RESEARCH ARTICLE

AESTIMATIO, THE IEB INTERNATIONAL JOURNAL OF FINANCE, 2014. 8: 90-113

Reinsurance analysis with respect to its impact on the performance: evidence from non-life insurers in Pakistan

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▸ RECEIVED: 2 JULY 2013
▸ ACCEPTED: 26 SEPTEMBER 2013

Abstract

This article is based on the relationship that exists between the reinsurance and performance of domestic non-life stock insurers currently operating in the private sector in Pakistan. Reinsurance is important because it helps to stabilize the earnings level, reduce the risk of insolvency and increase the underwriting capacity of the direct insurer. Because of these advantages most of the insurance companies make extensive use of it, which negatively affects their performance. Pakistan is a developing country currently suffering from a highly dynamic environment and critical economic conditions and requires an insurance industry that helps it in coping with such a situation. So, this article examines whether the reinsurance practice positively affects the performance of non-life direct insurers in Pakistan or conversely, has any negative effect on them. Reinsurance utilization and dependence and exposure of reinsurance (independent variables) have been analyzed with respect to their impact on certain firm's performance indicators, such as; Loss Ratio, Expense Ratio and Firm Size (dependent variables). Secondary data has been taken from the annual reports of insurance companies over the 10 year period s from 2002 to 2011 and three econometric models have been used for panel data regression analysis i.e. the Pooled Regression Model, the Fixed Effect Model and the Random Effect Model. The results of this study are consistent with previous studies performed in other parts of the world. The results indicate that reinsurance utilization improves the performance of the firm while dependence and exposure of reinsurance reduce its performance.

Keywords:
Reinsurance, Performance, Domestic Non-Life Stock Insurer, Reinsurer, Pakistan
JEL classification: G22, L1, L25.

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El reaseguro y su impacto en el rendimiento. **El caso de las aseguradoras no de vida en Pakistán**

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Resumen

Este artículo trata la relación existente entre el reaseguro y el rendimiento de las sociedades anónimas de seguros de no vida pakistaníes que actualmente operan en el sector privado del país. El reaseguro es importante porque facilita la estabilización del nivel de ganancias al reducir el riesgo de insolvencia y aumentar la capacidad de aseguramiento de las aseguradoras. Es por ello que la mayoría de las compañías de seguros hacen un extenso uso de dicha práctica que afecta negativamente a su rendimiento. Pakistán es un país en desarrollo que con un entorno actual muy dinámico y cuyas condiciones económicas son críticas, por lo que está necesitado de una industria de seguros que ayude a hacer frente a tal situación.

Este artículo investiga si la práctica del reaseguro afecta positivamente a las aseguradoras directas de no vida que operan en Pakistán o, por el contrario, tiene algún efecto negativo sobre ellas. En concreto se estudia el impacto de la utilización del reaseguro y dependencia (y exposición a) de las reaseguradoras en indicadores del rendimiento de las aseguradoras tales como la tasa de siniestralidad, la ratio de gasto y el tamaño de la compañía. Los datos han sido tomados de los informes anuales de las compañías de seguros y abarcan el periodo 2002-2011, y se utilizan tres modelos econométricos para llevar a cabo un análisis de regresión de datos panel: Modelo de regresión de observaciones medias combinadas, modelo de efectos fijos y modelo de efectos aleatorios. Los resultados obtenidos son ciertamente consistentes con los de los estudios realizados con anterioridad en otros países, e indican que la utilización del reaseguro incrementa el rendimiento de la compañía, mientras que la dependencia de los reaseguradores lo reduce.

Palabras clave:

Reaseguro, rendimiento, sociedades anónimas de seguros de no vida domésticas, reaseguradora, Pakistán.

1. Introduction

This study is based on the use of reinsurance by non-life insurance companies in Pakistan. Insurance companies reduce or eliminate the risk of other corporations but insurance companies themselves also have to consider the reduction of risk, which is done through reinsurance. So reinsurance is insurance of the insurer. This study is related to the reinsurance done by domestic non-life stock insurance companies which are currently active in the private sector in Pakistan. This article discusses how the reinsurance business works, to whom and to what extent it benefits the two parties i.e. insurer and the party getting insured, the cost and other benefits associated with reinsurance and the impact of reinsurance on the performance of insurance companies.

Before defining reinsurance it is essential to understand the definition of insurance. The term insurance simply refers to the acceptance of risk by a company which is engaged in the insurance business. The company accepts this risk for a consideration, called a premium (Swiss, 2002). The term reinsurance is related with the term insurance. "Reinsurance is the transfer of insurance risk from one insurer to another through a contractual agreement under which one insurer (the reinsurer) agrees, in return for a reinsurance premium, to indemnify another insurer (direct insurer, primary insurer or Cedant) for some or all of the financial consequences of certain loss exposures covered by the primary insurer's policies" (Domenichini and Crugnola, 2007).

The importance of reinsurance can be analyzed by the benefits it provides at its origin for the direct insurer, insurance industry and for the economy as a whole. Reinsurance stabilizes and enhances the capacity of the direct insurer because it enables the direct insurer to issue more policies, or accept more risks without increasing its own capital. This also helps it enjoy the benefits of economies of scale because the ability of the direct insurer to assume more risks at the same level of capital enables it to spread its overhead cost over the increased base or range of business. The ultimate benefit of the reinsurance practice is not just restricted to a single policyholder or insurance company but has an impact on the whole economy because it enables innovations and ensures that different players hold risk in the most efficient ways. In this way reinsurance plays an important part in the contribution of the insurance industry to social welfare and economic growth (Baur and Donoghue, 2004).

Reinsurance can be beneficial but it can also have a negative impact on the performance of the industry. Baur and Donoghue (2004) and Cummins *et al.* (2008) have shown that reinsurance can be beneficial by helping to enhance the business of the firm while its negative impact can be cause by expensive reinsurance cost which can result in insolvency of the direct insurer. This happens when the reinsurer becomes

insolvent or when the direct insurer starts issuing more and more policies without increasing its own capital. As the behavior of the insurer affects its performance, this study is based on such behavior and is focused on discovering whether direct insurers in Pakistan are enjoying the benefits of the reinsurance arrangement in the form of improved performance or are instead suffering from its negative effects.

Acharya *et al.* (2010) and Billio *et al.* (2010) have demonstrated that great attention has been paid to the interconnectedness within the industry of financial services since the financial crisis in the latter part of the first decade of this century. They have investigated the relationships between the insurance and banking industries and whether such interrelationships pose a systemic risk to the economy. However, very little work can be found on the important relationship that exists between the performance of direct insurers and reinsurance. It is importance to study this relationship because most of the insurance companies rely heavily on reinsurance in order to increase their underwriting capacity and to enhance their business, and this extensive use of reinsurance has exposed them to the potential risk of decreased performance. Pakistan is a developing country which is currently suffering from a highly dynamic environment and critical economic conditions. It suffers the threat of terrorism, natural disasters and war with other countries and the nature of these risks is such that the insurance companies cannot handle them individually. Rather they need an extra ergonomic hedging cover for the proper management of such risks and for this purpose reinsurance is required. The insurance industry is essential for the country s development and reinsurance is essential for the development of the insurance industry, but the practice is underutilized in the country due to lack of awareness and research in the area.

As mentioned above, this article is based on the relationship between the reinsurance practice and firm's performance. More specifically, the study examines the impact of the Ratio of Ceded Reinsurance (*RCR*) and the Ratio of Reinsurance Recoverable to Policyholders' Surplus (*RRPHS*) on the Loss Ratio (*LR*), the Expense Ratio (*ER*), and the Firm Size calculated by taking the Logarithm of Assets (*LOGA*). These ratios and indicators are selected as variables for the analysis under the Corporate Demand Theory. Thus, our purpose is to test whether reinsurance practices have a significant effect on *LR, ER* and *LOGA* of domestic non-life stock insurers in Pakistan.

LR is simply the difference between the amount of premium paid to the insurance company and the amount of claims which are settled by that company. So it is a proportionate relationship of incurred losses to earned premiums. It is also called the claims ratio. It should be small because a high level of the ratio indicates financial trouble for the company. Cummins *et al*. (2008) have used *LR* in their analysis and found that reinsurance significantly reduces volatility in the loss ratio. Al-Shami

(2008) found a significant negative relationship between *LR* and profitability of the insurance industry in the UAE. Malik (2011) conducted the same research in Pakistan and found the same results. *ER* shows the percentage of a company's earned premium that goes on the expenses incurred by management and underwriting activities. It is a measure of efficiency of the company, with a smaller number representing greater efficiency (Reichart, 2009). *LOGA* is used as an indicator for the firm *s* size. Cummins *et al*. (2011b) have used firm size in their study to study the relationship between firm size and reinsurance utilization and exposure, and found a significant negative relationship concluding that bigger firms demand lesser reinsurance. Their results are consistent with previous studies such as Mayers and Smith (1990), Chen *et al*. (2001) and Cole and McCullough (2006).

As for the independent variables used in the analysis, *RCR* provides direct information about the volume of reinsurance transactions that occur between the insurance companies and the reinsurer. It has been extensively used in the literature as the measure of reinsurance utilization (Mayers and Smith, 1990; Chen *et al*., 2001; Cole and McCullough, 2006; Powell and Sommer, 2007; Cummins *et al*., 2008; and Cummins *et al*., 2011b, are some interesting examples). *RRPHS* is the measure of dependence of an insurance company on its reinsurers, and shows the potential exposure to the collectability problems of reinsurance. Its normal range is from 50% to 150% (Smith, 2011). Cummins *et al*. (2011b) have used this ratio in their analysis in order to determine the relationship between the firm s performance and reinsurance utilization and exposure, and found a significant positive relationship between them.

Obviously, the above ratios and financial indicators do not reflect all of the determinants of the reinsurance practice and firm's performance, respectively. There are several other factors which are not considered in this work, such as the age of the company, profit margin ratio, return on Investment, and ceded reinsurance leverage and so on.

Other two limitations of the study are that (i) the results are based on the limited amount of data between 2002 and 2011 due to the prior financial statements of non-life insurance companies in Pakistan having different data and therefore not containing the factors which are required for the calculation of the independent variables i.e. *RCR* and *RRPHS*. And (ii) that although the article is based on the population of domestic non-life stock insurers currently operating in the private sector in Pakistan, two companies are excluded from the population because of the non-availability of data.

The rest of the article is organized as follows: the second section contains the theoretical framework, while a review of the previous literature is provided in the third section. Section 4 discusses the methodology and statistical results, with conclusions and recommendations detailed in section 5.

2. Theoretical framework

The Corporate Demand Theory (CDT) provides the motives for the purchase of reinsurance and also contains the premises for the positive and negative aspects of reinsurance. This theory provides the basis for this research. The apparent logic behind reinsurance is to transfer some or all the risk to another company. This does not only provide double security to the client but also helps to improve performance and sustainability of insurance companies.

The main motivation for purchasing insurance or reinsurance is risk sharing but there are several pieces of evidence that suggest that the optimal risk sharing is not the only reason or motive for purchasing reinsurance (Plantin, 2006). Mayers and Smith (1990) considered the resemblance between the company's motive to buy insurance and insurance company's motive to buy reinsurance and presented the logical grounds for the positive and negative aspects of reinsurance. The demand for insurance by insurance companies partially explains the demand for insurance by non-insurance companies such as by partnerships and closely held corporations. It means that the motive for insurance companies to purchase reinsurance is the same as it is for other industrial corporations to purchase insurance services. The motivations for purchasing insurance for both insurance and non-insurance companies are risk hedging, reduced volatility of pretax income, and reduced bankruptcy cost.

Reinsurance assists in the reduction of unnecessary volatility in the financial statements and helps the insurance companies to create sustainable shareholder's value and enhance their business (Krvavych and Sherris, 2004). The use of reinsurance helps in reducing or removing the losses of the direct insurer (Pitselis, 2008).

Mayers and Smith (1990) have shown that reinsurance firms have expertise and knowledge in the field of risk management. So, they provide information and advice to the insurance companies on pricing and claims adjustment services in different areas. Froot (2001) has shown that reinsurance is an expensive practice. The expertise and specialized services of the reinsurer increase the cost of reinsurance for a direct insurer, which can be even greater than the actuarial price of risk transferred. It may cause the direct insurer to produce insurance at a higher cost. Swiss (2004) emphasized that the services of reinsurers play a very important role in the assessment of risk, underwriting of risk and assistance to insurers in handling claims more efficiently.

The insurance companies use reinsurance as an action to enhance their business and to reduce the probability of their losses because by adopting this technique an insurance company can write more business without increasing its own capital (Pitselis, 2008).

Cummins *et al.* (2011b) have investigated the reinsurance counterpart relationships in property-liability insurers of USA while using CDT as a base. They found that ceding firms' performance is positively related to reinsurance utilization and exposure, but adversely related to concentration in reinsurance counterparties.

All of these motivations show the positive effects of reinsurance, but its negative effects are also hidden in these motivations. These negative effects include: reinsurance is an expensive practice because reinsurers charge direct insurers a very high premium for the provision of their expert services. Although the reinsurance practice increases the capital and underwriting capacity of the direct insurer, and results in increased business, if the direct insurer continues to write more business without increasing its own capital the financial distress will increase, which will ultimately result in the decreased performance of the firm.

Figure 1. **Corporate demand theory**

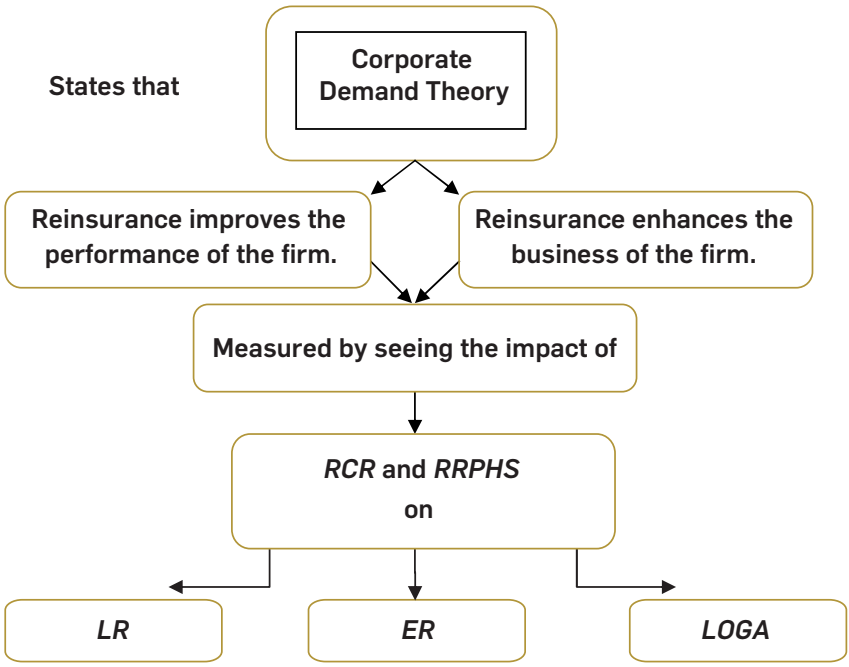

Figure 1 shows the relationship between the CDT and the variables used in this article (*LR, ER, LOGA, RCR* and *RRPHS*). The diagram is based on the two dimensions of the theory. The first block of the diagram states that according to CDT, reinsurance improves the performance of an insurance company. This effect will be measured by analyzing the impact of reinsurance utilization and exposure on a firm's performance indicators or ratios. *LR* and *ER* are the key performance ratios for any insurance company.

The second block of the diagram states that according to CDT reinsurance enhances the business of an insurer. This effect will be measured by analyzing the impact of reinsurance utilization and exposure on the size of firm. The Log of Assets represents the firm size and is the key performance indicator for any insurance company.

3. Literature review

Previous studies showing the impact of reinsurance on the firm's performance are reviewed and all those aspects of reinsurance which have a significant impact on the performance of insurance companies are included in the research. The date wise method of literature review for the period from 2001 to date is used in this section.

Cummins and Weiss (2002) asserted that the market of reinsurance is based on pure risk i.e. the risk category where loss is the only possible outcome, with no positive or beneficial result. The individuals and businesses transfer their pure risk to insurers and in turn pay an adequate amount as consideration in the form of a premium. The insurer, on the basis of law of large numbers, then diversifies the risks by making pools of loses related to many policyholders, so that the losses can become more predictable. The insurers may transfer all, or part of risk to a reinsurer, whether local or global. The insurers demand reinsurance because it reduces their burden of pure risk.

Garven and Tennant (2003) argued that the success of an insurer is not solely dependent upon an adequate amount of premium but also on the provision of credible assurance to policyholders that their claims will be paid in the event of a loss. The insurer uses reinsurance to cover its two concerns: firstly, to pay the claim in the event of a loss, and secondly, to remain financially solvent and stable.

Zeng (2005) showed that the shareholders manage their risk by using reinsurance so that they can ensure the longer term sustainability and growth of the business, to enhance the firm value.

Meier and Outreville (2006) argued that by using reinsurance the direct insurer can increase its volume of premiums more than it would be able to with the given amount of capital.

Cole and McCullough (2006) found that the firm size of an insurance company affects the demand for reinsurance. They showed that the firm size primarily drives the demand for foreign reinsurance.

Cummins *et al.* (2008) asserted that the purchase of reinsurance stabilizes loss experience, reduces loss ratio, limits the liability of an insurance company on the specific risks and protects against huge losses and catastrophes.

Cummins *et al.* (2011a) examined the relationship of affiliated reinsurance, foreign reinsurance, and the financial performance of U.S. property-liability insurance companies. They found that the use of affiliated and foreign reinsurance has a positive relationship with the efficiency of the direct insurer.

Cummins *et al.*, (2011b) found that ceding firms' performance has a positive relationship with reinsurance utilization and exposure is adversely related to concentration in reinsurance counterparties.

Swiss (2002), Baur and Donoghue (2004), Arndt *et al.* (2004), Cummins and Trainar (2009) stated that reinsurance provides advisory services to primary insurer such as advice on underwriting and pricing policies. The reinsurers' greater experience of dealing with the risks develops extensive expertise relating to pricing, insurance underwriting and exposure management that can cause a significant increase in the economic value of the primary insurer. Reinsurers provide useful information and play an important role in setting rates, adjusting claims, assessing risk, underwriting risk and assisting insurers in handling claims more efficiently, selecting premiums, designing reinsurance contracts and analyzing the existing portfolios of the direct insurer.

Chen *et al*. (2001), Swiss (2003), Arndt *et al.* (2004), Zeng (2005), Powell and Sommer (2006), Cummins *et al.* (2008) and AMF (2010) emphasized that reinsurance provides stability of losses experienced and specialized services which cause a reduction in the unnecessary volatility of a firm's earnings.

The literature mentioned above details the positive and constructive effects of reinsurance while another stream of reinsurance studies have focused on the negative or unconstructive effects of reinsurance and shed light on issues such as: how it has become costly and uneconomical, the factors which reduce its effiecincy and the adverse effects of reinsurance for the market, the industry and the economy as a whole.

The demerit of this practice is that it is quite expensive. The cost of reinsurance for a direct insurer can be greater than the actuarial price of risk transferred. It may cause the direct insurer to produce insurance at a higher cost (Froot, 2001).

A combination of many factors which affect the equilibrium of the reinsurance market can explain the higher prices of reinsurance relative to the expected losses. Shortages

of capital, lack of transparency, shareholder-manager incentive conflicts, and agency problems can result in decreased capacity and increased prices of reinsurance, especially after the huge losses that occur due to a major catastrophic event (Cummins and Weiss, 2002).

There are several reasons as to why reinsurance may cause inadequate management of major catastrophes; these include cyclicality of the market i.e. hard and soft market. In the soft market, prices are low and coverage is widely available and vice-versa in the hard market. This cycle may occur due to non-free capital flow in the industry which may be the result of information asymmetries that exist between the capital markets and insurers (Cummins and Doherty, 2002).

Reinsurance markets also have moral hazards similar to primary insurance markets. The contacting parties i.e. insurer and reinsurer control prices more tightly when they are not the members of same group i.e. when they are non-affiliates. There is no or very little monitoring of the underwriting and claim settlement activities of the primary (unaffiliated) insurer by the reinsurer because monitoring the non-affiliated insurer is quite costly. Conversely, there is significant monitoring between the affiliated insurers because of its lower cost (Doherty and Smetters, 2003).

The price of reinsurance has a significant effect on the underwriting cycle of direct insurer i.e. the ups and downs or fluctuations in the profits and prices of insurance companies. With decreased prices reinsurance becomes more affordable for the primary insurers and they will purchase reinsurance in order to increase their underwriting capacity. With increased capacity the price competition among insurers also increases and this ultimately increases the loss ratio of the companies and hence the combined ratio (Meier and Outreville, 2006).

Lakdawalla and Zanjani (2006) and Brandts and Laux (2007) argued that the efficiency of traditional reinsurance reduces due to the information asymmetries that exist between reinsurers with regard to the risk of direct insurer, which as a result, affects the price of reinsurance.

Froot (2007) argued that insurers and reinsurers are very sensitive to the cost which relates to the risk holding. Reinsurance markets are efficient for diversifying small, statistically independent and symmetrical risk. Risks which are correlated and larger usually have higher prices.

Cummins *et al.* (2008) analyzed the cost and benefits of reinsurance and found that the reinsurance practice significantly increases the cost of producing insurance services for the direct insurer. Froot and O'Connell (2008) showed that the

reinsurance capacity of the market is limited, particularly for catastrophic losses and that during periods of hard and soft markets reinsurance prices are highly volatile.

Reinsurance is a way for an insurance company to protect itself from catastrophic losses but this practice is expensive and also involves credit risk because of the default risk of the reinsurer (Swiss, 2009). Cummins and Trainar (2009) showed that reinsurance is a very effective tool for risk management for relatively small and uncorrelated risks but the efficiencies of reinsurance decreases when the magnitude of losses and the correlation of risks increases. Furthermore, the cost of capital that is required to maintain the minimum solvency requirement may become uneconomical.

By reviewing the different articles, books and reports (issued by different organizations engaged in insurance and reinsurance activities), an idea is generated that the reinsurance practice positively affects the performance of the direct insurer but significantly increases the cost for both - policyholder and direct insurer.

Very little work has been done in Pakistan, and hardly any research has been conducted on reinsurance in Pakistan. This leads to a great need for such work, which would not only highlight the current position of insurance companies in Pakistan with reference to reinsurance, but also with reference to issues related to the future.

4. Analysis of reinsurance

4.1. Data and methods

Secondary data is used for the research. The data is authentic because it is taken from the audited Financial Statements of the insurance companies under the "Pakistan Generally Accepted Accounting Principles (GAAP)" and hence provides the most realistic view of the insurance companies. Data is collected from the websites of the insurance companies, from the Insurance Year Books published by the Insurance Association of Pakistan and from the Lahore Stock Exchange. The population comprises all of the private sector domestic non-life stock insurers which are currently active in Pakistan. As there is not a very large number of domestic non-life stock insurers operating in private sector of Pakistan, all the companies which were established before 2001 are included in the study for analysis, except those which only insure specific areas. According to the list provided by SECP there are total of 31 domestic non-life stock insurers currently operating in the private sector in Pakistan. Out of these 31 companies 5 companies were formed after 2001 and 2 companies are engaged in insuring specific areas. Out of the remaining 24 companies,

2 companies have been excluded because of unavailability of data. All of the remaining companies which are engaged in general insurance business are included in the study. Table 1 in Appendix lists all the companies taken for the analysis.

4.2. Results

Tables 2 to 4 contain the descriptive statistics for the period of ten years from 2002 to 2011 for all of the variables used in the research (*LR, ER, LOGA, RCR* and *RRPHS*), which are attached in Appendix.

With respect to performance variables, Table 2 shows the data of *LR* and *ER* for all of the domestic non-life stock insurers currently operating in the private sector in Pakistan in the period from 2002 to 2011. Capital Insurance Company Limited has a maximum mean value in both ratios, i.e. 0.87471004 and 0.680826605 respectively, which is not in the company s favor. The lower the ratios the better they are. Silver Star Insurance Company Limited has a minimum mean value of *LR* i.e. 0.214343505 and Central Insurance Company Limited has a minimum mean value of *ER* which signifies good financial management of both companies.

Table 3 shows the results for firm size measured by *LOGA*. Adamjee Insurance Company Limited has a maximum mean value of *LOGA* i.e.7.12589334, which indicates that it is the biggest firm, while the smallest firm is Capital Insurance Company Limited with a mean value of 5.25827364.

Table 4 shows the results for the independent variables i.e. *RCR* and *RRPHS*. Central Insurance Company Limited has a maximum mean value of *RCR* i.e. 0.755718998. The Universal Insurance Company Limited has a maximum mean value of *RRPHS* i.e. 0.96462613. This ratio shows the dependence of an insurer on reinsurance and also shows the potential exposure of collectability problems from the reinsurer. This ratio is quite high which is not in the company s favor, nevertheless it is within the acceptable range i.e. 50% to 150% (Smith, 2011). Other financial indicators such as *LR* i.e. 0.488845852 and *ER* i.e. 0.38352334 are quite high. These characteristics show that the company is financially unsound. In this case, the company should take proper measures to stabilize its financial position. For example, it should try to increase its capital and reduce its *LR, ER* and its dependence on reinsurers.

Panel Data Regression is the method of analysis used in the study. Three econometric models have been used for Panel Data Regression analysis i.e. Pooled Regression Model (PRM), Fixed Effect Model (FEM), and Random Effect Model (REM). However, results of PRM are preferred because it is generally carried out on the data that has observations over time for cross-sections or several different units. The study

contains three dependent variables and two independent variables. Three specifications are estimated for each of the dependent variables. Panel data regression analysis is used because many similar studies have used it in their analysis, such as Carneiro and Sherris (2005), Scordis and Barrese (2007), Garven and Grace (2007), Lee and Lee (2011) and Cummins *et al.* (2011b).

Tables 5 and 6 contain the results of the panel data regression analysis, which are attached in Appendix. Table 5 shows the results for *LR*.

$$LR = 0.478002 - 0.260037\ RCR + 0.15324\ RRPHS \quad (1)$$

Equation 1 is the estimation of the PRM for *LR* and shows that a significant negative relationship exists between *RCR* and *LR* while a significant positive relationship exists between *RRPHS* and *LR*. The model indicates that with a one percent increase in *RCR* the *LR* of the companies decreases by 26% and with a one percent increase in *RRPHS* the *LR* increases by 15.324%. The value of *R* square indicates that 9% of the variations in *LR* are explained by *RCR* and *RRPHS*. In FEM, both variables are found to be not significant but have the same relationships whereas in REM only *RRPHS* is found to have a significant positive relationship. In PRM, both *RCR* and *RRPHS* are found to be significant, while in REM only *RRPHS* is statistically significant.

The results of the three models are different because of their different specifications. PRM is a restricted model because of the common intercept. FEM or Least Squares Dummy Variable Model (LSDV) is used in order to substantiate the panel data regression model. It considers the homogeneity in the data over a period of time and controls the different characteristics of all the subjects being studied. In addition, it removes the biasness from the data and only considers the sample variations, while REM or Error Correction Model (ECM) is applied on data when the sample characteristics e.g. geographical location, economic situation, political factors, social life of a country etc. differs among the subjects (Gujrati and Porter, 2009).

$$ER = 0.431772 - 0.347872\ RCR \quad (2)$$

Equation 2 presents the estimation of the PRM for *ER* and shows that *RCR* has a significant negative relationship with *ER*. However, *RRPHS* has a positive not significant relationship with *ER*. The non significance of *RRPHS* shows that it does not have any significant impact on the *ER* of domestic non-life stock insurers currently operating in the private sector in Pakistan, so it does not need to be included in the model. The model indicates that with a one percent increase in *RCR* the *LR* of the companies decreases by 34.7872%. The value of *R* square indicates that 5% of the variations in *ER* are explained by *RCR*. In FEM, *RCR* and *RRPHS* are found to have a

not significant negative relationship with *ER* while in REM, *RRPHS* has a positive not significant relationship and in PRM, *RCR* is found to be significant.

$$LOGA = 5.782403 + 0.0348\ RCR \quad (3)$$

In equation 3 the results of PRM indicate that *RCR* has a significant positive relationship with *LOGA*. The value of R square indicates that 2.6% of the variations in *LOGA* are explained by *RRPHS*; this ratio is quite low and shows that *RCR* has very little impact on the firm size of insurers in Pakistan. In all three models the relationship between *RCR* and *RRPHS* are the same i.e. positive and negative respectively. The results of FEM show that *RRPHS* has a negative significant relationship with *LOGA*. In FEM and REM, *RRPHS* is found to be significant.

The results indicate that in PRM, *RCR* has a significant impact on *LR*, *ER* and *LOGA*, while *RRPHS* has a significant effect on *LR*. So, a conclusion can be made that reinsurance has a significant effect on the performance and firm size of the domestic non-life stock insurers currently operating in the private sector in Pakistan.

The results are consistent with the previous studies. The literature indicates that reinsurance improves the performance of primary insurers and enhances their business (Mayers and Smith, 1990; Chen *et al*. 2001; Cole and McCullough, 2006; Cummins *et al*., 2008; and Cummins *et al*., 2011b.). The resultant relationships are the same as shown in the literature which indicates that reinsurance reduces the loss ratio and expense ratio which means it improves firm performance and enhances the business by increasing its firm size.

Conclusion and recommendations

The findings of this study are in line with the results of various studies performed in other parts of the world. The empirical results support the existing CDT which states that a firm's performance can be improved by using reinsurance. The results indicate that reinsurance utilization lowers the loss ratio and expense ratio and enhances the firm size.

These results are significant because the relationship of reinsurance utilization and exposure with firm's performance is less well recognized in Pakistan due to the lack of existing research. This study has opened an avenue for further research in areas such as: how reinsurance utilization reduces the loss ratio and expense ratio of the direct insurers, why dependence and exposure on reinsurance does not have any impact on the expense ratio of direct insurers while it affecting their loss ratio and

what measures should be taken by the companies which are financially unsound and have a higher percentage of reinsurance utilization and exposure in order to decrease their risk of insolvency. The study has focused on only the variables of reinsurance utilization and exposure while the relationship of firm's performance with other variables of reinsurance such as ceded reinsurance leverage should also be studied.

The empirical results indicate that reinsurance utilization lowers the firm's loss ratio and expense ratio and the descriptive results show that most of the companies are financially stable. As such, companies should take advantage of this practice by utilizing it within the solvency requirements in order to improve their performance and to augment their business. The results also show that the performance of companies is vulnerable to dependence and exposure on reinsurance because it increases the loss ratio of the firm. So the companies, whether financially stable or unstable, should try to reduce their dependence and exposure on reinsurance because the increased reliance exposes them to the potential risk of declined performance.

Acknowledgements

We would like to thank all the reviewers who were very kind in providing very useful guidance to improve our work and their benevolence, not only encouraging this contribution but also helping to get insights into some of the more critical issues. We are also thankful to Dr. José-María Montero for his kind correspondence throughout this period.

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Appendix

Table 1. **List of insurance companies**

Serial No.	Insurance Companies
1	Adamjee Insurance Company Limited
2	Alpha Insurance Company Limited
3	Asia Insurance Company Limited
4	Askari General Insurance Company Limited
5	Atlas Insurance Company Limited
6	Capital Insurance Company Limited
7	Central Insurance Company Limited
8	Century Insurance Company Limited
9	East West Insurance Company Limited
10	EFU General Insurance Company Limited.
11	Habib Insurance Company Limited
12	IGI Insurance Company Limited
13	New Jubilee Insurance Company Limited
14	Premier Insurance Company Limited
15	Reliance Insurance Company Limited
16	Security General. Insurance Company Limited
17	Shaheen Insurance Company Limited
18	Silver Star Insurance Company Limited
19	The Crescent Star Insurance Company Limited
20	The Pakistan General Insurance Company Limited
21	The United Insurance Company of Pakistan Limited
22	The Universal Insurance Company Limited

Table 2. Descriptive statistics for loss ratio and expense ratio

Insurance Companies	*LR*			*ER*		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.
Adamjee Insurance Co. Ltd.	10	0.626800228	0.23993096	10	0.26213289	0.0901796
Askari General Insurance Co. Ltd.	10	0.670187861	0.0601475	10	0.23405331	0.0312184
Asia Insurance Co. Ltd.	10	0.3984964	0.10143457	10	0.49657567	0.0875596
Atlas Insurance Co. Ltd.	10	0.301188596	0.16807893	10	0.29175618	0.2130816
Alpha Insurance Co. Ltd.	10	0.680677687	0.25509609	10	0.46200266	0.1672334
Capital Insurance Co. Ltd.	10	0.87471004	0.92245559	10	0.68082661	0.258612
Century Insurance Co. Ltd.	10	0.502630848	0.49981804	10	0.17153457	0.0543035
Central Insurance Co. Ltd.	10	0.251685673	0.42482787	10	-0.11566032	0.393104
East West Insurance Co. Ltd.	10	0.325646777	0.2475285	10	0.25751305	0.1779291
EFU General Insurance Ltd.	10	0.693368794	0.06841183	10	0.21250274	0.1447067
Habib Insurance Co. Ltd.	10	0.482228319	0.14787938	10	0.32770745	0.0405774
IGI Insurance Co. Ltd.	10	0.449600136	0.09640039	10	0.09876654	0.0895895
New Jubilee Insurance Co. Ltd.	10	0.493462915	0.25528916	10	0.2556599	0.1243413
Reliance Insurance Co. Ltd.	10	0.408105468	0.11192807	10	0.42227314	0.2043239
Shaheen Insurance Co. Ltd.	10	0.662937443	0.17749001	10	0.26394818	0.059197
Security General. Insurance Co. Ltd.	10	0.634427632	0.61318911	10	-0.02750977	0.2619591
Silver Star Insurance Co. Ltd.	10	0.214343505	0.11433417	10	0.26692657	0.1243898
The Crescent Star Insurance Co. Ltd.	10	0.326544976	0.19952043	10	0.42096093	0.0477844
The United Insurance Company of Pakistan Ltd.	10	0.638000044	0.93580323	10	0.1263392	0.1027986
The Universal Insurance Co. Ltd.	10	0.488845852	0.0344867	10	0.38352334	0.0999485
The Pakistan General Insurance Co. Ltd.	10	0.394562842	2.13450039	10	0.37150669	0.1586555
Premier Insurance Co. Ltd.	10	0.548842036	0.11794128	10	0.41057565	0.0914215

Table 3. Descriptive statistics for log of assets

Insurance Companies	*LOGA*		
	Obs.	Mean	S.D.
Adamjee Insurance Co. Ltd.	10	7.12589334	0.2472486
Askari General Insurance Co. Ltd.	10	5.92872785	0.2348684
Asia Insurance Co. Ltd.	10	5.3104528	0.3142963
Atlas Insurance Co. Ltd.	10	6.11040022	0.507586
Alpha Insurance Co. Ltd.	10	5.6729507	0.1113445
Capital Insurance Co. Ltd.	10	5.25827364	0.2601809
Century Insurance Co. Ltd.	10	5.87518954	0.2885745
Central Insurance Co. Ltd.	10	6.39878121	0.3453402
East West Insurance Co. Ltd.	10	5.82519097	0.1434717
EFU General Insurance Ltd.	10	6.93028863	0.4326884

Habib Insurance Co. Ltd.	10	6.03932325	0.2658104
IGI Insurance Co. Ltd.	10	6.72537731	0.5047446
New Jubilee Insurance Co. Ltd.	10	6.50175481	0.40238
Reliance Insurance Co. Ltd.	10	5.76330704	0.2331046
Shaheen Insurance Co. Ltd.	10	5.797042	0.1469299
Security General. Insurance Co. Ltd.	10	6.33697752	0.6068523
Silver Star Insurance Co. Ltd.	10	5.556634	0.2742661
The Crescent Star Insurance Co. Ltd.	10	5.33255733	0.1737881
The United Insurance Company of Pakistan Ltd.	10	5.72548226	0.3570625
The Universal Insurance Co. Ltd.	10	5.83482721	0.2241909
The Pakistan General Insurance Co. Ltd.	10	5.48636565	0.2777241
Premier Insurance Co. Ltd.	10	6.3156025	0.1993004

● Table 4. **Descriptive statistics for ratio of ceded reinsurance and ratio of reinsurance recoverable to policyholders' surplus**

Insurance Companies	*CRC*			*RRPHS*		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.
Adamjee Insurance Co. Ltd.	10	0.345313615	0.05561354	10	0.55689304	0.4116629
Askari General Insurance Co. Ltd.	10	0.318248893	0.10638076	10	0.74615782	0.3208921
Asia Insurance Co. Ltd.	10	0.3977352	0.05409047	10	0.22233855	0.1269492
Atlas Insurance Co. Ltd.	10	0.592944775	0.27482766	10	0.51979076	0.3611238
Alpha Insurance Co. Ltd.	10	0.453120384	0.07164433	10	0.39813243	0.2166171
Capital Insurance Co. Ltd.	10	0.505396312	0.14591026	10	0.2289519	0.2967542
Century Insurance Co. Ltd.	10	0.416720389	0.10438402	10	0.47446062	0.4219159
Central Insurance Co. Ltd.	10	0.755718918	0.25380611	10	0.06590029	0.0724055
East West Insurance Co. Ltd.	10	0.333551617	0.06499897	10	0.57699295	0.4286146
EFU General Insurance Ltd.	10	0.402256448	0.07507604	10	0.68335145	0.6028182
Habib Insurance Co. Ltd.	10	0.478107319	0.0197693	10	0.37669833	0.3987217
IGI Insurance Co. Ltd.	10	0.506765254	0.07555717	10	0.15962414	0.1378835
New Jubilee Insurance Co. Ltd.	10	0.439452078	0.06232983	10	0.56006974	0.833284
Reliance Insurance Co. Ltd.	10	0.396138062	0.09160973	10	0.58978684	0.1093832
Shaheen Insurance Co. Ltd.	10	0.243523215	0.07497577	10	0.75015421	0.371444
Security General. Insurance Co. Ltd.	10	0.644734718	0.08111549	10	0.38991829	0.3844988
Silver Star Insurance Co. Ltd.	10	0.399616472	0.11751907	10	0.19537219	0.0798298
The Crescent Star Insurance Co. Ltd.	10	0.331102254	0.05570197	10	0.41871509	0.0748392
The United Insurance Company of Pakistan Ltd.	10	0.289339118	0.11279868	10	0.3286111	0.0874853
The Universal Insurance Co. Ltd.	10	0.378307617	0.06509031	10	0.96462613	0.3877664
The Pakistan General Insurance Co. Ltd.	10	0.51663779	0.08683263	10	0.32803492	0.1150425
Premier Insurance Co. Ltd.	10	0.489114758	0.07430027	10	0.53086372	0.3155694

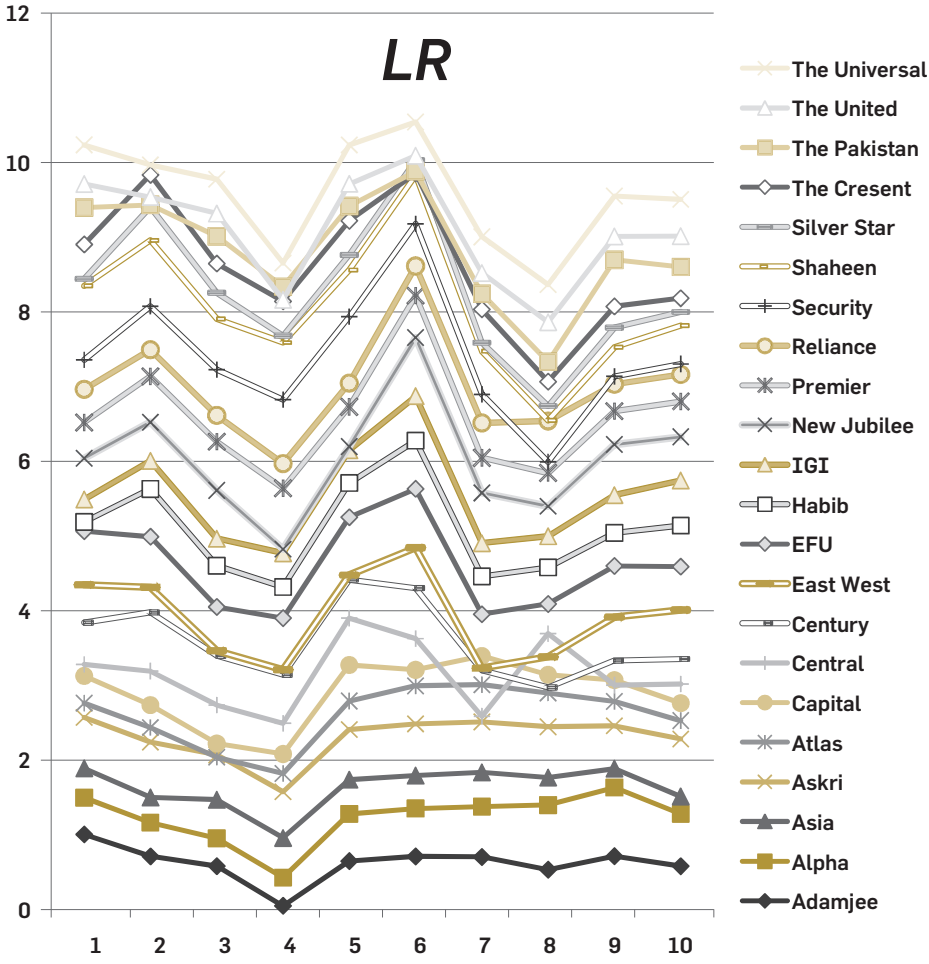
Table 5. Summary of pooled regression model (PEM), fixed effect model (FEM) and random effect model (REM)

	PRM	FEM	REM	PRM	FEM	REM
	Dependent variable: *LR*			Dependent variable: *ER*		
Constant	0.478002	0.48337	0.492893	0.431772	0.326807	0.346531
RCR	-0.260037	-0.182068	-0.2417	-0.347872	-0.092702	-0.143091
RRPHS	0.15324	0.067819	0.103361	0.008368	-0.003374	0.001137
Prob. of Constant	0	0	0	0	0	0
Prob. of *RCR*	0.0233	0.2454	0.063	0.001	0.4214	0.187
Prob. of *RRPHS*	0.0004	0.1321	0.0143	0.8297	0.9187	0.9719
R-squared	0.090028	0.341539	0.041846	0.051275	0.555756	0.008045
Adjusted *R*-squared	0.081642	0.264271	0.033015	0.042531	0.503625	-0.001098
S.E. of regression	0.246742	0.220849	0.222797	0.225857	0.162621	0.162528
F-statistic	10.7345	4.420173	4.738549	5.86397	10.66082	0.879938
Prob (*F*-statistic)	0.000036	0	0.009677	0.003309	0	0.416283
Akaike info criterion	0.052597	-0.080003		-0.124288	-0.692124	
Schwarz criterion	0.098873	0.290211		-0.078011	-0.32191	
Durbin-Watson statistic	1.407284	1.890075	1.694319	0.623332	1.377442	1.23295

Table 6. Summary of pooled regression model (PEM), fixed effect model (FEM) and random effect model (REM)

	PRM	FEM	REM
	Dependent variable: *LOGA*		
Constant	5.782403	6.051901	6.039013
RCR	0.573983	0.209606	0.227649
RRPHS	-0.081642	-0.326305	-0.315187
Prob. of Constant	0	0	0
Prob. of *RCR*	0.0348	0.3303	0.2771
Prob. of *RRPHS*	0.4187	0	0
R-squared	0.026346	0.763921	0.109142
Adjusted *R*-squared	0.017372	0.736218	0.100931
S.E. of regression	0.585899	0.303565	0.305695
F-statistic	2.935866	27.57519	13.29271
Prob (*F*-statistic)	0.055197	0	0.000004
Akaike info criterion	1.782205	0.556226	
Schwarz criterion	1.828482	0.92644	
Durbin-Watson statistic	0.187541	0.868281	0.764786

Figure 1. **Loss ratio of all companies**

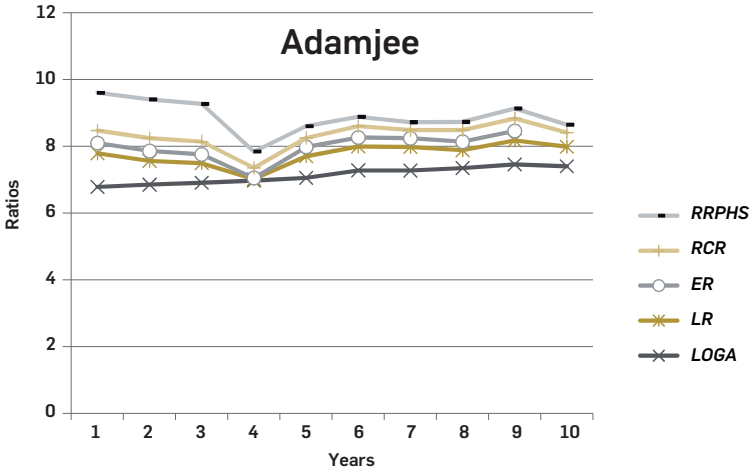


Note:The figures for other variables can be provided on request.

Figure 1 presents the trend of loss ratio for all of the companies from 2002 to 2011. Data has been extracted from the financial statements of the insurance companies.

This figure shows the instability of Loss ratio especially from 2004 to 2009. In this period the graph shows an upward movement which is unfavorable for the companies. But a downward trend can also be observed. Overall *LR* of most of the companies' has remained unstable during past 10 years.

Figure 2. **Individual performance of Adamjee Insurance Company Ltd.**



Note:The figures for other variables can be provided on request.

Figure 2 presents the performance of Adamjee Insurance Company Ltd. by showing the trend of the five variables considered in the study over 10 years from 2002 to 2011. Data has been extracted from the financial statements of the insurance companies.

The figure shows that the loss ratio and expense ratio are similar in their changes. Initially they were stable for 3 years before reducing for one year after which they experienced an upward movement before once again returning to a stable level. The stability of loss and expense ratio signifies good financial management, but the level of these ratios is quite high which is not in the favor of the company. The *LOGA* shows a decreasing trend which means that the company's size is decreasing over time. By carefully analyzing the graph it can be observed that *RCR* and *RRPHS* almost follow the same decreasing trend.