Determinants of profitability of takaful operators: new evidence from Malaysia based on dynamic GMM approach

Hodori, Arif and Masih, Mansur

INCEIF, Malaysia, INCEIF, Malaysia

10 May 2017

Determinants of profitability of takaful operators: new evidence from Malaysia based on dynamic GMM approach

Arif Hodori[1] and Mansur Masih[2]

Abstract

Takaful or Islamic Insurance is a branch of Islamic Finance that is frequently overlooked, with a very few empirical studies done in the field. In Malaysia, Takaful's asset base had grown from just RM$1.4 million in 1986 to RM$23 billion in 2014. Despite this significant growth, there has been very few empirical studies done in the field, especially on the determinants of Takaful operators' profitability. Motivated by this, this paper aims to investigate the determinants of profitability of Takaful operators by using the dynamic GMM estimator. This study finds that Takaful operators' size and age are significant determinants of its profitability. However, there are various limitations and challenges that this paper faced, especially on data availability which forced us to resort to manually extracting the data from the financial statements of the companies from their websites at a heavy cost of time and effort. This indicates the attention, work and effort that researchers in the field of Islamic Finance should give to this relatively unexplored field as deeper understanding of this field is crucial for supporting its growth and innovation.

Keywords: Islamic insurance, profitability, Malaysia, dynamic GMM

[1]Graduate student in Islamic finance at INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia.

[2] **Corresponding author**, Professor of Finance and Econometrics, INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia. Phone: +60173841464 Email: mansurmasih@inceif.org

Introduction

Takaful, or Islamic Insurance, has been growing for the past few years in Malaysia. The three decades of takaful evolution in this country has been characterised by the steady growth of market participants, including players, agents, consumers, and dedicated infrastructure capacity building. From an initial asset base of just RM$1.4 million in 1986, the asset base of Malaysia's takaful industry has grown manifold to a staggering estimate of RM$23 billion in 2014[3]. Malaysia's takaful market has been on a dynamic growth track, achieving double-digit growth momentum of about 19% and currently, In 2014, Malaysia was the largest Takaful market in Southeast Asia with expected gross Takaful contributions of US$2.9 billion. Although growing, the challenge remains for Takaful industry to raise its performance standards to be on par with the conventional insurance industry, and for the industry to maintain its growth, profitability of the Takaful operators should be seen as an important factor as with better profitability of the Takaful operators, it will enhance the growth of the industry. Moreover, even though the industry has been in Malaysia for three decades, the fact remains that it is an industry that is not fully mature yet, as evident from new Takaful operators coming in into the industry in recent years, setting up themselves alongside a handful of established Takaful operators that has been around for quite some time.

Nevertheless, we can't deny the potential of the industry, thus, understanding the factors that determining Takaful operators' profitability are crucial in order for the managers to be able to lay out business and managerial strategies and focus, with aim to grow the company, thus the industry. Despite the vast, ever-expanding body of Islamic finance literatures and empirical researches that has been published, Takaful seems to be getting less attention in the body of literature, with empirical works on Takaful operators' profitability in Malaysia are very limited. Motivated by this, I am making a humble attempt to study on the determinants of a Takaful operator's profitability for Malaysia's Takaful industry. The implication of this study is that, by gaining the understanding of the significant determinants of Takaful operators'

---

[3] Malaysian Takaful Association, Ernst & Young, (2015) "Malaysian Takaful Dynamics: Central Compendium 2015", Kuala Lumpur.

profitability, Takaful operators' managers are able to use this information to better strategize their business, in order for Takaful operators to be able to compete with their conventional counterpart.

Overview of Takaful Industry

Takaful is an Islamic insurance concept which is based on Islam Muamalat (banking transactions), to comply with the rules and regulations of Islamic law. This concept has been practiced in various forms for over 1400 years. According to Fisher and Taylor (2000) the concept of takaful has reportedly been practised in various forms since 622 AD on the basis of shared responsibility which laid the foundation of mutual insurance. It comes from the Arabic word Kafalah, meaning "the guarantee of each other" or "joint guarantee" against certain losses. It is said that the practices of kafalah has been used by the pre-Islam Arabs. There are various views on how Takaful came about to practice. It is said that the ancients Arabs practice a strong tribal system, and if a member of a tribe committed murder, it could lead two outcomes; either a tribal war, or by reaching a settlement by paying "blood money", which was used to compensate the loss of life came from tribal fund which was collected from donations by the members. Once the donation is made to the fund, no refund was allowed, and the fund was used mainly to settle compensation in tribal dispute. This was said as a obvious example of mutual Takaful, wherein the whole community stood as guarantee against the loss to any of its member, thus, according to Muslehuddin (1969) the communal enterprise is seen as social in character but economic in consequences. According to Porter et al (1933), "the underlying principle in mutual takaful is that the individual members are themselves the insurers as well as the insured".

According to Lailatul Faizah Abu Hassan et al. (2014), another theory on the early practice of Takaful is that Islamic insurance was first established in the early second century of Islamic era when Muslim Arabs started to expand their trade to India, the Malay Archipelago and other countries in Asia. Often, they had to suffer heavy losses as mishaps and misfortunes or robberies along the way. Based on Islamic principles of mutual assistance and cooperation in good and noble action, all the dealers agreed to contribute to a fund before they begin their journey. These funds were used to provide compensation to anyone in the group that suffered losses through any mishap in dire times of need. It was said that this was later copied by Europeans who later used to develop the concept of marine insurance.

The development of Takaful not only important for the development of Islamic economy, but also to the wellbeing of the people. According to Fisher (1999), Takaful is the second most important social institution in the Islamic community to counter poverty and deprivation. The Takaful is operated as an enterprise providing services on a self-sustaining model rather than as a charity Takaful has become one of the leading segments of the financial sector across the Asian, Arab and African regions with growth rates of 10% to 30% over the last couple of years. The global Takaful market is expected to grow at 14% annually over 2013-2016 and total worldwide direct Takaful premiums covering both non-life and life are expected to reach US$18.5 billion by 2016. Of this estimated amount, nearly US$2.6 billion in annual premiums would be written in GCC markets, US$6.4 billion written in the ASEAN region, and US$8.5 billion from Saudi Arabia. As the Malaysian authorities became comfortable with the growth and regulation of the Islamic market, the Government introduced further legislation to allow other conventional banks to offer Islamic products through their designated premises. Whilst sustaining the current pace of development, the growth prospect remains strong for the Malaysian Takaful sector, in view of the large untapped potential, where out of the 55.7% market penetration rate for both Takaful and insurance, the market penetration rate for Takaful was merely 14.5% in 2014. According to Malaysian Takaful Association, as of 2017, there are 11 Takaful operators, 3 Retakaful operators operating in Malaysia.

Literature Review

It is very important to note that there has been no empirical studies / literature found on Takaful's profitability and efficiency determinants. Thus, this study relies heavily on empirical research and evidences of conventional insurance as literature reviews to construct the study.

Firm Size

In terms of firm size, majority of studies argue that there is a positive relation between size and efficiency, as explained by the fact that large insurers have significant economies of scale advantages. In the insurance sector, it is usually assumed that a larger scale of operation reduces income volatility, since the pooling of risks works better the larger the risk pool (Cummins and Rubio-Misas, 2006). Many studies find results in line with the theoretical predictions of a positive relationship between size and efficiency (Cummins and Zi, 1998; Luhnen, 2009; Eling and Luhnen, 2010). However, there are studies that argue differently in a way that the very largest firms suffer from diseconomies of scale, for example, due to complexity of operations, so that they are not as efficient as middle-sized insurers (Fenn et al., 2008). However, Yuengert (1993) concludes that size and efficiency are statistically unrelated. On a different perspective, Zanghieri (2008) states that there is a nonlinear relationship between size and efficiency, which for life and non-life insurance he shows concave relations between size and cost/profit efficiency.

Leverage

Often, Risk-based capital standards will result in the increase of the required capital compared to simple ratio-based capital schemes. The increased security level associated with higher equity capital holdings of insurance firms comes at the expense of expensive equity capital, thus, an increase in equity, reflected in a decrease of leverage ratios, *ceteris paribus*, leads to a reduction in productivity. Moreover, it is argued that in the long run, increased security levels will be reflected in an increased volume of premiums because policyholders value low levels of insolvency risk (Epermanis and Harrington, 2006). Based on the economic argumentation, both directions could be supported. Cummins and Nini (2002) analyse capitalization of the U.S. property/liability (p/l) insurance industry for the period 1993–1998 and find that most insurers are significantly over-utilizing equity capital, which translates to significant revenue and cost of capital penalties, resulting in efficiency losses. In a study of the German p/l market for 1995–2006, Luhnen (2009) finds evidence of a positive relationship between leverage (his definition is equity to assets, which is sometimes discussed under the term “solvency” and efficiency (Eling and Luhnen, 2010).

Company's Age

There are two opposing arguments regarding the impact of age on efficiency. On the one hand, the long-term persistence of a firm in each market might indicate its ability to successfully adapt its technology and operations to changing market conditions, thus suggesting above-average efficiency and productivity. Moreover, firms with a long history and experience are also likely to be more well-known and to enjoy a good reputation. On the other hand, relatively new firms might be more innovative in the use of state-of-the-art production technology, signifying competitive and efficiency advantages for "young" firms. Both Hussels and Ward (2007), for the German and U.K. life insurance markets, and Biener and Eling (2011) for the microinsurance market, found that older firms tend to be less efficient in comparison to the younger ones.

Investment Income

Insurance companies have two main sources of revenue: premiums from underwriting activities and returns on investment income. Insurance companies invest premiums in order to generate a profit. Insurers invest in a wide array of assets, and must balance the desire to earn a higher return through riskier investments with the need to maintain liquidity to cover the liabilities associated with claims made against the policies that they underwrite. According to Nissim (2010) investing activities are particularly important for insurers, as for many, the spread between the return on investments and the interest cost of insurance liabilities is the primary source of income. Investment income is also significant for insurers where they accumulate substantial funds due to the time gap between the receipt of premiums and payment of claims, and they invest and manage these funds to generate investment income. This income contributes to earnings and so affects the pricing of insurance policies. In regards of Takaful companies, although the operations is different (due to the Shariah principles and arrangement of the contracts), the same principle do apply, where income from invested funds are one of their main source of revenue.

Data & Methodology

Data

For this study, the sample of the dataset is made up of 10 Takaful operator and ranges from the year 2011 to year 2015. All data are extracted manually from each of the companies' annual financial statement for every year, due to the lack of secondary data from databases.

Table 1 – Variables Description

Variable		Description
Profit/Loss	*(lnProfit)*	The total comprehensive income / loss for the period.
Investment Income Ratio	*(IIR)*	The ratio of investment income to the net earned contribution of the Takaful operator for the period.
Size	*(lnSize)*	The size of the Takaful operator, which was valued by the total asset of the Takaful operator.
Leverage Ratio	*(Lev)*	The leverage ratio of the takaful operator, which was calculated by the ratio of total debt/liabilities to total assets.
Company's Age	*(lnAge)*	The age of the company from the date it is incorporated.

Table 2 – Summary Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
lnProfit	Overall	16.89563	2.641009	0	19.08314	N =	49
	Between		1.657108	12.91828	18.74436	n =	10
	Within		2.101583	3.977351	20.82454	T-bar =	4.9
IIR	Overall	.1771784	.4200304	.0237012	3.00984	N =	49
	Between		.2303413	.0295291	.8212063	n =	10
	Within		.3676312	-.5744038	2.365812	T-bar =	4.9
lnSize	Overall	20.58071	1.501742	16.23062	23.29573	N =	49
	Between		1.240042	18.73089	22.56865	n =	10
	Within		.9399428	15.06853	22.13364	T-bar =	4.9
Lev	Overall	45.30442	37.15947	19.94019	256.3879	N =	49
	Between		27.23903	25.13588	107.8004	n =	10
	Within		26.30183	-22.31672	193.892	T-bar =	4.9
lnAge	Overall	1.949372	.7753227	0	3.465736	N =	49
	Between		.7573643	.7945135	3.400084	n =	10
	Within		.3010057	.9918734	2.601311	T-bar =	4.9

Table 1 shows the list of variables used for this study and its descriptions. The variable *lnProfit* is taken as the measurement of a Takaful profitability, while *IIR, ln Size, Lev*, and *lnAge* are the variables that this paper aim to test if it is a determinant of a Takaful operator's profitability. The dataset is an unbalanced panel which consist of 10 companies (groups). Table 2 is the summary statistics of the panel dataset.

Estimation Method

Traditional econometric methods (OLS, fixed effect and generalized effect) do not avoid the endogeneity problem arising from a causal relationship between the independent and dependent variables due to lagged dependent variables unlike a dynamic panel GMM. To solve this problem, the generalized moment method (GMM) is used as a generic tool to estimate a statistical model's parameters. GMM was proposed by Arellano and Bond (1991) and developed by Arellano and Bover (1995) and Blundell and Bond (1998) to solve the endogeneity problem in the independent variables using a series of instrumental variables generated by lagged variables (simultaneity bias problem of reverse causality and possible omitted variables). Given our focus only on Takaful / Islamic Insurance in Malaysia, we have an extremely small number of firms (N) in the sample, to the size of just 10. OLS gives rise to the endogeneity problem since, by construction, the lagged dependent variable is correlated with the bank-specific time-invariant fixed effect. Accordingly, the standard panel estimators such as the fixed-effect and random-effect estimators would not be appropriate. The small "N" in this study cautions us of instrument proliferation problem in case that an instrumental variable technique, e.g. the first-difference GMM or system GMM estimator, is used. According to Soto (2009), provided that some persistency is present in the series, the system GMM estimator yields the results with the lowest bias, in which the system GMM estimator outperform all the other estimators i.e. OLS, fixed-effects, difference GMM, level GMM, in terms of bias and efficiency. Taking notes of the above, we adopt the system GMM estimator suggested by Arellano and Bover (1995) and Blundell and Bond (1998). And for our case, the panel datasets are an unbalanced panel, thus, according to Roodman (2009), it is better to use System GMM and avoid Standard GMM, which has a weakness of magnifying gaps. Additionally, according to Davidson and MacKinnon (2004), in the presence of heteroskedasticity and serial correlation, the two step GMM uses a consistent estimate of the weighting matrix, taking the residual from the one step estimate, thus addressing the issue. Although it is asymptotically more efficient, the two-step GMM's standard error tend to be critically downward biased, to which we address by having a robust standard error estimation using the finite-sample correction to the two-step covariance matrix developed by Windmeijer (2005).

Estimation Result

Table 3 below shows us the estimation results, in which 6 types of GMM estimation has been estimated, which are one-step difference GMM, one-step difference GMM with robust standard error, two-step GMM with robust standard error, one-step system GMM, one-step system GMM with robust standard error, and two-step GMM with robust standard error. Based from the arguments presented in the previous section, it is agreed that the suitable estimation method to be used for this estimation is the System GMM and for a robust estimation, the two-step system GMM with robust standard error will be our estimation method of choice.

The result of the one-step system GMM with robust standard error is consistent with the result of the two-step system GMM with robust standard error. Interpreting the two-step system GMM with robust standard error, there are two variables that is found to be significant, which are lnSize, which is the size of firms, and *lnAge*, which is the company's age. For *lnSize*, it is highly significant at 99% significance level, and the coefficient indicates a positive relationship between Takaful operator's size and its profitability. To be more precise, an increase of 1% of the company size will result in an increase of profitability by 0.85%, given that other variables and factors remains constant. This means that the size of the company is a significant determinant of a Takaful operator's profitability. This is in line with Cummins and Rubio-Misas (2006) where we can view it in a way that a larger scale of operation for the insurer / takaful operator reduces income volatility, due to the better and larger risk pool that a larger takaful operator can have. This can be seen through a basic analysis of the takaful operators' financial statements. Out of the 10 companies selected for this study, 3 Takaful companies has not been profitable for the period of the sample, which was from 2011 to 2015, and the other 7 Takaful companies were mostly profitable throughout the period. One common characteristic of the 3 Takaful companies that has not been profitable is that, they only operate in the family Takaful line of business, while the other companies operate in both family Takaful and General Takaful. By operating in both line of business, it allows the Takaful company to have larger size, due to larger customer base, and having a larger pool of risk, while at the same time, diversify the risk through different line of business, instead of just focusing on a single line.

Table 3 – Estimation Results

lnProfit	(1) One-Step Diff GMM	(2) One-Step Diff GMM Robust	(3) Two-step Diff GMM Robust	(4) One-step System GMM	(5) One-step System GMM Robust	(6) Two-step System GMM Robust
L.lnProfit	0.115	0.115**	0.119	0.0445	0.0445	0.0303
	(0.0800)	(0.0492)	(0.0745)	(0.639)	(0.118)	(0.125)
IIR	3.241	3.241	5.576*	2.297	2.297	1.396
	(4.275)	(3.940)	(3.000)	(40.03)	(7.899)	(7.511)
lnSize	0.0328	0.0328	-0.0294	0.850**	0.850***	0.867***
	(0.116)	(0.116)	(0.0643)	(0.408)	(0.0591)	(0.0618)
Lev	0.00360	0.00360*	0.00404***	0.00535	0.00535	0.00521
	(0.00253)	(0.00173)	(0.00108)	(0.0190)	(0.00504)	(0.00508)
lnAge	-0.539	-0.539	-0.450	-0.990	-0.990***	-0.952***
	(0.570)	(0.488)	(0.428)	(1.576)	(0.162)	(0.127)
Observations	29	29	29	39	39	39
Number of Company	10	10	10	10	10	10
Number of Instruments	9	9	9	6	6	6
Prob > F	0.344	0.004	0.000	0.000	0.000	0.000
Sargan Test	0.294	0.294	0.294	0.914	0.914	0.914
Hansen Test	-	0.442	0.442	-	0.473	0.473
AR(1)	0.061	0.294	0.212	0.224	0.293	0.292
AR(2)	0.307	0.442	0.442	0.905	0.155	0.139

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As for the significance of the variable *lnAge*, it is found that it is significant at 99% significance level. From the estimated coefficient, we can see that there is a negative relationship between the Takaful operators' age to its profitability. To be more precise, from the estimated coefficient, it can be interpreted that an increase in the firm's age by 1% will cause a decrease of its profitability by 0.99%. This is similar to the finding of Hussels and Ward (2007) and Biener and Eling (2011), where it is found that older insurance firms are less efficient in comparison to the younger ones. This can be an explanation to the negative relationship exhibited by the coefficient. Alternatively, in respect of Malaysia's Takaful companies, after a further analysis of the companies "demographic", the profitable newcomers (a lot of new Takaful companies were established in the past 5 years) have a common characteristic, apart from operating in two line of Takaful business i.e. Family Takaful and General Takaful, these newcomers all have their conventional counterparts. Could having a conventional counterpart makes a Takaful operator more efficient and profitable? This is a plausible view as by having a conventional counterpart, it might mean better support for the Takaful company. The support could be in form of liquidity and equity assistance, to ensure the viability of the Takaful company business. Alternatively, maybe by having a conventional counterpart, it means that the Takaful company can leverage on their conventional sisters, in terms of customer base and human capital as well. These are some interesting takeaway that can be given attention as this study humbly tries to study the determinants of Takaful operators' profitability in situation of scarcity of data as well as empirical literatures on the subject matter.

Limitations and Challenges of the Study

This humble attempt of mine to study the determinants of Malaysia's Takaful operators' profitability comes with a lot of limitations and challenges that should be acknowledged. Firstly, is the lack of data availability. Databases do not have the data of Takaful operators' financial statement items. This led me to resort to manually extract the data from the financial statements of the companies from their website. This brings a different set of challenges. Some Takaful companies do not make all their financial statements available online despite having operated for more years than the year of financial statements available on its website. And while some do make it all available online, along the years i.e. in 2011 to 2012, there has been a change of reporting and disclosure format for Takaful companies, which changes some of the items in terms of what they disclosed and the measurement of the items.

Secondly, the challenge and limitations come in the form of the lack of empirical works that has been done in the field. In respect to empirical works in the field of Takaful / Islamic Insurance, it is very lacking and clearly there is a need of attention that should be given to this field. This made me to resort to referring conventional insurance's empirical works for my references of study. This could be cause by the lack of data availability, which what is faced by myself.

Thirdly, the challenge and limitations come in the technical side of the paper, which is the econometric processes. Due to the nature of the data, which is basically an extremely small "N" and "t", together with an unbalanced panel dataset, this causes the dataset to be not compatible to be tested by majority of panel unit root tests, panel cointegration tests, and panel VECM tests. Thus, it is not clear on the nature of the datasets, especially on its dynamics, cointegration, and perhaps causality amongst the variable. In addition to that, referring to the rule of thumb that the instruments in GMM estimation should be less or equal to "N", this renders the choice of instruments to be extremely limited, as well as resulting in the amount of variable that can be included in the estimations.

Despite a lot of limitations and challenges, it is important to emphasize that this study's main motivation is to make an humble attempt to explore one of the most unexplored regions in the ocean of Islamic finance empirical work. From the findings that is made, interesting part away questions can be risen, thus enabling a future direction of areas to be explored in the field of Takaful empirical research works.

Conclusion

In conclusion, this study found that Takaful operators' size and age are significant determinants of its profitability. The positive relationship between Takaful operators' size to its profitability might be because of the better and larger risk pool that a larger takaful operator can have with larger size and business line. The negative relationship of the Takaful operators' age to its profitability might be because of the higher efficiency of the younger firms, like what is mentioned by Hussels and Ward (2007) and Biener and Eling (2011). Another plausible explanation for this is that, after analysing the raw data, it could also be the result of having conventional counterparts, where the newcomers with conventional sisters can leverage on the conventional support that they have. It is also important to note the many challenges and limitations of this study, thus indicating a great amount of work and effort that researchers in the field of Islamic Finance should give to the field of Takaful, especially in terms of establishing a proper database for the field. Moving forward, from this study, further research question can be derived for future researches to gain better understanding of the field, such as the possible relationship or impact of a Takaful operators having conventional counterparts to their profitability and efficiency, the impact of the choice of business model i.e. Family Takaful and General Takaful on Takaful operators, and the quality of Takaful operators' risk pool and its impact on profitability.

References

Arellano, M., and O. Bover. 1995. Another look at the instrumental variables estimation of error components models. Journal of Econometrics 68: 29–51.

Arellano, M., and S. Bond. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Review of Economic Studies 58: 277–97.

Biener, C., Eling, M., 2011. The Performance of Microinsurance Programs: A Data Envelopment Analysis. Journal of Risk and Insurance 78(1), 83–115.

Björn Münstermann, Georg Paulus, and Ulrike Vogelgesang (2015), "What drives insurance operating cost?", McKinsey & Company.

Blundell, R., and S. Bond. 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics 87, 11–143.

Cummins, J. D., Rubio-Misas, M., 2006. Deregulation, Consolidation, and Efficiency: Evidence from the Spanish Insurance Industry. Journal of Money, Credit, and Banking 38(2), 323–355.

Cummins, J. D., Zi, H., 1998. Comparison of Frontier Efficiency Methods: An Application to the US Life Insurance Industry. Journal of Productivity Analysis 10(2), 131–152.

Eling, M., Luhnen, M., 2010. Efficiency in the International Insurance Industry: A Cross-Country Comparison. Journal of Banking and Finance 34(7), 1497–1509.

Epermanis, K., Harrington, S. E., 2006. Market Discipline in Property/Casualty Insurance: Evidence from Pre-mium Growth Surrounding Changes in Financial Strength Ratings. Journal of Money, Credit and Banking 38(6), 1515–1544.

Fenn, P., Vencappa, D., Diacon, S., Klumpes, P., O'Brien, C., 2008. Market Structure and the Efficiency of European Insurance Companies: A Stochastic Frontier Analysis. Journal of Banking and Finance 32(1), 86–100.

Fisher, O. C. 1999. Awakening of a Sleeping Giant – Rediscovery of Takaful Worldwide. Directory of Islamic Insurance (Takaful) 2000, Institute of Islamic Banking & Insurance.

Hussels, S., Ward, D. R., 2007. The Impact of Deregulation on the German and UK Life Insurance Markets: An Analysis of Efficiency and Productivity Between 1991 and 2002. Working Paper, SOM Research Paper Se-ries 4/07, Cranfield University, UK.

Lailatul Faizah Abu Hassana,, Wan Jamaliah Wan Jusohb, and Zarinah Hamid, (2014). Determinant of Customer Loyalty in Malaysian Takaful Industry. Procedia - Social and Behavioral Sciences 130 (2014) 362 – 370.

Luhnen, M., 2009. Determinants of Efficiency and Productivity in German Property-Liability Insurance: Evidence from 1995–2006. Geneva Papers on Risk and Insurance 34(3), 483–505.

Malaysian Takaful Association, Ernst & Young, (2015) “Malaysian Takaful Dynamics: Central Compendium 2015”, Kuala Lumpur.

Marcelo Soto, (2009). System GMM estimation with a small sample. Barcelona Economics Working Paper Series, Working Paper No. 395. Barcelona Graduate School of Economics, Spain.

Muhammad Muslehuddin, (1969). Takaful and Islamic Law. Islamic Publications, Pakistan.

Nissim, D., (2010). Analysis and Valuation of Insurance Companies. Center for Excellence in Accounting & Security Analysis, Columbia Business School, USA.

Omar Fisher and Dawood Y.Taylor (April 2000). "Prospects for Evolution of Takaful in the 21st Century: Origins of Takaful" (PDF). President and Fellows of Harvard College.

Porter, J. B., Craies, W. F., & Morgan, T. W., (1933). The laws of takaful: Fire, life, accident and guarantee embodying cases in the English, Scottish, Irish, American, Australian and Canadian courts, 8th Edition. London: Sweet & Maxwell.

Yuengert, A. M., 1993. The Measurement of Life Insurance: Estimates of a Mixed Normal-Gamma Error Model. Journal of Banking and Finance, 17, (2–3), 483–496.

Zanghieri, P., 2008. Efficiency of European Insurance Companies: Do Local Factors Matter? Academy of Management Journal, 38 (2), 341-363

Appendix

Panel Unit Root Test

lnProfit

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 259.3953

Prob > chi2 = 0.0000

IIR

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 133.4173

Prob > chi2 = 0.0000

lnSize

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 209.0464

Prob > chi2 = 0.0000

Lev

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 60.5423

Prob > chi2 = 0.0000

lnAge

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 239.8543

Prob > chi2 = 0.0000

d.lnProfit

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 153.5800

Prob > chi2 = 0.0000

d.IIR

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 118.9303

Prob > chi2 = 0.0000

d.lnSize

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 123.1884

Prob > chi2 = 0.0000

d.Lev

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 192.0510

Prob > chi2 = 0.0000

d.lnAge

Fisher Test for panel unit root using Phillips-Perron test (1 lags)

Ho: unit root

chi2(20) = 0.0000

Prob > chi2 = 1.0000

Dynamic panel-data estimation, one-step difference GMM

Group variable: Company		No. of Obs:	29
Time variable: Time		No. of groups:	10
	Obs. Per group:	Min:	2
		Avg:	2.9
		Max:	3
No. of instrument: 9		F(5, 24)	1.19
		Prob > F	0.344

lnProfit	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnProfit L1.	.1152806	.0800373	1044	0.163	-.0499083	.2804694
IIR	3.241457	4.275153	0.76	0.456	-5.582025	12.06494
lnSize	.0328073	.1160297	0.28	0.780	-.2066664	.2722809
Lev	.0035974	.002526	1.42	0.167	-.0016161	.008811
lnAge	-.5392696	.5698105	-0.95	0.353	-1.715301	.6367615

Instruments for first differences equation

GMM-type (missing=0, separate instruments for each period unless collapsed)

L2.(lnSize Lev IIR)

Arellano-Bond test for AR(1) in first differences: z = -1.87 Pr > z = 0.061

Arellano-Bond test for AR(2) in first differences: z = 1.02 Pr > z = 0.307

Sargan test of overid. restrictions: chi2(4) = 4.93 Prob > chi2 = 0.294

(Not robust, but not weakened by many instruments.)

Dynamic panel-data estimation, one-step difference GMM (Robust)

Group variable: Company		No. of Obs:	29
Time variable: Time		No. of groups:	10
	Obs. Per group:	Min:	2
		Avg:	2.9
		Max:	3
No. of instrument: 9		F(5, 10)	7.35
		Prob > F	0.004

lnProfit	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnProfit L1.	.1152806	.0491837	2.34	0.041	.0056925	.2248686
IIR	3.241457	3.939539	0.82	0.430	-5.536383	12.0193
lnSize	.0328073	.1157564	0.28	0.783	-.2251142	.2907287
Lev	.0035974	.0017316	2.08	0.064	-.0002608	.0074557
lnAge	-.5392696	.4881156	-1.10	0.295	-1.626859	.5483197

Instruments for first differences equation
GMM-type (missing=0, separate instruments for each period unless collapsed)
L2.(lnSize Lev IIR)

Arellano-Bond test for AR(1) in first differences:	z =	-1.20	Pr > z =	0.230
Arellano-Bond test for AR(2) in first differences:	z =	0.58	Pr > z =	0.560

Sargan test of overid. restrictions: chi2(4) = 4.93 Prob > chi2 = 0.294
(Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(4) = 3.74 Prob > chi2 = 0.442
(Robust, weakened by many instruments.)

Dynamic panel-data estimation, two-step difference GMM (Robust)

Group variable: Company		No. of Obs:	29
Time variable: Time		No. of groups:	10
	Obs. Per group:	Min:	2
		Avg:	2.9
		Max:	3
No. of instrument: 9		F(5, 10)	39.59
		Prob > F	0.000

lnProfit	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnProfit L1.	.1193128	.0745401	1.60	0.141	-.046773	.2853985
IIR	5.576078	3.000077	1.86	0.093	-1.10851	12.26067
lnSize	-.0294346	.0642546	-0.46	0.657	-.1726028	.1137336
Lev	.0040433	.0010757	3.76	0.004	.0016466	.00644
lnAge	-.4495581	.4279152	-1.05	0.318	-1.403013	.5038964

Instruments for first differences equation
GMM-type (missing=0, separate instruments for each period unless collapsed)
L2.(lnSize Lev IIR)

Arellano-Bond test for AR(1) in first differences:	z =	-1.25	Pr > z =	0.212
Arellano-Bond test for AR(2) in first differences:	z =	0.71	Pr > z =	0.477

Sargan test of overid. restrictions:	chi2(4) =	4.93	Prob > chi2 =	0.294
(Not robust, but not weakened by many instruments.)				
Hansen test of overid. restrictions:	chi2(4) =	3.74	Prob > chi2 =	0.442
(Robust, weakened by many instruments.)				

Dynamic panel-data estimation, one-step system GMM

Group variable: Company		No. of Obs:	39
Time variable: Time		No. of groups:	10
	Obs. Per group:	Min:	3
		Avg:	3.9
		Max:	4
No. of instrument: 6		F(5, 34)	118.62
		Prob > F	0.000

lnProfit	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnProfit L1.	0.0445054	.6390429	0.07	0.945	-1.254186	1.343197
IIR	2.297007	40.03398	0.06	0.955	-79.06182	83.65584
lnSize	.8504937	.4077473	2.09	0.045	.0218516	1.679136
Lev	.0053495	.0189931	0.28	0.780	-.0332492	.0439482
lnAge	-.990258	1.575838	-0.63	0.534	-4.192745	2.212229

Instruments for first differences equation
GMM-type (missing=0, separate instruments for each period unless collapsed)
L2.(lnSize Lev IIR) collapsed
Instruments for levels equation
GMM-type (missing=0, separate instruments for each period unless collapsed)
DL.(lnSize Lev IIR) collapsed

Arellano-Bond test for AR(1) in first differences: z = -1.21 Pr > z = 0.224
Arellano-Bond test for AR(2) in first differences: z = -0.12 Pr > z = 0.905

Sargan test of overid. restrictions: chi2(1) = 0.01 Prob > chi2 = 0.914
(Not robust, but not weakened by many instruments.)

Dynamic panel-data estimation, one-step system GMM (Robust)

Group variable: Company — No. of Obs: 39
Time variable: Time — No. of groups: 10

Obs. Per group: Min: 3
Avg: 3.9
Max: 4

No. of instrument: 6 — F(5, 10) 10858.93
Prob > F 0.000

lnProfit	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnProfit L1.	0.0445054	.1183892	0.38	0.715	-.219282	.3082929
IIR	2.297007	7.899109	0.29	0.777	-15.3033	19.89732
lnSize	.8504937	.0590677	14.40	0.000	.7188827	.9821048
Lev	.0053495	.0050374	1.06	0.313	-.0058744	.0165735
lnAge	-.990258	.1620452	-6.11	0.000	-1.351317	-.6291989

Instruments for first differences equation
GMM-type (missing=0, separate instruments for each period unless collapsed)
L2.(lnSize Lev IIR) collapsed
Instruments for levels equation
GMM-type (missing=0, separate instruments for each period unless collapsed)
DL.(lnSize Lev IIR) collapsed

Arellano-Bond test for AR(1) in first differences: z = -1.05 Pr > z = 0.293
Arellano-Bond test for AR(2) in first differences: z = -1.42 Pr > z = 0.155

Sargan test of overid. restrictions: chi2(1) = 0.01 Prob > chi2 = 0.914
(Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(1) = 0.51 Prob > chi2 = 0.473
(Robust, weakened by many instruments.)

Dynamic panel-data estimation, two-step system GMM (Robust)

Group variable: Company		No. of Obs:	39
Time variable: Time		No. of groups:	10
	Obs. Per group:	Min:	3
		Avg:	3.9
		Max:	4
No. of instrument: 6		F(5, 10)	9564.53
		Prob > F	0.000

lnProfit	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnProfit L1.	.030302	.1246839	0.24	0.813	-.247511	.308115
IIR	1.395758	7.51121	0.19	0.856	-15.34026	18.13178
lnSize	.8672491	.0617706	14.04	0.000	.7296158	1.004883
Lev	.0052147	.0050836	1.03	0.329	-.0061123	.0165416
lnAge	-.951594	.1268418	-7.50	0.000	-1.234215	-.6689728

Instruments for first differences equation
GMM-type (missing=0, separate instruments for each period unless collapsed)
L2.(lnSize Lev IIR) collapsed
Instruments for levels equation
GMM-type (missing=0, separate instruments for each period unless collapsed)
DL.(lnSize Lev IIR) collapsed

Arellano-Bond test for AR(1) in first differences:	z =	-1.05	Pr > z =	0.292
Arellano-Bond test for AR(2) in first differences:	z =	-1.48	Pr > z =	0.139

Sargan test of overid. restrictions:	chi2(1) =	0.01	Prob > chi2 =	0.914
(Not robust, but not weakened by many instruments.)				
Hansen test of overid. restrictions:	chi2(1) =	0.51	Prob > chi2 =	0.473
(Robust, weakened by many instruments.)				