**−0.0228368*** **	**−0.0248906*** **
	(0.000)	(0.000)	(0.000)
AGE	−0.0210048	**−0.0442618** **	**−0.0345236***
	(0.322)	(0.035)	(0.077)
CIR		**0.3904906***	
		(0.081)	
INDSIZE		**−4.288663***	
		(0.066)	
INF			0.0023816
			(0.754)
CH			**0.0106848** **
			(0.024)
POP			**−0.4212387*** **
			(0.000)
Constant	**−0.7089365** **	**−1.664792*** **	**−1.289623*** **
	(0.032)	(0.000)	(0.000)
R^2	39%	43.76%	47.03%
Comments	182	182	182

***, **and *correspond respectively to the significance thresholds of 1%, 5% and 10%. The values in parentheses are the *P*-Values.

According to **Table 8** results, we notice that the size of the firm has a positive and statistically significant e effect on the Combined Ratio, therefore a negative effect on the technical performance of Tunisian insurance companies. So, firms that have such high sizes are less efficient technically. This could be explained by the fact that the larger a firm is, the more difficult is to manage it. This corroborates the results of Stiroh et al. (2006). Then big firms tend to use an excessive number of labor force to manage its capital inefficiently, which leads to an allocative inefficiency as qualified by Ferrier and Lovell (1990). In addition, small companies make better use of technology and carry out innovations, which allows them to increase the number of insurance policies taken out and thus increase technical performance.

Similarly, financial leverage has a positive and statistically significant impact on the Combined Ratio, therefore a negative effect on the technical performance of Tunisian insurance companies. Thus, a large proportion of debt in relation to equity leads to a decrease in technical performance. Hence, highly indebted companies may face aggressive strategies from their less indebted rivals and lose market share in an oligopoly market (Almajali et al., 2012). Thus, the number of insurance contracts decreases which reduces technical performance. Regarding Risk Capital Management, it has a positive and statistically significant effect on the Combined Ratio and therefore a negative impact on technical performance. Thus, a large proportion of capital and

reserves to total assets negatively affects the technical performance of Tunisian insurance companies.

On the other hand, the volume of capital has a negative and statistically significant effect on the Combined Ratio, and a positive impact on the technical performance of Tunisian insurance companies. One of the explanations for this result is that the influx of capital allows insurance companies to develop and open new branches, and to increase their market share and subsequently improve its technical performance.

For the age of the firm, it has a negative but non-significant effect on the Combined Ratio in Equation (7). By introducing the mesoeconomic variables in Equation (8) and the macroeconomic variables in Equation (9) the effect of this variable becomes negative and statistically significant at 5 and 10% respectively. So, the age of the firm positively affects the technical performance of Tunisian insurance companies. This could be justified by the fact that older companies have more experience and can better take advantage from market conditions and better react and adapt their position to all kind of mesoeconomic and macroeconomic events.

The first mesoeconomic variable considered, the Concentration Index, has a positive and statistically significant effect on the Combined Ratio and therefore a negative effect on technical performance. Hence, the concentration of the sector hinders the technical performance of Tunisian insurance companies. One of the possible explanations for this result could be advanced when market concentration forces some insurers to lower the price of their insurance contracts to achieve their underwriting targets and maintain their market share. Thus, they agree to sign contracts at a lower price than the market price, which leads to a drop in the value of the premiums and subsequently a drop in technical performance. This result joins the findings of Primiano (2003).

The second studied mesoeconomic variable is Sector Size. Results show that it has a negative and statistically significant effect on the Combined Ratio and therefore a positive effect on technical performance. In fact, when the size of the sector increases, the number of insurers increases so there is a pooling of claims by the existing firms that covers all possible risk in the industry.

Regarding the used macroeconomic variables, inflation has a positive but non-significant effect on the Combined Ratio. So, there Has been no evidence of a possible impact of inflation on technical performance of Tunisian insurance companies. However, unemployment, a positive and statistically significant effect on the Combined Ratio, then a negative effect on the technical performance of Tunisian insurance companies. In fact, in periods of high unemployment and job losses, policyholders could be brought to cancel their contracts and withdraw the sums of paid money to replace the lack of income. Besides, population growth has a negative and statistically significant effect on the Combined Ratio (a positive effect on the technical performance). In fact, population growth leads to an increase in the number of insurance contracts. For example, in the case of automobile insurance, when the population increases, the automobile number also increases, thus the number of automobile insurance contracts increases. Similarly, when the population increases, the number of life insurance contracts increases. This leads to increased insurance revenues and subsequently improved technical performance.

5. Conclusion

The purpose of this study was to identify the determinants of the performance (economic, financial, and technical) of insurance companies. Based on a study carried out on 13 Tunisian insurance companies for the period from 2004 to 2017, we found that financial leverage, sector concentration and unemployment have a negative impact on the financial and technical performance of Tunisian insurance companies. Capital volume and population growth positively impact the financial and technical performance of Tunisian insurance companies. The age of the firm has a positive effect on the technical performance of insurance companies.

Thus, we can conclude that the performance of an insurance company is a set of determinants which are linked to the activities of this company and to the environment in which it operates. Each determinant should be managed delicately, so that the results of the activities are positive and satisfactory and meet the expectations of all stakeholders.

It is important to note that one of the main limitations of this study is to be only interested to the Tunisian insurance sector, and the small size of the sample due to the availability of data. Thus, we propose to future research to carry out a comparative study with certain countries of the Maghreb or the Middle East and North Africa (MENA) countries. It would also be interesting to replicate this study on insurance companies belonging to other MENA countries. We also believe it important to consider the financial crisis period and the COVID-19 crisis to isolate their specific impacts on the performance of insurance companies.

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