# Forecasting the net income performance of the life insurance industry using economic and insurance development indicators through multiple linear regression

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## Abstract

The life insurance industry is primarily concerned with helping insureds manage the risks that they face in life through its varied product offerings. The industry, which belongs to the financial services sector, is a potent vehicle for capital formation which contributes funds for national development. It also provides meaningful engagement through employment as well as selling and financial services work for its sales force called the agency. As with all businesses, it has to generate sufficient level of net income to adhere to compliance and reserve requirements of the government, provide adequate benefit payments to its insureds when due, provide its employees with salaries and benefits and adequate commission and incentives for its agency as well as generate sufficient surplus to be a going concern.

This paper determined significant variables in terms of economic indicators and insurance development metrics which affect the industry's net income. Data was generated form the Insurance Commission website, the government agency in charge of supervising the industry's operations. The multiple linear regression forecasting approach was used to come up with significant results. Among the economic indicators and industry development metrics considered, the one variable with statistically significant impact on net income performance was the number of its agents. It has been a challenge for the industry to recruit and develop members of its agency force who will stay with the business and generate sufficient production to contribute to the company's sales targets as well as adequate income for the agents' personal needs. The industry should continue its recruitment and development effort focusing on motivation, development, recognition and training activities to support this thrust.

**Key Words:** Life insurance; economic indicators; insurance development metrics; recruitment and development; multiple linear regression

## Introduction

The life insurance industry is primarily concerned with helping insureds manage the risks that they face in life through its varied product offerings. The industry, which belongs to the financial services sector, is a potent vehicle for capital formation which contributes funds for national development. It also provides meaningful engagement through employment as well as selling and financial services work for its sales force called the agency.

Broadly defined, “a life insurance policy is a contract with an insurance company. In exchange for premium payments, the insurance company provides a lump-sum payment, known as a death benefit, to beneficiaries upon the insured's death.” (What is life insurance?, n.d.). There are insurance plans which provide living benefits to insureds in terms of maturity benefits from endowment plans, anticipated payments and dividends, health and critical illness benefits as well as fund appreciation through variable unit linked products.

The financial needs and goals of the insured determine the kind of life insurance coverage they will get. It provides opportunity for the insured to build funds for future needs – family protection; education; capital for purchase of big ticket items like a house and a car or put up a business; retirement, among other things.

The industry, which belongs to the financial services sector, is a potent vehicle for capital formation which contributes funds for national development. It generated P32B in investments in 2015; its total premium income of P188B accounted for 1.41% of the country’s gross national income (GNI) of P16T; and the life sum insured of the industry amounting to P3.68T was 33.13% of GNI for the same year (Key insurance indicators, n.d.).

It also provides meaningful engagement through employment as well as selling and financial services work for its sales force called the agency. The 30 life insurance companies in 2015 had around 10,000 employees but more significantly, engaged more than 61,000 licensed agents who sold life insurance products to the public (Key insurance indicators, n.d.).

**Economic indicators**

The general economic performance of the country generally impacts the well-being of the population and the way business and industry operate and perform. For the latter, in general, a robust set of macroeconomic fundamentals will lead to better business and economic opportunities which in turn will lead to favorable business results in terms of revenues, profits as well as other value creation for the benefit of the business’ stakeholders.

Table 1 identifies economic indicators for the period 2007-2015 (Key insurance indicators, n.d.). These figures will be used to relate to and forecast the net income performance of the life insurance industry.

Gross national income (GNI) as of 2015 stood at P16 trillion with a compounded growth of 7.09% for the period, one of the fastest in the Asia-Pacific region. Per capita income stood at P158K with a good 5.5% growth. The labor force, which numbered 39 million, 38% of the population, did not grow as fast at only 1.62%. Population, exchange rate and inflation exhibited growth of less than 2%.

Table 1
*Economic Indicators*

| | Gross National Income (P Billion) | Population (in millions) | Per capita GNI (in pesos) | Labor force (employed— in millions) | Exchange rate (P:$) | Inflation rate (in percent) |
|---|---|---|---|---|---|---|
| 2007 | 8,634 | 89 | 97,340 | 33.7 | 41.4 | 1.25 |
| 2008 | 9,776 | 90 | 108,024 | 34.1 | 47.49 | 4.26 |
| 2009 | 10,652 | 91 | 117,060 | 35.1 | 46.36 | 2.09 |
| 2010 | 10,852 | 93 | 117,190 | 36.1 | 43.88 | 1.51 |
| 2011 | 11,598 | 94 | 123,123 | 37.2 | 43.93 | 2.72 |
| 2012 | 12,608 | 96 | 130,796 | 37.6 | 41.19 | 3.20 |
| 2013 | 13,850 | 99 | 140,191 | 38.1 | 44.41 | 3.20 |
| 2014 | 15,327 | 100 | 153,429 | 37.3 | 44.62 | 4.10 |
| 2015 | 16,096 | 102 | 158,434 | 39 | 47.17 | 1.40 |
| Average | 12,155 | 95 | 127,287 | 36 | 44 | 3 |
| Compounded growth | 7.09% | 1.51% | 5.50% | 1.62% | 1.45% | 1.25% |

**Insurance development metrics**

Table 2 shows insurance development metrics (Key insurance indicators, n.d.) which indicate the level of performance of the industry. Net income, the primary variable of interest to be forecasted, stood at P21B in 2015 and posted 4.12% compounded growth. Premium income, number of business policies and number of agents were the three fastest growing metrics for the period with 10.49%, 9.01% and 6.06% respectively. Only one variable declined for the period – operating expenses which may be favorable for bottom-line purposes.

Table 2
*Insurance Development Metrics*

| | Net income after tax (P Million) | Premium income (P Million) | Number of agents | Number of policies— new business | Number of policies— in force | Benefit payments (P Million) | Operating expenses (P Million) | Gross investment income (P Million) |
|---|---|---|---|---|---|---|---|---|
| 2007 | 14,719 | 76,213 | 35,987 | 316,338 | 3,405,970 | 28,273 | 14,936 | 25,598 |
| 2008 | 10,581 | 56,891 | 40,865 | 269,375 | 3,336,609 | 35,158 | 10,994 | 26,290 |
| 2009 | 11,953 | 57,239 | 35,550 | 267,840 | 3,344,432 | 37,556 | 5,002 | 28,345 |
| 2010 | 12,024 | 70,727 | 34,364 | 314,954 | 3,385,934 | 34,154 | 11,518 | 30,929 |
| 2011 | 14,045 | 86,345 | 36,828 | 317,241 | 3,505,704 | 45,519 | 15,755 | 32,853 |
| 2012 | 12,046 | 120,298 | 36,646 | 399,972 | 3,770,915 | 50,034 | 35,578 | 33,662 |
| 2013 | 13,756 | 171,154 | 32,576 | 617,813 | 3,829,252 | 54,763 | 12,342 | 33,301 |
| 2014 | 17,939 | 158,727 | 55,169 | 640,819 | 4,104,664 | 55,113 | 13,690 | 33,128 |
| 2015 | 21,244 | 188,818 | 61,461 | 692,884 | 4,426,405 | 49,964 | 12,704 | 32,561 |
| Average | 14,256 | 109,601 | 41,050 | 426,360 | 3,678,876 | 43,393 | 14,724 | 30,741 |
| Compounded growth | 4.12% | 10.49% | 6.06% | 9.01% | 2.92% | 6.46% | -1.76% | 2.68% |

## Objective

The objective of the study is to come up with a forecasting model to determine net income of the life insurance industry as affected by macroeconomic indicators as specified in the foregoing as well as insurance development metrics.

As net income is an effective measure in the performance of business, it will be useful at the macro-level for industry decision makers to determine variables which impact the income performance of the organization.

Multiple linear regression and correlation analysis was used to build forecasting model for net income as dependent variable and the economic indicators and insurance development metrics as independent variables. The study covered the period 2007-2015 and was done at the industry level.

## Literature Review

### Life insurance

There are four basic characteristics of life insurance operations: (1) products, (2) premiums, (3) marketing and sales, and (4) business operations (Feng, 2007).

*Products.* The general types of life insurance products can be classified as follows: term, whole life, direct purchase, endowment, investment-linked and annuities (Types of life insurance, n.d.). The products generally contain features and benefits which cater to the financial needs of insurance clients.

Sale of insurance products relies on sales people (Feng, 2007). Although direct marketing (thru print media, mailers, and lately the Web) are being used and bancassurance (selling through bank branches with life insurance tie up) have gained traction as a distribution system in the country at the start of the millennium, sales people known as the agency remains to be the principal distribution system for life insurance products.

*Premiums.* "An insurance premium is the amount of money that an individual or business must pay for an insurance policy. The insurance premium is considered income by the insurance company once it is earned, and also represents a liability in that the insurer must provide coverage for claims being made against the policy." (Insurance premium, n.d.).

The two basic types of premiums are first year and renewal (Feng, 2007). First year premiums are the amount of money paid by insureds during the first twelve months of their policies and are "key performance indicators among insurance companies" (Feng, 2007) as they measure the amount of new sales they generate. Single premium is the third type which is "a lump sum of money paid into the policy in return for a death benefit that is guaranteed to remain paid-up until you die" (Single premium, n.d.). Based on my experience in the industry, about 60% of the premiums come from renewals, 30% from first year and 10% from single premiums.

*Marketing.* Marketing and sales are all the activities done by insurers to generate new business premiums or revenues for the company. "The marketing mix is the combination of marketing activities that an organization engages in so as to best meet the needs of its targeted market…The marketing mix includes sub-mixes of the 7 P's of marketing i.e. the product, its price, place, promotion, people, process & physical attraction" (Shodhganga, n.d.).

*Sales.* Most sales processes follow roughly the same pattern. It's a cycle of seven different steps, starting with prospecting, appointment, qualifying, presentation, handling objections and ending with asking your new customer for referrals (The seven stages of the sales cycle, n.d.). The life insurance industry, given the nature of its product which remains in the books of the company for future benefit payments, has a seventh critical step – servicing of the policy.

*Business operations.* This involves all the other activities undertaken by life insurance companies to provide quality service to existing clients, maintain branch network to access clients, manage the financials of the company to maintain sufficient reserves for future benefit payments and observe and implement compliance rules. "Life insurance company's financial stability is very important. Prudent business operations are the fundamental management principle of a life insurance company" (Feng, 2007).

All the foregoing, when properly planned and implemented will result to specific levels of performance manifested through insurance development metrics identified in Table 2 which are the macro-level measures of the success of its operations. The eventual net income experience of the companies will depend on generating improving levels of performance variable results.

**Economic indicators**

"An economic indicator is a piece of economic data, usually of macroeconomic scale, that is used by analysts to interpret current or future investment possibilities or to judge the overall health of an economy. Economic indicators can be anything the investor chooses, but specific pieces of data released by government and non-profit organizations have become widely followed. Such indicators include but aren't limited to: the consumer price index (CPI), gross domestic product (GDP), unemployment figures and the price of crude oil" (What is an economic indicator?, n.d.).

"Leading indicators, such as consumer durables, net business formations and share prices, are used to predict the future movements of an economy. Coincident indicators, which include such things as GDP, employment levels and retail sales, are seen with the occurrence of specific economic activities. Finally, lagging indicators, such as gross national product (GNP), CPI, unemployment rates and interest rates, are only seen after a specific economic activity occurs. Most of these economic indicators have a specific schedule for release, allowing investors to prepare for and plan on seeing certain information at certain times of the month and year" (What is an economic indicator?, n.d.).

This study focused on economic indicators as specified in the Insurance Commission website (Key insurance indicators, n.d.) discussed earlier in the Introduction portion. Since

economic indicators affect the level of income and ability to consume among the population, they were used as predictors for the performance of the life insurance industry.

"Rise in income is necessary but not sufficient condition for insurance purchase…Ability to purchase insurance depends not only on income but readiness of households to postpone consumption and save. Life insurance institutions as financial intermediaries are seen as conduits for mopping up savings surplus of the people…Strong correlation between low levels of per capita income and insurance penetration have been observed" (Kutty, 2008).

**Framework**

Net income performance of life insurance companies is affected by external variables which in this paper are identified as economic indicators. Identified economic indicators in this paper are GNI, population, per capita income, labor force, exchange rate and inflation.

In addition, internal variables in the life insurance operations also affect an insurance company's net income. Internal variables included in the paper are premium, number of agents, new business policies, in-force policies, benefits paid, operating expenses and investment income.

**Methodology**

The Insurance Commission website (Key insurance indicators, n.d.) was accessed to surface key indicators for the life insurance industry during the period 2007-2015. Two sets of indicators were identified – economic indicators and insurance development metrics (see Tables 1 & 2).

Net income of the industry was identified as the variable of interest to be forecasted using the economic indicators and insurance development metrics. Multiple linear regression and correlation analyses were done to identify which among the surfaced indicators will be good predictors of net income performance.

The correlation analysis established which of the variables were related to each other so as to avoid the condition of multicollinearity – the independent variables being correlated (What is multiple linear regression?, n.d.).

**Results**

**Correlation**

The initial evaluation involved correlation analysis to establish which variables were significantly correlated. For this study, the cut off adopted as significant correlation were values which were 0.7 or higher. Correlation measure was determined using Pearson r determination.

In Table 3 are the correlation matrix of economic indicators together with the net income (NI) as the independent variable. The results show that NI had a significant relationship with gross

national income (GNI), population and per capita income. Of the three, GNI had the highest correlation measure at 0.746.

GNI, however, had very strong correlation measures with population and per capita income. Therefore, to avoid multicollinearity, GNI alone was used to predict NI among the economic indicators.

Table 3
*Correlation matrix, r: net income with economic indicators*

| | GNI | Population | Per capita income | Labor force | Exchange rate | Inflation |
|---|---|---|---|---|---|---|
| NI | 0.746 | 0.736 | 0.731 | 0.578 | 0.184 | -0.247 |
| GNI | | 0.989 | 0.998 | 0.903 | 0.249 | 0.184 |
| Population | | | 0.983 | 0.931 | 0.162 | 0.142 |
| Per capita income | | | | 0.9 | 0.267 | 0.192 |
| Labor force | | | | | 0.052 | 0.051 |
| Exchange rate | | | | | | 0.181 |

*Note: Specified significance cutoff: r>=0.70*

1. *NI with GNI significant*
2. *NI with population and per capita income significant but GNI multicollinear with population and per capita*

For the insurance development metrics, NI had significant correlation measures with premium, number of agents, new business policies and in-force policies. In-force policies however were multi-collinear with premium, number of agents and new business policies. Hence, it was dropped as a variable of interest in the regression model generated.

The three insurance development metrics used in the multiple linear regression to predict NI were: premium, number of agents, and new business policies.

Table 4
*Correlation matrix, r: net income with insurance development metrics*

| | Premium | Number of agents | New business policies | In-force policies | Benefits paid | Operating expenses | Investment income |
|---|---|---|---|---|---|---|---|
| NI | 0.767 | 0.856 | 0.804 | 0.872 | 0.471 | -0.087 | 0.377 |
| Premium | | 0.612 | 0.982 | 0.945 | 0.843 | 0.192 | 0.707 |
| Number of agents | | | 0.683 | 0.815 | 0.256 | -0.084 | 0.256 |
| New business policies | | | | 0.944 | 0.802 | 0.05 | 0.637 |
| In-force policies | | | | | 0.773 | 0.187 | 0.647 |
| Benefits paid | | | | | | 0.305 | 0.879 |
| Operating expenses | | | | | | | 0.417 |

*Note: Specified significance cutoff: r>=0.70*

1. *NI with premium, number of agents, new business policies significant*
2. *NI with in-force policies significant but in-force policies multicollinear with premium, number of agents, new business policies*

**Multiple linear regression**

The initial multiple linear regression model had the NI as the dependent variable with GNI, premium income, number of agents and number of new policies as independent variables, four in all. Table 5 is the full regression output.

*Significance of p-value.* The critical p-value used was 0.05. All computed p-values for the independent variables which were higher than 0.05 resulted to the acceptance of the null hypothesis that they do not have significant statistical impact on NI. The results showed that all the independent variables have p-values greater than 0.05. Using sensitivity analysis however, we considered evaluating number of agents whose p-value at 0.08 was close to the 0.05 critical value and the least p-value among the four variables.

From Table 6, a simple linear regression where NI was the dependent variable while number of agents was the independent variable was modeled. The p-value for number of agents at 0.0032 was much lower than the critical p which made us conclude that they were significantly related.

In addition, the r-value for the model of 0.856 meant a strong linear relationship between the variables and the r-squared figure at 0.733 meant that 73% of the changes in NI can be explained by the changes in number of agents.

The analysis of variance result for the F-test also supported the significance of the model since the F value at 0.0033 was a lot smaller than the critical value of 0.01. We rejected the null hypothesis of no relationship and concluded that the model was indeed statistically significant.

The final regression model is as follows: NI = 2,551.197 + 0.285 Number of agents. This means that NI will increase by an average of P285,000 for every increase of one (1) agent.

Table 5
*Summary Output: Net income with GNI, premium income, number of agents, number of new policies*

| Regression Statistics | |
|---|---|
| Multiple R | 0.923966752 |
| R square | 0.853714558 |
| Adjusted R Square | 0.707429117 |
| Standard Error | 1830.092175 |
| Observations | 9 |

| ANOVA | | | | | |
|---|---|---|---|---|---|
| | df | SS | MS | F | Significance F |
| Regression | 4 | 78183930.52 | 19545983 | 5.83595 | 0.057937441 |
| Residual | 4 | 13396949.48 | 3349237 | | |
| Total | 8 | 91580880 | | | |

| | Coefficients | Standard error | t Stat | P-value | Lower 95% |
|---|---|---|---|---|---|
| Intercept | 6640.578628 | 5052.855776 | 1.314223 | 0.259067 | -7388.398059 |
| GNI (P Billion) | -0.65355162 | 0.768300823 | -0.85065 | 0.44289 | -2.78669668 |
| Premium income (P Million) | 0.046826937 | 0.078867254 | 0.593744 | 0.584632 | -0.172143663 |
| Number of agents | 0.241817475 | 0.106111712 | 2.278895 | 0.08489 | -0.052795867 |
| Number of policies—new business | 0.001174442 | 0.023685263 | 0.049585 | 0.96283 | -0.064586389 |

Table 6
*Summary Output: Net income with number of agents*

| Regression Statistics | |
|---|---|
| Multiple R | 0.856153828 |
| R square | 0.732999378 |
| Adjusted R Square | 0.694856432 |
| Standard Error | 1869.000954 |
| Observations | 9 |

ANOVA

| | df | SS | MS | F | Significance F |
|---|---|---|---|---|---|
| Regression | 1 | 67128728.05 | 67128728 | 19.21717 | 0.003219799 |
| Residual | 7 | 24452151.95 | 3493165 | | |
| Total | 8 | 91580880 | | | |

| | Coefficients | Standard error | t Stat | P-value | Lower 95% |
|---|---|---|---|---|---|
| Intercept | 2551.196388 | 2741.8432 | 0.930468 | 0.383097 | -3932.232536 |
| Number of agents | 0.285146496 | 0.065046413 | 4.383739 | 0.00322 | 0.13133617 |

*Stepwise regression*. After building the simple linear regression with NI as dependent variable and number of agents as independent, we did stepwise regression adding the other three independent variables to the model one at a time to consider their impact in explaining NI and establishing model significance. They were added from the strongest to the least correlation value with NI.

From the initial simple linear regression which showed an r-value of 0.856 (Table 6), the addition of each variable only resulted to slight improvement in the r-values with the r-value of 0.924 (Table 5) as the final value with all the four variables in the model. In addition, the adjusted r-values also decreased as the variables were added from one to four.

## Conclusions

Six economic indicators were used in this study: gross national income, population, per capita GNI, employed labor force, exchange rate and inflation rate. Population was considered as a lead economic indicator while employment was coincidental. The rest (GNI, per capita income, exchange and inflation rates) were lagging indicators.

Among the six, it was GNI which had a significant correlation with the life insurance industry's net income for the period 2007-2015. Although population and per capita also had

significant correlation values with NI, they were not included as independent variables since they were highly correlated with GNI, a multicollinearity condition.

Among the seven insurance development metrics (premium income, number of agents, number of policies – new business, number of policies – in-force, benefit payments, operating expenses and gross investment income), only premium, number of agents and number of new policies – new business, manifested strong correlation values with NI and were included as independent variables to explain NI.

The multiple linear regression with NI as the dependent variable and with four independent variables – GNI, premium income, number of agents and number of policies- new business, revealed that it was the number of agents alone which had a statistically significant relationship in explaining NI.

**Recommendations**

Companies can build their own regression models using the specified economic indicators but use their own insurance development metrics as they may have different results from the study's outputs given their own companies' performance and experience.

Managing life insurance company operations is a complex activity and it may be oversimplifying to just focus on number of agents in predicting net income performance. However, since life insurance rely on the agency to distribute and sell life insurance products, it is indeed a critical variable to consider.

Continued focus and enhancement of recruitment and selection activities for the agents with specific emphasis in coming up with motivational, developmental, training and recognition activities with performance management and compliance added into the mix will contribute to heightened level of performance among the agents.

The number of agents will also be instrumental in contributing to the number of policies – new business through their sales efforts as well as number of policies – in-force, through their sales efforts as well as servicing of existing policies for them to remain in the books of the company.

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