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Performance in the Insurance Industry (Islamic versus Conventional) and Risk Management

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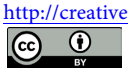

Abstract

This article proposes to compare the performance to both Islamic and conventional insurance. To do this, a sample made up of 9 insurance companies from 2000 to 2013 is used. The results indicate that risk premiums and size explain the difference between two insurance industries. Moreover, these two variables have a more favorable effect on the performance of Islamic and conventional insurance. Regardless of the choice of the period, the estimation technique or the method for accounting for the efficiency of insurance, these results remain unchanged.

Keywords

Efficiency, Risk Premium, Islamic Insurance, Conventional Insurance

1. Introduction

Pressed by external regulations and the financial crisis, economists have developed a map of the literature relating to the study of performance (or efficiency) and risk management in companies. Indeed, the intensification of trade and the progression of technological change have contributed to a process of financial integration, and intense competition in the insurance sector. Hence, greater risk-taking (Casu & Girardone, 2009) is highlighted. However, the financial sector faces serious challenges in managing the risk taken. Therefore, risk management comes at the right time to determine the causes of performance.

To go further, the competitiveness intensified by globalization must be able to allow us to evaluate efficiency: Measure to manage. Compare to move forward. That said, the study of performance (efficiency) and determining factors in the insurance industry is a focus of research interest. Indeed, the concept of perfor-

mance is a vague concept (Vu, 2008). These main determinants, as we know, are effectiveness and efficiency (Bouin & Simon, 2009; Berland, 2014). But also, effectiveness and efficiency are different from performance and we can be effective without being efficient (Maadani & Saïd, 2009).

Generally, traditional performance measures become insufficient to meet the strategic development needs of financial institutions (Zhang & Li, 2009) or more, on technical efficiency and cost minimization (Yao, 2007).

Indeed, the performance of the insurance industries has contributed to the creation of an intermediary role of the financial sector in an economy. Technical efficiency, as we know, represents a measure of the performance of insurance industry and assesses the vulnerability of these industries to financial difficulties. We then deduce that technical efficiency is crucial in identifying the best insurance industries than these competitors. From an efficiency point of view, the optimal use of resources refers to the measurement of the distance that separates the performance of a company from the best practices of the performance of the company (Yin et al., 2013; Adusei, 2016).

As far as we are concerned, we will limit ourselves here to efficiency.

Indeed, De Borger et al. (2002) combined the four strengths of boundary analysis:

> "It makes it possible to distinguish between efficient and inefficient production […], to estimate inefficiency by considering best practices such as benchmarks. Moreover, the estimated frontiers make it possible to separate changes in productivity over time from those in efficiency. Finally, it was recognized that frontier estimation techniques might involve production characteristics (e.g. economies of scale and scope) different from average practical functions".

Unsurprisingly, two techniques are highlighted (parametric and non-parametric) to measure the efficiency of insurance. Since then, the nonparametric technique (DEA) has been improved by making it applicable to increasing, constant and decreasing returns to scale (Banker et al., 1984; Gwahula, 2013; Adusei, 2016; Djalilov & Piesse; 2014; Wang et al., 2014; Giulia & Andrea, 2011; Kao & Liu, 2014; Zhang & Wang, 2014; Lin et al., 2015). More explicitly, a large number of economic phenomena are characterized by observing a sequence of insurance company events on a production frontier. Even more clearly, parametric approaches (DEA) and non-parametric approaches (SFA) complete the picture.

Essentially descriptive, the non-parametric approach (SFA) is based on an econometric regression model. More explicitly, this approach takes into account deviations from the production function, e.g. random errors (white noise) and inefficiency. However, efficiency scores are measured through stochastic frontier techniques in annual individual samples. Intuitively, calculating efficiency scores is straightforward. But, if one is interested in estimating the production function will be difficult.

However, if one is interested in the parametric estimation (DEA), the choice of a specific functional form or a form of distribution for the terms of error will not be privileged.

In this universe of parametric and non-parametric estimation, panel data refer to two contexts: the dynamic panel and the static panel. Generally, the dynamic panel applies certain tests to determine efficiency (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998; Sargan, 1958; Hansen, 1982). This method reduces the endogeneity biases of the variables, and controls for specific individual and temporal effects.

The Arellano-Bond test came, at the right time, to propose applying the generalized method of moments (GMM) of Hansen (1982) to transform all the regressors. However, the Arellano-Bover/Blundell-Bond estimator completes the Arellano-Bond hypothesis while integrating an additional hypothesis: the first differences of the instrumental variables are not correlated with the fixed effects. Therefore, the introduction of more instruments contributes to improving efficiency. Essentially, the static panel (Tobit) shows the significance of short-term variables than the dynamic panel (GMM).

In order to go further into the functioning of these techniques, we assume that the majority of the work has been carried out in the context of a developed or developing economy, where there is competition between the insurance industries, that rivalry between insurance industries improves the efficiency of the sector.

Faced with this problem, our article aims in particular to provide an empirical answer to the question of the difference between Islamic insurance and conventional insurance. More specifically, we examine the effect of risk management on the performance of two types of insurance.

In this framework of analysis, the sample mobilized is composed of 9 insurance companies in Tunisia from 2000 to 2013. In accordance with the literature in insurance economics, the performance of insurance companies was approximated both by efficiency. More explicitly, efficiency is the result of a multidimensional estimation combining several inputs and outputs.

The article is structured as follows. The first part presents a brief review of the literature on risk management and performance. The data and methodology are presented in the second part. The third part presents and discusses the results.

Literature review: or the theoretical context.

1.1. The Literature Review

To be able to cover losses and remain competitive, an insurance company must focus its efforts on the services that bring the maximum profit. That said the financial situation of the insurance market is in two-way communication with the financial market (Hainaut, 2017). It depends on the ability to improve the quality of information provision to better manage risk (Hainaut, 2017). More or less, the financial stability and solvency of insurance companies are also important issues in the field of risk management of an insurance company (Sanchis et al.,

2007; Kalkavan et al., 2015). Therefore, risk management theory has come at the right time to show that financially constrained insurance companies are risk averse (Froot, Scharfstein, & Stein, 1993; Froot & Stein, 1998). For this, the basic idea lies on the incentive to protect against these risks.

Even more clearly, when a hazard occurs, ex post risk management measures are highlighted (mobilised). More explicitly, a positive correlation exists between the level of risk preparedness and the costs associated with adaptation (Calvo & Dercon, 2006) show that a good incentive structure would reduce the risk of opportunistic behavior and better allocate resources.

The work dedicated to risk management has constituted considerable progress, both theoretical and empirical. In this regard, the work of Barnes et al. (2017) show that the existence of financial risks leads to changes in the granting of credit and insurance. Consequently, the growth and improvement of insurance companies (tawa8) insurance are achieved by using the information system and technologies, e.g., the cost method. Sometimes this method cannot classify insurance risks (profitable or unprofitable) in countries where the purchasing power of the population is low. That said, the introduction of insurance management information systems is unjustified (Tomczyk et al., 2016, Bokšová, 2015; Lee & Lin, 2016).

Today, the exposure of insurance companies to risks is increasingly strong. The impact of risk management on the performance of the insurance company represents a research debate. Therefore, it is important to address the problem of risk management to affirm its effect on the performance of insurance companies (Pagach & Warr, 2007).

Some works have shown the disagreement of the link between risk management and the financial performance of companies. On the other hand, others have shown the existence of a positive link between risk management and the performance of the insurance company (Hoyt & Liebenberg, 2008; Nocco & Stulz, 2006). Indeed, Nocco and Stulz (2006) show that risk management creates value for shareholders and for the company and exhibits a competitive advantage. Similarly, Bertinetti, Cavezzali and Gardenal (2013) explained the impact of the adoption of risk management on the value of the company and on the determinants of the choice of risk management. They have shown the positive impact of risk management on the value of companies.

Nevertheless, for some, an enterprise risk management system (ERM) does not have an effect on the financial performance of the organization (Pagach & Warr, 2010; Lukianchuk, 2015; Ramlee & Ahmad, 2015). Also, Ramlee and Ahmad (2015) showed the non-significance of risk management on the performance of non-financial companies in Malaysia. For them, business performance does not depend on risk management. Lukianchuk (2015), too, showed that risk management does not have a positive impact on the performance of insurance companies. Similarly, Pagach and Warr (2010) did not confirm that risk management creates value. They believe that a program from which performance can be measured was needed, to confirm the positive impact of risk management on

business performance.

However, good governance of insurance companies improves risk control efficiency and can effectively withstand crises than companies with weaker corporate governance (Chinese). Indeed, the complexity of the governance and operations of insurance companies obliges insurance companies to strengthen their profitability and control risks. Indeed, an increase in the number of independent board members in an insurance company can reduce both investment risk and total risk (Ling et al., 2013). Similarly, Cheng et al. (2011) showed that institutions and investors can control investment risks and reduce the cost of capital. Also, risk management increases the value of an insurance business by reducing distress costs, the cost of external capital and agency costs (Mayers & Smith, 1981). Other founders of the traditional theory risk management use hedging to reduce the total risk of the insurance company (Mayers & Smith, 1981; Smith & Stulz, 1985; Froot, Scharfstein, & Stein, 1993). They argue that risk management theory is used to distribute risk among several sources of risk, than to reduce the total risk. In this case, hedging is a risk reduction tool and a risk reallocation technique.

1.2. Data and Methodology

Data and variables

Accounting data on conventional and Islamic insurance were collected from the World Bank database and FTUSA annual reports from 2000 to 2013. The sample was constructed in 9 insurance companies. More explicitly, the number of conventional insurance is 8 and one Islamic insurance.

In in the appendices, we present the efficiency of insurance by year (2010-2013).

Indeed, we measure the efficiency of insurance to report on their performance (Banker et al., 2010; Hsiao et al., 2010; Barth et al., 2013; Johnes et al., 2014; Ayadi et al., 2016; Bitar et al., 2017). More explicitly, efficiency takes into consideration indicators that take the form of inputs and outputs than the use of a single accounting ratio.

The efficiency frontier can also be estimated via parametric (SFA) and non-parametric (DEA) approaches.

A series of control variables (size, GDP, risk premium) relating to the characteristics of the insurance companies were also used. The latter are likely to impact both the performance and the efficiency of both Islamic and conventional insurance. Also friendly variables, e.g. crisis and inflation are mobilized to determine its impact on the performance of insurance industries.

Even more significantly, the logarithm of total assets was included as an instrumental variable for the size of the insurance industry. More explicitly, in light of the work of Abedifar et al. (2013), the growth of total assets is used to control the growth of insurance. In addition, we use fixed assets over total assets (tangibility) in order to take into account the financing activities of the insur-

ance industry. This ratio represents the opportunity cost resulting from the integration of non-performing assets in the insurance balance sheet (Beck et al., 2013).

Indeed, the GDP per capita variable can pose a problem of reverse causality in this analysis. However, the user of the GMM estimator allows us to overcome this handicap. The inflation variable is likely to influence economic decisions, particularly in terms of investments, and also makes it possible to integrate monetary policy measures.

Methodology:

Hamermesh (1993) suggests that the Cobb-Douglas function is commonly used in empirical studies and seems an acceptable representation of reality (Hamermesh, 1993), and it is based on restrictive assumptions, in particular a unitary elasticity of substitution between the factors.

The cost function:

The model used in this study was developed by Ahmed (2011) who studied the impact of specific variables of a company (size, risk premium, tangibility, risk, growth (GDP), crisis and inflation) on the performance of companies insurances Tunisia.

To better understand the impact of these variables on the performance of the insurance industry in Tunisia, it is preferable to use the following model:

The Cobb-Douglas cost function of the insurance industry in Tunisia is written (Ahmed, 2011):

$$y_{it} = \beta_0 + \beta_1 Pr_{it} + \beta_2 Ta_{it} + \beta_3 SZ_{it} + \beta_4 Cr_{it} + \beta_5 I_{it} + \beta_6 L_{it} + \beta_7 LG_{it} + \varepsilon_{it} \quad (1)$$

y_{it} = Performance (ROA) = (net earnings before interest and taxes divided by total assets);

Pr_{it} : the risk premium;

Ta_{it} : the Tangibility (Tangibility) = (fixed assets/total assets);

SZ_{it} : The Size (Size) = Ln (total assets);

Cr_{it} : the growth (Growth) = (the Variation of the premiums in percentage);

I_{it} : inflation;

L_{it} : labor;

ε_{it} : the error term.

The efficiency frontier method

We focus on the input-oriented approach to calculate efficiency scores (Hsiao et al., 2010; Chortareasa et al., 2012; Barth et al., 2013; Ayadi et al., 2016; Adusei, 2016; Dharmendra & Bashir, 2015). More explicitly, the outputs of insurance companies depend on factors that they can hardly control and that they can be considered more as cost minimizing actors. Therefore, the use of an input-oriented method would be more preferred than an output-oriented approach. This technique, as we know, does not use a functional form but rather a multi-input and multi-output production function (Cook, Tone, & Zhu, 2014).

Essentially, the DEA approach exhibits two models: the CCR model of (Charnes, Cooper, & Rhodes, 1978) under the assumption of constant returns to

scale and the BCC model of (Banker, Charnes, & Cooper, 1984) under the assumption of variable returns to scale. Indeed, this approach is estimated to build a common efficiency frontier, to compare insurance industries. Therefore, all insurances not located on this efficiency frontier are inefficient. It goes without saying that the efficiency scores of Islamic and conventional insurance are calculated relative to the common frontier for each year of the period covered (Barth et al., 2013).

In order to test the robustness of the results, we also used the approach based on constant returns to scale proposed by (Charnes et al., 1978).

Based on a priori nonparametric forms (DEA) of the efficiency frontier approach, nonparametric modeling has the advantage of distinguishing between (pure) technical efficiency and technical efficiency versus scale efficiency and allocative efficiency (Chen et al., 2009; Cummins et al., 1999), cost, revenue or profit efficiency (Berger & Di Patti, 2006; Pasiouras et al., 2009). In the context of our article, we have, in the light of this work, also used the concept of technical efficiency. The following linear programming is used to estimate the technical efficiency of each insurance: Tobit DEA.

More or less, the Tobit regression model takes into account the limitation of the dependent variables. That said, it determines the impact of the regression on the efficiency, because the efficiency scores of this model are bounded and have a positive probability, but they are in continuous distribution on the strictly positive variables (Wooldridge, 2013).

To obtain the estimates of the factors that affect the efficiency of the insurance industries in Tunisia, the regression model used is the Tobit. Generally, this model determines the relationship between the dependent variable y_i (performance) and the independent variable x_i (size, growth, inflation, crisis) (Tobin, 1958). Therefore, this model determines the estimates efficiency bounded between 0 and 1 (Gwahula, 2013; Djalilov & Piesse, 2014; Khalad & Mazila, 2014; Dharmendra & Bashir, 2015).

Using an OLS estimation method to analyze the regression coefficient yields a biased and inconsistent parameter estimate, an invalid solution. Anyway, all this remains a question of choice of estimation method, but the technical efficiency of DEA is not continuous and the values are bounded between 0 and 1. Consequently, the maximum likelihood technique partially corrects this handicap (Tobin, 1958).

Be that as it may, the technical efficiency of the insurance industry in the Tobit model (Zhaoqun, Rong, & Yugui, 2016) is written:

$$y_i = \beta_0 + \sum \beta_j X_{ji} + u_i \tag{2}$$

where y_i is the regeneration and efficiency of each insurance industry;

β_j denotes the coefficient of the partial regression;

u_i denotes the interference term subject to the distribution of the normal norm law.

To better understand the performance of the insurance industry in Tunisia, it

is preferable to use the size of the company, the crisis, inflation, the risk premium and growth, being factors that determine the efficiency.

The y_i: bring out;

$$y_i = \beta_0 + \beta X_{1i} + \beta X_{2i} + \beta X_{3i} + \beta X_{4i} + \beta X_{5i} + u_i \quad (3)$$

X_{1i}: The size of the insurance industry;

X_{2i}: crisis;

X_{3i}: inflation;

X_{4i}: growth;

X_{5i}: the risk premium;

u_i: The stochastic distribution.

The existence of several dependent lag variables in the form of explanatory variables, as we know, decries a dynamic model. Additionally, dynamic panels include endogenous structure in the model through instrumental variables. This endogeneity exhibits a correlation relationship between the dependent variable and the error term, linked to the cause and effect relationship between the variables explained in the model (Mileva, 2007; Wooldridge, 2013).

Unambiguously, the OLS technique does not yield efficient estimates because of the lagged dependent variable than the GMM technique.

Indeed, the GMM technique is much more advantageous. On the one hand, it solves the problems of simultaneity bias, reverse causalities and variables that weaken the results of studies and on the other hand, it deals with the problem of endogeneity of all the explanatory variables, i.e. the relationship between the social capital and growth.

In short, two extensions of the GMM estimator in dynamic panel: the GMM estimator in first difference and the GMM estimator in system. More explicitly, two tests are highlighted in the GMM estimator, e.g. the over-identification test of Sargan/Hansen, which tests the validity of lagged variables as instruments, and the autocorrelation test of Arellano and Bond or the null hypothesis is the absence of first order autocorrelation of level equation errors.

Generally, the first difference GMM estimator takes for each period the first difference of the equation to be estimated. That is to say, eliminate the specific effects and instrument the explanatory variables (the size, the crisis, the risk premium, inflation and growth) of the equation in difference by their values with a level delayed by one period or more.

The model AR (1)[1] with unobserved individual effects is written:

$$y_{it} = \alpha y_{i,t-1} + \eta_i + v_{it} \quad |\alpha| < 1 \quad (4)$$

for $i = 1, \cdots, N$ and $t = 2, \cdots, T$, where $\eta_i + v_{it} = u_{it}$ is the standard error of Component Structure:

[1]Indeed, the AR model (1) of the Equation (1), causes a problem when the autoregressive parameter (α) approaching unity, e.g. the variance of the individual effects (η_i) increases relative to Transient Shock variance (v_{it}).

$$E[\eta_i]=0,\quad E[v_{it}]=0,\quad E[v_{it}\eta_i]=0 \quad \text{for} \quad i=1,\cdots,N \quad \text{and} \quad t=2,\cdots,T \tag{5}$$

We assume that transient errors are uncorrelated:

$$E[v_{it}v_{is}]=0 \quad \text{pour} \quad i=1,\cdots,N \quad \text{et} \quad s\neq t \tag{6}$$

And that the initial conditions y_{i1} are predetermined.

$$E[y_{i1}v_{it}]=0, \text{ pour. } \quad i=1,\cdots,N \quad \text{et} \quad t=2,\cdots,T \tag{6}$$

It follows that these assumptions imply the momentary restrictions[2] infra:

$$m=0.5(T-1)(T-2) \tag{7}$$

with

$$E\left[y_{i,t-s}\Delta v_{it}\right]=0 \quad \text{for} \quad t=3,\cdots,T \quad \text{et} \quad s\geq 2 \tag{8}$$

We can rewrite it:

$$E\left(Z_i'\Delta v_i\right)=0$$

where Z_i is the matrix $(T-2)\times m$ given by:

$$Z_i=\begin{bmatrix} y_{i1} & 0 & \cdots & 0 \\ 0 & y_{i2} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & y_{T-2} \end{bmatrix} \tag{9}$$

And Δv_i is the vector $(T-2)$ vector $(\Delta v_{i3},\Delta v_{i4},\cdots,\Delta v_{iT})'$.

Indeed, the differentiation of the GMM estimator poses the problems of bias. However, this case is highlighted when the lagged levels of the series are only weakly correlated with the subsequent first differences, so that the instruments available for the first difference of the equations are weak (Blundell & Bond, 1998). Therefore, the inclusion of current or lagged values of these regressors in the instrument improves the GMM estimator.

Some series are difficult to estimate in this method, e.g. estimating autoregressive models for a series, i.e. GDP per capita.

- **Non-parametric estimation of microeconomic variables the static Tobit model (DEA CRS) and dynamic SFA (GMM):**

Tobit regression;

Inefficience DEA CRS;

Log likelihood = 85.310684.

The non-parametric estimation of the Tobit model naturally leads to observing first of all the significant values associated with the battery of variables retained in the short term and in the long term (GMM, cf **Table 1** and **Table 2**): the risk premium (0.017) and size (0.037) and labor (0.00).

In the nonparametric Tobit model, the estimated microeconomic variables

[2]These are the momentary restrictions exploited by the different first-order linear GMM estimator. More explicitly, they involve the use of lagged levels dated at *t*-2 as instruments for equations in first differences (Arellano & Bond, 1991). This gives a consistent estimator of α of $N\to\infty$ with *T* fixé.

Table 1. Tobit non-parametric estimation of microeconomic variables: the Tobit static model: DEA CRS.

Ineff CRS	Coeff	Std.Err	T	$P>\|t\|$	[95% conf interval]
Prime risk	2.25e−10	8.89e−11	2.53	0.017*	4.37e−11 4.06e−10
Size	−0.1817122	0.04246	−4.28	0.000*	−0.0268211 −0.0095234
Inflation	−0.0023412	0.159899	−0.15	0.885**	−0.0349115 0.0302292
GDP	0.0000479	0.0039153	0.01	0.990**	−0.0079272 0.008023
Crise	−0.0015927	0.0255687	−0.06	0.951**	−0.0536745 0.050489
-cons	0.3685741	0.098783	3.73	0.001**	0.1673597 0.5697885

*Significant (5%); **No-significant (5%).

Table 2. Dynamic panel GMM.

ineffSFA	Coef	Stderr	$P>\|t\|$	[95% conf interval]
L1	0.9676649	0.00871123	0.000	−9.495723 −9857575
Prime size	8.75e−11	3.11 e−11282	0.010	2.29 e−11 1.5 e−10
Size	−0.003568	0.016063222	0.037	−0.0069085 −0.0002274
inflation	0.0005366	0.000739	0.476	−0.0010004 0.0020735
ggdp	−0.002586	0.0004332	0.557	−0.011594 0..0006422
-cons	0.0885496	0.0300313	0.008	.026096 0.15100

correspond to the impact of these variables on the performance of insurance industries.

Clearly, the results obtained confirm, complete or clarify some of the Tobit parametric developments. In particular, the effects of size, the risk premium emerging from Table 1 are unambiguous. We also know that performance is positively influenced by the level of risk and the size of the company, but negatively influenced by the debt ratio[3] (Ahmed, 2011).

1.3. The Difference between Islamic Insurance and Conventional Insurance

The impact of the crisis on the performance of Islamic and conventional insurance:

In its first form, the question of the impact of the crisis on the performance of insurance industries was addressed between two periods: the period during the

[3]Leverage.

crisis (2008-2009) and the period after the crisis (2010-2013). In addition, we introduced a dummy variable in each of the regressions. This variable takes the value 0 if during the crisis period (2008, 2009), and the value 1 otherwise. Therefore, this variable makes it possible to identify the difference in performance for the different insurances due to the crisis.

Regressions and hypothesis testing.

We retain two samples (Islamic insurance and conventional insurance). This is based on 54 observations.

For each sample, we will run 6 multiple regressions defined by:

1) $$Performance_t = \beta_0 + \beta_1 premium_{vt} + \beta_2 size_t + \beta_3 crisis_t + \beta_4 growth_t + \beta_5 inflation_t + \beta_6 tangibility_t + e_t$$

2) $$Performance_t = \beta_0 + \beta_1 risk\ premium_{vt} + \beta_2 size_t + \beta_3 crisis_t + \beta_4 growth_t + \beta_5 inflation_t + \beta_6 tangibility_t + \beta_7 crisis_t * risk\ premium_t + e_t$$

3) $$Performance_t = \beta_0 + \beta_1 premium_{vt} + \beta_2 size_t + \beta_3 crisis_t + \beta_4 growth_t + \beta_5 inflation_t + \beta_6 tangibility_t + \beta_7 crisis_t * size_t + e_t$$

4) $$Performance_t = \beta_0 + \beta_1 premium_{vt} + \beta_2 size_t + \beta_3 crisis_t + \beta_4 growth_t + \beta_5 inflation_t + \beta_6 tangibility_t + \beta_7 crisis_t * inflation_t + e_t$$

5) $$Performance_t = \beta_0 + \beta_1 premium_{vt} + \beta_2 size_t + \beta_3 crisis_t + \beta_4 growth_t + \beta_5 inflation_t + \beta_6 tangibility_t + \beta_7 crisis_t * growth_t + e_t$$

6) $$Performance_t = \beta_0 + \beta_1 premium_{vt} + \beta_2 size_t + \beta_3 crisis_t + \beta_4 growth_t + \beta_5 inflation_t + \beta_6 tangibility_t + \beta_7 crisis_t * growth_t + \beta_8 crisis_t * inflation_t + \beta_9 crisis_{t*} size_t + \beta_{10} crisis_t * risk\ premium_t + e_t$$

We will also add each time the interaction variables in the different regressions to better explain the performance of the insurance industries at period *t*. Secondly, we choose a new sample in order to combine the observations of Islamic insurance and conventional insurance. This classification method provides a sixth multiple regression. This regression is chosen in order to identify whether there is a difference in performance between Islamic insurance and conventional insurance during the crisis. For this, we must take into account the dummy variable 'type of insurance'. That said, this variable takes the value 1 if it is an Islamic insurance and 0 for conventional insurance.

We will test the hypotheses below for the first five regressions:

H0: Performance during the crisis = Performance after the crisis;

H1: Performance during the crisis ≠ Performance after the crisis.

The assumptions for the sixth regression follow:

H0: Performance of Islamic insurance during the crisis = Performance of conventional insurance during the crisis;

H1: Performance of Islamic insurance during the crisis ≠ Performance of conventional insurance during the crisis.

Clearly, for each of the regressions, the *P*-value is low (<5%) (cf, **Table 1** and

Table 2). Therefore, the global model is significant, at least one parameter is significantly different from zero (risk premium). It goes without saying that for all the regressions, at least one independent variable explains the dependent variable (the financial performance or the Tobin's Q ratio). However, in all the modeling, the crisis dummy variable is not significant.

In sum, and beyond the observable regressions, it should be recognized that the financial performance of our Islamic insurance in times of crisis is no different from that after the crisis, which confirms the results of research on the crisis.

More or less, Islamic insurance has been more resilient to the Subprime financial crisis than conventional insurance. That said, this resilience is inherent in the principles that Islamic finance conveys and on which it is based.

Technically, Islamic insurance companies cannot carry toxic assets on their balance sheets. Why? Because complex structured products are quite simply instruments of Riba (interest rates) and therefore very highly speculative (Gharar, maysir). However, their presence has not generated positive externalities on the stability of conventional insurance. This could be explained by the distancing of Islamic insurance from their economic model and their imitation of the commercial practices of their conventional competitors. The hypothesis is not detachable from the reference to certain theoretical contributions. In particular, Martens (2001) reminds us that when Islamic finance coexists with conventional finance, Islamic insurance behaves similarly to conventional insurance, behavior that would seem to be a necessary condition for their survival in a competitive market[4].

Also, Islamic insurance is more resistant to subprime crises thanks to its better selection and in-depth study of projects. Unsurprisingly, it protects itself from informational asymmetries through participatory mechanisms. A way to explore means of control and monitoring to reduce the risk of loss of invested capital.

The last regression is then written:

$$\begin{aligned} Performance_t = {} & \beta_0 + \beta_1 premium_{vt} + \beta_2 size_t * kind\ of\ insurance \\ & + \beta_3 crisis_t + \beta_4 growth_t + \beta_5 inflation_t + \beta_6 tangibility_t \\ & + \beta_7 crisis_t * growth_t + \beta_8 crisis_t * inflation_t \\ & + \beta_9 crisis_t * size_t + risk\ premium_t * kind\ of\ insurance + e_t \end{aligned}$$

So far, we have modeled the performance (5 regressions) by retaining two states: classic insurance and Islamic insurance. Unsurprisingly, the above regression shows that risk premium*type of insurance and size*type of insurance are significant. Indeed, respectively, these rates have coefficients of order 0.017% and 0.00% (Table 1) and respectively, 0.010% and 0.037% (Table 2).

Therefore, these variables explain the difference in financial performance between Islamic insurance and conventional insurance.

Essentially, the results obtained explain that performance is positively influ-

[4]In particular, when they adjust upwards the remuneration they pay on deposits in order to make it close to the interest rate practiced by their competitors.

enced by the level of risk and the level of size but negatively influenced by the debt ratio (Ahmed, 2011; Akhtar et al., 2011). In addition, the size variable seems to have an influence on the resistance of the two insurance industries (Islamic insurance versus conventional insurance). That said, having an optimal size seems to have an influence on the costs. This variable increases the probability of winning the side of competitiveness.

In addition, the significance of the size variable may come from economies of scale, which should be greater for large insurance companies (Barth et al., 2013; Mollah et al., 2016; Bitar et al., 2017) and from their greater diversification (Abedifar et al., 2013). That said, growth in total assets is also positively related to insurance efficiency. More explicitly, insurers that exhibit higher total asset growth have the opportunity to invest more in risk management.

Ultimately, beyond the results obtained, the insurance industry in Tunisia is trying to diversify these products to resist competition and achieve performance. Consequently, the differentials of the industries of the different research strategies according to the objectives fixed at the beginning of the process of the performance, e.g. cost efficiency, productive efficiency, but also of the preferences and the constraints.

Any researcher of performance (efficiency), in fact, is associated with a range of specific preferences and diversification of products (economy of scope), which contributes to the hypothesis of a link between performance and diversification. In particular, diversification can drive up agency costs (Aron, 1988; Harris, Kriebel, & Raviv, 1982; Rotemberg & Saloner, 1994) and lead to an inefficient allocation of capital between the divisions of a diversified company (Rajan, Servaes, & Zingales, 2000; Stulz, 1990).

However, there are two kinds of hypotheses infra:

H_0 = Diversification is positively related to performance;

H_1 = Diversification is negatively related to performance.

This shows the relationship between diversification and performance:

Perf = f (diversification, characteristic of the company and the sector).

That said, the performance of the insurance industry depends on the diversification and the characteristics of the company and the sector.

Clearly, Islamic insurance in Tunisia is recently created; they are smaller in size than conventional insurance. Furthermore, they fail to reach the optimal scale and achieve a higher cost structure (agency and transaction costs). Unsurprisingly, this handicap should gradually disappear with the expansion of the insurance sector.

In short, better performance facilitates the achievement of greater social well-being.

How then to explain the significance of the risk premium variable in the static model? The answer essentially lies in risk management according to the type of insurance (Islamic or conventional).

Ultimately, beyond the results obtained, several work paths seem to be

emerging. Indeed, as we know, conventional insurance in Tunisia is more successful than Islamic insurance in Tunisia. However, Islamic insurance has been comforted with many risks (Aris et al., 2012), and has prudent underwriting practices to reduce information asymmetry (gharar, maysir). Unsurprisingly, information asymmetry hinders the development of a market. That said, a significant risk aversion allows the increase of the risk premium, which generates inefficiency in the insurance industry in Tunisia. Therefore, it cannot reach the optimal size as an example, life insurance to finance old-age benefits. In addition, financial intermediaries and transparency reduce information asymmetry and enhance market efficiency.

Indeed, most agents show, as we know, a reduction in risk aversion and pay a lower risk premium.

Nevertheless, some studies find that insurance (classic and Islamic) exhibit a high risk management score. Consequently, it is impossible to see the significance of the link (positive or negative) between the size of the company and the effectiveness of risk management.

By way of conclusion, risk management is a priori a problem for the insurance industries. However, competition hinders any exaggerated setting of the risk premium. Thus, risk management depends on the size of the company, the innovation and the degree of sophistication.

Is it desirable for Islamic insurance to incur the same volume of financial risks as that incurred by traditional insurance?

At the end of this work, it is difficult to find the answer. That said, the issue also comes back to the inability to bring practice closer to theory.

On a practical level, conventional insurance should eliminate as much risk as possible, in a more rational way, using equity to maximize the rate of return and accumulate the maximum amount of assets. Indeed, Islamic insurance can gain a better level of competitiveness by reducing risks, which presents an undesirable additional cost for them. Moreover, unsurprisingly, Islamic insurance provides for the risk in the calculation of their prices than conventional insurance.

This article highlights the only practical and theoretical difference between the two insurance industries.

Be that as it may, the fact that Islamic insurance takes on the same volume of risks as conventional insurance, gives Islamic insurance the opportunity to simplify the mode of financing so as to bring the risk profile linked to these modes closer to that of the interest used in the conventional ones.

Let us now stop at the theoretical level. It can be said that a simplification of Islamic financing methods leads to a loss of the specific characteristics of Islamic finance, its raison d'être. Furthermore, this represents a major challenge.

Indeed, this simplification appears difficult to operate. It is, however, counter-intuitive because Islamic management methods are intended to finance real transactions and insurance companies take on a share of the risks which justifies their right to profits This can be problematic insofar as obliges insurance com-

panies to keep more capital and to develop more rigorous control and risk management technique

2. Conclusion

The objective of this article is to analyze the performance of the insurance industry in Tunisia (Islamic insurance versus conventional insurance) over the period 2000-2013.

We show that the risk premium and the size are significant and positively related to the performance (efficiency) of insurance whether conventional or Islamic. These variables explain the difference between the two insurance sectors.

Indeed, our investigations have highlighted the importance of the technological revolution, economies of scale, cost strategies in the performance of insurance industries. These strategies suggest, all other things being equal, different search strategies depending on the types of insurance companies. The different estimation methods used to analyze performance (efficiency), which we have tested, reveal a myriad of analyses.

The insurance sector in Tunisia, as we know, is affected by major events. That said, a wave of acquisitions, a financial crisis and mergers increase the risk for the various sectors of the industry (Islamic or conventional). However, the study of risk management for the Islamic insurance sector remains complex. Indeed, risk management processes allow insurance sectors to control risks and take advantage of investment opportunities. Be that as it may, the liberalization of financial markets is associated with increased risk and financial instability. Generally, Islamic insurance has been comforted with many risks and has prudent underwriting practices to reduce information asymmetry (gharar, maysir). More explicitly, the increase in the risk premium in a situation of aversion risk exhibits inefficiency in the insurance industry in Tunisia. Therefore, this industry fails to reach the optimal size. Furthermore, financial intermediaries and transparency reduce information asymmetry and enhance market efficiency.

Nevertheless, some studies find that insurance (classic and Islamic) exhibit a high risk management score. Consequently, it is impossible to see the significance of the link (positive or negative) between the size of the company and the effectiveness of risk management.

Usually, globalization and technological revolution are key factors in the development of Islamic insurance industries beyond national borders. This financial sector has experienced strong dynamism and competitiveness on the one hand and complexity on the other.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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