THE EFFECT OF MACROECONOMIC VARIABLES ON THE GROWTH OF GUARANTEE INSURANCE

By

Min Young Hong

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
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ABSTRACT

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As world economy has shown dynamic reaction to the changes of market leading indicator including exchange rate changes, stock price, current account and GDP, economic growth also has given impact on numerous industries directly as well as indirectly. In recent years, a number of researchers conducted studies on the relationship between the growth of economy and financial sector. However, the research on the insurance industry development has been done infrequently even if insurance is one of the important sectors of the financial industry. This paper covers how much impact of economic indicators is given to the development of surety and credit insurance in Korea, one of the non-life insurance classes. According to the monthly premium income and the economic factors during the first decade of this century, each economic indicator has different effects to the development of each surety and credit insurance product, as well as, total premium income. This article uses ADF tests, Granger causality test and cointegration test, and introduces the impulse response analysis to observe responses of surety and credit insurance industry to economic shocks.

Keywords: Economic growth, Surety and Credit insurance, ADF test, Granger causality test, cointergration test, impulse response analysis

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I. INTRODUCTION

This paper examines the historical relation between guarantee insurance, also called surety and credit insurance, one of the non-life insurance classes, and economic growth in Korea during the first decade of this century using time-series data from 2000 to 2010. The link between financial sector development and economic growth has been an intriguing issue, given how financial intermediaries have demonstrated their potential for economic contribution via mobilizing capital from one place to another and dispersing risk. Since the share of the insurance industry in the financial sector has been growing, the importance of the insurance-growth relationship is likewise increasing, thereby expanding the potential role of insurance companies in economic growth (Rule, 2001). Although many studies have emphasized the nexus between the development of financial sectors and the economy, few empirical studies have focused on the relationship between insurance activities and economic growth, and fewer still have focused on surety and credit insurance.

The role of the financial sector in economic growth has become a popular topic of empirical research for modern economies. Levine, Loayza and Beck (2000) found that financial intermediary development had a significant impact on economic growth. Rousseau and Wachtel (1998), also focusing on the relationship between financial development and economic growth among five countries using the exogenous component of financial intermediary development, pointed out that a rapidly growing financial system can play an important role in enhancing both resource allocation and general economic performance.

However, literature that deals with the effect on industries of macroeconomic indicators has been primarily concerned with real estate, banking or stock markets. A linkage

between various macroeconomic indicators and the real estate market has been demonstrated in studies by Mei and Lee (1994), Li and Wang (1995) and Ling and Naranjo (1999). In addition, the connection between equity market returns and economic fundamentals has been examined in the context of developed markets. For example, Fama (1981) finds a significant relationship between macroeconomic factors and stock prices. Since then, Chen (1991), Cheung and Ng (1998), Choi et al. (1999), Dickinson (2000), Nasseh and Strauss (2000) have explored the topic in the context of one country or a selected group of countries.

Although there has been limited research concerning how macroeconomic indicators affect the insurance sector, insurance concerns are similar to banks and capital markets in that they address the needs of business entities and households as financial intermediaries. The availability of insurance services is helpful in allowing participants in financial markets to maintain a more acceptable level of risk while engaging in economic activities. Skipper (1997) showed that insurance market activity may contribute to economic growth in the following ways: (1) by promoting financial stability and reducing anxiety; (2) by substituting for government security programs; (3) by facilitating trade and commerce; (4) by mobilizing national savings; (5) by allowing risk to be managed more efficiently; and (6) by fostering a more efficient allocation of domestic capital.

In terms of research on the insurance industry, Adams et al. (2005) studied the historical relation between banking, insurance and economic growth in Sweden throughout the 19^{th} and 20^{th} centuries. Outreville (1996) examined the relationship between financial development and the development of the life insurance sector by examining data for 1986 covering 48 developing countries. Later on, Haiss et al. (2005) find the weak link in the bank and capital market-economic growth nexus in more recent years in Europe as importance of insurance sector within financial intermediation has risen over time, and thus the impact of

life insurance has expanded on the economy. Webb et al. (2002) also investigated the relationship between the activity of banks, life, and non-life insurance activity and economic growth. Ward and Zurbruegg (2000) examined nine OECD countries in terms of the short-run and long-run relationships between economic growth and development in the context of the insurance industry.

Insurance may be divided into two categories, life and non-life insurance. Life insurance coverage pays out premiums to the insured or their specified beneficiaries in the event of a certain incident, such as the insured's death. Non-life insurance, on the other hand, protects the insured against predetermined losses and damages such as those involving property or means of transportation by land, sea, or air. As one of the non-life insurance classes, the guarantee insurance market is known as an industry that is sensitive to economic ups and downs. It offers a wide range of comprehensive guarantee services to assist in the economic development of a nation by helping to build a credit-based society. In order to run a business or engage in economic activities, individuals and companies find themselves faced with a need of some type of surety bond guaranteeing that an individual or company will perform contractual or legal obligations in an appropriate manner. In the aftermath of the global financial crisis, surety companies have not only confronted a decline in aggregate premiums earned but also an increase in the filing of loss claims. The demand for surety bonds has decreased, while the cancellation and incompletion rates of contracts have increased.

An examination of the relationship between economic and guarantee insurance development indicators by product has not thus far been carried out, primarily due to a lack of suitable data sources. In Korea, some studies on the interaction between the guarantee insurance sector and economic growth have been conducted. However, most of these were

undertaken in the early 1990s, before the Asian financial crisis had broken. With regard to surety and credit insurance in Korea, Lee et al. (1997) authored a study on the development of guarantee insurance, and Shin et al. (2001) conducted a study on the facilitation of credit insurance. Those studies, however, concentrated primarily on introducing the system and investigating the operation status of the surety and credit insurance industries. One correlation analysis of business fluctuations and guarantee insurance provided evidence that macroeconomic factors, the business cycle and manufacturing inventory rates, showed a strong relationship with direct premiums earned (Lim, 1995). Recently, Park (2009) examined macroeconomic factors leading guarantee insurance and the effects of these on certain industries. He argued that recent research efforts in this century have not been sufficiently persuasive thus far to attract the attention of policymakers to the importance of such analyses. Given that risks for guarantee insurance can be differentiated from risks for ordinary insurance, analyses of applicable risk factors and various approaches to loss ratio analysis have been carried out, including *A Study on the Optimum price of Loan Bonds* (Lew, 1997), *Analysis on Loss Ratio of Guarantee insurance and Risk Management with CAT Bond* (Lew, 2003), and *A Study on Option Model for Pricing Premiums* (Ouh, 1993).

The objective of this study is to closely investigate the link between surety and credit insurance sector development and economic growth, and hence to fill a gap in the current finance-growth nexus literature by analyzing the relationship between those related factors, using direct premiums as an indicator of guarantee insurance growth. This study differs from previous studies in several ways. First, it focuses on surety and credit insurance only, a part of the non-life insurance segment, because just as life and non-life insurance activities may affect economic growth by different means, so may surety and credit insurance. In terms of magnitude of impact, according to Han et al. (2010), it is apparent that non-life insurance has

a much more significant impact on economic growth than does life insurance. Second, this study examines income premiums by product, and each relationship of a product with economic factors. Last, the methodology applied here differs from that of other guarantee insurance studies primarily based on this study's use of multiple regression analysis.

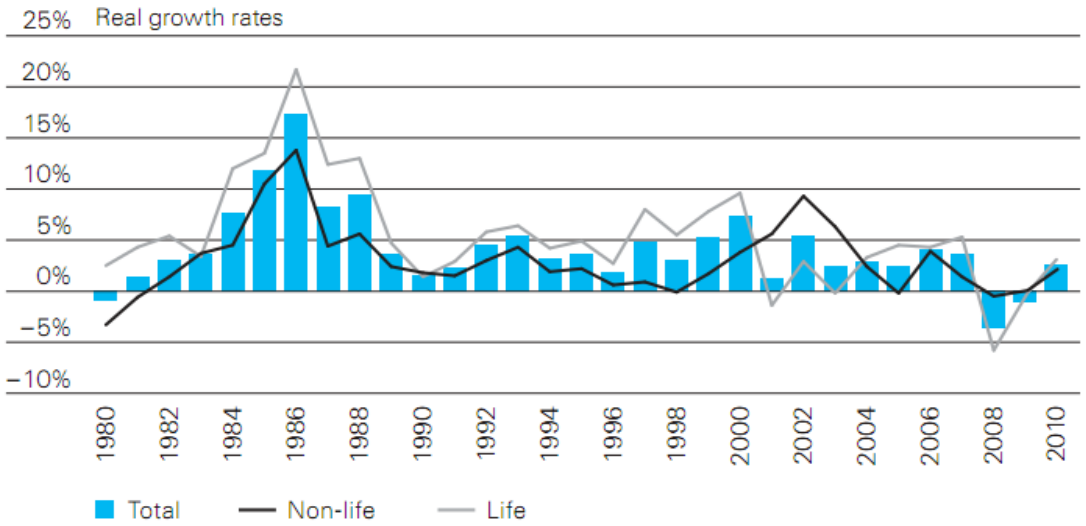
The remainder of this paper is organized as follows. Section II provides background information on the surety and credit insurance market, both in general and in Korea, while Section III describes the research methodology, including descriptions of variables. Finally, Section IV discusses the empirical analyses and their results and Section V offers some conclusions.

II. SURETY and CREDIT INSURANCE

1. The insurance industry

In 2010, the global economy continued to recover, supporting an increased demand for insurance, with a 2.7% total increase in premium volume to USD4339bn, above pre-crisis levels. Thanks to developed and emerging markets with particularly strong GDP growth, capital markets continued to stabilize in the low interest rate environment. Global life insurance premiums increased by 3.2% in 2010 while non-life insurance premiums rose by 2.1% in the same year. In Figure 1, which shows the general growth flows of the world market in the insurance sector over 30 years, it may be noted that after 2009 growth rates bounced back into the positive range.

[Figure 1] Real premium growth from 1980 to 2010

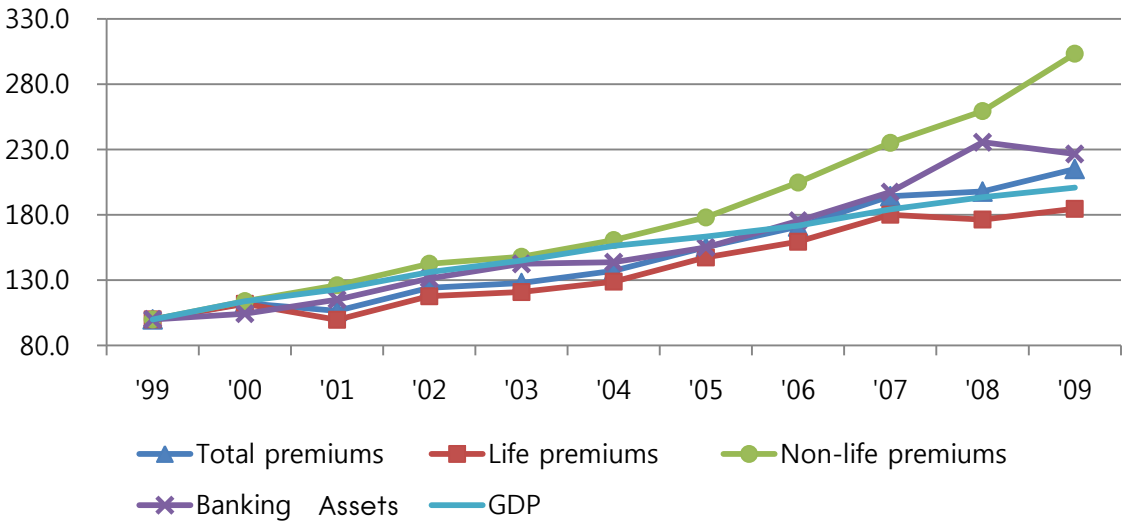


Source: Swiss Re Economic Research & Consulting

Due to the growing importance of the insurance sector in the overall financial sector, the insurance-growth nexus can be supported by the growth trend in those sectors. Figure 2 illustrates the parallel and rapid growth of total insurance premiums and total bank assets

relative to GDP growth in Korea during the period from 1999 to 2009 (1999=100). The growth in non-life insurance measured by income premiums is especially strong compared to other lines.

[Figure 2] Financial development and economic growth (1999~2009)



Source: Korea Insurance Development Institute

The year 2009 and 2010 were marked by a rebound in insurance premium growth as well as enhanced profitability due to the steady recovery of both the Korean and the global economy. Another contributing factor was the stabilization of the financial markets. Within this positive context, the Korean non-life insurance sector experienced remarkable growth, due mainly to the increasing popularity of long-term lines and the ongoing recovery of commercial ones. The life insurance sector also returned to profitability, thanks to a healthy demand for pension products.

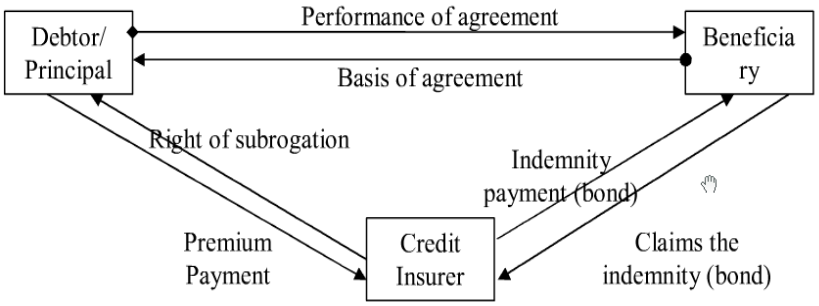
2. Surety and credit insurance

Surety and credit insurance both guarantee commitments that have been made between a principal and a beneficiary.

A surety bond is a contract in which an insurer guarantees the performance of any of a

variety of obligations, in any of a variety of contracts, from construction to service, and in any of a variety of contexts, from licensing to commercial undertakings. The bond represents a guarantee to compensate a loss sustained as a result of a breach of contractual or legal obligations. Therefore, a surety bond perhaps functions more in the manner of a contract of guarantee, rather than of insurance. Moreover, this sort of bond involves three persons: the contractor, who puts the bond in place, the employer, who contracts with the contractor and requires the surety bond to be provided, and the guarantor, generally an insurer. In the event of the contractor's default, the guarantor compensates the employer for any losses incurred. For example, the failure of a contractor to complete terms specified in a contract commitment or a failure of an entity to pay taxes or custom duties to a government can be secured by a surety bond. The functioning of a surety bond is presented in Figure 3.

[Figure 3] The functioning of a surety bond

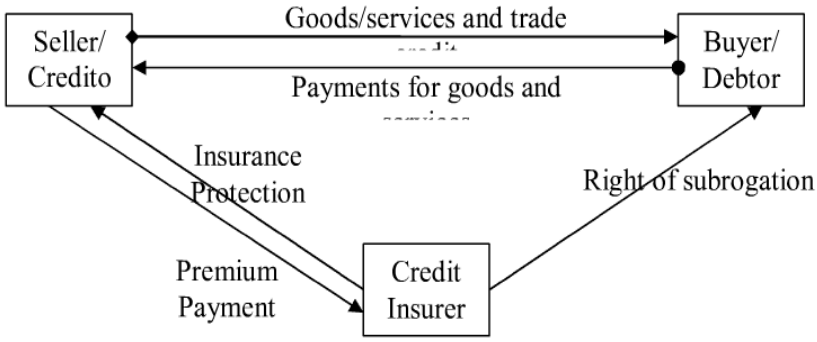


Source: Seoul Guarantee Insurance

Credit insurance underwrites a payment risk stemming from the delivery of goods and services. Credit insurance is purchased by businesses to protect them from non-payment due to a customer's insolvency. If, for example, a UK bank enters into a financial arrangement with an overseas customer, to protect itself from the default of that customer, the bank may take out a trade credit insurance contract. In this instance, the peril is the default by the overseas customer and the risk is the loss to the bank. The risk is located in the UK, given

that this is where the bank is located. The functioning of credit insurance is outlined in Figure 4.

[Figure 4] The functioning of credit insurance



Source: Seoul Guarantee Insurance

Global credit insurance, with total premiums estimated at USD 6.9 billion in 2005, has traditionally been offered primarily by companies in Europe, home of the world's number one credit insurance provider, Euler Hermes, and otherwise a substantially sized market. On the other hand, global surety premiums totaled an estimated USD 7.9 billion in 2005, with more than half of this amount written in the United States. In coming years, the demand for surety and credit insurance is expected to continue to grow, given that international trade is growing faster than GDP and that the less-penetrated Asian and Middle East markets have started to build the legal and regulatory frameworks necessary to support surety bonds.

The industry also provides indemnity payments after claims have been made based on evaluations of losses incurred, with the right of subrogation thereupon given to the insurer. This characteristic of surety and credit insurance constitutes a huge difference between this and other insurance sectors.

3. Surety and credit insurance in Korea

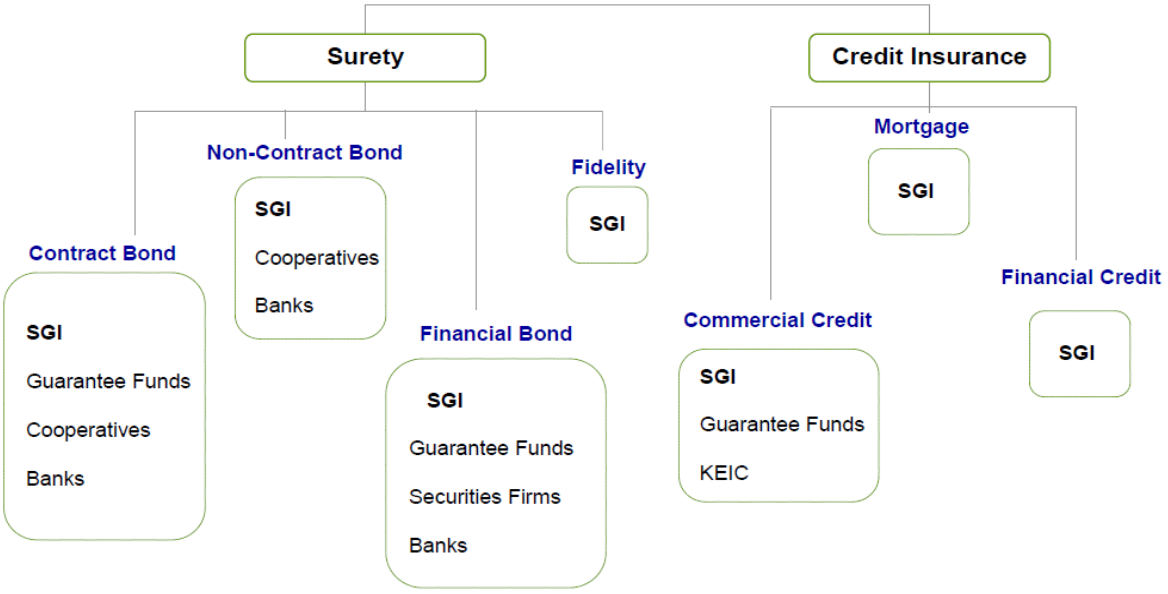
A recent report by the Korea Insurance Development Institute (KIDI) positioned the South Korean insurance market as the 10th largest in the world, with USD91.9bn of gross

written premiums in 2009. The market's ratio of life to non-life business was 63:37, with USD57.4bn premium volume in life insurance, the world's eighth largest, and USD34.5bn in non-life business. Korea's circumstances are thus different from those of other large insurance markets, in which the non-life business is larger. The American insurance sector, for instance, is the biggest in the world, with USD1139.7bn in gross written premiums. However, the ratio between life and non-life business is 43:57, with a premium volume of USD492.3bn for life and of USD647.4bn for non-life. In the South Korean non-life insurance industry, long term insurance was found to be the leading sub-segment, accounting for more than 50% of the market. The second largest sub-segment in that market was motor, and liability was the third. Private annuity and retirement insurance were the other major sub-segments, accounting for 10.4% of the market in Korean fiscal year 2010 (April 2010 to March 2011). Guarantee insurance represented 2.2% of the South Korean non-life insurance market.

3.1 Seoul Guarantee Insurance Company

The Seoul Guarantee Insurance Company (SGI) has been regarded as the topmost financial organization in Korea in the surety context. The company ranks fourth in the world in overall performance and in credit insurance. SGI is the only insurance company providing both surety and credit insurance in Korea, with domestic guarantee exposure amounted to USD156.3bn, accounting for 26.5% of Korea's guarantee market (USD589.3bn) as of March 31, 2010. Other guarantee companies, such as cooperatives, banks, and guarantee funds operated by the government, offer slightly different insurance products or participate in select lines of business. These specialized participants include the Korea Construction Financial Cooperative, the Korea Housing Guarantee Company and the Korea Credit Guarantee Fund. The Korean market structure for surety and credit insurance and its relative shares of participants in the market are shown in Figure 5 and Table 1.

[Figure 5] Korean market structure for surety and credit insurance



Source: Seoul Guarantee Insurance

[Table 1] Market share of credit & surety insurance in Korea[1]

As of March 31, 2010

	SGI	KHGC	Banks	Financial Coop.	Guarantee Funds	Others	Total
Exposure (USD bn)	156.3	112.0	104.5	119.9	53.0	43.6	589.3
Percent (%)	26.5%	19.0%	17.7%	20.4%	9.0%	7.4%	100.0%

Source: Seoul Guarantee Insurance

SGI was initially formed under the aegis of two Korea Fidelity and Surety Companies, Daehan and Hankuk. In 1969, Daehan, once Korea's largest credit and surety services provider, came into being, helping Korea to develop into a full-fledged credit-based society. During the Asian financial crisis of 1997, as the market endured economic downturns and the industry underwent extensive restructuring, the Korean insurance market also suffered impacts from the economic recession. As a result of the market shock, Daehan and Hankuk collapsed, only to merge in November 1998 upon receiving public funding of more than ten

[1] a) The figure for the financial cooperatives is the sum of the totals of eight cooperatives, including the Korea Construction Financial Cooperative and the Korea Specialty Contractor Financial Cooperative.
b) The figure for guarantee funds is based on the combined total of the Korea Credit Guarantee Fund and Korea Technology Credit Guarantee Fund.

trillion won, under the firm's present name of Seoul Guarantee Insurance Company.

Other than underwriting agreements, SGI offers recoveries from claims made and exercises the right to indemnity. Furthermore, the firm also provides business reinsurance services.

3.2 Clients for credit and surety insurance

SMEs and individuals held 98.9% of total accounts as of March 2010, representing the company's focus on assisting groups in need of credit. Beneficiaries vary in type and scale, and include governments, publicly owned companies, large corporations, small and medium companies, and individuals.

[Table 2] Client Structure: Principal

	Large Corp.	SMEs	Individuals	Total
No. of Contractors (Mil)	0.2	1.9	16.7	18.8
Percent (%)	1.1%	10.3%	88.6%	100.0%
Exposure (USD bn)	24.4	52.9	79.0	156.3
Percent (%)	15.6%	33.9%	50.5%	100.0%

[Table 3] Client Structure: Beneficiary

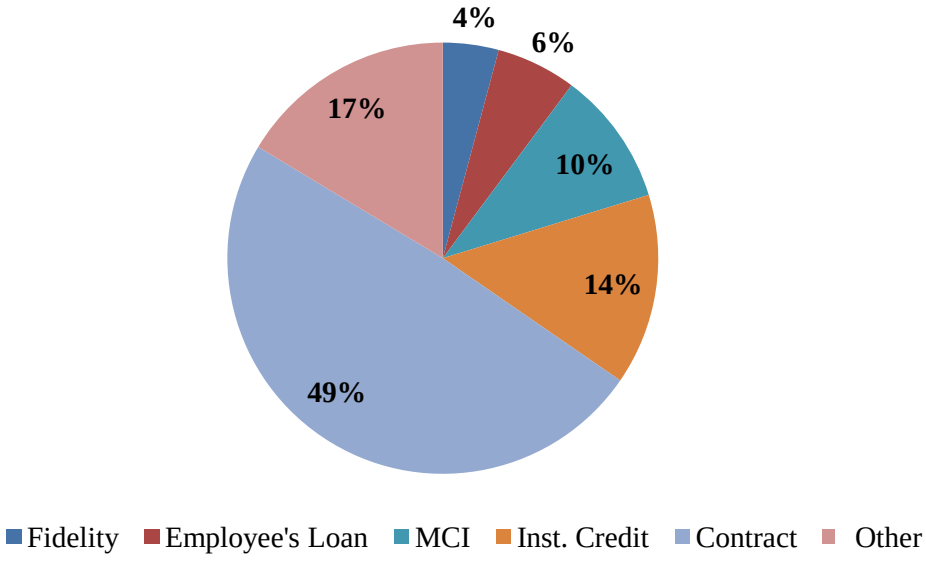
	Government & Public Co.	Financial Institutions	Large Corp.	SMEs	Individuals	Total
No. of Contracts (Mil)	1.4	1.5	8.1	4.1	1.4	16.5
Percent (%)	8.4%	9.2%	48.8%	24.9%	8.7%	100.0%
Exposure (USD bn)	36.2	22.3	26.6	28.8	15.0	128.9
Percent (%)	28.1%	17.3%	20.7%	22.3%	11.6%	100.0%

Source: Seoul Guarantee Insurance

Surety and credit insurance provides guarantees to companies that need credit support or improved financial security in order to enter into a contract. The insurance helps such companies enhance their creditworthiness, allowing for healthier economic performance. It also benefits the economy in a broader sense. Among surety bonds, the insurance products can be divided into three categories: contract bonds, non-contract bonds and financial

guarantees. Contract surety bonds concerning construction or supply contracts and purchases of goods or services are among the core products in the guarantee insurance industry, accounting for 49.0% of SGI's total written premiums in 2010. Contract surety bonds include bid bonds, performance bonds, advance payment bonds, maintenance bonds, and payment bonds for purchases or construction contracts with the government or private companies. Non-contract bonds include fidelity bonds, court bonds, taxation bonds, and license and permit bonds. Employee loans constitute the lion's share of the portfolio of financial guarantees. Credit insurance, on the other hand, indemnifies an insured against unpaid receivables. SGI, authorized by the Korean government to begin selling credit insurance products in May 1997, provides coverage for domestic trade transactions, while the Korea Trade Insurance Corporation provides coverage for overseas business. Major products of credit insurance include installment credit insurance and mortgage credit insurance, accounting for 84.4% of SGI's written premiums in credit insurance in 2010, and 24.4% of SGI's total written premiums.

[Figure 6] Product portfolio of SGI in 2010 (as % of total premium income)



3.3 Types of credit & surety insurance

The bond products offered by a credit organization such as SGI are as follows:

- **Fidelity bonds**

These bonds are used to indemnify any employer of theft, robbery, fraud, embezzlement or breach of trust committed by an employee. The owner of the project is the beneficiary of such bonds, while the bidder is the principal figure. The period of the bond starts on the day prior to the bidding day and continues for over 30 days.

- **Employees' loan bonds**

Any loss occurring in case a principal fails to repay the principal and interest received from the beneficiary is covered by an employee's loan bond.

- **License bonds**

A license bond guarantees any loss caused by the failure of the principal to perform the conditions which grant a special privilege regardless of the name of the license, permit or patent. Some of the most popular license bonds are employment permit bonds for foreign workers and bonds that cover such things as forest damage caused by development, and so on.

- **Court bonds**

Upon issuance of a court order for provisional attachment, a patent owner will usually be requested by the court to place a surety bond. Because of the danger of liability for wrongful attachment, the court requests a court deposit, whereupon a court bond could be filed with the court in lieu of payment of the dollar amount set by the judge. The loss of the person attached or required to refrain from doing a specified act would be compensated by the court bond if the debtor can prove damages.

- **Mortgage Credit Insurance (MCI)**

MCI guarantees any loss occurring in case a mortgage borrower fails to repay a mortgage loan. The policyholder is the borrower, and the financial institution that lends to the

borrower is the potential beneficiary, insured beyond the amount of the borrower's small loan deposit up to 60% of the loan value.

- **Installment sales bonds**

Such bonds guarantee parties who sell products on an installment basis against losses which occur when a debtor fails to pay installments to the policyholder.

- **Contract bonds**

This type of bond ratifies the completion of the obligation specified in an underlying contract, including construction contracts, supply contracts, and so on. If a contractor fails to perform obligations stipulated in the underlying contract, then the loss of the beneficiary who is the recipient of the contract deposit will be covered by these bonds.

III. DATA and METHODOLOGY

1. Data

Herein, the analysis treated monthly data for the period from June 1999 to December 2010. This study covered only 139 months based on the availability of certain data (labor related indicators are available only from June 1999). The data used in the study may be divided into two sub-groups based on the two main data sources, SGI and Bank of Korea. The first data set consisted of premium data by product. The second data set consisted of macroeconomic factors. The time series data for premiums of surety and credit insurance as underwriting income were taken from the database of SGI, which was chosen because it is the market leader in the domestic surety and credit insurance industry. This study examined four types of products, two for surety and two for credit insurance: Contract Bonds (CONTRACT) and Employee's Loan Bonds (LOAN) in the surety sector and Installment Sales Bonds (INSTALLMENT) and Mortgage Credit Insurance (MCI) in the credit insurance sector. For LOAN, INSTALLMENT and MCI, SGI has held a monopoly in these bonds; therefore direct written premiums themselves are likely to be seen as market demand itself. Moreover, Contract Bonds (CONTRACT) were selected because most guarantee insurance companies, including guarantee funds or financial cooperatives, are involved in this product, and it therefore operates by market logic to a great extent. CONTRACT is also very closely related to the construction industry, which accounts for a significant portion of the GDP and therefore has a less volatile premium sequence. These four products constituted 80 percent of the total premium income of SGI in 2010.

All macroeconomic factors were taken from the Bank of Korea (BOK) database. These included the Industrial Product Index (IP), unemployment rates (UNEMPLOYMENT) and interest rates (INTEREST). As a measure of overall economic activity in the economy, IP

was used as a growth factor variable in lieu of GDP since IP was available on a monthly basis. A central tenet of previous studies is that the growth of the guarantee business will move with IP.

The unemployment rate, which measures the ratio of the number of people failing in looking for jobs to the total labor force, is another important indicator in analyzing the nexus of the nation's economy and its insurance industry. Theoretically, the unemployment rate is expected to have a negative effect on the growth of bonds, such as fidelity bonds. The unemployment rate, however, may actually have a positive effect. In a model taken from *An Empirical Test of a Contingent Claims Lease Valuation Model* (Stanton & Wallace 2009), the only significant variable in a particular regression analysis was the unemployment rate and that analysis suggested that leasing volume increases as the unemployment rate rises.

Shafik and Jalali (1991) showed that high interest rates are not always bad for economic growth in their examination of the 1980s, during which rapid growth in the world economy coincided with unprecedentedly high interest rates in the industrialized countries. We can distinguish many types of interest rates in the Korean financial market. However, in this study we shall concentrate on the 3-year Treasury bond yield. Studies on business cycles of various countries have relied primarily on interest rates for treasury securities because of the convenience of collecting data where statistics for many maturities are available continuously from a certain period of time in the past to the present in a consistent format on public websites. Another reason is that the pricing of these securities is not significantly subject to the sorts of credit risk that may induce changes in the rates of treasury securities. For similar reasons, this study used data on national government debt securities. Some analysts have also used, as short-term rates, the CD and Call rates closely controlled by central banks in Korea. Even though these are useful for some purposes, the control on those rates could be exercised by the central bank, in which case the rates would not be fully

reflective of the expectations of financial market participants.

All of the series herein were transformed into natural logarithms prior to the empirical analysis and all return data were calculated on a monthly basis.

2. Methodology

A VAR model is a system of regressions composed of variables of interest and their own lagged values (Enders 2004). This methodology has proven especially useful for forecasting interrelations between time-series variables. In the system, variables of level are allowed to affect each other, including their time-lag variables. To offer a simple example, in the VAR model, the time path of insurance premium income is allowed to be affected by current and past realizations of the series of premiums, and the time path of the premium incomes can also be affected by current and past realizations of the GDP sequence. A general unrestricted order p Gaussian VAR model can be represented as below.

$$X_t = c + A_1 X_{t-1} + A_2 X_{t-2} + \cdots + A_p X_{t-p} + e_t$$

where X is a vector of variables, c is a vector of constants, and e_t is a vector of equation errors.

$$c = (c_1, c_2, \cdots, c_n)'$$

$$e_t = (e_{1t}, e_{2t}, \cdots, e_{nt})' \ , \ E(e_t) = 0, \ E(e_t e_s') = \begin{cases} \Omega, t = s \\ 0, t \neq s \end{cases}$$

$$A_j = \begin{bmatrix} A_{11j} & \cdots & A_{1nj} \\ \vdots & \ddots & \vdots \\ A_{n1j} & \cdots & A_{nnj} \end{bmatrix}, j = 1,2, \cdots, p$$

The contents of X are: x_1 – Industrial Production Index (IP); x_2 – Unemployment rate (UNEMPLOYMENT); x_3- Interest rate (INTEREST). Since VAR is sensitive to the ordering of variables, this study tested every possible ordering combination with optimal time lag. The lag length for the VAR can be chosen using Akaike information criterion (AIC) or

Schwarz Bayesian Criterion (SBC). This study used the SBC to choose p (time lag). The traditional F-test and its Wald test were subsequently applied to determine parameters of a VAR model with null hypothesis of parameters being jointly zero. After the VAR model was identified, impulse response functions were estimated.

Before analyzing time series data and building a model, it was necessary to consider data to be stationary. If a data series appears nonstationary, differencing is needed to make the volume series stationary. Engle and Granger (1987) point out, however, that if there is a cointegration relationship between non-stationary variables, differencing the variables would not produce a proper model. They also demonstrate that if a cointegration relationship is known, then a simple ordinary least squares regression analysis minimizing the variance of residuals provides estimates of long-run regression coefficients. After the existence of cointegration is confirmed with a precondition in which variables of the same order are integrated, the residuals from the long-run estimates can be used as the error correction terms to explain the short-run relations. Engel and Granger (1987) and Toda and Phillips (1993) showed that in the existence of cointegration, the standard VAR (p) with the variables in the first difference is not an adequate model for analysis, and they suggested a vector-error correction model (VECM) given as follows:

$$\Delta X_t = c + \sum_{i=1}^{p} A_i \Delta X_{t-i} - d(\beta' X_{t-1}) + \nu_t$$

where, X is an n ×1 vector of a variables of interest, c is an n ×1 vector of constant terms, v is an n ×1 vector of disturbances such that $(\nu_t \nu_t')= \Omega$, p is the lag length, and Δ is a difference operator.

Before testing for the long-run relationship and the direction of causality with VECM, it was necessary to test stationarity of the time series data and to establish the order of integration. The present study employed a unit root test to determine stationarity of the variables, and the order of integration of the series was selected using the Schwarz-Bayes Criterion. Next followed the methodology of Johansen (1988) and Johansen and Juselius (1990) for a

Maximum-Likelihood cointegration technique to identify the presence and the number of cointegration vectors. Under the establishment of VECM, an impulse response analysis was conducted to discuss how a shock to one variable might affect the other in the long-run.

IV. Empirical Analysis

1. Descriptive statistics

As a first step, summary statistics are examined. Such a summary is depicted in Table4.

[Table 4] Summary statistics of premiums (June 1999-Dec.2010)

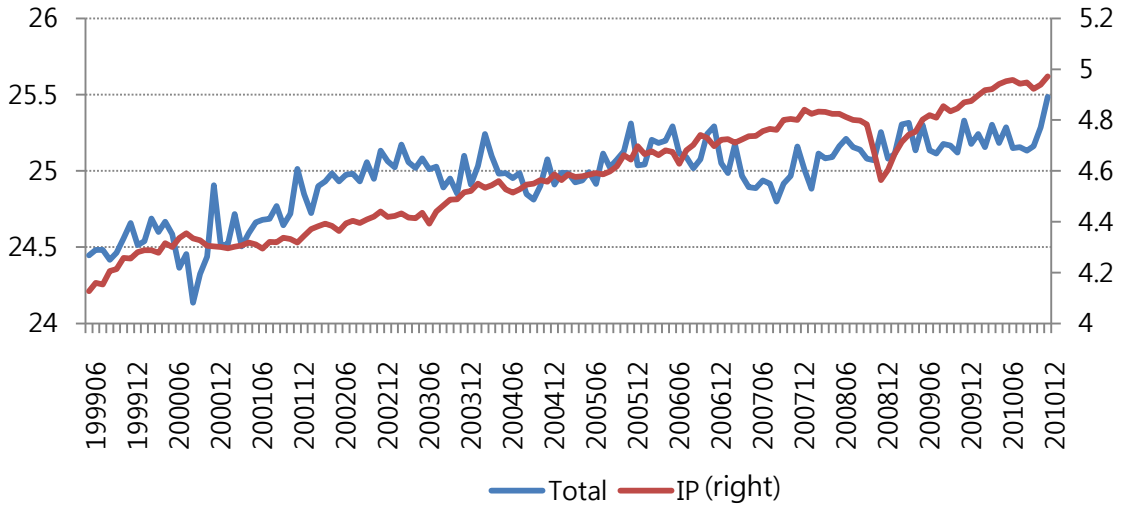
	CONTRACT	LOAN	MCI*	INSTALLMENT	TOTAL
Mean	24.064	22.119	22.210	23.005	24.958
Median	24.053	22.316	22.575	23.197	25.010
St. dev	0.331	0.533	1.374	0.580	0.253
Max	24.831	22.942	23.880	23.890	25.485
Min	23.236	20.782	16.662	20.631	24.135
Range	1.594	2.160	7.217	3.259	1.350
Skewness	0.030	-0.748	-2.223	-1.774	-0.849
Kurtosis	-0.544	-0.480	6.226	3.177	0.285

Note: statistics on MCI premiums cover only the period from 2005 to 2010 since the sales of MCI product were very unstable at the beginning of its operations

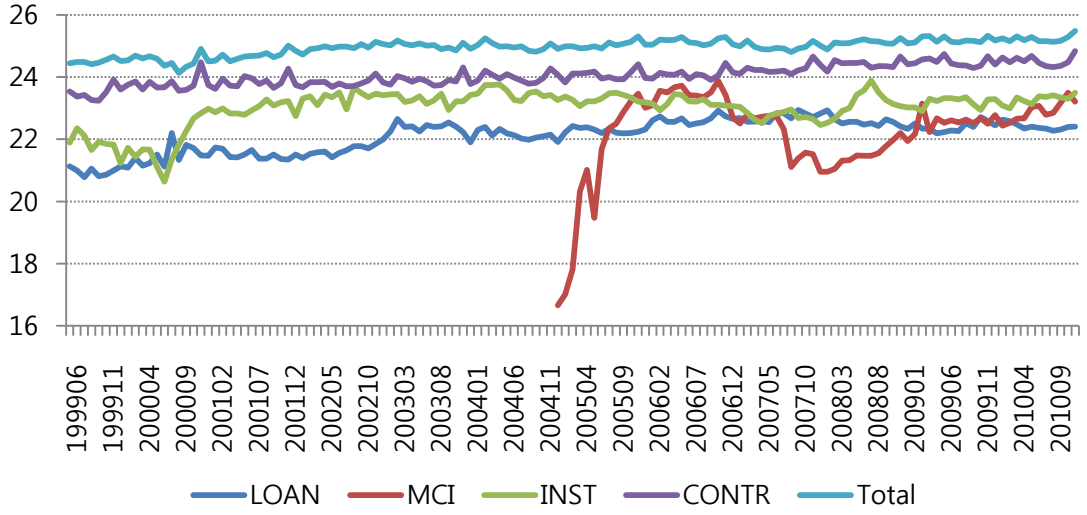
Table 4 above presents descriptive statistics. CONTRACT has the highest mean among the four products, proving that CONTRACT is the main product in guarantee insurance, followed by INSTALLMENT, MCI, and LOAN, which shows the worst performance. As expected based on the note, MCI is characterized by a higher volatility than others. The skewness of zero means that a variable is normally distributed and symmetric. Negative values for the skewness of LOAN, MCI, and INSTALLMENT indicate that data are skewed left, having a long left tail. Similarly, a positive value for the skewness of CONTRACT indicates that data are skewed right, with a long right tail relative to the left. The high value of kurtosis is another important characteristic emerging in the summary statistics. MCI, for instance, has a high value of kurtosis and therefore is more likely to be observed with either sign of distribution as compared to other variables. Figures 7 and 8 depict the total income premium flow along with IP for 139 months and the income premium

flows by products. In general, both surety and credit insurance and the economy are growing. In addition, MCI moves somewhat differently from other products.

[Figure 7] Growth in Guarantee insurance and in IP



[Figure 8] Growth in insurance products



Note: MCI premiums data cover only the period from 2005 to 2010
INST is the acronym for installment product and CONTR is for contract bonds

2. Stationary test with unit root test

In order to estimate the regression models, stationarity of time series has to be tested before conducting the model analysis. In this study, the Augmented Dickey-Fuller (ADF)

method, developed by Dickey and Fuller (1979), is employed to test for the presence of unit roots. The standard test is based on the formula:

$$X_t = \beta_1 + \beta_2 X_{t-1} + y_t + \varepsilon_t$$

where β and γ are the coefficients, X_t is an individual value of series X at time t, and ε_t represents disturbance. Since the study encompasses 139 months of data from June 1999 to December 2010, $\ln(139)$ is greater than 2. Therefore, the SBC (Schwartz Bayesian Criterion) is used to determine the lag length, because SBC selects a more parsimonious model for large samples than the AIC (Akaike Information Criterion), which has been widely used in other studies. In Table 5, it may be observed that the null hypothesis of the unit root is not rejected in favor of the one-sided alternative except for with regard to MCI and INSTALLMENT. It may therefore be concluded that most of the data series have a unit root and are nonstationary.

Based on the stationarity test, except for MCI and INSTALLMENT, the variables prove to be nonstationary by virtue of a unit root. In this study, it will be assumed that the results indicate that all the series of the income premiums and the macroeconomic factors are I(1) processes. Having established the order of integration, I further test the cointegrating relationships, or long-run equilibrium relationships, between guarantee insurance and the economic indicators using the cointegration procedure suggested by Engle and Granger (1987). Based on this analysis, we can reject the null hypothesis of cointegration between guarantee insurance and the economic growth. This finding suggests that there is a long-run relationship between guarantee insurance premiums and economic growth. Therefore, the error-correction term is taken into account in subsequent empirical models and analyses. If the null hypothesis cannot be rejected, meaning that there is no cointegration between the guarantee insurance and the economic growth, then we conduct the VAR model with the variables in differences which are all stationary.

[Table 5] The Results of Unit Root Test[1]

	Variable in Levels		Variable in Differences	
Variables	**t-statistics**	**p-value**	**t-statistics**	**p-value**
TOTAL	-1.543[3][4]	0.5120	-9.147[2]***	0.0000
CONTRACT	-1.262[3]	0.6465	-10.479[2]***	0.0000
MCI[2]	-5.033[1]***	0.0000	-8.306[0]***	0.0000
INSTALLMENT	-3.585[1]***	0.0061	-12.081[0]***	0.0000
LOAN	-2.293[2]	0.1742	-11.200[1]***	0.0000
IP	-0.297[1]	0.9260	-7.658[1]***	0.0000
INTEREST	-2.577[2]*	0.0979	-7.613[1]***	0.0000
UNEMPLOYMENT	-1.136[2]	0.7005	-3.771[1]***	0.0032

Note: 1) The null hypothesis is that the variable has a unit-root
2) Data of MCI are used from 2005, after its sales stabilized
3) TOTAL: Total income premium, CONTRACT: income premium of Contract bonds, MCI: income premium of Mortgage Credit Insurance, INSTALLMENT: income premium of Installment, LOAN: income premium of Employees' Loan, IP: Industrial Production Index (2005=100), INTEREST: Interest Rate, UNEMPLOYMENT: Unemployment rate
4) The numbers in the parentheses of ADF tests are the optimal lag length under SBC.
5) *, **, and *** indicate statistically significance at the 10%, 5%, and 1% levels, respectively.

3. Optimal lag order

The most common approach for model order selection involves selecting a model order that minimizes one or more *information criteria*. Commonly used information criteria include the Akaike Information Criterion (AIC), the Schwarz-Bayes Criterion (SBC), the Final Prediction Error Criterion (FPE), and the Hannan-Quinn Criterion (HQ). By selecting the smallest value of lag, we seek to identify a model that is both parsimonious, meaning that there is no overfitting the data with too many parameters, while also accurately modeling the data. We start with the total income premium first, with results as shown in Table 6.

$$X_t = (\mathrm{TOTAL}_t, \mathrm{IP}_t, \mathrm{INTEREST}_t, \mathrm{UNEMPLOYMENT}_t)$$

[Table 6] The Results of Optimal lag order

	LR	FPE	AIC	HQ	SBC
0		6.1e-07	-2.95049	-2.91551	-2.86441
1	1137.8	1.7e-10	-11.1418	-10.9669	**-10.7114***
2	51.994*	1.5e-10*	-11.2899*	-10.9751*	-10.5152
3	25.994	1.5e-10	-11.2454	-10.7907	-10.1263
4	13.739	1.8e-10	-11.1102	-10.5155	-9.64675

Note: LR stands for sequential modified Likelihood Ratio test statistic (each test at 5% level)

Since it is preferable to use the SBC due to our sample size, a lag order of one is selected for the total income premium model. Tests for the rest of the products are the same, and a lag order of one is chosen for INSTALLMENT, CONTRACT, MCI and a lag order of two for LOAN.

4. **Granger Causality Tests**

According to Granger, if the prediction of Y becomes more accurate after the past values of X are included along with the past values of Y then we may say X causes Y. In other words, if past values of X statistically improve the prediction of Y, then we can conclude that X "Granger-causes" Y. Normally, Granger causality may or may not indicate a causal effect of *X* on *Y*. However, there exist some weaknesses in the test for Granger causality. First, the analysis identifies “temporal” causality rather than theoretical causality. Second, the null hypothesis of Granger causality can be rejected, leading to the conclusion that *X* does Granger-cause *Y* when a common third process with different lags drives both *X* and *Y*. In this case, manipulation of one of the variables would not cause any change to the other. Indeed, when there exist three or more variables, the Granger test may produce misleading results concerning the true relationship of pairs of variables. Third, this analysis focuses on the relationship between lagged values of variables, so simultaneous interaction of variables is not computed. Therefore, we use a Granger Causality Test to detect the order of

variables in the model because the order of equations can dramatically change the impulse responses. We set the variable with strong exogenity at the front of each model. The results of Granger causality tests using a lag of two carried out previously with SBC are shown in Table 7.

[Table 7] Results from Granger Causality Tests

Effect \ Cause	TOTAL	IP	INTEREST	UNEMPLOYMENT
TOTAL		0.496	0.333	0.369
IP	0.061*		0.083*	0.563
INTEREST	0.018**	0.251		0.906
UNEMPLOYMENT	0.230	0.195	0.616	

Order: UNEMPLOYMENT-> IP -> INTEREST -> TOTAL

Effect \ Cause	CONTRACT	IP	INTEREST	UNEMPLOYMENT
CONTRACT		0.550	0.334	0.027**
IP	0.000***		0.072*	0.048**
INTEREST	0.569	0.085*		0.869
UNEMPLOYMENT	0.999	0.331	0.315	

Order: IP -> INTEREST -> CONTRACT -> UNEMPLOYMENT

Effect \ Cause	MCI	IP	INTEREST	UNEMPLOYMENT
MCI		0.188	0.783	0.392
IP	0.256		0.001***	0.247
INTEREST	0.227	0.068*		0.008***
UNEMPLOYMENT	0.755	0.702	0.350	

Order: MCI -> IP -> INTEREST -> UNEMPLOYMENT

Effect \ Cause	INSTALL -MENT	IP	INTEREST	UNEMPLOYMENT
INSTALLMENT		0.007***	0.028**	0.105
IP	0.421		0.028**	0.107
INTEREST	0.073*	0.103		0.463
UNEMPLOYMENT	0.145	0.751	0.812	

Order: UNEMPLOYMENT -> INSTALLMENT -> IP -> INTEREST

Effect \ Cause	LOAN	IP	INTEREST	UNEMPLOYMENT
LOAN		0.066*	0.827	0.210
IP	0.011**		0.051*	0.895
INTEREST	0.703	0.085*		0.941
UNEMPLOYMENT	0.028**	0.348	0.498	

Order: UNEMPLOYMENT -> INTEREST -> IP -> LOAN

5. Cointegration test

The results of unit root testing imply that most of the variables are non-stationary, giving rise to the possibility of the existence of a long-run relationship among the variables. Johansen's (1988) multiple cointegration test is introduced to identify the long-run relationship with a lag length of two as suggested by Schwarz's Bayesian information Criterion (SBC) criteria, under the assumption that the cointegrating equations have an intercept, but not a trend. The null hypothesis is that the number of cointegrated equations is larger than r. The results of the cointegration test are given in Table 8, with trace test statistics and their associated critical values on each rank at most. These test statistics help evaluate the null hypothesis of r = 0 against the alternatives of r ≤ 1, having one cointegrating vector, or r≤ 2, having two cointegrating vectors.

[Table 8] Results from the Johansen's Cointegration Rank Trace Test

Product	Rank	Eigenvalue	Trace statistic	Critical Value
TOTAL	r=0		**64.1964***	47.21
	r≤ 1	0.21649	**30.7720***	29.68
	r≤ 2	0.14968	8.5579	15.41
CONTRACT	r=0		**89.1628***	47.21
	r≤ 1	0.31770	**36.790***	29.68
	r≤ 2	0.18038	9.5390	15.41
MCI	r=0		**74.0273***	47.21
	r≤ 1	0.39996	**38.2736***	29.68
	r≤ 2	0.33823	9.3747	15.41

INSTALL -MENT	r=0		**67.9902***	47.21
	r≤ 1	0.25053	28.4809	29.68
	r≤ 2	0.15397	5.5740	15.41
LOAN	r=0		**53.3971***	47.21
	r≤ 1	0.22698	18.1264	29.68
	r≤ 2	0.07316	7.7178	15.41

Note: trace statistics marked * are statistically significant at p≤0.05

As Table 8 indicates, the variables are cointegrated for all products. These tests prompt us to accept that there is one cointegrating vector for INSTALLMENT and LOAN, and two cointegrating vectors for TOTAL, CONTRACT and MCI, since the trace statistics do not lead to the rejection of the null hypothesis of r ≤ 1 and r ≤ 2, respectively. Based on these results, it can be concluded that there exists a long-run relationship among the premiums of the products and economic factors: Industrial Production Index, Interest rate, and Unemployment rate. The number of cointegrating vectors is used in the final estimation of the VEC models and in the estimation of the impulse reposes.

To facilitate a better interpretation of the VEC model, a normalization of the cointegrating vectors with respect to the variables of interest follows. Since our goal is to analyze the impact of economic variables on output, the cointegrating vector is normalized with respect to total income premium (TOTAL). The normalised cointegrating vector is reported in Table 9.

[Table 9] Normalized Cointegrating Vector

	TOTAL	**IP**	**INTEREST**	**UNEMPLOYMNET**	**constant**
TOTAL	1.000	-.247	.272	1.589	-26.351

This can be rewritten into the form of an equation:

TOTAL = .247 IP - .272 INTEREST - 1.589 UNEMPLOYMNET + 26.351.

This equation shows that IP affects TOTAL positively in the long-run, whereas INTEREST and UNEMPLOYMENT have a negative effect on output. The individual coefficients represent elasticities of IP, INTEREST and UNEMPLOYMENT with respect to output respectively. The negative sign on UNEMPLOYMENT suggests that an increase in the unemployment rate leads to a decrease in total income premiums in the long-run. The positive coefficient on IP indicates that an increase in IP positively affects TOTAL, boosting the surety and credit insurance industry and generating more premiums income in the insurance market. This finding then implies that a slowing in the growth of an economy will reduce premium incomes for guarantee insurance.

6. Impulse Response Analysis

The impulse response analysis is widely used in the empirical literature to examine the dynamic relationship between macroeconomic variables within VAR models (Lütkepohl, 1990). The responses trace the time path of effects on variables driven by a shock to a selected variable in the model. This analysis is not just for looking at how one variable affects another, since such a result can be drawn simply by looking at the coefficients; it is also used for examining a long-run effect on a response variable based on unexpected changes in an impulse variable. Figures 9-13 below show the results from the impulse response analysis across 60 periods, five years, where an orthogonalized shock each to IP, INTEREST and UNEMPLOYMENT is interpreted as an economic shock. There emerges an impulse response function of an impulse from the natural log of economic variables on the natural log of income premiums. Figure 9 displays the responses of total income premiums of products (TOTAL) to one standard deviation shock in IP, INTEREST, and UNEMPLOYMENT.

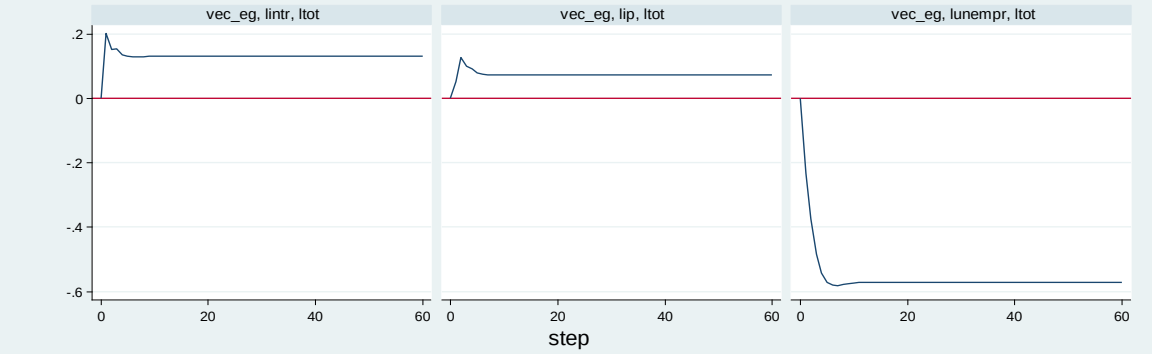
If there is an upward impact by one standard deviation on unemployment rate then the

total income premium drops by 0.6 percent after five months. On the other hand, a shock to IP and INTEREST increases TOTAL by 0.07 and 0.13 in the long run, respectively. Figure 10 shows the impulse responses for CONTRACT, with results opposite those for TOTAL. Increased interest rates can indeed provoke a drop in investment for construction firms, and thereby reduce the demand for contract bonds. When the unemployment rate rises, then the economy may be in recession.

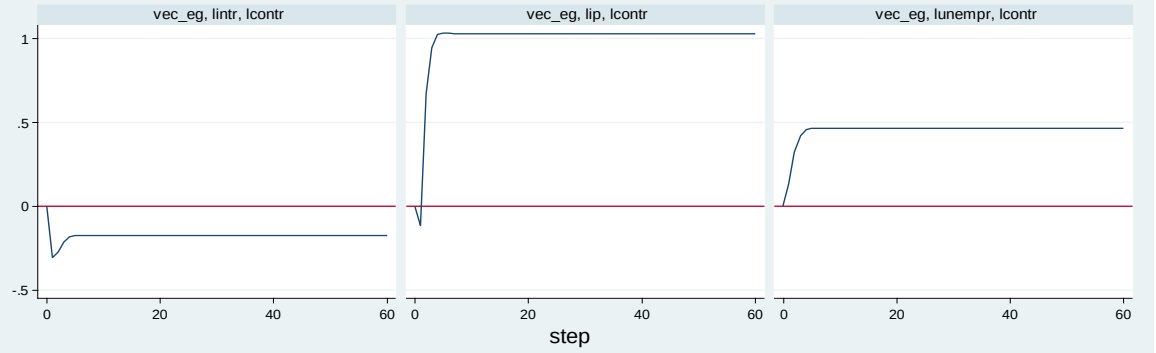
However, the results from our study do not yield the expected outcome. Because Korea has launched various innovative internship programs for young people, and because a number of public and private sector companies have temporarily recruited the economically active population, unemployment rates have been reduced.[2] The impact from the increase in IP is large, accounting for more than one percent of the construction field, as expected. In terms of the impulse responses for INSTALLMENT and LOAN, the IP and the premium move together, while negative relations between INTEREST/ UNEMPLOYMENT and the premium exist, as shown in Figures 11 and 12. On the other hand, MCI is needed when lenders (banks) provide more loans to borrowers beyond the predetermined loan amount. Therefore, if the market is pessimistic, the demand for MCI tends to decrease since the real estate market is not active. Figure 13 shows these phenomena. Graphs are arranged according to the effects of variables INTEREST, IP and UNEMPLOYMENT.

[2] According to the standard ILO definition, any person who works for more than one hour per week is counted as being employed.

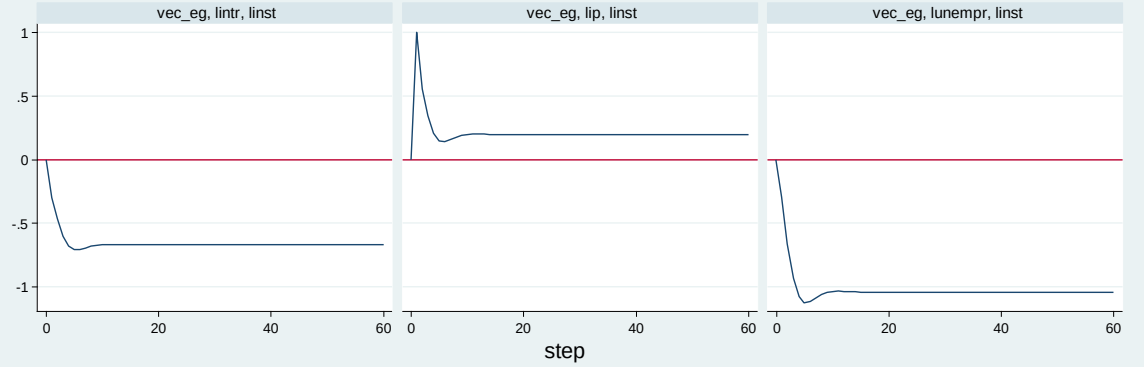
[Figure 9] The results of Impulse Response on TOTAL



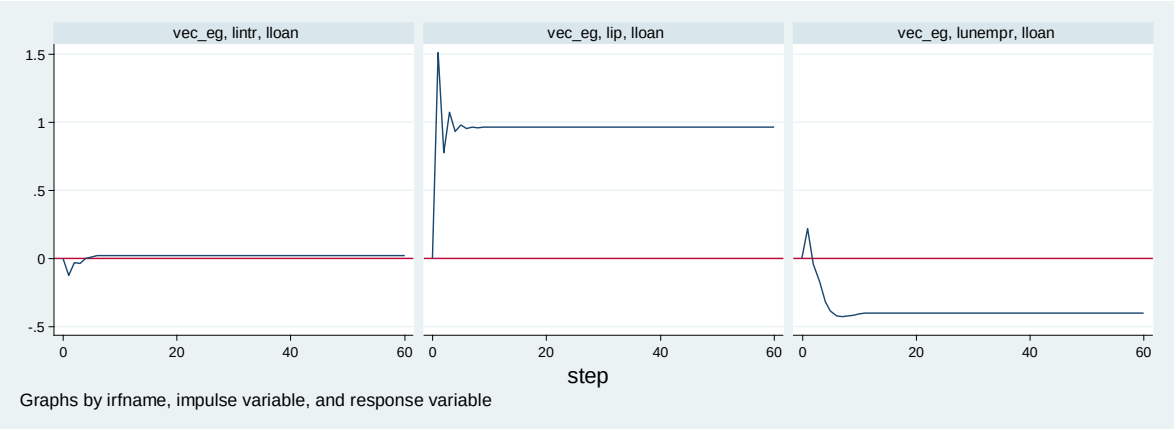
[Figure 10] The results of Impulse Response on CONTRACT



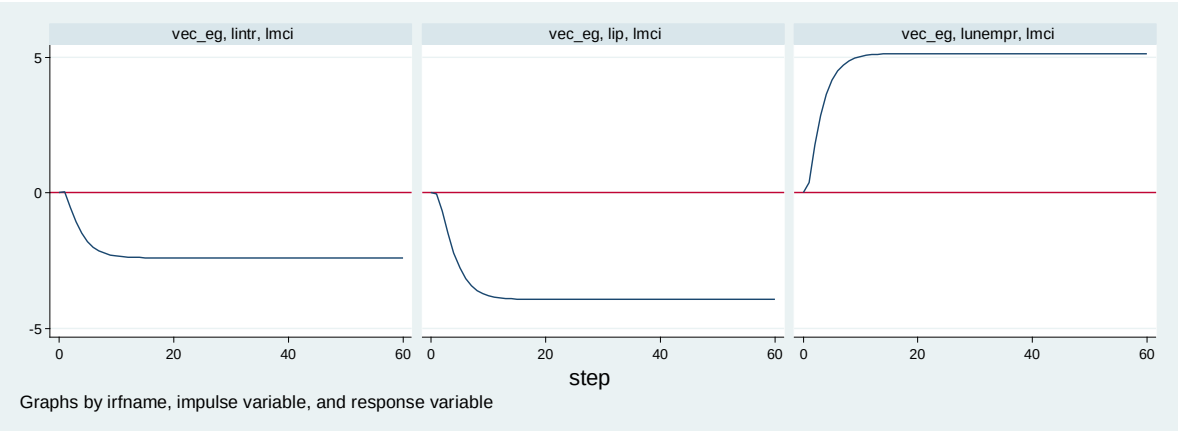
[Figure 11] The results of Impulse Response on INSTALLMENT



[Figure 12] The results of Impulse Response on LOAN



[Figure 13] The results of Impulse Response on MCI



V. Conclusion

The relationship between macroeconomic variables and the demand for credit and surety insurance (by total premium income) has been examined herein in order to ascertain how the market affects surety and credit insurance. Even though cultural aspects, existing insurance policy indexation mechanisms, the propensity to accept risk and the regulatory framework also explain how the insurance market responds to economic development, this empirical study has shown that there is a close relationship between the state of the economy and guarantee insurance premiums. In this regard, we have studied monthly data for economic variables and insurance income premiums by type for the period 2000 to 2010.

The result of the unit root tests showed that most of the variables were non-stationary at their levels and therefore the stationarity test on their differences was conducted, resulting in all variables being integrated at order one. Then the Johansen multivariate cointegration test was applied to investigate the long-run relationship between the surety and credit insurance market and economic growth. We concluded the presence of one cointegrating vector among the variables. Also, this study gives rise to the conclusion that the responses of the industry to various economic factors vary by product. The general effect of economic factors, IP, INTEREST and UNEMPLOYMENT, on the surety and credit insurance industry is indisputable since the market reacts positively to IP and INTEREST but negatively to UNEMPLOYMENT. The level of impacts of IP on CONTRACT and LOAN is greater than that of other economic variables. As seen in the response results of CONTRACT and INSTALLMENT, the impulse variable INTEREST exerts a different effect by product.

The world economy has begun to recover from the current financial crisis in an environment of low interest rates. However, low rates do not always guarantee economic growth, especially under certain circumstances. If no entrepreneur is willing to invest in or undertake a project, then the demand for money and the value of money will decrease. This

situation could spark inflation, which is parallel to economic growth given that those two concepts cannot meet at the same time. This study found that UNEMPLOYMENT has a negative effect on most surety and credit insurance products except for CONTRACT and MCI. Since MCI is different from other major products, the results of the impact analysis of UNEMPLOYMENT on CONTRACT require a careful look. In order to compute the unemployment rate, the number of persons unemployed becomes the numerator and the economically active population the denominator. Although a shock occurred to the unemployment rate (UNEMPLOYMENT), we cannot guarantee which variable caused the shock. In Korea, the number of persons employed in the studied period increased when departments and enterprises introduced youth internship programs as a result of government intervention on behalf of employment during the economic downturn.[3] Thus, it is risky to conclude that a decreased unemployment rate is on the same page as economic growth.

To conclude, the surety and credit insurance industry is related to various factors of both long-run and short-run economic growth, and each factor contributes to the market as well as to each product differently. Future work in this area would deepen our understanding of the surety and credit insurance development–economic growth nexus by considering different indicators for insurance engagement, such as changes in rate of premium and loss rate flows. Moreover, future inquiries would do well to examine supervisory and regulatory factors surrounding the guarantee insurance market.

[3] Korea reinstated the Youth Internship Program, which has provided jobs and career development opportunities to approximately 100,000 young persons.
(ILO, *Republican of Korea's response to the crisis*, G20 Country Brief on the Republic of Korea, 2010b, http://www.ilo.org/public/libdoc/jobcrisis/download/g20_korea_countrybrief.pdf.)

VI. References

Adams, M., Andersson, J., Andersson, L. and Lindmark, M., 2005, *The Historical Relation Between Banking, Insurance and Economic Growth in Sweden: 1830 to 1998*, Working Paper SEB (School of Business and Economics, Swansea, UK), 2006/2.,

Chen, N, 1991, Financial Investment Opportunities and the Macroeconomy, *Journal of Finance*, June, 529-554.

Cheung, Y. Wong and Ng, L. K., 1998, International Evidence on the Stock Market and Aggregate Economic Activity, *Journal of Empirical Finance*, 5, 281-296.

Choi, J., Hauser, S. and Kopecky, J., 1999, Does the Stock Market Predict Real Activity? Time Series Evidence from the G-7 Countries, *Journal of Banking and Finance*, 23, 1771-92.

Dickey, D.A. and Fuller, W. A., 1979, Distribution of the Estimators for Autoregressive Time Series With a Unit Root, *Journal of the American Statistical Association*, 74, 427-431.

Dickinson, D. G., 2000, Stock Market Integration and Macroeconomic Fundamentals: an Empirical Analysis: 1980-1995, *Applied Financial Economics*, 10, 261-276.

Enders, W., 2004, Applied Econometric Time-Series, John Wiley and Sons: New York, Second edition.

Engle, R. F. and Granger, C. W. J., 1987, Co-integration and error correction: Representation, estimation and testing, *Econometrica*, 55, 251-276.

Fama, E. F., 1981, Stock Returns, real Activity, Inflation, and Money, *American Economic Review*, 71, 545-564.

Haiss, Peter and Sümegi, Kjell, 2005, *The Relationship of Insurance and Economic Growth – A Theoretical and Empirical Analysis*, Europeinstitute University of Economics and Business Administration Viena.

Han, L., Li, D., Moshirian, F. and Tian, Y., 2010, Insurance Development and Economic Growth, *The Geneva Papers on Risk and Insurance – Issues and Practice*, 35, 183-199

International Credit Insurance & Surety Association, ICISA, http://www.icisa.org

Johansen, S., 1988, Statistical Analysis of Cointegration Vectors, *Journal of Economic Dynamics and Control*, 12 (2/3), 231-254.

Johansen, S. and K, Juselius, 1990, Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money, *Oxford Bulletin of Economics and Statistics*, Vol. 52.

Lee, H. C., Shin, D. H., Lee, K. H. and Lee, J. S., 1997, *Study on the Development of Guarantee Insurance*, Working paper No.97-1. 12, Korea Insurance Research Institute.

Levine, R., N. Loayza, and T. Beck, 2000, Financial Intermediation and Growth: Causality and Causes, *Journal of Monetary Economics*, 46(1), 31-77.

Lew, K. O., 1997, *A Study on the Optimum Price of Loan Bonds*, Working Paper No. 41, 165-187, Korea Insurance Academic Society.

, 2003, *Analysis on Loss Ratio of Guarantee Insurance and Risk Management with CAT Bond*, Working Paper No. 63, 30-53, Korea Insurance Academic Society.

Li, Y. and Wang, K., 1995, The Predictability of REIT Returns and Market Segmentation, *Journal of Real Estate Research*, 10(4), 471-482.

Ling, D. C. and Naranjo, A., 1997, Economic Risk Factors and Commercial Real Estate Returns, *Journal of Real Estate Finance and Economics*, 15(3), 283-307.

Lim, J.M., 1995, The Correlation Analysis between Business Cycle and Surety Bond Business, SungKyunKwan University.

Lütkepohl, H., 1990, Asymptotic Distributions of Impulse Response Functions and Forecast Error Variance Decompositions of Vector Autoregressive Models, *Review of Economic & Statistics*, 72, 116-125.

Mei, J. and Lee, A., 1994, Is There a Real Estate Risk Premium? *Journal of Real Estate Finance and Economics*, 9, 113-126.

Nasseh, A. and Strauss, J., 2000, Stock Prices and Domestic and International Macroeconomic Activity: A Cointegration Approach, *Quarterly Review of Economics and Finance*, 40(2), 229-245.

Ouh, C. S., 1993, *A Study on the Option Models for the Pricing of Insurance Contracts*, Working Paper No. 41, 133-163, Korea Insurance Academic Society.

Outreville, J. F., 1996, Life Insurance Markets in Developing Countries, *Journal of Risk and Insurance*, 63(2), 263-278.

Park, D.H., 2009, A Study on Factors of Guarantee Insurance Growth in Korea, Yonsei University.

Rousseau, P.L. and Wachtel, P. (1998), Financial Intermediation and Economic Performance: Historical Evidence from Five Industrialized Countries, *Journal of Money Credit and Banking*, 30(4), 657-678.

Rule, David, 2001, Risk Transfer between Banks, Insurance Companies and Capital Markets, Financial Stability Review No. 11, 127-159.

Shafik, N., and J. Jalali, 1991, *Are High Real Interest Rates Bad for World Economic Growth?* Policy Research Working Paper No. 669, the World Bank.

Skipper, H. D., 1997, *Foreign Insurers in Emerging Markets: Issues and Concerns*, Occasional Paper 97-2, Center for Risk Management and Insurance.

Stanton, R. H. and Wallace, N., 2009, *The Bear's Lair: Indexed Credit Default Swaps and the Subprime Mortgage Crisis*, Working paper, U.C. Berkeley.

Swiss Re, *Credit insurance and surety: solidifying commitments*, Sigma No 6/2006.

Toda, H.Y. and P.C.B Phillips, 1993, "Vector Autoregressions and Causality", *Econometrica*, 61, 1367–93.

Ward, D. and Zurbruegg, R. 2000. "Does Insurance Promote Economic Growth? Evidence from OECD Countries," *The Journal of Risk and Insurance*, 67(4), 489-506.

Webb, I., Grace, M. F. and Skipper, H., 2002, *The Effect of Banking and Insurance on the Growth of Capital and Output*, Georgia State University, Center for Risk Management and Insurance, Working Paper 02-1.