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Insurance Development and Economic Growth*

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This paper investigates the relationship between insurance development and economic growth by employing GMM models on a dynamic panel data set of 77 economies for the period 1994–2005. Insurance density is used to measure the development of insurance. Controlled by a simple conditioning information set and a policy information set, we can draw a conclusion that insurance development is positively correlated with economic growth. The sample is then divided into developed and developing economies. For the developing economies, the overall insurance development, life insurance and non-life insurance development play a much more important role than they do for the developed economies.
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Introduction

There has been a great interest in the role of financial institutions in economic growth. Economists refer to some work of researchers in the late 19th and early 20th centuries who discussed the significance of finance for economic growth. In recent times, a number of studies have analysed various issues with respect to the role of the banking sector in economic growth. The most prominent studies have been conducted by Levine and his colleagues. For instance, King and Levine[1] demonstrated the connection between bank development and economic growth, which was confirmed by later studies such as Levine, Beck *et al.*, Levine *et al.*, Rousseau and Wachtel, and Beck and Levine.[2] The studies of the relationship between financial development and economic growth have been shown to be robust using different econometric methods. For instance, Levine and Zervos[3] used cross-country regressions, whereas Levine[4] used cross-country instrumental variables regressions. The recent studies by Beck *et al.*, Levine *et al.*, and Beck and Levine[5] used dynamic panel GMM estimations, whereas Rousseau and Wachtel[6] used panel Generalised Method of Moments (GMM) estimation for a Vector Autoregression (VAR) model.

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[1] King and Levine (1993a, b).

[2] Levine (1998, 1999), Beck *et al.* (2000), Levine *et al.* (2000), Rousseau and Wachtel (2000), and Beck and Levine (2004).

[3] Levine and Zervos (1998).

[4] Levine (1998, 1999, 2002).

[5] Beck *et al.* (2000), Levine *et al.* (2000), and Beck and Levine (2004).

[6] Rousseau and Wachtel (2000).

Although comparing with studies on banks' role in economic growth, the role of insurance is relatively less examined, there has been increasing literature on this issue recently. Insurance is of great importance to a modern society by making many economic activities possible in addition to its contributions to the economies in terms of its size, employment, managed assets, and so on.[7] In fact, economic growth is characterised by the soundness of a national insurance market.[8,9,10] Outreville[9] emphasised on the importance of property-liability insurance and life insurance, respectively, in developing economies and their growth. Skipper[10] stated that insurance contributed to the economy from the following aspects: " … (1). Promotes financial stability and reduces anxiety; (2). Can substitute for government security programs; (3). Facilitates trade and commerce; (4). Mobilizes savings; (5). Enables risk to be managed more efficiently; (6). Encourages loss mitigation; (7). Fosters a more efficient capital allocation … ".[10] Sigma[11], Enz[12], and Ward and Zurbruegg[13] described the relationship between insurance market development and economic development as an "S Curve", which stated the starting sharp and then smooth increase of insurance development corresponding to the lower and higher stages of economic development, respectively. Ward and Zurbruegg[14] argued the insurance contributions to economic growth from the following aspects: risk transfer and indemnification services and financial intermediary services. They further analysed the above two economic contributions in terms of the following factors: productivity improvement and innovation facilitation for the former services and production efficiency enhancement, investment opportunity increases, reduction in the waste of early monetary realisation, and insurance institutional monitoring benefits for the latter services. Webb *et al.*[15] argued that life and property/liability insurers can contribute to economic growth from the following aspects: (1) Life insurance can increase productivity by reducing the demand for liquidity and by shifting from unproductive use to more productive use of resources. This is similar to the role of banks on investment quality documented by Pagano.[16] (2) Property/liability insurers provide an extra risk-financing choice, which potentially reduces the probability of firm financial distress and firm bankruptcy costs. This influences investment decisions in a particular economy. (3) Insurers may potentially increase expected investment returns by reducing the costs of risk financing, because insurers can: "(a) Excel in offering risk-pooling services through the identification of standardised risks and simplification of contracts, (b) Provide optimal investments and asset-liability matching, (c) Provide valuable and cost-effective administrative services related to

[7] Liedtke (2007).
[8] UNCTAD (1964).
[9] Outreville (1990, 1996).
[10] Skipper (1997).
[11] Sigma (1999).
[12] Enz (2000).
[13] Ward and Zurbruegg (2002).
[14] Ward and Zurbruegg (2000).
[15] Webb *et al.* (2002).
[16] Pagano (1993).

risk management and claims payments, and (d) Offer products that are tax-deductible business expenses in many markets" (p. 6).[15] Regarding the theoretical relationship between insurance and economic growth, Webb *et al.*[16] has a detailed argument. According to Webb *et al.*,[15] based on a Solow-Swan neoclassical growth model, assuming a Cobb-Douglas type of production model, which states that production growth is due to labour, capital, and technology, the following factors should be added in the augmented growth model: financial activities of property/liability insurers and life insurers, which with banks may measure the differences in productivity and investments based on institutional factors and savings rate. As can be seen from the above analysis, it is expected in this paper that insurance activities should have a positive impact on economic growth. However, this impact may vary across different countries and across different lines of insurance business.

The empirical results of this paper, by employing GMM models on a dynamic panel data set of 77 economies for the period 1994–2005 and controlled by a simple conditioning information set and a policy information set, have shown that insurance development is positively correlated with economic growth. This paper reports the analysis of insurance development and economic growth by breaking them into life and non-life insurance as well as developed and developing economies. It has been shown that for the developing economies, the overall insurance development, life insurance and non-life insurance development play a much more important role than they do for the developed economies. This finding has significant policy implications in that "it could give empirical ground to the micro-insurance policy strategy of the World Bank and the UN-ISDR and nicely complement the theory of the wealth effects of insurance".[17]

The remaining parts of this paper are structured as follows: the following section discusses the data used in the empirical analysis and the econometric methodology. The penultimate section discusses the empirical results. The final section concludes.

Data in the insurance industry and empirical methodology

This paper evaluates the long-run relationship between insurance development and economic growth. In doing so, it will differentiate between developed and developing economies and the role that life and non-life insurance development could play for economic growth. This paper uses a panel data set of 77 economies over the period 1994–2005. Table A1 in the Appendix lists the names of the economies used in this study. Table 1 reports summary statistics for 77 economies used in this study by referring to the information on economic growth, insurance density, life and non-life insurance density. As can be seen from Table 1, the development of insurance is largely different in life and non-life insurance lines and across different economies.

Table 2 reports global insurance income from 1998 to 2005. As can be seen from Table 2, in 2005, there were a total amount of US$3426 billion in worldwide insurance premiums, with life insurance US$1974 billion and non-life insurance US$1452 billion.

[17] Thanks to the anonymous referee to point this out.

Table 1 Summary statistics: 1994–2005

Descriptive statistics	*Economic growth*	*Insurance density*		
		Total business	*Life business*	*Non-life business*
Mean	3.480	4.982	3.747	4.428
Median	3.700	4.808	3.507	4.433
Maximum	31.100	8.534	8.313	7.660
Minimum	−22.900	0.182	−2.302	−0.511
Std. dev.	3.459	2.001	2.504	1.823
Skewness	−0.825	−0.096	0.001	−0.338
Kurtosis	13.545	2.005	1.920	2.340
Jaque-Bera	4348.392	37.427	42.103	32.468
Probability	0.000	0.000	0.000	0.000
Observations	916	875	866	874
Cross-sections	77	77	77	77

Table 2 Global insurance income, 1998–2005 (billion)

	2005	*2004*	*2003*	*2002*	*2001*	*2000*	*1999*	*1998*
Life insurance	1,974	1,849	1,673	1,536	1,439	1,521.3	1,412	1,264
Non-life insurance	1,452	1,395	1,268	1,091	969	922.4	912	891
Total insurance	3,426	3,244	2,941	2,627	2,408	2443.7	2,324	2,155

Source: Sigma (various issues).

From Figure 1, it can be seen that the growth patterns between 1994 and 2005 for life and non-life insurance differ from each other. For instance, there was a large fluctuation for life insurance, while the fluctuation in non-life insurance is relatively small. As can also be seen from Figure 1, there have been apparently unbalanced growth patterns between life and non-life insurance over this period. For instance, in 2005, the growth rates for total, life and non-life premiums were 2.5 per cent, 3.9 per cent, 0.6 per cent, respectively, after deducting inflation.[18]

Indicators

To measure insurance development, we use the insurance density, measured by annual premium payments divided by population and converted into U.S. currency. As a way of assessing the independent connection between insurance development and economic growth, we control for other potential factors influencing economic growth in this paper. In order to control for convergence, in the simple conditioning information set, we include the initial real gross domestic product (GDP) per capita. As a way of

[18] Sigma (2006).

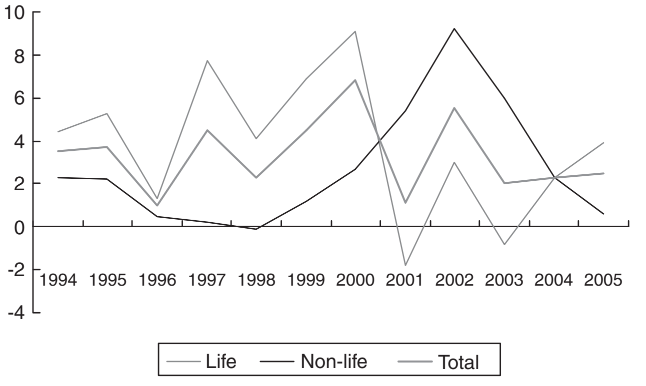

Figure 1. Global growth in premium income from 1994 to 2005.
Source: Sigma (various issues).

controlling for human capital accumulation, we use gross enrolment ratio of tertiary students. In the other model that deals with the *policy conditioning information set*, we use one of the following factors: inflation rate, trade balance, and gross fixed assets investment. All of the above factors are supposed to have an impact on the conventional growth model by influencing one or more of the growth factors, such as labour, capital, and technology.

Empirical methodology

In order to empirically test the relationship between insurance development and economic growth and also to avoid the statistical problems associated with the use of ordinary least squares, the panel data technique is used in this paper. We use the same methodology used in Beck and Levine[19] for banks, stock markets, and economic growth for the purpose of testing the role of insurance development in economic growth. In this paper, we follow Beck and Levine[19] to employ the following regression equation, Eq. (1):

$$y_{i,t} - y_{i,t-1} = (\alpha - 1)y_{i,t-1} + \beta' X_{i,t} + \eta_i + \varepsilon_{i,t} \tag{1}$$

where y is GDP after taking into account inflation and by the logarithm transformation, X is the independent variables other than lagged y, η, and ε is unobservable country-specific effect and error term, respectively, i means country, and t means time period. We use two-step GMM estimators of dynamic panel data with fixed effects to estimate the model, which is promoted by Holtz-Eakin *et al.*,[20] and Arellano and Bond.[21] In the model, we also include period dummy variables to control for time-specific effects.

[19] Beck and Levine (2004).
[20] Holtz-Eakin *et al.* (1988).
[21] Arellano and Bond (1991).

Empirical results

Regression without insurance density and endogeneity test of insurance density

For testing the impact of insurance development on the growth of an economy, we conduct a series of regressions excluding the insurance density from the explanatory variables. The statistics of those regressions are given in Table 3. If the regressors include all economic factors, which are gross enrolment ratio of tertiary students lagged 2, inflation rate, trade balance, and gross fixed assets investment, the sign of the coefficient of gross enrollment ratio of tertiary students lagged 2 is positive, which is reasonable. If regressing inflation rate and gross fixed assets investment separately with gross enrollment ratio of tertiary students lagged 2 one by one into the regressors, we can have reasonable regressions. If we put trade balance and gross enrollment ratio of tertiary students lagged 2 together into regressors, the coefficient of trade balance is negative, which is not reasonable. However, the R^2 of all those regressions are lower than the corresponding regressions including insurance density. It has demonstrated that insurance development really improves the economic growth. In fact, in the history of human economic society, investment and demand take the first position to promote the economic growth, and then for the long run come the education and technique innovation. These factors do not exclude the positive impact of the development of insurance on economic growth, at least it improves the economic growth, in term of promoting the society stability and security. This paper argues that insurance density with other important variables really improve the economic growth, in another words, it has a positive impact on economic growth. For testing the endogeneity of insurance density, we implement the Hausman test. The result shows the insurance density is very significantly endogenous. Therefore in the next regression we use GMM method in the dynamic panel modeling.

Insurance density and economic growth

Using the econometric methods outlined above, this section presents regression results concerning the relationship between economic growth and insurance density. The regressions simply include the logarithm of initial real per capita GDP, the logarithm of gross enrolment ratio of tertiary students, the logarithm of gross fixed assets investment, the average inflation rate over the period, and trade balance of the economies. We present the panel estimator regressions in Table 4.

The results in Table 4 show a statistically and economically significant relationship between the insurance development and economic growth. The first column reports the result of the pure regression without the use of the variables forming *the policy conditioning information set* (trade balance, inflation rate, gross fixed assets investment). Insurance density is positively correlated with economic growth at the 5 per cent significance level in the columns 1–5, where the following potential econometric problems are absent: simultaneity bias, omitted variables, serial correlations, and over-fitting problems. Inflation rate and trade balance have negative signs and enter the regression significantly. Gross fixed assets investment is positively correlated with the economic growth. In the last column, we include all *the policy*

Table 3 Economic growth excluding insurance density, two-step GMM estimator

Regressors	*1*	*2*	*3*	*4*
Dependent variable: Real per capita GDP growth				
GDP (−1)	−0.011	0.019***	0.006	−0.014
	(0.750)	(0.000)	(0.328)	(0.694)
Logarithm of initial income per capita	−33.912***	−36.039***	−35.387***	−33.952***
	(0.000)	(0.000)	(0.000)	(0.000) ***
Gross enrolment ratio of tertiary students lagged 2[a]	2.050***	1.034***	1.121***	1.916***
	(0.000)	(0.000)	(0.000)	(0.000)
Inflation rate[b]	−2.089**	0.149*		
	(0.031)	(0.096)		
Trade balance[b]	0.046		−0.073***	
	(0.195)		(0.000)	
Gross fixed assets investment[b]	0.303***			0.271***
	(0.000)			(0.002)
R^2	0.248	0.233	0.245	0.246
Serial correlation test (*P*-value)[c]	0.000	0.000	0.000	0.000
J-statistic[d]	25.713	50.187	42.186	26.486
Countries	73	73	73	73
Observations	417	535	535	417

[a]In the regression, this variable is included as log (1 + variable).
[b]In the regression, this variable is included as log (variable).
[c]The null hypothesis is that the errors in the regression do not have second-order serial correlation.
[d]The null hypothesis is that the instruments do not have over-fitting problem.
P-value in parentheses.
***,**,* indicate significance at 1%, 5%, and 10% level in the two-step GMM regression, respectively.

conditioning information set and conclude that economic growth is also positively influenced by insurance density. Regarding the magnitude of the measured effects, it has been shown in the last column that there is about 4.781 per cent increase in economic growth given 1 per cent increase in total insurance density. For the purpose of comparison, the enhancement impact of banking activities on economic growth is no more than 1.8 per cent given 1 per cent increase in bank credit (Table 4, Beck and Levine[19]).[22]

Life insurance density and economic growth

The results for the panel regressions in Table 5 show that life insurance density has a significantly positive impact on economic growth. The results do not reject the close connection between economic growth and life insurance density with the coefficient ranging from 1.657 to 2.640. Serial correlations in the error term

[22] We use logarithm of insurance density and Beck and Levine (2004) use logarithm of banking credit. So it should be interpreted with precautions when comparing two different measures.

Table 4 Economic growth and insurance density, two-step GMM estimator

Regressors	*1*	*2*	*3*	*4*	*5*
Dependent variable: Real per capita GDP growth					
GDP (−1)	0.038	0.059***	0.0265***	−0.001	0.023206
	(0.000)	(0.000)	(0.004)	(0.971)	(0.583)
Logarithm of initial income per capita	−42.100***	−42.93909***	−42.635***	−42.889***	−42.794***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gross enrolment ratio of tertiary students lagged 2[a]	1.252*	0.975***	1.340***	0.990***	1.023*
	(0.000)	(0.000)	(0.000)	(0.0599)	(0.079)
Inflation rate[b]		−0.878**			−1.572
		(0.0140)			(0.135)
Trade balance[b]			−0.051***		0.092
			(0.000)		(0.261)
Gross fixed assets investment[b]				0.317***	0.402***
				(0.000)	(0.000)
Premium density[b]	5.414***	5.455***	5.329***	4.872***	4.781***
(Insurance density)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.260	0.257	0.267	0.276	0.300
Serial correlation test (*P*-value)[c]	0.000	0.000	0.000	0.000	0.000
J-statistic[d]	52.982	52.869	52.125	32.022	35.560
Economies	73	73	73	73	73
Observations	517	517	517	405	405

[a]In the regression, this variable is included as log (1 + variable).
[b]In the regression, this variable is included as log (variable).
[c]The null hypothesis is that the errors in the regression do not have second-order serial correlation.
[d]The null hypothesis is that the instruments do not have over fitting problem.
P-value in parentheses.
***,**,* indicate significance at 1%, 5%, and 10% level in the two-step GMM regression, respectively.

and over-fitting problems are absent. Total fixed assets investment plays a significant role in economic growth, and inflation rate and trade balance do not pass the test in the last column. Regarding the magnitude of the measured effects, it has been shown in the last column that there is about 1.728 per cent increase in economic growth given 1 per cent increase in life insurance density, which is very close to the enhancement impact of banking activities on economic growth (no more than 1.8 per cent given 1 per cent increase in bank credit documented in Table 4 by Beck and Levine[19]).

Non-life insurance density and economic growth

In Table 6, the panel results are more robust than life insurance as described in Table 5. The coefficient value ranges from 4.180 to 4.962. Non-life insurance density is positively and significantly correlated with economic growth when using the same conditioning information sets and policy information sets. Inflation rate and trade

Table 5 Economic growth and life insurance density, two-step GMM estimator

Regressors	*1*	*2*	*3*	*4*	*5*
Dependent variable: Real per capita GDP growth					
GDP (−1)	0.004	0.017***	−0.002	−0.100***	−0.078**
	(0.591)	(0.001)	(0.739)	(0.005)	(0.016)
Logarithm of initial income per capita	−40.941***	−40.435***	−41.570***	−41.144***	−42.249***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gross enrolment ratio of tertiary students lagged 2[a]	0.697***	0.460**	0.901***	0.647	0.657*
	(0.004)	(0.041)	(0.000)	(0.186)	(0.080)
Inflation rate[b]		0.179			−1.414
		(0.598)			(0.118)
Trade balance[b]			−0.070***		0.0496
			(0.000)		(0.340)
Gross fixed assets investment[b]				0.439***	0.454***
				(0.000)	(0.000)
Premium density[b]	2.640***	2.502***	2.478***	1.657***	1.728***
(Insurance density)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.255	0.251	0.264	0.315	0.316
Serial correlation test (*P*-value)[c]	0.000	0.000	0.000	0.000	0.000
J-statistic[d]	55.620	58.782	54.043	27.194	26.516
Economies	73	73	73	73	73
Observations	511	511	511	405	405

[a]In the regression, this variable is included as log (1 + variable).
[b]In the regression, this variable is included as log (variable).
[c]The null hypothesis is that the errors in the regression do not have second-order serial correlation.
[d]The null hypothesis is that the instruments do not have over fitting problem.
P-value in parentheses.
***,**,* indicate significance at 1%, 5%, and 10% level in the two-step GMM regression, respectively.

balance have negative signs and enter the regression significantly. The gross fixed assets investment is positively correlated with economic growth. Once again, serial correlations in the error term and over-fitting problems are absent. Regarding the magnitude of the measured effects, it has been shown in the last column that there is about 4.180 per cent increase in economic growth given 1 per cent increase in non-life insurance density. For the purpose of comparison, the enhancement impact of banking activities on economic growth is no more than 1.8 per cent given 1 per cent increase in bank credit (Table 4, Beck and Levine[19]).

In terms of the magnitude of the impact, it is apparent from the above analysis that non-life insurance has a much more significant impact on economic growth than life insurance. In addition, in Tables 4–6, initial income per capita has a negative effect on economic growth, which indicates that the higher the historical economic growth is, the slower the economy boosts. This supports the "S Curve" argument by Sigma[11] and Enz.[12] Gross enrolment ratio of tertiary students lagged 2 periods has positively influenced economic growth in most equations. So, the education factor is quite important for a country's long-term development.

Table 6 Economic growth and non-life insurance density, two-step GMM estimator

Regressors	*1*	*2*	*3*	*4*	*5*
Dependent variable: Real per capita GDP growth					
GDP (−1)	0.043***	0.065***	0.034***	0.032	0.0548
	(0.000)	(0.000)	(0.000)	(0.340)	(0.105)
Logarithm of initial income per capita	−42.491***	−42.667***	−42.690***	−41.221***	−40.028***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gross enrolment ratio of tertiary students lagged 2[a]	1.129*	0.926***	1.238***	1.336***	1.083*
	(0.000)	(0.001)	(0.000)	(0.009)	0.061
Inflation rate[b]		−0.933**			−0.381
		(0.016)			(0.768)
Trade balance[b]			−0.049***		0.0851**
			(0.000)		(0.042)
Gross fixed assets investment[b]				0.305***	0.366***
				(0.000)	(0.000)
Premium density[b]	4.962***	4.938***	4.909***	4.197***	4.180***
(Insurance density)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.250	0.246	0.257	0.263	0.259
Serial correlation test (*P*-value)[c]	0.000	0.000	0.000	0.000	0.000
J-statistic[d]	55.619	55.628	55.986	31.505	28.153
Economies	73	73	73	73	73
Observations	516	516	511	405	404

[a]In the regression, this variable is included as log (1 + variable).
[b]In the regression, this variable is included as log (variable).
[c]The null hypothesis is that the errors in the regression do not have second-order serial correlation.
[d]The null hypothesis is that the instruments do not have over fitting problem.
P-value in parentheses.
***,**,* indicate significance at 1%, 5%, and 10% level in the two-step GMM regression, respectively.

The comparison between developed economies and developing economies

This section of the paper attempts to separately investigate the relationship between insurance development and economic growth for industrial and developing economies over the period 1994–2003. Classification of economies is based on 2002 Gross National Income (GNI) per capita calculated using the World Bank Atlas method. The income groups are: low income, $735 or less; lower middle income, $736–$2,935; upper middle income, $2,936–$9,075; and high income, $9,076 or more. According to our empirical analysis, we divide 77 economies discussed in the paper into two kinds: developed economies and developing economies. The developed economies are selected from high-income economies publicised by the World Bank. Low-income and middle-income economies are sometimes referred to as developing economies. We also put the upper middle-income economies into the developing economies group. Finally, we get 32 industrialised economies and 45 undeveloped economies. The means of these economies' indicators can be seen in Tables A2 and A3 in the Appendix.

According to Tables 7–9, the results in developing markets provide strong support for the insurance services: overall insurance density is strongly associated with

Table 7 A comparison between developed economies and developing markets: Economic growth and insurance density

Regressors	*Developing economies*	*Developed economies*
Dependent variable: Real per capita GDP growth		
GDP (−1)	0.109***	−0.157***
	(0.001)	(0.000)
Logarithm of initial income per capita	−49.900***	−19.311***
	(0.000)	(0.000)
Gross enrolment ratio of tertiary students lagged 2[a]	2.435**	1.656*
	(0.040)	(0.065)
Premium density[b]	9.172***	1.873***
(Insurance density)	(0.000)	(0.001)
R^2	0.299	0.231
Serial correlation test (*P*-value)[c]	0.000	0.000
J-statistic[d]	26.949	24.307
Economies	41	32
Observations	291	216

[a]In the regression, this variable is included as log (1 + variable).
[b]In the regression, this variable is included as log (variable).
[c]The null hypothesis is that the errors in the regression do not have second-order serial correlation.
[d]The null hypothesis is that the instruments do not have over-fitting problem.
P-value in parentheses.
***,**,* indicate significance at 1%, 5%, and 10% level in the two-step GMM regression, respectively.

Table 8 A comparison between developed economies and developing markets: Economic growth and life insurance density

Regressors	*Developing economies*	*Developed economies*
Dependent variable: Real per capita GDP growth		
GDP (−1)	0.150***	−0.178***
	(0.000)	(0.000)
Logarithm of initial income per capita	−36.563***	−44.525***
	(0.000)	(0.000)
Gross enrolment ratio of tertiary students lagged 2[a]	0.023	0.627
	(0.980)	(0.681)
Premium density[b]	2.495***	0.812
(Insurance density)	(0.000)	(0.328)
R^2	0.206	0.420
Serial correlation test (*P*-value)[c]	0.000	0.000
J-statistic[d]	28.793	22.175
Economies	41	32
Observations	297	214

[a]In the regression, this variable is included as log (1 + variable).
[b]In the regression, this variable is included as log (variable).
[c]The null hypothesis is that the errors in the regression do not have second-order serial correlation.
[d]The null hypothesis is that the instruments do not have over-fitting problem.
P-value in parentheses.
***,**,* indicate significance at 1%, 5%, and 10% level in the two-step GMM regression, respectively.

Table 9 A comparison between developed economies and developing markets: Economic growth and non-life insurance density

Regressors	*Developing economies*	*Developed economies*
Dependent variable: Real per capita GDP growth		
GDP (−1)	0.121***	−0.162***
	(0.000)	(0.000)
Logarithm of initial income per capita	−48.039***	−19.220***
	(0.000)	(0.000)
Gross enrolment ratio of tertiary students lagged 2[a]	2.323*	1.653*
	(0.059)	(0.072)
Premium density[b]	8.760***	1.309**
(Insurance density)	(0.000)	(0.028)
R^2	0.247	0.230
Serial correlation test (*P*-value)[c]	0.000	0.000
J-statistic[d]	25.030	23.537
Economies	41	32
Observations	289	216

[a]In the regression, this variable is included as log (1 + variable).
[b]In the regression, this variable is included as log (variable).
[c]The null hypothesis is that the errors in the regression do not have second-order serial correlation.
[d]The null hypothesis is that the instruments do not have over fitting problem.
P-value in parentheses.
***,**,* indicate significance at 1%, 5%, and 10% level in the two-step GMM regression, respectively.

economic growth. This close relationship holds after controlling for potential simultaneity bias and omitted variable bias. More specifically, as shown in Table 7, overall insurance density is closely associated with economic growth, with a coefficient of 9.172 significant at 1 per cent level for developing economies, much larger than that for developed economies (a coefficient of 1.873 at 5 per cent significance level). This means there is about 9.172 per cent increase in economic growth given 1 per cent increase in overall insurance density for the developing economies, compared to 1.873 per cent increase in economic growth given 1 per cent increase in non-life insurance density for the developed economies. It has been shown in Table 8 that life insurance only has a significant impact on economic growth for the developing economies, not for the developed economies. There is about 2.495 per cent increase in economic growth given 1 per cent increase in life insurance density for the developing economies. As shown in Table 9, non-life insurance density is closely associated with economic growth, with a coefficient of 8.76 significant at 1 per cent level for the developing economies, much larger and significant than that for the developed economies (a coefficient of 1.309 at 5 per cent significance level). This means that there is about 8.76 per cent increase in economic growth given 1 per cent increase in non-life insurance density for the developing economies, compared to 1.309 per cent increase in economic growth given 1 per cent increase in non-life insurance density for the developed economies. As can be seen from the above analysis, for developing economies, life insurance, non-life insurance, and total insurance play a much more import role than they do for the developed economies.

Conclusion

In this paper, we have combined cross-sectional and time series data to examine the relationship between insurance development and economic growth in 27 economies over the period of 1994–2005. We used GMM models on dynamic panel data to conclude that there is fairly strong evidence in favour of the hypothesis that insurance development contributes to economic growth. This relationship is more significant for non-life insurance than for life insurance. We then divide the economies into two groups and compare the different roles of insurance in the developed and developing economies. The result indicates that insurance, including life insurance and non-life insurance business, play a much more important function in developing economies than they do in developed countries. Through the combination of the results of Beck and Levine[19] and this paper, we can argue that overall financial development containing stock markets, banks and insurance is significantly correlated with economic growth. The empirical results of this paper suggest that non-life insurance is of great importance for economic growth in developing countries and should be strengthened in these countries.

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Appendix

The data are listed country by country in Table A1. The mean of major indicators in emerging economies and developed economies used in the paper are provided in Tables A2 and A3.

Table A1 Economies in the sample

United States	Spain	Kuwait
Canada	Portugal	Lebanon
Panama	Cyprus	Oman
Mexico	Slovenia	Thailand
Argentina	Czech Republic	Jordan
Venezuela	Greece	Saudi Arabia
Brazil	Hungary	China
Costa Rica	Slovak Republic	Iran
Uruguay	Croatia	India
El Salvador	Poland	Philippines
Dominican Republic	Russia	Sri Lanka
Colombia	Latvia	Vietnam
Ecuador	Bulgaria	Pakistan
Peru	Turkey	Bangladesh
Guatemala	Romania	South Africa
United Kingdom	Ukraine	Mauritius
Denmark	Japan	Tunisia
Netherlands	Hong Kong SAR	Morocco
Belgium	Singapore	Zimbabwe
Finland	Taiwan Province of China	Kenya
France	Korea	Algeria
Norway	Israel	Egypt
Germany	United Arab Emirates	Nigeria
Italy	Qatar	Australia
Austria	Bahrain	New Zealand
Iceland	Malaysia	

Table A2 The mean of major indicators in emerging economies, 1994–2005

Developing economies	*Premium density*[a]	*Life premium density*[a]	*Non-life premium density*[a]	*GDP per capita growth (%)*
Panama	1.272	4.785	3.557	4.431
Mexico	0.484	4.381	3.498	3.835
Argentina	0.773	4.897	3.703	4.527
Venezuela	0.663	4.359	0.737	4.331
Brazil	0.850	4.462	2.991	4.152
Costa Rica	0.749	4.331	1.684	4.255
Uruguay	0.674	4.632	3.081	4.359
El Salvador	0.484	3.507	2.278	3.154
Dominican Republic	0.647	3.668	1.447	3.549
Colombia	0.851	3.899	2.433	3.626
Ecuador	0.402	3.171	0.897	3.061
Peru	0.005	3.155	1.924	2.761
Czech Republic	1.257	5.322	4.177	4.931
Hungary	0.958	4.985	3.993	4.509
Slovakia	1.069	4.809	3.707	4.386
Croatia	1.015	4.999	3.000	4.826
Poland	0.996	4.742	3.648	4.327
Russia	0.699	3.917	2.690	3.497
Latvia	0.785	4.181	1.474	4.103
Bulgaria	0.734	3.462	1.548	3.274
Turkey	0.184	3.561	1.757	3.379
Romania	−0.169	2.829	0.915	2.650
Ukraine	0.213	2.415	−1.163	2.348
South Korea	2.481	7.108	6.804	5.765
Lebanon	0.940	4.904	3.335	4.660
Oman	−0.001	4.314	2.576	4.118
Thailand	1.029	4.138	3.544	3.315
Jordan	0.726	3.526	1.685	3.337
Saudi Arabia	−0.682	3.745	0.033	3.717
China	0.619	2.742	2.125	1.879
Iran	−0.250	2.696	0.226	2.604
India	0.843	2.349	2.062	0.941
Philippines	0.376	2.694	2.037	1.941
Sri Lanka	0.238	2.436	1.559	1.896
Vietnam	−0.092	1.362	0.710	0.805
Pakistan	−0.361	1.175	0.326	0.612
Bangladesh	−0.676	0.576	0.095	−0.407
South Africa	2.785	6.242	6.051	4.563
Mauritius	1.438	5.145	4.586	4.288
Tunisia	0.548	3.645	1.082	3.565
Zimbabwe	1.485	3.187	2.505	2.474
Kenya	1.023	2.315	0.894	2.032
Algeria	−0.567	2.348	−0.711	2.304
Egypt	−0.358	2.153	0.857	1.822
Nigeria	0.055	1.228	−0.830	1.072

[a]This variable is included as log variable.

Table A3 The mean of major indicators in industrialized economies, 1994–2005

Industrialized economies	*Premium density*[a]	*Life premium density*[a]	*Non-Life premium density*[a]	*GDP per capita growth (%)*
U.S.	8.004	7.232	7.382	3.375
Canada	7.344	6.526	6.758	3.450
Guatemala	2.871	1.232	2.653	3.425
U.K.	8.026	7.678	6.780	2.958
Denmark	7.739	7.241	6.790	2.450
The Netherlands	7.839	7.232	7.048	2.375
Belgium	7.555	7.011	6.620	2.208
Finland	7.689	7.421	6.226	3.483
France	7.744	7.333	6.653	2.183
Norway	7.520	6.846	6.793	3.133
Germany	7.484	6.652	6.911	1.475
Italy	7.046	6.390	6.259	1.708
Austria	7.361	6.493	6.810	2.058
Iceland	6.814	3.983	6.747	3.775
Spain	6.816	6.062	6.169	3.125
Portugal	6.585	5.913	5.842	2.292
Cyprus	6.397	5.710	5.615	3.767
Slovenia	6.176	4.605	5.934	3.942
Greece	5.509	4.795	4.833	3.367
Japan	8.284	8.052	6.707	1.617
Hong Kong	7.153	6.836	5.747	3.708
Singapore	7.116	6.821	5.731	5.533
China (Taiwan)	6.938	6.604	5.669	4.717
Israel	6.876	6.138	6.222	3.733
United Arab Emirates	5.687	3.949	5.489	5.675
Qatar	5.726	3.004	5.703	8.058
Bahrain	5.329	3.673	5.115	4.283
Malaysia	5.243	4.653	4.408	5.533
Kuwait	4.836	3.057	4.643	2.692
Morocco	3.554	2.177	3.259	3.700
Australia	7.534	6.984	6.659	3.800
New Zealand	6.940	5.621	6.612	3.358

[a]This variable is included as log variable.