Dynamic financial model of life insurance and family takaful companies in Malaysia

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Abstract: The ability to understand and identify factors affecting solvency of life insurance and family takaful company is crucial to various stakeholders of an insurance industry. The purpose of this study is to empirically study firm-specific and economic factors affecting solvency of life conventional insurance and family takaful companies in an emerging economy and well-regulated financial industry of Malaysia. Equity-to-asset and equity-to-technical reserve ratio are used as proxy for solvency. The investigation was done from year 2008 to 2012 on 11 life insurance and six family takaful companies using balanced panel data regression model. The study found that expenses and investment income are statistically significant and positively related to solvency of life insurance business. Meanwhile, company size and liquidity are statistically significant and negatively related to solvency of life insurers' solvency. For family takaful, takaful leverage and contribution growth have significant positive effect, while, expenses and company size have significant negative effect on solvency.

Keywords: life insurance; takaful; solvency; Malaysia.

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1 Introduction

Between 2008 and 2009, the global insurance industry was experiencing unprecedented volatility as a result of the global financial crisis. As a consequence, the regulators have tightened up the regulatory and supervision framework for insurance industry and financial industry as a whole. Amongst others, solvency has been a significant regulatory monitoring. In the case of Malaysia, solvency requirement for insurance industry is governed by the risk-based capital (RBC) framework. The RBC framework for conventional insurance companies was introduced in April 2007, followed by its full implementation is actually in January 2009. It was a timely action by the regulator of insurance industry in Malaysia; Bank Negara Malaysia (BNM), as it came just at the right time, when the world was hit by the global financial crisis which started end of 2007 until 2009. On the other hand, the RBC framework for takaful industry was later introduced in 2012 and effectively implemented in January 2014.

The BNM's incentive to tighten up the regulatory and supervision framework for insurance industry in Malaysia has proven to be a success story in the domestic financial industry, as both conventional life insurers and family takaful companies continue to perform tremendously as depicted by its growth in recent years.

In fact, takaful has recorded remarkable positive and much higher growth as compared to its conventional counter-part in terms of contribution income for the period 2008 to 2012. The higher comparative growth of family takaful signals the confidence and trust that consumers and market participants have in Malaysia takaful industry, as a mean of protecting their financial interest from the unforeseen financial loss, hence providing long-term financial solutions.

Therefore, realising the tremendous growth of insurance industry in Malaysia, this research aims to identify the solvency determinants, including firm-specific and economic (market) factors, hence analyses the different factors affecting solvency of insurance and takaful sector, respectively. It investigates further the factors that give significant impact to the solvency of life insurance and family takaful business for the period 2008 to 2012.

The rest of the paper is organised as follows. Part two discusses previous studies done in the area and justification of using selected dependent and independent variables in this study. Part three shows the data and methods used in this study and part four discusses the finding and its managerial implications. Part five is conclusion and recommendations.

2 Literature review

A wide variety of published literatures have investigated the determinants of financial performance of insurance and takaful companies such as Browne et al. (2001), Shiu (2004), Pervan and Pavić (2010), Ismail (2013), and Akotey et al. (2013). By adopting four performance measures namely investment yield ratio, percentage change in shareholders fund, returns on shareholders fund and combined ratio, Shiu (2004) revealed that liquidity, unexpected inflation, interest rate level, and underwriting profits are significant factors affecting the financial performance of general insurance industry in the UK. Pervan and Pavić (2010) found that age and market shares have significant and positive impact, and on the other hand, claims ratio has negative impact on the insurer's financial performance. With regard to the market shares, Das et al. (2003) found that low

market valuation for shares of the company which can be measured or indicated by market or book value, price per earning, and price-to-gross premium ratios, may indicate a poor quality of earnings or equity (capital) and therefore, the assets, liabilities and exposures need to be revised. Adams and Buckle (2003) proved that the operational performance in Bermuda insurance market is negatively related to underwriting risk and liquidity, and positively related to leverage.

In a study conducted by Ismail (2013), determinants of financial performance of general takaful operators and conventional insurers in Malaysia are measured against investment yield and combined ratio. A combine ratio is a sum of loss ratio and expense ratio. It measures the performance of underwriting operation. According to Das et al. (2003), a prolonged triple-digit combined ratios in a low and volatile market yield for investments signal a drain on capital, hence indicates a solvency problem. Such result if happens, is threatening as return from investment is a major source of income for a long-term business of a conventional life insurer and family takaful operator.

The key indicators of insurers' profitability attract the keen interest of investors, scientific researches, financial market analyst and insurance regulators (Akotey et al., 2013). In the study conducted by Akotey et al. (2013) on life insurance companies in Ghana, they highlighted that profit does not only improve the solvency of the insurers, but also plays an important role in persuading the policyholders and shareholders, to supply funds to insurance firms. The study examined the relationship between three measures of profitability namely, investment income, underwriting profit and overall (total) net profit. The result of the analysis revealed a setting-off rather than a complementary relationship, between the underwriting profit and investment income towards the enhancement of the overall profitability of life insurers. Furthermore, the study discovered positive relationship between the overall (total) net profit and gross written premium and negative relationship against the investment income. Akotey et al. (2013) have included firm-specific factors such as gross written premium, claims, expenses on management, reinsurance, total debts, and company size in their study. The authors have also highlighted other factors affecting profitability, including size, capital, sales growth, efficiency, risk management, and retention ratio.

On a study of firm-specific, industry specific and macroeconomic factors affecting financial performance of non-life insurance companies in Croatia, Pervan and Pavić (2010) found that, inflation, expense ratio, and ownership have negative correlation with profitability. According to Chen and Wong (2004), size, investment, and liquidity are significant determinants of the profitability of insurers. Ahmed et al. (2011) revealed that leverage is negatively related to profitability, but size and loss ratio are positively related to profitability of life insurance companies in Pakistan. He further claimed that liquidity is not a significant factor affecting insurance industry in Pakistan. Another study in Pakistan by Malik (2011) identified that the profitability of the overall insurance industry, covering both life and non-life business, in Pakistan have a positive relationship with firm's size and capital, but found that, the loss ratio and leverage have a strong inverse relationship with profitability. On the other hand, Asimakopoulus et al. (2009) revealed that profitability is negatively impacted by leverage and current assets, size, while sales, growth and investment are positively related to profitability. In addition, Demirgüç-Kunt and Maksimovic (1998) and Akhavein et al. (1997) have found a positive correlation between size and profitability. Furthermore, Carson and Hoyt (1995) found that financial soundness of insurers is significantly affected by surplus and leverage.

As for solvency, according to Yakob et al. (2012), factors affecting solvency of the insurers and takaful operators in Malaysia are investment income, total benefit paid to capital and surplus ratio, financial leverage, and liquidity. The results showed positive relationship of investment income with solvency, and negative relationship for the other variables. In addition, Akotey et al. (2013) emphasised that adequately capitalised insurance not only signals financial soundness of an insurance company on the sight of regulator. Insurers are also able to underwrite large capital investments to generate high profit. Browne et al. (1999) argued that competition contributes to an increase in solvency. Besides market competition, the study discovered that bond return has positive influence on solvency, while inflation has negative relation with solvency. Table 1 and Table 2 summarise the dependent and independent variables adopted in previous studies.

Table 1 Proxies for solvency in previous literatures

Variable	*Details*	*Source*
Dependent variable: Solvency	Indicator of capital adequacy: $\frac{Capital}{Total\ assets}; \frac{Capital}{Technical\ reserve}$	Das et al. (2003)
	Investment income ratio: $\frac{Net\ investment\ income}{Net\ premium\ earned}$	Adams and Buckle (2003)
	Free asset ratio:	Shiu (2005)
	Excess (deficiency) of available assets and implicit items over the required minimum margin divided by the sum of long-term insurance business assets and other than long-term insurance business assets allocated towards long-term insurance business required minimum margin	
	Valuation ratio: $\frac{Policyholder's\ fund}{Valuation\ liability}$	Yakob et al. (2012)

Table 2 Independent variables used in previous literatures

Variable	*Measurements*	*Sources of literatures*
Level of interest rate or profit rate	Year-end prime rates	Chen and Wong (2004)
	5-year Malaysian Government Securities (MGS)	Ismail (2013)
	5-year Government Investment Issue (GII)	
	Average Yield on AAA corporate bonds over a three year period preceding Quarter 1	Browne and Hoyt (1995)
	UK ten-year government bonds yield	Shiu (2005)
Equity returns	FTSE All Share Total Return Index	Shiu (2005)
	FTSE Bursa Malaysia EMAS Shariah Index	Ismail (2013)
	FTSE Bursa Malaysia KL Composite Index	

Table 2 Independent variables used in previous literatures (continued)

Variable	*Measurements*	*Sources of literatures*
Unexpected inflation	The difference between UK inflation rate and interbank one-year middle rate	Shiu (2005)
Company size	Natural logarithm of grand total of admissible assets	Shiu (2005)
	Net premiums	Charumathi (2012)
	Natural logarithm of total assets	Ismail (2013) and Shiu (2004)
Reinsurance or retakaful dependence	$\frac{Reinsurance\ /\ retakaful\ ceded}{Total\ assets}$	Ismail (2013) and Shiu (2005)
Risk retention ratio	$\frac{Net\ written\ premium}{Total\ gross\ premium}$	Das et al. (2003) and Akotey et al. (2013)
	$\frac{Premium}{Capital\ and\ Surplus}$	Yakob et al. (2012)
Premium/contribution growth or new business premium/contribution	$\frac{\frac{Grosspremium}{contribution}written\ t - \frac{Grosspremium}{contribution}wrtiten\ t-1}{\frac{Grosspremium}{contribution}wrtiten\ t-1}$	Charumathi (2012) and Ismail (2013)
Insurance/takaful leverage	$\frac{Total\ reserves}{Capital\ and\ Surplus}$	Shiu (2005)
	$\frac{Reserves}{Surplus}$	Chen and Wong (2004)
	$\frac{Premium\ /\ Contribution}{Surplus}$	Yakob et al. (2012)
Investment	$\frac{Investment\ Income}{Net\ Premium}, \frac{Investment\ Income}{Investment\ Asset}$	Das et al. (2003)
	Investment income	Akotey et al. (2013) and Yakob et al. (2012)
Liquidity	$\frac{Sum\ of\ cash, bonds, equities\ and\ other\ shares}{Total\ liabilities}$	Shiu (2005)
	$\frac{Cash\ flow}{Liabilities}$	Yakob et al. (2012)
	$\frac{liquid\ assets}{current\ liabilities}; \frac{liquid\ assets}{total\ assets}; \frac{liquid\ liabilities}{Total\ liabilities}$	Das et al. (2003)
Management soundness	$\frac{Operating\ expenses}{Gross\ Premium}$	Das et al. (2003)

3 Data and methodology

3.1 Data

Solvency is a key measure of financial soundness of an insurance company or takaful operator. This paper intends to analyse which firm-specific and economic factors that have significant influence on the equity-to-total life asset, and equity-to-total family takaful asset for insurance and takaful respectively, as well as equity-to-technical reserve (ETR) ratio, as solvency measures.

1 $$\text{Equity-to-Asset Ratio} = \frac{\text{Capital and Surplus}}{\text{Total life / family assets}}$$ as the first indicator of solvency

2 $$\text{Equity-to-Technical Reserve Ratio} = \frac{\text{Capital and Surplus}}{\text{Technical Reserve}}$$ as the second indicator of solvency

The values of the variables for the abovementioned ratios are extracted from financial statements of life insurance companies and family takaful operators for each financial-year end of 2008 to 2012. Such ratios are chosen based on the previous studies, which has been discussed prior to this section.

As for the independent variables, the firm-specific variables used in the study are selected based on the previous studies, including insurance and takaful companies' financial performance, profitability, solvency, and insolvency determinants. The figures for the variables are extracted from the financial statements of life insurance and family takaful companies.

Ismail (2013) used firm-specific factors such as company size, retakaful or reinsurance ceded, solvency margin, stability of underwriting operation and liquidity to analyse determinants of investment yield as financial performance measure of general business in the insurance sector of Malaysia. On the other hand, Browne et al. (2001) combined solvency ratios, firm size, leverage, surplus, interest rate exposure, asset risk and liquidity risk and economic as firm specific factors while Asimakopoulus et al. (2009) selected size, sales, growth, investment, leverage, current assets, etc. as firm-specific factors. Meanwhile, Akotey et al. (2013) selected gross written premium, claims expenses on management, reinsurance, total debts, company size and Yakob et al. (2012) included premium-to-surplus, reinsurance-to-premium, benefit-to-surplus, cash flow-to-liability, total benefit paid-to-premium, real estate-to-asset ratios, as well as investment income, to reflect firm-specific factors.

Besides analysing the firm-specific factors, this paper also investigates economic (market) factors affecting solvency of life insurance companies and family takaful operators. It is important to include both economic and firm-specific factors to analyse the dynamic financial models of life insurers (Browne et al., 2001). Browne et al. (2001) included market variables such as investment returns, inflation, disposable personal income, the slope of the yield curve, unemployment and returns on real estate, in their study on dynamic financial models of life insurers. The economic factors are associated with three economic components namely disintermediation (interest rates, personal income and employment condition); returns on insurer investments (bonds, stocks, and real estate); and competition (Browne et al., 2001). Akotey et al. (2013) included interest

rate and gross domestic product as market factors influencing the financial performance of life insurance companies in Ghana.

In this research, the exposure to market risks is analysed by market interest rate, profit rate and the movement in conventional and Islamic equity prices (market indices) to see their adverse impact on life insurance and family takaful industry in Malaysia. The firm-specific and economic variables selected in this paper are hypothesised to be positively related, or negatively related, to both equity-to-asset (EAR) and ETR. The following section describes the motivation of the independent variables selected for the analysis.

3.1.1 Interest rate or profit rate level

Income from investment in fixed-income securities such as bond and sukuk are significant source of long-term revenue for insurance and takaful companies. Insurance and takaful companies often invest in bond or sukuk because it gives periodic income stream as well as preserving their capital investment which would add values to the companies. According to Ismail (2013), bonds, sukuk and fixed deposit are among investment instruments which depend mostly on the level of interest rate for returns on investment. Insurance market in Malaysia has been using the rates of Government Investment Issue (GII) and Malaysian Government Securities (MGS) as benchmarks in determining the rates offer for investment-linked products.

From the investors' point of view, the changes of interest rate or profit rate in both direction, i.e., positive and negative, will influence the price of bond and sukuk, hence gives indication to insurance and takaful companies to improve their investment portfolio strategies. Considering Malaysia's strong capital market performance, the growth of market yield is expected to have positive relation with solvency. When interest earning is high, insurance companies have more likelihood to perform well and remain solvent in the industry (Browne and Hoyt, 1995). In contrast, the negative relationship suggests unexpected high interest rate adversely affect insurance firms' solvency. The adverse relationship can be due to insufficient investment return from bonds or sukuk to cover a higher cost of investment expenses, as well as losses from poor underwriting performance (Ismail, 2013).

H1 High interest/profit rate is likely to improve EAR and ETR of life insurance/takaful company.

3.1.2 Market equity return

The adverse effects of the economic factors could impede financial soundness of a company. Other than fixed-income securities, equity securities or shares, is another source of investment income to insurance and takaful companies, through capital gain and dividend income. Therefore, besides interest rate or profit rate, market equity is another economic factor that may influence profitability and solvency of insurance and takaful operation. As long-term insurance business, dividend income and capital gain from equity investment are vital to both life conventional insurers and family takaful operators to remain sustainable in the market. The unfavourable poor performance of equity index will result in asset-liability mismatch. When equity return increased, insurer's investment portfolio also increases, hence, improving the performance of the insurer (Browne et al., 1999).

H2 High equity return is likely to improve EAR and ETR of life insurance/takaful company.

3.1.3 Company size

With regard to company size, there is no consensus yet upon its real impact towards life insurance profitability. Charumathi (2012) found that company size, as measured by net premium, is a significant and positive determinant of profitability of life insurance companies in India. His finding contradicts with the study done by Warner (1977), and Adams and Buckle (2003). According to Adams and Buckle (2003), firm sizes do not have significant influence on financial performance. Besides, in the context of life insurance, Shiu (2005) found company size to negatively affect solvency. However, Charumathi (2012) confirms that of Ismail (2013), who conducted study on non-life insurance and takaful companies in Malaysia.

H3 Larger company size is likely to improve EAR and ETR of life insurance/takaful company.

3.1.4 Risk retention ratio

Reinsurance and retakaful enable an insurance and takaful company to transfer or share its portfolio of underwriting risk, as protection against sudden severe and frequent claims by the policyholders. Reinsurance and retakaful also enable an insurance or takaful company to underwrite more business, hence expanding their assets and diversifying their business portfolio. Moreover, reinsurance and retakaful protect insurers and takaful companies from underwriting losses hence improving its financial performance and solvency. However, Shiu (2004) explained that even though reinsurance could increase an insurer operational stability by covering a poor underwriting year, increasing reinsurance dependence will reduce the company's retention level and thus, generate a lower long-term profitability for the insurer. If an insurance company relies much on reinsurance, then greater examination on financial health of a reinsurance company is needed (Das et al., 2003). That is why, in accordance to Das et al. (2003), in certain jurisdictions, the regulators may impose a pre-determined percentage of business to be ceded to the domestic reinsurance or retakaful company. Hence, this matter needs to be taken into account when comparing and analysing the risk retention ratio with across various countries.

At the industry level, the risk retention ratio reflects the overall underwriting strategy of to an extent that the risks assumed by an insurance or takaful company are ceded to reinsurance or retakaful, in order to cover a plausible severe risk scenario. High retention ratio indicates an insurance company is writing large business and capable of retaining the written business. On the other hand, when an insurance or takaful company records a risk retention ratio of more than one, it means the company does not cede its underwriting risk to reinsurer or retakaful, which could hamper the sustainability, hence solvency of the company.

H4 High retention ratio is likely to improve EAR and ETR of life insurance/takaful company.

3.1.5 Premium/contribution growth or new business premium/contribution

Premium and contribution growth is a significant proxy of market penetration of both life and non-life insurance and takaful business, respectively. According to Ismail (2013), the new business does influence investment performance of general insurance companies positively as measured by percentage change in gross contributions or premiums written. Furthermore, Browne et al. (2001) highlighted that, increase in new business sales signals low termination or surrender of insurance policy, thereby increase insurer's liquidity. In contrast, Charumathi (2012) claimed that, premium growth has inverse relationship with profitability of life insurance companies in India. As opposed to Charumathi (2012), this paper's hypothesis is, a positive premium or contribution growth would increase the solvency of life insurance and family takaful companies. The variable is calculated by taking the yearly growth.

H5 A positive contribution growth is likely to improve EAR and ETR of life insurance/takaful company.

3.1.6 Investment income ratio

Investment portfolios are vulnerable to changes in asset prices (Das et al., 2003). The earnings and income from investment is an important long-term source of capital. Akotey et al. (2013) have stated that, the financial solidity of an insurer depends on the investment performance. A higher investment income ratio is preferable as it indicates high income is received from the invested assets. Hence, it proves the success of an insurer or takaful operator investment strategy.

H6 High investment income ratio is likely to improve EAR and ETR of life insurance/takaful company.

3.1.7 Takaful or insurance leverage

According to Browne and Hoyt (1995), an increase in insurance leverage and/or financial leverage might increase the risk of an insurer. Adams and Buckle (2003) highlighted that, low leverage signals a corporate financial strength. On the other hand, Chen and Wong (2004) mentioned in their studies of determinants of financial health of Asian insurance companies (life and non-life) that, from the literature on capital structure, a firm's value will increase as leverage increase but up to an optimum point as leveraging beyond the optimum point signals high risk of insolvency and low value of the firm. In relation to this, Yakob et al. (2012) found that financial leverage as measured by ratio of premium to surplus is negatively related to solvency of life insurance companies in Malaysia. Charumathi (2012) found leverage to be negatively related to profitability. However, Adams and Buckle (2003) found leverage to be positively related to financial performance.

H7 Excess insurance leverage is likely to reduce EAR and ETR of life insurance/takaful company.

3.1.8 Liquidity

Liquidity is all about the exposure to maturity mismatch risk. Illiquidity and insolvencies have significant relationship in a financial industry because according to Das et al. (2003), illiquidity results in policyholders losing confidence in the company which lead them to terminate the cover, demand a return of unexpired premium, and find other insurance company for insurance coverage. Liquidity measures capability of an insurance company or takaful operator to pay its liability which include operating expenses and claim or benefit payments to the policyholders. Moreover, due to uncertainty of claims severity, frequency and timing of claims or benefits, liquidity measures is vital to ensure soundness of asset and liability management. The cash flow (mainly premium and investment income) and liquidation of assets are the sources of liquidity.

According to Das et al. (2003), life insurer may not be exposed to maturity mis-match risk with regard to its assets and liabilities as compared to the banking industry and non-life insurers. This is true because life insurance and family takaful products are long-term policy, hence enable the life insurance companies and family takaful operators to match its assets and liabilities more effectively, than the conventional general insurers and general takaful operators. However, the relationship of liquidity and solvency would concerns the policyholders who may demand a return from their unexpired premium or cancel their policy and find other alternatives (Das et al., 2003).

H8 High liquidity is likely to improve EAR and ETR of life insurance/takaful company.

3.1.9 Expense ratio

Expense ratio is a significant indicator of whether the operating cost generated by the business of an insurance company or takaful operator is efficiently sourced to improve performance and solvency of an insurance or takaful company. In this paper, an expense ratio is measured by the operating (management) expenses, as a percentage of net premium or contribution written. In the case of conventional insurance, operating expenses include both commission and management expenses. For takaful, operating expenses include fees and commission expenses, and the management expenses. The increase in the management expenses in a year or over a period of years are contributed by several factors. First, it indicates that the company has underwritten more premium or contribution. Secondly, it can be that the company is expanding its operational business for example, increasing expenditure on agents, incentive fees, and product marketing in order to boost sales and performance, and for other reasons. However, if across the years, the written premium or contribution has not increased as much as the increase in management expenses, it could deteriorate the financial soundness of a company. In other words, too much spending could lower profitability of company hence affecting its solvency. Akotey et al. (2013) found that an increase in expenses has an inverse influence on the overall profitability of insurers. However, based on the preliminary analysis from previous literatures, it is expected that a positive increase of expenses ratio would lead to a higher solvency level.

H9 High expense ratio is likely to improve EAR and ETR of life insurance/takaful company.

3.2 Method of analysis

For the purpose of this study, the selection of firms is restricted to 11 life insurance companies and six family takaful operators in Malaysia. This study will employ cross sectional and time-series regression models by using a balanced panel data for the period 2008 until 2012. A panel data approach allows the inclusion of time effects, as well as control for the individual heterogeneity, which is captured by firm-specific fixed or random effects components (Baltagi, 1995). The sources of information are extracted from the annual reports of the companies, as well as market data obtained from Bloomberg. Total sample or number of observations for the panel data analysis is 85 observations; 55 and 30 for life insurance and family takaful, respectively.

The general form of the empirical regression model for a panel data is in the following form, which is adopted from Yakob et al. (2012), with some modification in order to suit this paper's econometric model.

$$Y(it) = \alpha(i) + \sum_{j=1}^{k} \beta(j) X(jit) + \sum_{l=1}^{m} \beta(l) X(lit) + \varepsilon(it)$$

where *Yit* and *Xit* represents the dependent and explanatory variable, respectively, for an insurer or takaful company, *i* at time, *t*. The first set of explanatory variables which is indicated by *j*, represents the firm-specific factors, and *k* is the number of the firm-specific factors. The second set of explanatory variables which is indicated by *l*, denotes the economic or market factor influencing the dependent variable. αi, βi and βl are the parameters to be estimated by the linear regression models. ε_{it} is the error component which is normally distributed.

Solvency in the analysis is measured by two variables, EAR and ETR, representing EAR and ETR ratio, respectively. It means that the analysis is based on two models, i.e. EAR and ETR, as indicators for solvency, whereby the EAR and ETR models are to be run separately. Therefore, both insurance and takaful have EAR and ETR models. This makes four regression models all together. The EAR and ETR models shall be viewed as complementary to each other, to improve the sensitivity of the results obtained. The empirical relationship is based on nine explanatory variables that are predicted to influence solvency, i.e., positive or negative of life insurance and family takaful companies in Malaysia.

Table 3 presents dependent and independent variables to be used and how they are computed in the analysis of the data. The choice of measurement for each dependent and explanatory variable are derived from previous studies on related topics as well as the well-established and frequently used of financial ratios.

Table 3 The dependent and independent variables used in the empirical model

Abbreviations	*Variables*
EAR	Equity-to-asset ratio
ETR	Equity-to-technical reserve ratio
PRORATE	10-year Malaysian Government Securities (MGS)
INTRATE	10-year Government Investment Issue (GII)
EQINDEX_I	EQINDEX FTSE Bursa Malaysia EMAS Shariah Index
EQINDEX	FTSE Bursa Malaysia Kuala Lumpur Composite Index

Table 3 The dependent and independent variables used in the empirical model (continued)

Abbreviations	*Variables*
COMPSIZE	Natural logarithm of grand total assets
RISKRE	Risk Retention Ratio
CONGROW	Contribution Growth
PRGROW	Premium Growth
INVINC	Investment Income
TALEV/INLEV	Takaful/Insurance Leverage
LIQ	Liquidity
EXP	Expenses

4 Findings and discussion

4.1 Descriptive analysis

Tables 4 and 5 present the descriptive statistics of the dependent and explanatory variables for takaful and insurance, respectively. When the descriptive statistics for takaful and insurance were compared, the observation has shown a slight difference in the average of all the variables, except for ETR ratio. The ETR ratio for insurance far exceeded takaful by 6.37 times, indicating that insurance companies in Malaysia on average, hold larger equity and technical reserve as compared to takaful which has smaller equity than its technical reserves, on average. Moreover, within the takaful and insurance industry, respectively, ETR showed a large variation with a standard deviation of 3.1087 (mean of 3.2781) for takaful, and 27.3635 for insurance (mean of 20.8876). This may be due to the different market position in terms of equity capital and size of the technical reserves, which have been established and controlled by the companies since its establishment. On the other hand, the other variables showed a moderate variation among the takaful and insurance companies in Malaysia over the period of study.

Table 4 Descriptive statistics for family takaful

Takaful	*EAR*	*ETR*	*COMP SIZE*	*RISK RE*	*CON GROW*	*INV INC*	*TA LEV*	*LIQ*	*EXP*	*PRO RATE*	*EQ INDEX_I*
Mean	0.24	3.28	20.96	0.94	0.18	0.03	0.24	0.95	0.29	3.80	0.069
Med.	0.18	2.73	20.67	0.97	0.05	0.03	0.30	1.02	0.30	3.88	0.12
Max.	0.58	10.62	22.89	1.02	1.87	0.08	0.87	1.93	0.55	3.94	0.43
Min.	0.07	0.21	19.33	0.76	–0.65	0.00	–1.09	0.09	0.00	3.50	–0.44
Std. dv.	0.16	3.12	1.19	0.06	0.52	0.02	0.45	0.39	0.15	0.16	0.29
Obs.	30	30	30	30	30	30	30	30	30	30	30

Table 5 Descriptive statistics for life insurance

Life insurance	*EAR*	*ETR*	*COMP SIZE*	*RISK RE*	*PR GROW*	*INV INC*	*IN LEV*	*LIQ*	*EXP*	*INT RATE*	*EQ INDEX*
Mean	0.15	20.89	22.34	0.96	0.19	0.05	0.56	1.00	0.31	3.72	0.07
Med.	0.09	7.67	22.05	0.97	0.11	0.04	0.67	0.99	0.28	3.78	0.10
Max.	0.93	121.9	24.83	1.02	2.43	0.06	1.00	2.60	0.99	3.92	0.45
Min.	0.01	0.20	19.87	0.88	–0.70	0.02	–0.55	0.00	0.16	3.41	–0.39
Std. dv.	0.17	27.36	1.21	0.03	0.47	0.01	0.42	0.41	0.14	0.17	0.28
Obs,	55	55	55	55	55	55	55	55	55	55	55

It can be observed that some of the performance variables are consistent over the takaful and insurance industry. They are takaful and insurance leverage, premium and contribution growth, and conventional and Islamic equity index. They had all recorded negative minimum value. From data observation, while the distribution of negative value for takaful and insurance leverage, premium and contribution growth are random among the companies, it was also observed that both conventional and Islamic equity index performance are reported losses in 2008, due to the global financial crisis of 2007–2008 which had greatly impacted the financial market and caused economic meltdown all over the world.

In addition, the analysis further discovered that on average, Islamic equity index had performed better than the conventional equity index. Contrary to market equity index, interest and profit rate had marked the highest in 2008 for both conventional and Islamic. This finding shows that the Malaysia government long-term debt instruments, both Islamic and conventional, were not affected by the subprime crisis. In other words, there was no direct impact to the sovereign long-term capital instruments during the crisis, proving that such instruments were safe and less risky.

By analysing the ratio of management and operating expenses-to-net earned premium or contribution of life insurance and family takaful companies, it was learned that no company had ever recorded higher management expenses over the net written premium, indicating an efficient expenditure in underwriting the insurance and takaful business. Moreover, the investment income and ETR ratios showed a very large difference in terms of variation between the insurance and takaful sectors as depicted by the standard deviation, with nine times bigger for equity-to technical reserve and 1.87 times smaller for investment income in insurance, than that of takaful.

4.2 Multicollinearity

According to Gujarati (2004), when there is an exact linear relationship between the explanatory variables, then multicollinearity exists. Gujarati (2004) has outlined practical consequences of multicollinearity to include amongst others, greater standard error due to greater multicollinearity. When multicollinearity is present, it leads to very wide confidence intervals for the coefficients, and t-statistics tend to be very small. This will reduce the probability of rejecting the null hypothesis. In order to detect multicollinearity between the independent variables, Pearson's correlation coefficients test was used (Adams and Buckle, 2003; Yakob et al., 2012; Ismail, 2013). Since there was no variables detected to have correlation coefficients more than 0.8 or less than –0.8, as can

be seen from Tables 6 and 7, the result indicated that multicollinearity problem was not exist in both takaful and insurance.

Table 6 Correlation matrix of independent variables for takaful

	COMP SIZE	*CON GROW*	*EQ INDEX_I*	*EXP*	*INV INC*	*LIQ*	*PRO RATE*	*RISK RE*	*TA LEV*
COMPSIZE	1.00								
CONGROW	0.075	1.00							
EQINDEX_I	0.086	–0.12	1.00						
EXP	–0.40	0.34	0.14	1.00					
INVINC	0.54	0.09	0.04	–0.46	1.00				
LIQ	0.62	–0.22	–0.12	–0.69	0.67	1.00			
PRORATE	–0.13	–0.14	–0.17	–0.28	–0.23	–0.04	1.00		
RISKRE	0.49	0.18	0.11	–0.03	–0.15	–0.13	0.06	1.00	
TALEV	0.69	0.23	–0.03	–0.04	0.34	0.22	–0.23	0.36	1.00

Table 7 Correlation matrix of independent variables for life insurance

	COMP SIZE	*PR GROW*	*EQ INDEX*	*EXP*	*INV INC*	*LIQ*	*INT RATE*	*RISK RE*	*IN LEV*
COMPSIZE	1.00								
PRGROW	0.05	1.00							
EQINDEX	–0.62	0.06	1.00						
EXP	0.69	0.15	–0.45	1.00					
INVINC	–0.14	–0.25	0.02	–0.19	1.00				
LIQ	–0.14	–0.16	–0.00	–0.14	0.19	1.00			
INTRATE	–0.14	–0.13	0.08	0.07	0.14	–0.11	1.00		
RISKRE	–0.03	0.29	0.08	0.13	0.03	0.08	–0.10	1.00	
INLEV	0.50	0.02	–0.38	0.37	0.11	–0.33	–0.14	0.08	1.00

4.3 Heteroscedasticity

One of the assumptions of the fitted model is that the variance around the regression line is constant for all values of the explanatory variables. This is called homoscedasticity or homogeneity of variance. It is represented by null hypothesis, Ho, in Breusch-Pagan/Cook Weisberg test. When the probability of the test exceeds 0.50, it indicates presence of homoscedasticity, and as such, Ho cannot be rejected.

For takaful, Breusch-Pagan/Cook Weisberg test reported the presence of homoscedasticity, for both EAR and ETR models. For insurance, Breusch-Pagan/Cook Weisberg showed a positive result of homoscedasticity for ETR model, but unfortunately, this result was not the same for EAR model. Therefore, White's test was conducted on EAR model to observe if the results differ. The White's test result shows probability of 0.3988 and chi-square statistic of 55. Therefore, the result showed that there is no heteroscedasticity in both EAR and ETR models for takaful, as well as insurance.

4.4 Autocorrelation

An OLS regression model assumes that the individual error or residual terms is independent i.e. uncorrelated to each other, or else, the estimators are still unbiased and not linear (Gujarati, 2004). Durbin Watson statistic is used to detect an autocorrelation problem, i.e., strong correlation across the error terms, whereby, Durbin Watson statistic's value of 2 indicates non-existence of autocorrelation. The value near to 0 indicates positive correlation and value near to 4 indicates negative correlation with 2 and 4 being perfect negative and positive autocorrelation, respectively. From the results of Durbin Watson test as depicted in Table 8, both EAR and ETR model for takaful as well as insurance show insignificant autocorrelation.

Table 8 Durbin Watson test for autocorrelation

		Durbin-Watson statistic
Takaful	EAR	1.242204
	ETR	1.348336
Insurance	EAR	1.024069
	ETR	2.659702

Table 9 Empirical residual test for residuals using Liliefors and Cramer-Von Mises (W2)

			Prob.
Liliefors	Takaful	EAR	> 0.1
		ETR	0.054
	Insurance	EAR	> 0.1
		ETR	> 0.1
Cramer-Von Mises (W2)	Takaful	EAR	0.66
		ETR	0.07
	Insurance	EAR	0.05
		ETR	0.08

4.5 Normality of residual

One of the assumptions of a classical normal linear regression model is that each residual or error term is normally distributed with mean zero and variance to be σ2 (Gujarati, 2004). This study employed Lilliefors version of Kolomogorov-Smirnov's D test of goodness of fit, and Cramér-Von Mises (W2) for checking the normality of residuals series. According to Bundt and Murphy (2008), normality test is obtained by comparing empirical and theoretical cumulative distribution function. The null-hypothesis of normality of residuals is tested against the alternative hypothesis of non-normality of residuals. The normality null is not rejected if p values of Lilliefors and Cramer-Von-Mises test exceeds 5% significance level. The results from normality test on EAR and ETR models for both takaful and insurance confirm that the residuals of the four models are normally distributed.

4.6 Model selection test

The model specification used in this paper to identify and discuss solvency determinants of life insurance and family takaful companies in Malaysia were non-effects pooled ordinary least square (OLS) regression model and fixed-effects regression model. Random effects model is believed to be more appealing if the sample is drawn from a large population. The selection of non-effects pooled regression model was based on the result of Breusch-Pagan Lagrangian Multiplier (LM) test which showed statistic value less than the tabulated chi-squared critical value. Since Malaysia life insurance industry is not big in numbers, with only 11 family takaful operators and 14 conventional insurance companies operating life insurance business as of 2012, and that the samples taken for the analysis were 6 and 11 companies for takaful and insurance, respectively, therefore, the result of LM test was expected.

However, the result of ETR model for insurance showed a LM value of more than the tabulated chi-squared critical value. Following this finding, Hausman test was conducted in order to identify whether random or fixed effects was appropriate for the model. From Hausman test, the appropriate regression model for ETR model for insurance was the fixed-effects model, because the probability of Hausman test was statistically significant at 0.05 confidence level.

Table 10 Panel regression result for Takaful

Independent variables	*Dependent variable*	
	EAR	*ETR*
Intercept	4.554249	–15.4895
COMPSIZE	–0.181005***	–0.05377
RISKRE	–0.40536	5.791219
CONGROW	0.044432	1.49613*
INVINC	0.61029	20.79053
TALEV	0.181504***	4.727178***
LIQ	0.09396	–1.92305
EXP	–0.05632	–7.185395*
PRORATE	–0.0751	4.27219
EQINDEX_I	0.007776	0.99026
Number of observations	30	30
R2	0.890864	0.733276
Adjusted R2	0.841753	0.61325
F-statistic	18.13977***	6.109308***
Durbin Watson statistic	1.242204	1.348336
LM test	2.667718	0.115548
Hausman test	Nil	Nil

Notes: *, **, ***Means significant at alpha 10%, 5%, and 1% respectively.

4.7 Panel regression result

Overall, the two dependent variables (EAR and ETR) in both takaful and insurance were well explained by the independent variables. For takaful, the non-effect pooled OLS model was performed on both EAR and ETR models, with F-value of 18.13977 and 6.109308, and, they were statistically significant at 0 and 0.000379, respectively, as demonstrated in Table 10. The R2 result for takaful showed that 89.09% and 73.33% of the variation within the data were explained by the proposed regression model of EAR and ETR, respectively.

Table 11 Panel regression result for insurance

Independent variables	*Dependent variables*	
	EAR	*ETR*
Intercept	0.174414	–265.6756
COMPSIZE	–0.039153**	8.270195
RISKRE	0.911705	45.76124
PRGROW	–0.000886	–3.136587
INVINC	1.634657	311.898**
INSLEV	–0.013383	–2.641313
LIQ	–0.129097***	1.864655
EXP	0.781929***	90.62437***
INTRATE	–0.054742	4.04282
EQINDEX	–0.012008	5.222057
Number of observations	55	55
R^2	0.750711	0.969416
Adjusted R^2	0.700853	0.952814
F-statistic	15.05701***	58.38937***
Durbin Watson statistic	1.024069	2.659702
LM Test	0.439835472	45.20107284
Hausman Test	Nil	0.0147 (fixed effect)

Notes: *, **, *** means significant at alpha 10%, 5%, and 1% respectively.

Table 11 shows the results for insurance. The non-effect pooled regression model best estimated the data for EAR model with F-value of 15.05701 and statistically significant at 0% significance level. The R2 recorded was 75.07%. Meanwhile, the ETR model was best predicted by the fixed-effect model, chosen based on the result of Hausman test which produced p value of 0.0147, significance at 0.05%. The R2 of 96.94% explains the variations within the data of ETR model were explained by the fixed-effects regression model.

4.8 Discussion

Interestingly, in EAR model, the coefficient estimate of company size is negative and statistically significant for both takaful and insurance. The result shows that for insurance, company size has a negative and significant influence on EAR at 5%

significance level, and, positive and insignificant influence on ETR. For takaful, the coefficient estimates of company size are negatively correlated with both EAR and ETR, which is inconsistent with the hypothesis. This means, expansion of company size would not secure solvency of family takaful companies. Although the finding of negative relationship between company size and the dependent variable is contrary to that of Ismail (2013) and Charumathi (2012), the study made by Warner (1977), Adams and Buckle (2003) and Shiu (2005) have proved the same findings. According to Warner (1977), smaller firms incur a lower financial distress costs as compared to bigger ones, therefore, small firms have stronger stimulus to keep a higher solvency level. The result shows that firms with huge assets do not necessarily indicates high solvency, instead, it may suggest inefficient use of resources, which may lead to loss of revenue.

At the industry level, the risk retention ratio reflects the overall underwriting strategy of to an extent that the risks assumed by an insurance or takaful company, are ceded to reinsurance or retakaful, in order to cover a plausible severe risk scenario. High retention ratio indicates an insurance company is writing large business and capable of retaining the written business. The result shows that in insurance, risk retention ratio has positive influence on both EAR and ETR, which is consistent with the expectation, while in takaful, it has negative and positive relationship with EAR and ETR, respectively. The positive relationship between risk retention ratio and solvency implies that, retaining the contribution written has proven to give a positive impact to solvency of family takaful companies in Malaysia. However, Shiu (2004) explained that even though reinsurance could increase an insurer's operational stability by covering a poor underwriting year, increasing reinsurance dependence will reduce the company's retention level and thus, generate a lower long-term profitability for the insurer.

The contribution growth of takaful is found to be positively related to solvency, and has a significant impact on family takaful companies' ETR at 10% significance level, while, it is statistically insignificant when measured against EAR. On the other hand, premium growth is negatively related to solvency and statistically insignificant. In addition, the contribution growth has a significant impact on family takaful companies' ETR at 10% significance level, and it is statistically insignificant when measured against EAR. From the findings, life insurance is likely to become insolvent due to a rapid premium growth because the coefficient's estimate of premium growth is found to be negatively related to both EAR and ETR. Kim et al. (1995) said that the rapid growth of premium volume is a contributing factor to insurer's insolvency. This argument is supported by Chen and Wong (2004), who stated that the effective selection of profitable investment portfolios may be neglected due to excessive attention on marketing the premium growth.

The earnings and income from investment is an important long-term source of capital. From the panel regression result, the coefficient of investment income indicates that the investment income is positively related to EAR and ETR, for both takaful and insurance. Such industry-consistent results lend support to that of Yakob et al. (2012), who found investment performance to be negatively correlated to insolvency rate. Investment income has no statistical significance influence on EAR for both takaful and insurance. However, investment income ratio is statistically significant at 5% in the ETR model for life insurance providers. There is no statistical significance relationship between ETR and investment income ratio for takaful.

According to Browne and Hoyt (1995), an increase in insurance leverage or financial leverage might increase the risk of an insurer. Adams and Buckle (2003) highlighted that,

low leverage signals a corporate financial strength. Yakob et al. (2012) stated that, an efficient management will utilise capital and reserves efficiently. Nevertheless, Chen and Wong (2004) stated that, from the literature on capital structure, a firm's value will increase as leverage increase but up to an optimum point as leveraging beyond the optimum point signals high risk of insolvency and low value of the firm. The result shows that insurance leverage is negatively related to solvency. In contrary, solvency and takaful leverage illustrate positive relationship. In addition, there is statistical significance relationship between takaful leverage and solvency at 1% confidence level, for both EAR and ETR model. The positive and significant result of takaful leverage as a determinant of solvency indicates that leveraging has not deteriorated the solvency of family takaful companies. It also indicates that family takaful companies successfully manage their underwriting risk which include risk pooling and risk sharing activities with the retakaful companies.

The finding shows liquidity of takaful is statistically insignificant to both EAR and ETR model. In addition, liquidity has positive and negative influence on EAR and ETR, respectively. In insurance sector, while liquidity is negative and statistically significant to EAR at 1% level, it has a positive influence on ETR. The finding with regard to negative relationship between liquidity and solvency measures is inconsistent with the hypothesis which states higher liquidity results in higher solvency. In this regard, a drop in liquidity of an insurance or takaful company will not lead to insolvency. Such result lends support to that of Browne et al. (1999) who studied on insolvencies prediction in life-health insurance industry.

Ismail (2013) explained that as compared to other riskier and long term investments such as equities and private debt securities, liquid assets generally produce lower returns in the long-term. Furthermore, the author asserted that liquid assets caused reinvestment risk, as proceeds from the liquid assets have to be reinvested after a relatively short period of time. After all, a low liquidity ratio is not a threat to the solvency of life insurance or family takaful business as it is meant to measure if the companies could meet its short-term, i.e., current obligations. Hence, the adverse relationship between solvency measure and liquidity suggests that, low liquidity does not translated into lower solvency, in fact, it improves solvency level of such long-term business segment. In addition, liquidity of insurance company is relatively predictable (Das et al., 2003).

What is of higher concerned to life insurance or family takaful company is its capacity to meet its long-term financial commitments to the policyholders. In this regard, an efficient management of insurance risk is vital, which include projection of the frequency and severity of claims or benefits, sound risk management in handling reinsurance, longevity and mortality risk, etc. Furthermore, based on the result of the descriptive statistics in Table 4 and Table 5, both takaful and insurance maintain high liquidity levels as compared to other firm-specific variables, within the range of 1.9309 and 0.0869 for takaful, and 2.6044 and 0.0010 for insurance.

While there is no statistical significance between EAR and expenses for takaful, there is a negative and significant relationship between ETR and expenses, at 10% significance level. The negative relationship between expenses and solvency measures means, a rising expenses of family takaful companies, accompanied by careful selection and mitigation of risks after all, has not lead to high solvency. The result suggests that takaful companies may continue to increase its operating and management expenditure to enhance its growth, as it has an adverse effect on solvency. Meanwhile, insurance has proved a consistent result with that of hypothesis, in both EAR and ETR model, whereby,

expenses is found to be statistically significant and positively related to solvency, at 1% level (Table 11). The result for insurance supports the hypothesis, such that, higher expenses have positive influence on solvency. In other words, when the expenditure for the business operation increases, the solvency rate tends to improve. Indeed, this relationship is quite obvious between ETR and expenses with high coefficient estimates of 90.62437.

The result shows that profit and interest rate are positively related to ETR for both takaful and insurance, respectively. The results also show that profit and interest rate is negatively related to EAR of takaful and insurance, respectively. The former relationship means, a drop in sukuk yield would lower the ETR level of family takaful, but the adverse effect can be seen on EAR. The insignificant result of profit rate against solvency measures reflect that, an attractive offer of high profit rate which leads to high capital gain and, good performance of long-term investment, have no statistical significance influence to solvency level of family takaful company.

Shari'ah equity index has a positive influence on solvency of family takaful companies. This suggests that a positive growth of Shari'ah equity index would improve solvency of family takaful sector in Malaysia. On the other hand, insurance has provided different sign for the coefficient estimates of equity index in EAR and ETR models (Table 11). However, the statistical relationship between solvency and equity index are not significant for both takaful and insurance. There could be several reasons for such insignificant findings between equity index and solvency. From the descriptive statistics analysis as depicted in Table 4 and Table 5 for takaful and insurance, respectively, market shares level are relatively low with means of 0.0639 and 0.0726, for takaful and insurance, respectively. Moreover, there is only a small spread of equity rate as reflected by the standard deviation during the period of study. Therefore, equity index may not appear to result in a large cumulative effect on the solvency of life insurance and family takaful companies in Malaysia.

5 Conclusions

As solvency is a key measure of success of an insurance business, the aim of this research has been to investigate the factors affecting solvency of life insurance and family takaful companies in Malaysia from year 2008 to 2012. Analysis of sample data acquired from 11 life insurance and six family takaful companies through panel data regression resulted in varying findings.

The determinants that are positively related to EAR of takaful include contribution growth, investment income, takaful leverage, liquidity, and Islamic equity index. In contrast, company size, risk retention, expenses, and profit rate are negatively related to EAR of takaful. ETR of takaful are positively related to risk retention, contribution growth, investment income, takaful leverage, profit rate and Islamic equity index. The other variables including company size, liquidity, and expenses are negatively related to ETR of takaful. The panel regression results revealed that company size, contribution growth, takaful leverage and expenses are statistically significant to solvency of family takaful in Malaysia.

For insurance, risk retention, investment income, and expenses are positively related to both EAR and ETR. Company size, premium growth, insurance leverage, liquidity, interest rate, and conventional equity index are found to be negatively related to EAR. In

contrast, company size, liquidity, interest rate, and conventional equity index are positively related to ETR. On the other hand, premium growth and insurance leverage are negatively related to ETR. Hence, company size, investment income, liquidity and expenses are four factors found to be statistically significant to solvency of life insurance in Malaysia.

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