

The effect of reinsurance operations on the financial performance of non- life insurance companies in the Egyptian market -A quantitative study

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**أثر عمليات اعادة التأمين على الاداء المالي
لشركات التأمينات العامة المصرية – دراسة كمية**

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ABSTRACT

The aim of this study is to determine the effect of reinsurance operations on the financial performance (ROA and ROE) of non-life insurance company in Egypt under the control variables by using the data of 9 non-life insurance company during the period from 2008 until 2016, reinsurance operation include (insurance and reinsurance debts, the ratio of reinsurance, local reinsurance premium ceded to local reinsurer, foreign reinsurer premium ceded to foreign reinsurer, local claim coming from local reinsurer, foreign claim coming from foreign reinsurer, the ratio of retention, the ratio of commotion, the ratio of insurance dependence) and control variables include (market share, size of the company age of the company and financial leverage) by using panel data to determine the best model to predict the effect of reinsurance arrangement operations on financial performance. The study found significant and negative relationship between financial performance (ROA) insurance and reinsurance debt, foreign reinsurer premium, the ratio of reinsurance, the ratio of retention, size and financial leverage by the fixed effect model, and significant and positive relationship between size and ROE, and significant and negative relationship between age and ROE, by the random effect model.

Key words

Reinsurance - Financial Performance –insurance company specific –control variables- -panel data.

أثر عمليات اعادة التأمين على الاداء المالي لشركات التأمينات العامة المصرية – دراسة كمية

ملخص

ROA تهدف هذه الدراسة الى تحديد أثر عمليات اعادة التأمين على الاداء المالي (باستخدام معدل العائد على الاصول لشركات التأمينات العامة المصرية باستخدام عدد من المتغيرات التفسيرية و ROE ومعدل العائد على حقوق الملكية الرقابية وذلك لعدد 9 شركات خلال الفترة من 2008 الى 2016، وتشمل المتغيرات التفسيرية (عمليات اعادة التأمين) كلا من (مدينو عمليات التأمين و اعادة التأمين و نسبة اعادة التأمين و نسبة عمليات اعادة التأمين المحلية الى اجمالي الاقساط و نسبة اقساط اعادة التأمين الاجنبية الى اجمالي الاقساط و نسبة التعويضات من عمليات اعادة التأمين المحلية و نسبة التعويضات من عمليات اعادة التأمين الاجنبية و حد الاحتفاظ و نسبة عمولات اعادة التأمين و درجة الاعتماد على اعادة التأمين) وتشمل المتغيرات الرقابية على (الحصة السوقية و حجم الشركة و عمر الشركة و الرافعة المالية) و تم استخدام نماذج السلاسل الزمنية المقطعية لتحديد افضل نموذج للتنبؤ بأثر عمليات اعادة التأمين و المتغيرات الرقابية على الاداء المالي، وقد (ومدينو ROA توصلت الدراسة الى وجود علاقة معنوية و عكسية بين الاداء المالي (باستخدام معدل العائد على الاصول عمليات اعادة التأمين و اقساط اعادة التأمين الاجنبية و نسبة اعادة التأمين، حد الاحتفاظ، و حجم الشركة و الرافعة المالية وذلك باستخدام نموذج التأثيرات الثابتة، و توصلت الدراسة الى وجود علاقة ايجابية و معنوية بين حجم الشركة و معدل العائد على وكذلك وجود علاقة عكسية و معنوية بين عمر الشركة و معدل العائد على حقوق الملكية (ROE) حقوق الملكية) باستخدام نموذج التأثيرات العشوائية. ROE)

الكلمات الدالة

اعادة التأمين – الاداء المالي – خصائص الشركة – المتغيرات الرقابية – السلاسل الزمنية المقطعية .

1-Introduction

This study is related to the reinsurance done by domestic non-life insurance companies which are currently active in Egypt, the insurance company facing risks that may be affect on its financial performance and reducing the profit of policy holders ,one of this risks are the reinsurance operations, and this study sought to investigate the relationship between reinsurance operations and the financial performance of the insurance company in Egypt, and the impact of reinsurance on the profitability of insurance companies are discussed in this study.

Insurance companies are aware of the impact of reinsurance on their financial performance, but the insurance industry as a whole is inattentive of the impact of such practice on it. The companies in the insurance industry need to determining the fact of whether the industry has the benefit of improved profits by using reinsurance or undergoing from it negative characteristics. Insurance industry is extremely important for the survival of all industries; any trouble that could lead to financial distress and losses of insurance industry is very detrimental for the whole economy(Iqbal and Rehman,2014).

Reinsurance is expensive to the insurer, when insurer transfer risks to reinsurance company ,they reduce the volatility the ratio of loss , reducing underwriting risk, reduces its cash-flows volatility and financial leverage, and increase the capital of the company, Therefore, reinsurance reduces the risk of bankruptcy and improves the financial stability of the insurer. so we can Consider the reinsurance process as a risk management, and a decision on the company's capital structure (Burcă and Bătrîncea,2014).

The insurance sector has a privileged place inside the finance sector because the insurance sector facilitates the way society's risks are transferred and dispersed, while also playing an active role in capital and money markets through the funds it channels into securities. With the added value and labor it thus creates, the insurance sector is capable of influencing the entire economy (Koc, 2016).

Profit plays an essential role in persuading policyholders and shareholders to supply funds into insurance firms. Thus, one of the objectives of management of insurance companies is to attain profit as an underlying requirement for conducting any insurance business (KRAMARIC et.al, 2017).

Insurance in developing economics is growing in importance because its increasing share in financial sector productivity and profitability's firm is sensitivity to changes in reinsurance utilization (Chen and Hamwi, 2000).

A primary insurer is defined as an insurance company that sells to the public. A professional reinsurer, on the other hand, is an insurance company that does not have any direct premium written and sells insurance only to other insurance companies (Chen and Hamwi, 2000).

IFRS 17, defines a reinsurance contract as: "An insurance contract issued by one entity (the reinsurer) to compensate another entity for claims arising from one or more insurance contracts issued by that other entity (underlying contracts)."

We must state the difference between reinsurance held and reinsurance assumed, **Reinsurance held (or ceded)**: looks at reinsurance contracts from the perspective of the direct insurer that has purchased reinsurance cover for the risks of the insurance contracts it has issued, **Reinsurance assumed**: looks at reinsurance contracts from the perspective of the reinsurer. The reinsurer has issued reinsurance contracts and assumes the risk that these bring.

There are two principal categories of reinsurance:

(a) Proportional reinsurance: where the reinsurer agrees to cover a proportionate share of the risks ceded; and

(b) Non-proportional reinsurance: where particular risks (on a risk by risk basis or in aggregate) are covered by the reinsurer (EFRAG, 2018).

Reinsurance is an important transaction for primary insurers; it can be used to increase insurer capital and earnings and to reduce regulatory costs. However, if a reinsurer becomes insolvent, due to some firm-specific cause or some external force, it can have severe adverse effects for a variety of stakeholders. For example, if a reinsurer is unable to pay for losses, the ceding company is then responsible for the losses, this can lead to one or more of the following: (1) decreased capacity and financial strength of the ceding company; (2) financial distress and/or increased costs of capital for insured that may be without coverage; (3) a strain on remaining insurers if guaranty fund assessments are required to pay the claims of insolvent primary insurance companies; and/or (4) overall increased insurance costs and costs of capital related to further reductions or strains in the insurance markets (Cole and McCullough, 2006).

When insurance company purchasing reinsurance it's seek to improve their financial performance, security and stability over time , five primary functions of reinsurance from the insurer's point of view, the first when insurance company underwrite the risks reinsurance provide flexibility for insurers in the size and types of risk, the second reinsurers supply assistance to insurers in specialized areas where the insurer may have little or no expertise, the third Reinsurance programs will assist insurers by limiting wide fluctuations in underwriting results, the fourth increasing an insurer's capitalization, by assistant in insurer's operation , the fifth provide protection against the potential large, accumulations that can result from catastrophic events *e.g.* earthquakes, bushfires and cyclones.

Insurance in Egypt is one of the most important non-banking financial activities, It is the main contributors to the GDP, as it is integrally linked to the rest of the economic sectors and contributes to risks'

management to which the economic assets may be exposed. In this respect, insurance is considered one of the most important tools for the stability and continuity of the rest of non-banking financial sectors, During 2018, growth rate of insurance premiums was 23.4% compared to last year. The number of companies operating in this sector is 37 companies. The total premiums amounted to 30 billion EGP on 30/6/2018 compared to 2017 where the total premiums amounted to 24 billion EGP. On the other hand, companies paid total compensations of 15.4 billion EGP in 2018 compared to 12.9 billion EGP in 2017(financial regularity authority, 2018).

Despite the decline in insurance companies' surplus by 23% to reach 3.7 billion EGP compared to last year where the surplus-reached 4.7 billion EGP, results of the companies' activities have improved over the past four years. As in this period insurance surplus amounted to 3.6 billion EGP during 2018 compared to 2 billion EGP in 2014, which has had the effect of attracting more new investments in the insurance market through establishing new companies, On 30 June 2018, net investments of insurance companies amounted to 99.4 billion EGP on a growth rate of 16% compared to net investments last year of 86 billion EGP(Egypt Financial Supervisory Authority (EFSA), 2018).

While the total rights of policyholders - which represent the liabilities of the insurance companies towards their clients - was 61 billion EGP during 2018 compared to 54 billion EGP during 2017 with a growth rate of 12%,On the other hand, shareholders 'equity in insurance companies amounted to 38 billion EGP in 2018 with a growth rate of 23.3% compared to shareholders' equity of 31 billion EGP in 2017(Egypt Financial Supervisory Authority (EFSA), 2018).

For reinsurance company in Egypt from 2007 there is not found local reinsurance company, before 2007 the Egyptian reinsurance company was the only local company specialist in reinsurance in Egypt and the insurance company ceded a ratio of premiums mandatory to this company, which was reduced the premium ceded to the foreign reinsurance company, and the insurance company must depending on

foreign reinsurance company on its reinsurance arrangement, and in this case may affect the financial performance of insurance company.

For the past several years, the global reinsurance sector has weathered unfavorable and continuously changing business conditions; the challenges have included a prolonged soft reinsurance pricing cycle, heightened competition, limited organic growth opportunities, a record Influx of alternative capital, low interest rates, mergers and acquisitions, and large catastrophe losses in 2017. Against this backdrop, reinsurers are trying to pull whatever levers they can to not only remain relevant but sustain profitability(S&P GLOBAL RATING ,2018),

For the pervious reasons this study attempt to determine the effect of reinsurance operations on the financial performance of non- life insurance company in Egypt during the period from 2008 to 2016 to determine the probability effects on insurance company and how to keep on its profitability to achieve high return to policyholders and shareholders.

The aim of this study is to determine the effect of reinsurance operations on the financial performance of non- life insurance company in Egypt under the control variables by using the data of 9 non- life insurance company during the period from 2008 until 2016 by using panel data to determine the best model to predict the effect of reinsurance arrangement operations on financial performance.

The contribution of this study is to collect the ratios of reinsurance operation and the control variables that may be affect the financial performance which we calculate by using two measures ROA and ROE and determine which of two measures may be affected by reinsurance operations to recommended the insurance company for which of ratios may affect the financial performance on Egyptian insurance company.

2-Literature Review

Insurance play vital role in the economy of any country from its role in risk management on behalf of individual ,and risk transferring of

Projects and people to insurance company , the goal of the insurance company is to increase profit to shareholders and policyholders, and this profit may be affected by a lot of variables from it the reinsurance operations which can affect the financial performance of insurance company ,financial performance of insurance company It has been studied in many previous studies, some researches measure the financial performance of insurance company by ROA or ROE or both the two measures such as, Wani and Dar (2014), SAMBASIVAM and AYELE(2013), Boadi et al.,(2013), Malik(2011), Reshid(2015), OBONYO(2016), Mwangi and Murigu(2015), Datu(2015), Lee and Lee(2012), Koc(2016), Lire and Tegegn (2016), Mazviona et.al(2017), SISAY(2017),all this studies using ROA (profit before taxes / total assets)and ROE (profit before taxes /total equity) as a measure of profitability or financial performance .

Adebowale and Adebayo (2018) study the effect of reinsurance utilization (measuring by the ratio of premium ceded to reinsurer and reinsurance dependence)on financial (using ROA and ROE)and non-financial performance (using questionnaire),by using log transformation regression to measure the effect on financial performance ,and content analysis to measure the effect on non-financial analysis ,the study found a significant relationship between reinsurance utilization and performance of non-life insurance companies in Nigeria , the study also stated the importance of non-financial performance indicators like customers satisfaction, claims management procedures, time lag .

Bressan (2018) study the effect of reinsurance on solvency, profitability, and taxes of insurers for a sample of insurers in the united states during the period from2005-2017 for five types of insurance company include composite insurance ,health insurance, life insurance, title insurance, and non-life insurance, to determine the effect of reinsurance(the ratio of reinsurers' share of technical provisions over total assets) on solvency (CAPITAL is the sum of equity capital and surplus divided by total assets. CAPITAL2 is the sum of equity capital and surplus divided by total earned premiums),

profitability(ROA ,and ROE), taxes(the difference between pre-tax profit and profit net of taxes, divided by pre-tax profits) the study concluded that Reinsurance and capital can be considered alternatives to improvement Solvency.

Aduloju And Ajemunigbohun (2017) investigate the relationship between reinsurance and underwriting profit, gross premium income, and financial stability (ROA and ROE) of insurance companies in Nigeria, The Ratio of Ceded Reinsurance , and Reinsurance Recoverables to Policyholder's Surplus are the usual measures of reinsurance utilization, surplus refers to equity Capital, while 'recoverables' represent funds owed by reinsurers to insurance companies, by using questionnaire, they found a significantly positive relationship between

Reinsurance capacity and gross written premium , a significantly positive relationship between reinsurance capacity and profitability of insurance companies ,and a significant relationship between reinsurance capacity and financial stability of insurance companies in Nigeria.

Kramaric et.al (2017) analyses the influence of insurance company-specific, insurance industry-specific and macroeconomic variables on performance of insurance markets in selected Central and Eastern European countries by using two performance variables ,return on assets (ROA) and return on equity (ROE),and the explanatory variables Included size(measured on the basis of gross written premium),type , share of premium ceded to reinsurance, combined ratio, ownership variable indicating foreign or domestic ownership, age, organizational form dummy variable referring to joint stock companies or mutual and real GDP per capita growth, by using panel models there are age is positively effect and significance with performance measured with both ROA, and ROA, and a real GDP per capita growth is significant influence on performance of ROA.

Koc , (2016) sought to determine the factors that affect the financial performance of insurance company in Istanbul , by using panel data he found there are a positive relationship between *numbers of agents*,

technical profit/earned premiums ratio , *financial assets investment profit and financial performance*, and a negative relationship between *loss ratio and financial performance*.

Obonyo, (2016) studied the effect of reinsurance on financial performance for general insurance in Kenya by using ratios such as net premiums, claim ratios and underwriting profitability to determine the relationship between reinsurance arrangement and financial performance of general insurance company the result was there are a positive but insignificant relationship between reinsurance and financial performance, Net commissions earned had a positive effect on underwriting profit ratio, and the study recommended that insurance companies should effectively manage their claim costs and underwriting quality in order to increase their underwriting profits.

Mankai" and Belgacem(2015) determine the interaction between risk taking ,capital, and reinsurance for property–liability insurance firms ,the study found that the adjustments between risk and capital are positive. And this result, found only in one direction, and reinsurance is negatively associated with capital.

Mwangi and Murigu (2015)study the factors that can impact the financial performance of general insurance in Kenya, by using explanatory variables included (leverage, liquidity, size of the firm, the age of a company, underwriting risk, Retention ratio, Management Competence index ,the ownership) and ROA as a dependent variable ,using multiple linear regression financial performance is significance with leverage, equity capital, size, management competence, and Financial performance was not significantly with retention ratio, underwriting risk,.

Others studies measure the financial performance by ROA and ROE ,**Iqbal and Rehman(2014)** analyze the relationship between reinsurance and profitability for domestic non –life insurance company in Pakistan ,the study use the ratios (ROA,ROE) as indicator to profitability, and use reinsurance utilization and reinsurance dependence as indicator for reinsurance ,the result of the study is there are a significant influence for the reinsurance utilization on

profitability ,and there is no significant influence for reinsurance dependence on profitability of non –life insurance company in Pakistan.

Burcă and Bătrînca(2014) analyze the determinants of the demand for reinsurance in the Romanian insurance market ,the study determine some indicators such as the return on total assets ratio, company size, age of the company, financial leverage, growth of gross written premiums, underwriting risk, solvency margin, taxes and group affiliation, the amount of reinsurance purchased, and Diversification, the study concluded that the determinants of the demand for reinsurance in the Romanian insurance market are the return on total assets ratio, company size, number of years since the company operates in the Romanian insurance market and the financial leverage in insurance.

Park and Xie (2014) determine the systematic risks that may be caused the US property–casualty insurance company resulting from the correlation between reinsurance companies and US insurers (P / C), and found that the likelihood of lowering the initial insurance company increases with its exposure to the default reinsurance risk from the reinsurance companies that have been downgraded.

Cummins et.al(2012) study the determinants of reinsurance counterparty relationships ,and the linkage between these relationships and insurer financial performance, in the U.S. property-liability (P-L) insurance industry,using regression analysis ,with reinsurance counterparty relationship as dependent variable by using three measures (utilization, exposure, degree of concentration) , and firm characteristics as independent variables, and measure the impact of reinsurance counterparty relationships on primary insurer financial performance(ROA and ROE), and frontier efficiency analysis to estimate cost, revenue, and profit efficiency)and measure efficiency utilizing data envelopment analysis (DEA),there are a negative relationship between firm size and reinsurance

Utilization, insurers that write a higher portion of business in riskier lines will purchase more reinsurance, a positive relationship between

firm size and reinsurance concentration, reinsurance utilization is positively related to all types of efficiency, ROE, and ROE, whether utilization is measured by premiums ceded or recoverables.

Cummins et.al(2008) estimate the effect of reinsurance on insurers' costs, and estimate a parametric cost function to predict of the effect of reinsurance on insurers' underwriting risk, The empirical results state that reinsurance increases significantly the costs of producing insurance services and reduces significantly the volatility of the loss ratio, and insurers purchasing reinsurance to reduce their underwriting risk.

Chen and Hamwi, (2000) sought to analyze the comparison between performance of primary insurance and professional reinsurance to see whether there is any significant difference in performance between primary insurers and professional reinsurers, (for example, in the combined ratio that measures underwriting profitability, or in the yield on invested assets, or in the change in policyholders' surplus that affects policyholders' security), the study using least square regression analyses found that reinsurers have a higher degree of redundancy in their loss reserves than primary insurers who underwrite a higher volume of business relative to their policyholders' surplus.

3-Determinates the effect of reinsurance on the financial performance of insurance company

3.1-depement variables

Two common measures were used by prior studies to measure the financial performance of insurance company which are ROA and ROE. Following prior studies, SAMBASIVAM and AYELE(2013), Boadi et al.,(2013), Malik(2011), Reshid(2015), OBONYO(2016), Mwangi and Murigu(2015), Datu(2015), Lee and Lee(2012), Koc(2016), Lire and Tegegn(2016), Mazviona et.al(2017), SISAY(2017) this study uses ROA and ROE as proxies of insurance companies s' financial performance ROA is used to evaluate insurance company's ability to generate returns from available sources of funds. It has been calculated as the ratio of net profit before taxes for a year

to the total assets of the same year. Additionally, ROE is used to analyze the return generated by the funds that shareholders have invested. It has been calculated as the ratio of net profit before taxes for a year to the total equity of the same year.

3.2- Independent variables

Two categories of independent variables were used in this study as shown in Figure. Insurance and reinsurance-specific (independent) variables were considered as internal factors, which include the ratio of insurance and reinsurance company to equity ,the ratio of reinsurance , the ratio of local reinsurance ,the ratio of foreign reinsurance ,the ratio of local claim reinsurance to local reinsurance premiums, the ratio of foreign claim reinsurance to foreign reinsurance premiums, the ratio of retention , the commotion of ceding reinsurance, the reinsurance dependence , Another category of independent variables is control variables which affect the financial performance of insurance companies ,which include market share, size of company, age of the company, the leverage Following is an explanation of both Categories of independent variables.

3.2.1- Insurance and reinsurance-specific

1- **The ratio of insurance and reinsurance company to equity (IRCE)** (insurance and Reinsurance Company to equity)Which means The company's debt with others insurance and reinsurance companies, and this ratio determine the value of this debts to the equity and how can it affect the performance of company which may be positive or negative effect on the financial performance of insurance companies.

2- **The ratio of reinsurance(RE)** (the total premium ceded to reinsurance company to the total premium) this ratio determine the percent of premium that ceded to reinsurance company and reflect the depends of insurance company on reinsurance, and there must not more than 50% of total premium ,and if this ratio more than this percent , mean that the insurance company don't participate insurance and collect money only.

3- **The ratio of local reinsurance(LRE)** (the total of local premium ceded to local reinsurance company to the total premium) ,this ratio represent the percent of local premium that ceded to local reinsurance company ,and this ratio mean the percent of premium that go to local reinsurance company ,some Countries' Legislation(e.g. Egypt before 2007) state that there must be a percent of local premium ceded to local reinsurance company ,and the object of this Legislation reduced the percent of premium that go out the country.

4- **The ratio of foreign reinsurance(FRE)** (the total of foreign premium ceded to foreign reinsurance company to the total premium), this ratio represent the percent of foreign premium that ceded to foreign reinsurance company ,and this ratio mean the percent of premium that go to foreign reinsurance company, this ratio determine the degree of dependence of local company on reinsurance ,and if this percent is more than 50% that means high dependence of local company on reinsurance ,to receive the commission of reinsurance ,and local insurance company take the role of mediator only.

5- **The ratio of local claim reinsurance(LCRE)** (local claim reinsurance in a year to local premium in the same year) and According to this ratio the insurance company determine the result of local reinsurance treaties, and decide which of this treaties must be continue and which deleted.

6- **The ratio of foreign claim reinsurance(LFRE)** (**foreign** claim reinsurance in a year to **foreign** premium in the same year) and According to this ratio the insurance company determine the result of **foreign** reinsurance treaties, and decide which of this treaties must be continue and which deleted, and the insurance company must compare between this ratio with the pervious ratio to determine if company can depends on local or **foreign** reinsurance treaties.

7- **The ratio of retention(RET)** (the net underwriting premium in the year to the total underwriting premium in the same year) ,this ratio determine the percent of premium that company can be keep it and this ratio must be more than 50% and if it not, the company are more

depending on reinsurance to collect premium and receive only commission from reinsurance company , and this ratio affected by many variables that out of this study.

8- The commotion of ceding reinsurance(CRE), (the value of commission from reinsurance company to the premium that ceded to the reinsurance company) and this commission represent a revenue to the insurance company that reinsurance company pay to the company in opposite the premiums which are ceded to it, when this ratio increase it means more revenue to the insurance company.

9-The Rinsurance dependence (REDEP)(The value of total ceded premium to total assets), this ratio investigate to what the insurance company depended on reinsurance company when underwrite in risks

3.2.2- control variables

1-Market share(MS) (the percent of total premium of the company to total premium of the all companies in the market) this ratio determine the share of the company in the market ,and its effect on the financial performance of the insurance company.

2- size of company(SIZE) (natural logarithm of total assets [LNAS]) this ratio reflect the contribution of assets in the revenue of the company , and its effect on the financial performance of the insurance company.

3- Age of the company (AGE) (the number of years from the company started), this variable reflect the experience of the company which affect the financial performance of insurance company.

4-Financial Leverage (LEV)(total liabilities to total assets) this ratio reflect the percent of all liabilities on the insurance company to its assets ,we can say that when this ratio is increase there is negative affect on the financial performance ,and verse -verse.

4 . Data And Methodology`

In this section, data sources and sample selection are provided. Then, the methodology and used models are discussed.

4.1 - Data collection and sampling

The dataset for the Insurance and reinsurance-specific variables used by this study is fetched from Egypt Financial Supervisory Authority (EFSA) STATSTICAL BOOK (2008-2016), which supplies all information regarding all Insurance company working in Egypt. Thus, it is considered the most common and authenticated database for Insurance company system information, The database provides annual information for all insurance company working in Egypt which include one public company , 10 life insurance ,4 life Takaful insurance,13 private non-life insurance,5 non-life Takaful insurance , table (1) and figure (1) explore the value of direct premium, reinsurance premium coming, total premium, reinsurance premium forward, net premium, the percentage or reinsurance premium to direct premium, and the percentage of reinsurance premium forward to direct premium for all non- life insurance company in Egypt during (2008/2009-2016/2017).

TABLE 1 results of non-life insurance company in Egypt

year	Direct premium L.E	Reinsurance premium – COMING L.E	Reinsurance premium – COMING/ Direct premium %	Total premium L.E	Reinsurance premium – FORWARD L.E	Reinsurance premium – FORWARD / Direct premium %	Net premium L.E
2008/2009	4750238	358077	7.538085	5108315	2463618	51.86304	2644697
2009/2010	5173824	477897	9.236824	5651721	2546739	49.22353	3104982
2010/2011	5655426	474070	8.382569	6129496	2747803	48.58702	3381693
2011/2012	6088898	444421	7.298874	6533319	3193686	52.45097	3339633
2012/2013	6953525	568853	8.180786	7522378	3946003	56.74824	3576375
2013/2014	7546710	653899	8.66469	8200609	3969704	52.60178	4230905
2014/2015	8117980	756340	9.31685	8874320	3978346	49.0066	4895973
2015/2016	9009391	882661	9.797122	9892052	4257950	47.26124	5634102
2016/2017	12328621	1450121	11.76223	13778742	5845459	47.41373	7933283

Source: (Egypt Financial Supervisory Authority (EFSA)-statistical books (2008-2016)

Note: total premium=direct premium + reinsurance premium coming ,net premium= (direct premium +reinsurance premium coming) – reinsurance premium forward.

FIGUAR 1

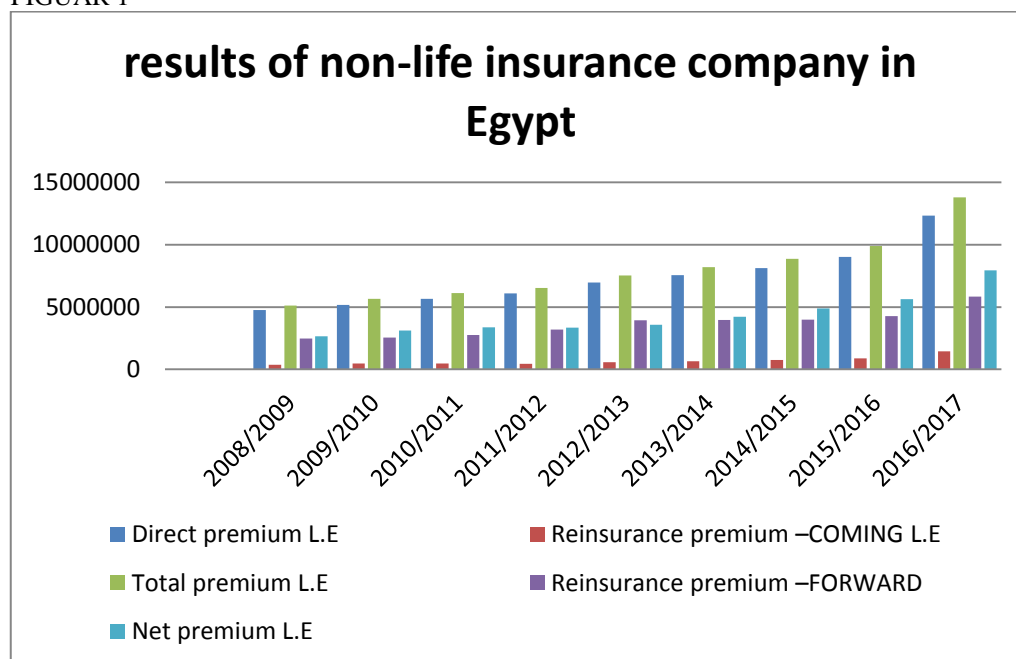
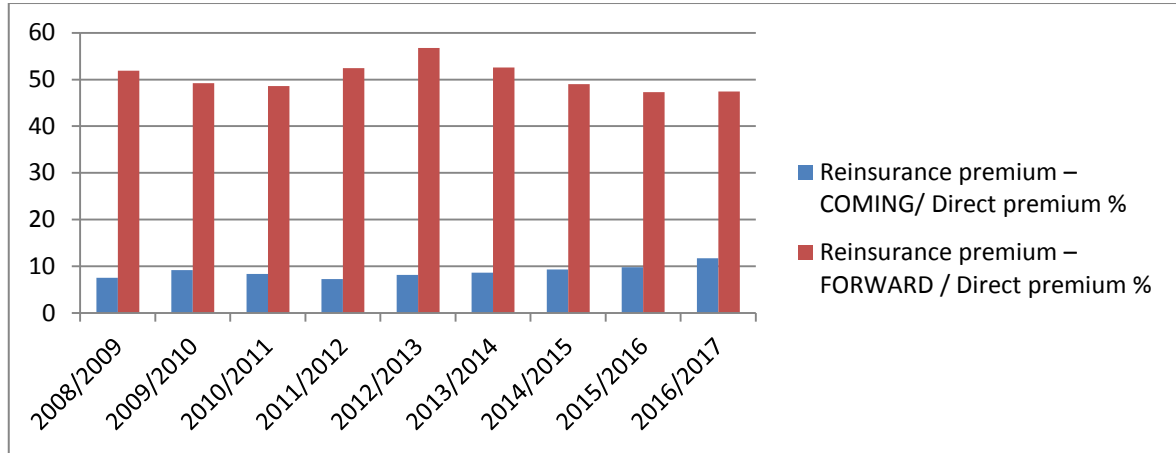


Figure 2 investigate the comparison between premium of reinsurance coming and forward to direct premium which explore the increasing of percentage of reinsurance premium forward to direct premium and

that mean non-life insurance company are high depended on reinsurance foreign and we need to investigate the relationship between reinsurance and financial performance of non-life insurance company.

FIGUAR 2



Source: depended on data in table 1

this study focus only on non-life insurance company, which include 18 company , the sample include 9 company which its data are available during the period of the study(2008/2009-2016/2017), The nine (9) companies were selected based upon the availability of data and the number of years that an insurer has been in operation ,The sample of this study is using panel data that consists of 9 insurance company with 81 observations for a period of 9 years from 2008/2009 to 2016/2017, Importantly, the study includes all public-sector insurance company that include one company ,and 3 local private company ,5 foreign private company , The criteria for selection of these company are depending on the availability of data for the period covered by this study, further in EGYPT before 2007 there are only one local reinsurance company (Egyptian Reinsurance Company) which started working from 1958 ,and was deleted in 2007 ,and this decision affect the insurance company ,where the law was determine a percentage legally that insurance company must be ceded to Egyptian Reinsurance Company , which the objective of this law is decreasing the reinsurance premium which are going to foreign reinsurance company ,and keeping a part of premium in Egypt that may be going to foreign reinsurance , This makes the investigation of insurance company financial performance during this period is interesting and very useful for shareholders and policyholders.

Regarding comparing the sample used in this study with samples from previous studies, most studies conducted on the financial performance or profitability of an insurance company in different countries have used panel data. For example, Koc (2016) sampled five insurance companies on the Istanbul Stock Exchange between 1993 and 2005,, **Datu(2015)** studied the association between Insurer-specific indicators and macroeconomics on profitability in Philippine non-life insurance market in the period between 2008-2012, **SISAY(2017)** study the effect of financial risk on the performance of insurance companies in Ethiopia for eight insurance companies covering the period of sixteen years in the period between 2000-2015, In the same context, **Shahid_et.al(2017)**,determine the factors that effect on the profitability of five life insurance company in Pakistan in the period between 2008-2105 , **Lire and Tegegn (2016)**,analyze the factors which impact the profitability of private insurance in Ethiopia in the period between 2005-2015, **Ortyński(2016)**,determine the main factors of financial performance of non-life insurance company in Poland in the period between 2006-2013,**Çekrezi(2016)**,investigated the factors that affected on financial performance of five insurance company in Albania in the period between 200-2013, **Kaya(2015)**,determine the specific factor of insurance company that effect on profitability for 24 non- life insurance company in turkey in the period between 2006-2013, **Wani and Dar (2015)**,measured the relationships between financial risks and financial performance for life insurance company working in India, Burcă and Bătrîna (2014),studied the factors of financial performance of insurance company in Romani in the period between 2008-2012.

4.2 | Model specification and econometric tools

Prior literature on the effect of reinsurance operations on the financial performance of insurance company revealed that a linear regression models are the suitable form of analysis (pooled, fixed, and random effect models, e.g., Iqbal and Rehman (2014) ; Burcă and Bătrîna(2014) ; Datu(2015) ; Lee and Lee(2012); **SISAY(2017)**; **Shahid_et.al(2017)**; **Lire and Tegegn (2016)**; **Ortyński(2016)**; **Kaya(2015)**; **ADULOJU and AJEMUNIGBOHUN (2017)**;

TOMISLAVA et.al (2017), either used a regression analysis ;e.g, **Adebowale and Adebowale and Adebayo (2018)**; **Mwangi and Murigu(2015)**; **OBONYO (2016)**; **SAMBASIVAM and AYELE(2013)**; **Malik(2011)**; **Reshid(2015)**, **Wani and Dar (2015)**; **Boadi et.al (2013)**; **Bressan(2018)**, or both regression analysis and data envelopment analysis (DEA), **Cummins and Weiss (2012)**, This study used linear regression models with a combined, constant and random effect, and examined all the assumptions required to perform a linear regression. Using linear regression for three models can help to obtain more consistent and comparable estimates for parameter models. As such, panel data analysis is used instead of the proposed new GMM. The researchers emphasized the main advantages of adopting the analysis of panel data. The first is its efficiency of econometric estimates on pure or pure time-series data analysis techniques (Baltagi, 2005; Hsiao, 2003), and the second is its ability to control individual and dangerous multi-line heterogeneity (Kyereboah-Coleman, 2007), the third advantage is it can study dynamic relationships, and model the differences or *heterogeneity* between subjects (**Frees, 2004**), Panel data of 9 years for 9 Egyptian non- life insurance company is used to analyze the Affecting by insurance company -specific and control variables on non-life insurance financial performance , Following **Burcă and Bătrînca(2014)**, **Iqbal and Rehman (2014)**, **Adebowale and Adebayo (2018)**, **Aduloju And Ajemunigbohun (2017)**, **Tomislava et.al (2017)**, **OBONYO ,(2016)** , the essential structure and context of the panel data is defined as per the following regression model

$$y_{nt} = \alpha + \beta x_{nt} + \varepsilon_{nt}, \quad (1)$$

where y_{nt} denotes the dependent variable financial performance , α is the intercept term on the explanatory variables, β is a $k \times 1$ vector of parameter to be estimated, and vector of observations is x_{nt} , which is $1 \times k$, $t = 1 \dots, T$; $n = 1, \dots, N$. the practical and operational form, the aforementioned model can be expressed as follows:

$$\text{financial performance} = f(\text{insurance company- specific variables}; \text{control variables}) \quad (2)$$

financial performance is measured by ROA and ROE. Insurance company- specific variables include, The ratio of insurance and reinsurance company to equity, The ratio of reinsurance, The ratio of local reinsurance ,The ratio of foreign reinsurance ,The ratio of local claim reinsurance ,The ratio of foreign claim reinsurance ,The ratio of retention ,The commotion of ceding reinsurance ,the reinsurance dependence control variables include, Market share, size of company, Age of the company ,Leverage, Expanding the proxies used in Model 2, two models have been developed to investigate the factors that may affect the insurance company financial performance in EGYPT. The models hypothesize that the insurance company financial performance in EGYPT depends on insurance company– specific variables; control variables that are as follows:

$$\text{ROA}_{it} = \alpha_i + \beta_1 \text{IRCE} + \beta_2 \text{RE} + \beta_3 \text{LRE} + \beta_4 \text{FRE} + \beta_5 \text{LCRE} + \beta_6 \text{LERE} + \beta_7 \text{RET} + \beta_8 \text{CRE} + \beta_9 \text{REDEP} + \beta_{10} \text{MS} + \beta_{11} \text{SIZE} + \beta_{12} \text{AGE} + \beta_{13} \text{LEV} + \varepsilon_{it} \quad (3)$$

$$\text{ROE}_{it} = \alpha_i + \beta_1 \text{IRCE} + \beta_2 \text{RE} + \beta_3 \text{LRE} + \beta_4 \text{FRE} + \beta_5 \text{LCRE} + \beta_6 \text{LERE} + \beta_7 \text{RET} + \beta_8 \text{CRE} + \beta_9 \text{REDEP} + \beta_{10} \text{MS} + \beta_{11} \text{SIZE} + \beta_{12} \text{AGE} + \beta_{13} \text{LEV} + \varepsilon_{it} \quad (4)$$

where i refers to an individual insurance company; t refers to year; $\beta_1:\beta_{13}$ are the coefficients of determinant variables and ε is the error term; and all other variables are as defined in Table 2.

Both models are estimated using combined, random, and constant regression. The Hausman test is applied to determine whether Basiuras and Cosmedo (2007) indicated that it was the value at which Hausmann tested was greater than the critical square, and the estimated fixed effects were the appropriate option (Al-Maqtari, 2018).

TABLE 2 Definitions of insurance company' financial performance and reinsurance variables

Variable	Acronym	Measure	Exp. effect	Evidence from prior studies
Dependent variables				
financial performance	ROA	$ROA_{it} = \frac{Net\ profit\ it\ before\ taxes}{Total\ Assets_{it}}$		Adebowale and Adebayo (2018) Bressan (2018) ADULOJU and AJEMUNIGBOHUN (2017) TOMISLAVA et.al (2017) OBONYO,(2016) Mankar and Belgacem(2015)
	ROE	$ROE_{it} = \frac{Net\ profit\ it\ before\ taxes}{Total\ Equity\ it}$		
Independent variables: insurance company-specific				
The ratio of insurance and reinsurance company to equity	IRCE	$IRCE = \frac{insurance\ and\ Reinsurance\ Company\ debt}{Total\ equity}$	-	
The ratio of reinsurance	RE	$RE = \frac{total\ premium\ ceded\ to\ reinsurance}{total\ premium}$	-	Datu(2015), OBONYO (2016), Mazviona et.al(2017), ADULOJU and AJEMUNIGBOHUN (2017), Bressan (2018), Iqbal and Rehman(2014), <i>KRAMARIC and PAVIC(2017)</i>
The ratio of local reinsurance	LRE	$LRE = \frac{total\ of\ local\ premium\ ceded\ to\ local\ reinsurance}{total\ premium}$	+ -	
The ratio of foreign reinsurance	FRE	$FRE = \frac{total\ of\ foreign\ premium\ ceded\ to\ foreign\ reinsurance}{total\ premium}$	-	
The ratio of local claim reinsurance	LCRE	$LCRE = \frac{local\ claim\ reinsurance\ in\ a\ year}{local\ premium\ in\ the\ same\ year}$	- +	
The ratio of foreign claim reinsurance	LFRE	$LFRE = \frac{foreign\ claim\ reinsurance\ in\ a\ year}{foreign\ premium\ in\ the\ same\ year}$	- +	
The ratio of retention	RET	$RET = \frac{net\ underwriting\ premium}{Total\ underwriting\ premium}$	-	OBONYO (2016), ADULOJU and AJEMUNIGBOHUN (2017),
The commotion of ceding reinsurance	CRE	$CRE = \frac{the\ value\ of\ commission}{the\ premium\ ceded\ to\ the\ reinsurance\ company}$	+	Augustine and Lukmon(2017),
The reinsurance dependence	REDEP	$REDEP = \frac{total\ ceded\ permium}{total\ assets}$	+	<i>Reshid,(2015), Adebowale and Adebayo (2018),</i> Tegegn and Lire(2016)
control variables				
Market share	MS	$MS = \frac{total\ premium\ of\ the\ company}{total\ premium\ of\ the\ all\ companies\ in\ the\ market}$	+	Datu(2015)
size of company	SIZE	size = natural logarithm of total assets	+	Burcă and Bătrîncea(2015) ;

				Datu(2015) ; Lee and Lee(2012); <i>Reshid,(2015),</i>
Age of the company	AGE	AGE= number of years from the company started	+	Burcă and Bătrîncea(2015) ;
Leverage	LEV	$LEV = \frac{\text{total liabilities}}{\text{total assets}}$	-	Burcă and Bătrîncea(2015) ; <i>KRAMARIC and PAVIC(2017)</i>

5 | Data Analysis And Results

5.1 | Descriptive Statistics

Table 3 shows descriptive statistics for insurance company-specific and control variables that affect the financial performance of the insurance company variables over the period from 2008 to 2016, the minimum value of ROA and ROE are -0.93669 and 3.285376 , respectively. The mean values are 5.74 for ROA and 20.5 for ROE. This indicates the positive skew distribution of ROA and ROE during 2008–2016, it is also shown in Table 3 that there is a variation between the average values and standard deviation of all independent variables. For insurance company-specific variables, the average of the ratio of (IRCE) is 16.54%, the ratio of, RE, LRE, FRE, and LCRE are 16.55%, 47.67%, 4.35% and 43.32% with standard deviation of 15.45%,12.21%,3.87% and 12.9% respectively.

Further, the average values of the ratio of LCRE, LFRE ,RET ,CRE and REDEP are 137.83%,51.14%,52%,25% and 22.38% with standard deviation of 405%,16.1%,12.9%,8.5%,and 9.78% respectively. With consideration of control variable ,the market share (MS) has an average value of 76.3 with a standard deviation of 67, and (Min. = 2.09, Max. = 266.75), the mean value of SIZE is 5.85 % with a standard deviation of 0.53 , and (Min. = 4.9, Max. = 7.5), the mean value of AGE is 32.4 with a standard deviation of 15.2, and (Min. = 18, Max. = 67),and the mean value of LEV is 0.64% and a standard deviation of 0.25, and (Min. = 0.12, Max. = 1.75).

TABLE 3 Descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.
Panel A: dependent variables					
ROA	5.744623	5.456802	14.38832	-0.93669	3.285376
ROE	20.52179	16.9228	198.0156	0.505863	23.23189
Panel B: insurance company-specific					
IRCE	16.54598	13.04864	99.7626	0.486849	15.45333
RE	47.66709	46.31783	78.18883	23.88427	12.21009
LRE	4.347938	2.930795	15.77699	0	3.866886
FRE	43.31915	41.40827	76.26853	16.70029	12.9022
LCRE	137.8372	28.12161	2469.836	0.018149	405.0059
LFRE	51.14016	50.40266	101.7868	0.286624	16.08377

RET	51.99878	53.682	76.11646	16.12033	12.90324
CRE	24.96375	24.3	69.9	1.5	8.532547
REDEP	22.375	21	52	6	9.781635
Panel C: control variables					
MS	76.32071	53.33135	266.7527	2.099577	67.00232
SIZE	5.849937	5.74236	7.508586	4.928555	0.5317
AGE	32.4125	26	67	18	15.23877
LEV	0.640803	0.669889	1.757765	0.118555	0.250127

Note: IRCE :insurance and reinsurance debts(%),RE: the ratio of reinsurance(%);LRE: local reinsurance premium ceded to local reinsurance(%);FRE: foreign reinsurer premium ceded to foreign reinsurer (%);LCRE: local claim coming from local reinsurer(%);FCRE: foreign claim coming from foreign reinsurer(%);RET: the ratio of retention(%);CRE: the ratio of commotion(%);REDEP: the ratio of insurance dependence(%);MS: market share(%);SIZE: natural logarithm of total assets; AGE: number of working year; LEV: financial risk (%);ROA: ratio of insurance profit before taxes to total assets; ROE: ratio of insurance profit before taxes to shareholders equity.

5.2 Unit root test

As a prerequisite requirement and the starting point for the econometric analysis of the models of the study, stationary of the panel data using a unit root test is conducted. Stationary of the variables is tested by Levin, Lin, and Chu, Im, Pesaran, and Shin, Augmented Dickey–Fuller, and PP–Fisher tests. As shown in Table 4, the variable of ROA and ROE stationary at the first difference in all the applied tests, and the variables RE, LRE, FRE, and redep, found to be stationary at the first difference in all the applied tests, and IRCE, LFRE, RET, and CRE, found to be stationary at the second difference in all the applied tests, further, for control variables MS and AGE, found to be stationary at the first difference in all the applied tests, and SIZE, LEV found to be stationary at the second difference in all the applied tests, This leads to reject the null hypothesis of a unit root.

TABLE 4 Unit root test

Variables	level				1st difference				2 nd difference			
	Levin, Lin, & Chu t*	Im, Pesaran, and Shin W-stat	ADF–Fisher chi-square	PP–Fisher chi-square	Levin, Lin, & Chu t*	Im, Pesaran, and Shin W-stat	ADF–Fisher chi-square	PP–Fisher chi-square	Levin, Lin, & Chu t*	Im, Pesaran, and Shin W-stat	ADF–Fisher chi-square	PP–Fisher chi-square
Panel A: dependent variables												
ROA	0.4128	0.7226	0.7065	0.0382	0.0000	0.0001	0.0000	0.0000				
ROE	0.0010	0.2156	0.2095	0.0005	0.0009	0.2187	0.1901	0.0000				
Panel B: independent variables												
IRCE	0.0000	0.2510	0.1209	0.0524	0.9997	0.1984	0.1676	0.0000	0.1107	0.0433	0.0220	0.0000
RE	0.0003	0.2645	0.2594	0.0763	0.0000	0.0056	0.0041	0.0000				
LRE	0.0007	0.4559	0.3889	0.4709	0.0000	0.0663	0.0389	0.0000				
FRE	0.0000	0.0000	0.0020	0.0047								
LCRE	0.0144	0.0856	0.0258	0.0000	0.0000	0.0000	0.0000	0.0000				
LFRE	0.7161	0.6779	0.8152	0.0002	0.0007	0.1086	0.0663	0.0000	0.0000	0.0000	0.0000	0.0000

RET	0.0004	0.2973	0.2776	0.1138	0.0000	0.0763	0.0477	0.0014	0.0003	0.2305	0.0930	0.0008
CRE	0.6289	0.8331	0.9545	0.3389	0.6094	0.3405	0.3665	0.0000	0.0085	0.1061	0.0549	0.0000
redep	0.0029	0.2264	0.2009	0.0874	0.0000	0.1274	0.0938	0.0000				
Panel c: control variables												
MS	0.0010	0.3495	0.2845	0.3487	0.0000	0.0977	0.0652	0.0000				
SIZE	0.6062	0.9984	0.9971	0.2665	0.4719	0.5063	0.3691	0.0067	0.0000	0.1885	0.1229	0.0000
AGE	0.0010	0.3495	0.2665	0.4719	0.0000	0.0977	0.0652	0.0000				
lev	0.0096	0.6531	0.7375	0.1278	0.0033	0.1715	0.0702	0.0000	0.0000	0.0000	0.0124	0.0000

Note: IRCE :insurance and reinsurance debts(%),RE: the ratio of reinsurance(%);LRE: local reinsurance premium ceded to local reinsurance(%);FRE: foreign reinsurer premium ceded to foreign reinsurer (%);LCRE: local claim coming from local reinsurer(%);FCRE: foreign claim coming from foreign reinsurer(%);RET: the ratio of retention(%);CRE: the ratio of commotion(%);REDEP: the ratio of insurance dependence(%);MS: market share(%);SIZE: natural logarithm of total assets; AGE: number of working year; LEV: financial risk (%);ROA: ratio of insurance profit before taxes to total assets; ROE: ratio of insurance profit before taxes to shareholders equity

5.3 Pearson correlation

Table 5 shows the correlation matrix and diagnostics of multicollinearity for the used variables in the study. The results depict that there is a positive and negative relationship between dependent and independent variables. With regard to : insurance company-specific, there is a positive/negative correlation between insurance company-specific and both ROA and ROE, Where LER,RET,CRE,REDEP have a positive correlation with ROA ,and IRCE,LCRE,LERE,RET,SIZE,AGE have a positive correlation with ROE ,where IRCE,RE,LRE,FRE,MS,SIZE,AGE,LEV have a negative correlation with ROA, and RE,;RE,FRE,CRE,REDEP,MS,LEV have a negative correlation with ROE.

All independent variables have a low correlation that indicates the absence of multicollinearity issues in this study. expet LRE and MS have found the problem of multicollinearity, where The VIF is more than 10 (113.5, 115.2) respectively, so we excluded the two variable as shown in table 5, For more reliable analysis, Variance Inflation Factor (VIF) test is conducted to test multicollinearity issues. As it is shown in Panel B of Table 5, VIF values do not exceed 6.06 for all variables(except LRE and MS) that indicate that there is no multicollinearity between independent variables.

TABLE 5 :Correlation and multicollinearity diagnostics

	IRCE	RE	LRE	FRE	LCRE	LFRE	RET	CRE	REDEP	ROA	ROE	MS	SIZE	AGE	LEV
Panel A: Pearson correlation															
IRCE	1														
RE	-0.118	1													

LRE	0.0476	-0.026	1													
FRE	-0.126	0.9541	-0.32	1												
LCRE	0.1233	-0.046	0.105	-0.0754	1											
LFRE	0.2769	-0.449	-0.04	-0.4137	0.0174	1										
RET	0.1295	-0.986	0.048	-0.9477	0.0507	0.429	1									
CRE	0.1086	-0.057	-0.03	-0.0433	-0.052	0.252	0.0725	1								
REDEP	-0.15	0.3162	0.214	0.2352	0.0863	-0.06	-0.288	0.024	1							
ROA	-0.321	-0.115	-0.22	-0.0418	-0.067	0.133	-0.0739	0.254	0.1127	1						
ROE	0.0199	-0.265	-0.01	-0.2478	0.0414	0.039	0.2708	-0.205	-0.097	-0.03	1					
MS	0.0435	-0.009	0.993	-0.3061	0.0956	-0.04	0.0153	-0.038	0.223	-0.2	-0.03	1				
SIZE	-0.068	-0.119	-0.16	-0.0637	-0.051	0.129	0.1385	-0.315	-0.363	-0.11	0.339	-0.22	1			
AGE	0.122	-0.086	0.019	-0.0865	-0.022	0.263	0.1057	-0.253	-0.271	-0.2	0.198	-0.02	0.83	1		
LEV	0.0217	0.3753	-0.03	0.3642	-0.086	-0.12	-0.361	-0.171	0.2816	-0.1	-0.06	-0.04	0.016	0.24	1	
Panel B: diagnostics of multicollinearity																
VIF	1.2955	3.116	113.5	1.22	1.0758	1.815	2.6974	1.436	1.6011			115.2	6.064	5.72	1.771	

Note: IRCE :insurance and reinsurance debts(%);RE: the ratio of reinsurance(%);LRE: local reinsurance premium ceded to local reinsurer(%);FRE: foreign reinsurer premium ceded to foreign reinsurer (%);LCRE: local claim coming from local reinsurer(%);FCRE: foreign claim coming from foreign reinsurer(%);RET: the ratio of retention(%);CRE: the ratio of commotion(%);REDEP: the ratio of insurance dependence(%);MS: market share(%);SIZE: natural logarithm of total assets; AGE: number of working year; LEV: financial risk (%);ROA: ratio of insurance profit before taxes to total assets; ROE: ratio of insurance profit before taxes to shareholders equity

5.4 | Results of model estimation

Tables 6 and 7 show the estimation results of pooled Ordinary Least Squares (OLS), fixed and random effect, models in Equations (1) and (2). The analysis of the results is presented below and categorized into two groups; insurance company-specific and control variables, which affect the financial performance using both ROA and ROE as dependent variables that are regressed independently against both categories of explanatory variables as explained in Equations (3) and (4). Following is the discussion of the results based on these two categories.

1- insurance company-specific

As shown in Table 6, ROA is used as a dependent variable and a function of both categories of insurance company-specific and control variables, to some extent, all the three models conducted show similar results. The results in these models demonstrate that IRCE,RE,FRE, RET, have a significant impact on financial performance measured by ROA, further, only CRE, and REDEP , have a significant impact on financial performance in the case of pooled and Random effect models, As expected in Table 2, across the three models, it has been found that IRCE,RE,FRE, RET affect significantly and negatively the financial performance of Egyptian insurance company , as measured

by ROA at the level of 1% level of significance (P value < 0.01), This is consistent with some earlier studies (e.g., **Adebowale and Adebayo, 2018; ADULOJU** and

TABLE 6 Model estimation results summary

ROA Variable	Pooled				Fixed				Random			
	Coeff.	SD.Er	t	Prob.	Coeff.	SD.Er	t	Prob.	Coeff.	SD.Er	t	Prob.
C	37.6009	11.9437	3.1482	0.002	44.9376	64.348	0.6984	0.4862	37.601	10.3	3.651	0.0004
Insurance and reinsurance-specific												
IRCE	-0.0662	0.01622	-4.081	0.0001	-0.062	0.017	-3.643	0.0004	-0.066	0.014	-4.733	0.000
RE	-0.5733	0.13422	-4.271	0.000	-0.5437	0.1288	-4.22	0.000	-0.573	0.1157	-4.953	0.000
FRE	-0.15724	0.06462	-2.4332	0.0162	-0.16658	0.0812	-2.0524	0.0421	-0.1572	0.0557	-2.822	0.0054
LCRE	-0.0000775	0.00056	-0.138	0.8901	0.00067	0.0005	1.2214	0.2241	-0.0000775	0.0005	-0.16	0.8727
LFRE	0.01791	0.01858	0.9638	0.3367	0.02796	0.0233	1.2014	0.2318	0.0179	0.016	1.118	0.2655
RET	-0.3561	0.11365	-3.133	0.0021	-0.4365	0.1153	-3.786	0.0002	-0.356	0.098	-3.634	0.0004
CRE	0.10382	0.03034	3.4214	0.0008	0.0486	0.0297	1.6389	0.1036	0.1038	0.0262	3.968	0.0001
REDEP	0.06281	0.02902	2.1646	0.032	-0.0376	0.0524	-0.717	0.4748	0.0628	0.025	2.51	0.0131
Control variable												
SIZE	0.73748	0.95625	0.7712	0.4418	3.87202	1.6036	2.4146	0.0171	0.7375	0.8246	0.894	0.3726
AGE	-0.0335	0.03416	-0.98	0.3285	-0.7494	1.8858	-0.397	0.6917	-0.033	0.0295	-1.137	0.2574
LEV	0.21988	1.1448	0.1921	0.848	-4.64687	1.3039	-3.5637	0.0005	0.2199	0.9872	0.223	0.8241
Adjusted R2	0.29				0.47				0.29			
F-statistic	6.78				6.009				6.78			
Prob (F-statistic)	0.00				0.00				0.00			
Hausman test					0.00							

Note: IRCE :insurance and reinsurance debts(%),RE: the ratio of reinsurance(%);FRE: foreign reinsurer premium ceded to foreign reinsurer (%);LCRE: local claim coming from local reinsurer(%);FCRE: foreign claim coming from foreign reinsurer(%);RET: the ratio of retention(%);CRE: the ratio of commotion(%);REDEP: the ratio of insurance dependence(%);SIZE: natural logarithm of total assets; AGE: number of working year; LEV: financial risk (%);ROA: ratio of insurance profit before taxes to total assets; ROE: ratio of insurance profit before taxes to shareholders equity.

AJEMUNIGBOHUN,2017; TOMISLAVA et.al ,2017; **OBONYO, 2016;Cummins et.al,2012**), who agreed that the ratio of reinsurance and retention affect the financial performance of the insurance company , On the contrary, Iqbal and Rehman, (2014) reported that the ratio of ceded reinsurance have a significant and positive relationship with ROA, and the ratio of reinsurance recoverable to policyholder's surplus is insignificant and negative relationship with ROA, **Bressan (2018)**, Mazviona et.al(2017), **KRAMARIC and PAVIC(2017)**, **Cummins et.al(2012)** , and Datu(2015)reported a significant and positive relationship between the ratio of reinsurance and ROA, Along the same line, the results declare that CRE ratio affects significantly ROA at the level of 1% (P value < 0.01). Expectedly, the coefficient of CRE ratio is found to have a positive value. The results are similar with the studies of **OBONYO (2016)**,

Augustine and Lukmon(2017), so well ,the ratio of **REDEP** affects significantly ROA at the level of 1% (P value < 0.01). Expectedly, the coefficient of CRE ratio is found to have a positive value, The results are different with the studies of Reshid(2015) ,reported insignificant and negative relationship of REDEP with ROA, and similar with Adebawale and Adebayo(2018), Lire and Tegegn (2016),which reported a significant and positive relationship between REDEP and ROA, On the contrary, Sisay(2017) reported insignificant and positive relationship between REDEP and ROA.

TABLE 7 Model estimation results summary

ROE Variable	Pooled				Fixed				Random			
	Coeff.	SD.Er	T	Prob.	Coeff.	SD.Er	t	Prob.	Coeff.	SD.Er	t	Prob.
C	-90.9763	90.7745	-1.002	0.3179	-23.062	588.437	-0.0392	0.9688	-90.976	94.1872	-0.966	0.3357
Insurance and reinsurance-specific												
IRCE	0.176668	0.12328	1.433	0.154	0.03331	0.15576	0.2138	0.831	0.17667	0.12792	1.381	0.1693
RE	-0.35936	1.02012	-0.352	0.7251	-1.2148	1.17818	-1.031	0.3044	-0.3594	1.05848	-0.34	0.7347
FRE	-0.38341	0.49115	-0.781	0.4363	0.16902	0.74219	0.2277	0.8202	-0.3834	0.50962	-0.752	0.453
LCRE	0.001437	0.00426	0.3378	0.736	-0.0004	0.00499	-0.0897	0.9287	0.00144	0.00442	0.326	0.7452
LFRE	-0.1157	0.14123	-0.819	0.4139	-0.3064	0.21281	-1.4396	0.1524	-0.1157	0.14654	-0.79	0.431
RET	-0.14896	0.86375	-0.172	0.8633	-0.6512	1.05434	-0.6176	0.5379	-0.149	0.89622	-0.166	0.8682
CRE	-0.23684	0.23061	-1.027	0.3061	-0.1348	0.27119	-0.4969	0.6201	-0.2368	0.23928	-0.99	0.3239
REDEP	0.280864	0.22053	1.2736	0.2048	0.56627	0.47929	1.1815	0.2396	0.28086	0.22882	1.227	0.2216
Control variable												
SIZE	28.98072	7.26765	3.9876	0.0001	33.8587	14.6643	2.3089	0.0225	28.9807	7.54088	3.843	0.0002
AGE	-0.57843	0.25966	-2.228	0.0274	-2.1203	17.2451	-0.123	0.9023	-0.5784	0.26942	-2.147	0.0334
LEV	7.208987	8.7007	0.8286	0.4087	7.10172	11.924	0.5956	0.5525	7.20899	9.02781	0.799	0.4258
Adjusted R2	0.17					0.11			0.174			
F-statistic	4.06					1.71			4.06			
Prob (F-statistic)	0					0.02			0			
Hausman test									0.938			

Note: IRCE :insurance and reinsurance debts(%),RE: the ratio of reinsurance(%);FRE: foreign reinsurer premium ceded to foreign reinsurer (%);LCRE: local claim coming from local reinsurer(%);FCRE: foreign claim coming from foreign reinsurer(%);RET: the ratio of retention(%);CRE: the ratio of commotion(%);REDEP: the ratio of insurance dependence(%);SIZE: natural logarithm of total assets; AGE: number of working year; LEV: financial risk (%);ROA: ratio of insurance profit before taxes to total assets; ROE: ratio of insurance profit before taxes to shareholders equity.

In addition, the results in Table 6 demonstrate insignificant impact of LCRE and LFRE ratio on ROA in the three models at the level of 5% (P value < 0.05) in the three models, however LCRE ratio is a negative effect with ROA in both pooled and random effect models, and a positive relationship in the fixed effect model, the ratio of LFRE insignificant impact on ROA, and a positive relationship with ROA in the three models.

With regard to the impact of insurance company-specific variables on the financial performance of Egyptian non-life insurance company as measured by ROE, the results indicate that the ratios of IRCE,

RE,FRE,LCRE,LFRE,RET,CRE,REDEP are insignificant impact on ROE ,in the three models ,and IRCE, RE,FRE, LCRE, LFRE, RET,CRE,REDEP have a positive relationship with ROE in the random effect model, In addition the ratios of IRCE,LCRE ,REDEP have a positive effect in both pooled and fixed effect models ,and the ratios of RE,FRE,LFRE,RET ,CRE have a negative relationship with ROE in both pooled and fixed effect models, No evidence is found at any level of significance (P value > 0.05).this results are different with the studies (e.g., ADULOJU and AJEMUNIGBOHUN,2017; Bressan, 2018; Cummins et.al,2012), which reported significant and positive relationship between the ratio of RE with ROE , and agreed with Adebowale and Adebayo (2018) and Iqbal and Rehman(2014), reported insignificant and positive relationship between RE and ROE. For the reliability of the three used models, the adjusted R square in case of ROA is 29%, for the pooled model, 47% in the fixed effect model, and 29% in the case of the random effect model, It shows that both insurance company-specific and control variables are explaining about 29% to 47% of the variation of non-life insurance company financial performance as measured by ROA, Similarly, the value of the adjusted R square in case of ROE is 17% in the pooled model, 11% in the fixed effect model, and 17.4% in the random effect model, exhibiting that both insurance company-specific and control variables are contributing about 11% to 17.4% to the financial performance , To evaluate and compare the results of the three models (pooled ,fixed, random) applied, it is clearly seen from the results of Tables 6 and 7 that all models have a P value(0.000) of less than 1% revealing that all models are fit and significant, Furthermore, Hausman test was conducted for deciding the appropriate estimated model between The three models. The P value suggests that fixed effect model is superior and appropriate than random effect model for ROA , as the P value of Hausman test is less than 0.05 (P value = $0.00 < 0.01$). Accordingly, Hausman test suggests that fixed effect model is more appropriate than random effect model for ROA, On the contrary P value of

Hausman test is more than 0.05 (P value = 0.938 > 0.01) for ROE, Hausman test suggests that random effect model is more appropriate than fixed effect model for ROE.

2-Control variables

Regarding the set of control variable that affect the financial performance of non-life insurance company as measured by ROA, this study found that, SIZE, AGE, and LEV are insignificant impact on ROA at any level of significance in both pooled and Random effect models ,and a positive effect of SIZE and LEV in both pooled and fixed models ,and negative effect of AGE in the random effect model, and significant impact of SIZE and LEV on ROA in the fixed effect model ,with positive effect for SIZE, and negative effect for LEV with ROA, and no significant of AGE and negative relationship with ROA, this agreed the studies of (e.g, Mazviona and Sakahuhwa, 2017), reported that no significant and negative relationship between size and ROA, and different with studies of (e.g., Lee and Lee, 2012;; ,Mwangi and Murigu, 2015; Datu, 2015; Lire and Tegegn , 2016; Mazviona and Sakahuhwa, 2017; SISAY, 2017; Adebawale and Adebayo , 2018;; Bressan, 2018; ADULOJU and AJEMUNIGBOHUN , 2017;; TOMISLAVA et.al , 2017; Koc , 2016 ; OBONYO , 2016) ;Mankai and Belgacem, 2015; Iqbal and Rehman, 2014; ,Mirie and Jane , 2015; Burcă and Bătrîna, 2014; Cummins et.al, 2012; Cummins et.al, 2008; Chen and Hamwi, 2000), reported a significant and positive relationship between size and age with ROA, and the studies of (e.g, Burcă and Bătrîna, 2014; Lee and Lee, 2012; Mwangi and Murigu, 2015; Mazviona and Sakahuhwa, 2017) reported a significant and negative relationship with ROA.

Although SIZE is significant and positive relationship with ROE in the three models ,and this result agreed with (e.g., Burcă and Bătrîna, 2014; *KRAMARIC and PAVIC*, 2017; Cummins et.al, 2012; Mankai and Belgacem, 2015; Lire and Tegegn, 2016; Malik, 2011; Bressan , 2018), AGE is significant and negative relationship with ROE in both pooled and random effect models, and insignificant and negative in the fixed effect models ,this deferent with (e.g., Burcă and Bătrîna, 2014, ; *KRAMARIC and PAVIC*, 2017) reported significant

and positive relationship with ROE, so well LEV insignificant and positive relationship with ROE in the three models , On the contrary the studies (e.g, Burcă and Bătrîncea,2014; Malik,2011) reported significant and negative relationship with ROE.

In this view, We can conclude that each variable CONTROL investigated in this study (SIZE and LEV) except AGE significant with ROA in the fixed effect model, and significant AGE and SIZE with ROE in the random effect model ,and that mean the important of control variables(SIZE and LEV)in effect on financial performance of Egyptian non-life insurance company measured by ROA, and important of (AGE ,and SIZE) in effect on financial performance measured by ROE.

5.5 | Robustness analysis

When confronted with highly idealized models of phenomena, they require a method for determining which aspects of their models make trustworthy predictions or can reliably be used in explanations, robustness analysis provides an alternative method for determining when models make trustworthy predictions about their targets, Robustness testing analyzes the uncertainty of models and tests whether estimated effects of interest are sensitive to changes in model specifications, **Beck and Katz (1995)** reported that generalized least squares (FGLS) The standard error coefficients that were underestimated when compared to the "corrected standard errors from the board", we found the estimated PCSE accurately estimate the standard errors without any loss of efficiency. Based on PCSE, it produces accurate standard coefficient errors compared to OLS (Al-Maqtari, 2018). PCSE standard error estimation is strong not only for unit heteroskedasticity but also against potential contemporary correlation across units (Bailey & Katz, 2011))

TABLE 8 Panel-corrected standards error (PCSE)

Variable	ROA: PCSE by: xtpcse, corr (psar1)				ROE: PCSE by: xtpcse, corr (psar1)			
	Coef.	Std. Err.	z	P > z	Coef.	Std. Err.	z	P > z
C	37.60086	21.04323	1.79	0.074	-90.9763	40.26588	-2.26	0.024
Insurance and reinsurance-specific								
IRCE	-0.06621	0.232213	-3.54	0.000	-0.1766684	0.079348	2.23	0.026
RE	-0.57328	0.232213	-2.47	0.014	-0.35936	0.785273	-0.46	0.647
FRE	-7.8E-05	0.065458	2.4	0.016	-0.38341	0.405974	-0.94	0.345
LCRE	-7.8E-05	0.000448	-0.17	0.863	0.001438	0.002422	0.59	0.553
LFRE	0.017909	0.02405	0.74	0.456	-0.1157	0.146298	-0.79	0.429
RET	-0.35612	0.208318	-1.71	0.087	-0.14896	0.475609	-0.31	0.754
CRE	0.103816	0.034091	3.05	0.002	-0.23684	0.285929	-0.83	0.407
REDEP	0.062808	0.043382	1.45	0.148	0.280864	0.135735	2.07	0.039
Control variable								
SIZE	0.737484	1.354357	0.54	0.586	28.98072	8.751471	3.31	0.001
AGE	-0.03349	0.043855	-0.76	0.445	0.578433	0.21868	-2.65	0.008
LEV	0.219877	1.516793	0.14	0.885	7.208987	5.70974	1.26	0.207
No. of obs	81				81			
No. of groups	9				9			
Est. covariances	45				45			
Est. coefficients	12				12			
R ²	0.335				0.232			
Wald χ^2 (11)	50.87				135.98			
Prob > χ^2	0.000				0.000			

Note: IRCE :insurance and reinsurance debts(%),RE: the ratio of reinsurance(%);FRE: foreign reinsurer premium ceded to foreign reinsurer (%);LCRE: local claim coming from local reinsurer(%);FCRE: foreign claim coming from foreign reinsurer(%);RET: the ratio of retention(%);CRE: the ratio of commotion(%);REDEP: the ratio of insurance dependence(%);SIZE: natural logarithm of total assets; AGE: number of working year; LEV: financial risk (%);ROA: ratio of insurance profit before taxes to total assets; ROE: ratio of insurance profit before taxes to shareholders equity.

This study applied PCSE where the panel is constituted by 9 non- life insurance company in 9 years, the PCSE is the most suitable estimator.

Table 8 provides results of the PCSE. PCSE is a panel correction standard error that arbitrary accounts for heteroscedasticity within cross-sectional correlation (Beck& Katz, 1995). With reference to insurance company-specific variables and ROA, PCSE model provides evidence that IRCE ratio, RE ratio ,FRE ratio ,CRE ratio have statistically significant impact on ROA, All of these ratios are found to be statistically significant at the level of 1% (P value < 0.01), Notably, they all have a negative coefficient that denotes a significant negative impact or decrease on financial performance of the Egyptian non- life insurance company as measured by ROA, except CRE ratio that has a positive coefficient suggesting a significant increase in ROA. The coefficient sign is met with the expected sign stated in Table 2.

In terms of ROE, among the insurance company-specific variables the results show that only IRCE ratio and REDEP ratio have statistically significant impact on ROE. at the level of 1% (P value < 0.01). Notably, they all have a positive coefficient that denotes a significant positive impact or increase on financial performance of the Egyptian non- life insurance Company as measured by ROE.

However, the majority of control variables results show insignificant impact on financial performance as measured by ROA at the level of 1% (P value < 0.01), Similarly, all control variables excepting LEV, reveal a significant impact on ROE. This significant impact is at the level of 1% (P value < 0.01).

Overall, the estimated adjusted R squared for PCSE model is 33.5% in case of ROA and 23.2% for ROE. This suggests that both insurance company-specific and control variables investigated by this study are contributing about 33.5% and 23.2% to the variability of ROA and ROE, respectively. In other words, 33.5% and 23.2% of the total variability is accounted for by the models stated in Equations 3 and 4.

6 CONCLUSION AND RECOMMENDATIONS

The Egyptian non-life insurance company facing a lot of changes and challenges ,which include Entry of foreign insurance company according to GATS treaty which include the freedom of interning foreign insurance company to the Egyptian market ,and this lead to more competition between local and foreign insurance company .

in addition the abolition of the Egyptian reinsurance company since 2007 ,and this lead to Lack of reinsurance company in the Egyptian market ,an so the increasing the premium forward to foreign reinsurance company ,and effect on financial performance of insurance company ,so well ,the merger and equation between the big three local insurance company in one big company ,in the last ,the economic conditions in Egypt after the year 2011,and decreasing the value of local currency in forint the foreign currency ,all this changes affect the financial performance of insurance company in Egypt .

so the aim of this study investigate the effect of reinsurance operations(9 non-life insurance company ,ranging from 2008 to 2016)

as independent variables (such as the ratio of insurance and reinsurance debts to equity , IRCE ,the ratio of premium ceded to reinsurance company or the ratio of reinsurance , RE, the ratio of local premium to total premium , LRE, the ratio of foreign premium to total premium ceded to reinsurance company ,FRE, the ratio of local claim to total premium, LCRE, the ratio of foreign claim to total premium, FRCE, the ratio of retention that mean the percent of premium ceded to reinsurance company to total premium of insurance company , RET, the ratio of commission that the commission the reinsurance company pay to insurance company ,CRE, the ratio of reinsurance dependence which mean the percent of reinsurance premium ceded to total assets ,REDEP) on financial performance measured by ROA (the net profit before taxes to total assets)and ROE(the net profits before taxes to equity)**as dependent variables .**

There are control variable that may be increase or decrease the financial performance measured by ROA and ROE ,this variables include market share, the percent premium of company to the total premium of the market ,MS ,The SIZE of company which measure by natural legalism of total assets, age of the company the number of year operating ,and the leverage the total liabilities to total assets ,LEV.

The results indicate that insurance company –specific such as the ratio of insurance and reinsurance dept. to equity, the ratio of reinsurance ,the ratio of foreign reinsurance premium to total premium, the ratio of retention , have a negative impact on ROA, With regard to the impact of control variables on ROA, the results revealed that a positive impact of SIZE on ROA, and leverage a negative impact on ROA, Concerning the insurance company –specific and control variables of financial performance of Egyptian non-life insurance company measured by ROE, the results indicate that insignificant impact of all ratios on ROE, Further, there is a positive impact of size and negative impact of age on ROE, and insignificant and positive impact of leverage on ROE.

The findings of this study have considerable implications for Decision makers, shareholders in insurance companies, supervisors of insurance companies and employees of reinsurance department in insurance

companies, analysts, and Academicians, Decision makers and employees of reinsurance department in insurance companies should focus on the ratios that decrees the profitability of Egyptian non-life insurance company More emphasis should be given to the ratio of reinsurance ,the ratio of foreign reinsurance premium ,the debts. On the other insurance and reinsurance company ,minimizing the ratio of reinsurance ,Reducing the value of debts to insurance companies towards other insurance and reinsurance companies, put underwriting policies supporting to evaluate risks more accurate and decreeing the depending on reinsurance company ,select the appropriate treaty reinsurance ,for regulator construct local reinsurance company to reduce the premium forward to foreign reinsurance and increase the financial performance of non-life insurance company ,increasing the commission from reinsurance company to increase the financial performance.

In addition Decision makers and insurance company supervisors must Interested in the leverage and investment in assets of insurance company and its effect on financial performance ,as more leverage decrease the ROA as a measure financial performance of insurance company.

Finally, future research could investigate this issue by including more variables or using other techniques of analysis such as the ratio of reinsurance in takful insurance company and effect on financial performance ,further using more control variables that affect the financial performance , future studies may compare the financial performance of non- life insurance company with the private and public sectors ,This study sought to bridge a gap by providing new empirical evidence on the reinsurance operations and control variables that affect the financial performance of Egyptian non – Life Insurance Company.

The findings of the present study have considerable contributions to the existing stock of prior studies by comprehensively explaining and empirically analyzing the current state of financial performance of non- life insurance company in Egypt, It focuses on a major and important sector in an emerging economy like Egypt , It gives

attention to some crucial events that happened and effect on the insurance sector in Egypt such Entry of foreign insurance company , the abolition of the Egyptian reinsurance company since 2007 ,merger and equation between the big three local insurance company ,decreasing the value of local currency in forint the foreign currency , Further, a unique contribution of this study is to consider the effect of reinsurance operation on financial performance of non-life insurance company in Egypt.

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