

# **Proposals of the Suitable Solvency Regulation for the Vietnamese Life Insurance Industry – Based on the Experience from the US and Japan**

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## **Abstract**

There are two common methods of supervising solvency of life insurance companies in the world such as fixed ratio model and risk based capital model. This study mainly focuses on comparative study of solvency supervision models based on the experience and data from newly emerging Vietnam's life insurance industry. At first, the study specifies the method to calculate the risk amount of each type of risk and solvency margin ratio based on the risk based capital models of the US and Japan and compares the results given by each calculation. Then it describes proposals for applying the new risk based capital model in Vietnam and compares solvency results calculated by the currently stipulated model in Vietnam with the new risk based capital model in order to come up with the better model that should be used for the Vietnamese life insurance industry in the near future.

**Key words:** Risk-based capital model, Fixed ratio model, Solvency margin, Solvency margin ratio, Life insurance, Risk amount.

# **Proposals of the Suitable Solvency Regulation for the Vietnamese Life Insurance Industry – Based on the Experience from the US and Japan**

## **1. Introduction**

The primary function of an insurer is to manage all risks such as risks of insufficient premiums, miscalculation of technical provisions, adverse change in loss frequency, reinsurance risk, depreciation, liquidity, interest rates, etc in a way of being able at any time to meet its commitments to policyholders and beneficiaries. The capacity of an insurer to meet its commitments is known as solvency. Due to the complexity in structural organization and business of the insurance industry, it is quite difficult for policyholders or beneficiaries to check insurer's solvency by themselves. It is, therefore, usual that for the primary purpose of protecting consumers, countries have instituted systems for supervising the solvency of insurance companies. Recently, there are two common methods of supervising solvency of life insurance companies in the world. The first is the "fixed-ratio" model used by European Union since 1979, and the second is the "risk-based" capital model (RBC model), a new method used by the National Association of Insurance Commissioners (NAIC) in USA in 1992. In 1996, Japan for its first time introduced the new model of solvency supervision called "solvency margin criteria", which is in general similar to the risk based capital model of the US. In 2002, European Union issued the EU Directive 2002/83/EC on a new solvency regulation called "Solvency I" with a view to reforming the old solvency supervision. But in the new solvency regulation of European Union, fixed ratio model is still used.

The fixed ratio model by itself shows some weak points such as inflexibility of using fixed percentage to different profiles of risk of insurance companies, or higher burden of solvency margin loaded to prudent insurance companies. The objective of RBC model is to address the drawbacks of the fixed ratio model by incorporating not just one or two factors, but all of the risks confronting an insurance undertaking. In property-liability insurance, Grace, Harrington, and Klein (1998) find that although the ratio of actual capital to RBC is negatively and significantly related to the probability of subsequent failure, relatively few companies that later failed had ratios of actual capital to RBC within NAIC's ranges for regulatory action. Cummins, Harrington and Klein (1995) confirm that the predictive accuracy of the RBC ratio is very low, even when the

components of the ratio, rather than the overall ratio, are used as predictors. However, in life insurance, there are not many discussions about the effectiveness of the RBC model.

In developing countries, life insurance markets seem not so developed as compared with those in developed countries. Within a limited range of risks and very strict regulations, whether fixed ratio model is still be useful to implement rather than more complicated RBC model should be a good question. In addition, it also wonders that whether RBC model can actually give insurance supervisors an effective tool to early intervene any troubled life insurers. The objective of this paper is to focus on comparative study of fixed ratio and RBC models based on the experience and data from the Vietnamese life insurance industry to answer those questions and find out the most suitable and effective solvency model for Vietnam in the future.

The rest of paper is organized as follow. Section two applies the principles of RBC model of the US and a similar RBC model of Japan to calculate components of risk amount and compare solvency margin ratio by using data from the Vietnamese life insurance industry. Section three develops a new solvency model for Vietnam and uses this model to calculate solvency margin ratio for the Vietnamese life insurance industry. Section four compares the solvency margin ratios of all life insurance companies in Vietnam calculated by the new model with those calculated by the currently stipulated solvency model in Vietnam. The last section gives conclusions.

## **2. Comparative study of two RBC models**

In order to calculate solvency margin ratio, we have to clarify total risk amount and solvency margin. Total risk amount can be calculated by combining various risk amounts such as risk amount of insurance risk, assumed interest rate risk and interest rate risk, risk amount of asset management risk, and risk amount of operational risk. We use data of Vietnam life insurance industry to analyze each risk amount in both RBC models to find a better risk amount for Vietnam. The details of each model is specified in Appendix 1.

### ***Insurance risks***

Apart from life insurance risk, we also have to consider non-life insurance risk because BaoViet – the biggest insurance company in Vietnam is now doing both life and non-life insurance business. For life insurance risk, the risk factor of insurance risk of 0.06 seems suitable to both Japanese and US models. For non-life insurance risk, because the US model does not have a formula to calculate risk amount, we use formula of Japanese model in stead to calculate.

### ***Assumed interest risks (in RBC model of Japan only)***

The risk factor of assumed interest rate risks is based on the difference between the assumed interest rates in setting up premiums and the treasury bond interest rate. Treasury bond interest rate of Japan is 4 percent a year while that of Vietnam is 8.5 percent a year. Therefore, assumed interest rates and its corresponding risk factors must be adjusted in order to meet Vietnam's current condition. For assumed interest rate is below 6 percent, risk factor is 0.01. For assumed interest rate varies from 6 percent to 11 percent or above, risk factor also changes from 0.2 to 1.2.

### ***Interest rate risks (in RBC model of the US only)***

The risk factor is set based on the degree of guarantee of surrender value. Almost insurance policies sold in Vietnam are endowment ones that have long term insurance period and surrender penalty. Therefore, we apply medium risk factor of 1.5 percent of all life insurance policies in Vietnam.

### ***Asset management risks***

Asset management risks are calculated for short-term deposit risk, long-term deposit and loan risk, joint venture and shares risk, real estate and reinsurance risk, and receivable risk. Each type of assets has a different level of risk. Therefore, we apply different risk factors for respective types of assets mentioned in each RBC model (see Appendix 1). However, there are two problems when using Japanese RBC model for Vietnam in terms of long term loans and deposits risks. At first, in Vietnam, almost big banks are state-owned enterprises. As a principle, state-owned banks can receive supports from the government in case of financial difficulties. Therefore, the probability

of insolvency of those state-owned banks seems as low as zero. As a result, we only calculate risks arising from deposits given to non-state-owned banks. It has been found that only 13.2 percent of total deposits given to non-state-owned banks<sup>1</sup>. Non-state-owned banks in Vietnam are much smaller than those Vietnamese state-owned banks as well as Japanese private ones. That fact shows that applying risk factor of only 1 percent to non-state-owned banks like Japan's seems not appropriate. Secondly, in terms of investment regulation, we will concentrate on two angles of investment regulations. For quantitative limits on categories of the investments of a life insurance company, it cannot be said that the regulation of Vietnam on the maximum limits of investments is looser than that in Japan. However, for quantitative limits on financial instruments held by the same institution, unlike the case in Japan, in Vietnam there are no regulations dealing with concentration risk of investment. Therefore, it can be said that, in general, investment regulations issued in Vietnam seem not as tight as those in Japan.

With all of these problems, when applying this model in Vietnam, risk factor for long term deposits and loans should be 1 percent for 50 percent of long term deposits and loans, and 4 percent for the remaining 50 percent to make sure the investments of life insurance companies in Vietnam become secure.

***Operational risks and catastrophic risks (only for non-life insurance)***

Risk factor of operational risks is shown in Appendix 1. For catastrophic risks, in Vietnam, there are very few earthquakes but there are many heavy typhoons. Therefore, catastrophic risk in Vietnam should be assumed for claims paid on recurrence of a certain typhoon during a year. However, we do not have information about the amount of claims arising from typhoon in Vietnam. Therefore, we use the data from 9 biggest general insurance companies in Japan to calculate catastrophic risks for BaoViet's part of non-life business. The risk factor applied to BaoViet is 0.11.

In calculating risk amount of catastrophic risks using US RBC model, because we don't have information about catastrophic risks in the US, we use the risk amount of catastrophic risks already calculated by Japanese RBC model to apply US RBC model.

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<sup>1</sup> State Bank of Vietnam, the report in 2004.

### ***Solvency margin ratio***

This ratio is calculated by dividing total amount of solvency margin by 50 percent of the total amount of risks as specified in both Japanese RBC and US RBC models. As a result, the standard of solvency margin ratio for Japanese life insurance companies is 200 percent. However, in order to compare with solvency margin ratio of Vietnam (the standard solvency margin ratio in Vietnam is 100 percent), we calculate solvency margin ratio by the following way: dividing total amount of solvency margin by the total amount of risks and multiplying by 100 percent.

### ***Comparative results of solvency calculations between Japanese RBC and US RBC models***

Based on the explanation about the way of calculation for both Japanese RBC and US RBC models mentioned above, we can have two implications as follows. (1) We can see that the requirements of US RBC model are tighter than those of Japanese model. Therefore, the solvency margin ratio calculated by US model should be lower than that of Japanese model. (2) However, as we compare the results of both models, it can be found that out of 5 life insurance companies in Vietnam, there are three companies (Prudential, Manulife and AIA) whose solvency margin ratios calculated by US model are higher than those calculated by Japanese model.

In order to explain the reasons why the implication (2) is contrary to the implication (1), we examine the facts witnessed in Prudential and AIA in the financial year of 2003.

For the case of Prudential and AIA, even the risk factor for joint venture, shares and real estate in US RBC is high, it does not have much effect on total risk amount of Prudential and AIA because the two companies have invested not so much in those categories. In terms of interest rate risk, in US RBC model, the amount of interest rate risk is mainly focused on the uncertainty of lapse rate and interest rate. However, in Japanese RBC model, for those assumed interest rates that are higher than that of treasury bond, higher amounts of risks will be applied in the calculation. We can understand that the problem for Prudential and AIA is at assumed interest rate, not at lapse rate.

### ***Implications of the current context of Vietnam life insurance industry***

In terms of interest rate risk, in Japan, when the recent prolonged Japanese recession struck, life insurance companies found difficult to earn investment returns sufficient to match returns on liabilities. The problem has been that insurers provided policyholders with relatively high guaranteed rates of return in the late 1980s and in the 1990s and the subsequent decline of interest rate reduced investment returns to below those initial guaranteed rates. In order to deal with that problem, in RBC model of Japan, assumed interest rate risks has been recognized for risk of not being able to secure the assumed interest rate, which forms the basis of calculation for technical reserve. The assumed interest rates set up by life insurance companies in Vietnam are very high, as compared with government bond interest rate. It can be considered that the situation in Vietnam seems similar to that of Japan.

In terms of structure of investment assets, we can find that 30.8 percent<sup>1</sup> of total assets of life insurance companies in Vietnam has been invested in short term deposits. In contrast, this type of investment is not popular in the US and Japan. In addition, the stock market is in its infancy in Vietnam, and therefore investment chances in shares seem not so many so far. Vietnam is a developing country with rather high growth rate of GDP. At present, the demand of capital to serve its economic development is increasing but the channels of mobilizing available money from the population are very limited. Banking system is playing the most important role in mobilizing and giving loans to serve the demand of capital of enterprises. Because of this high demand of capital, the interest rate sees higher than in other countries like the US or Japan. The interest rate for long term deposits is higher than that for short term and the same as that of government bonds. Therefore, it also seem attractive for both the population and life insurance companies to give long term deposits at banks.

### **3. A new solvency model**

In section 2, we have done comparisons of solvency calculations using RBC models of Japan and the US, and found suitable and inappropriate points of each model. Hinted by the analysis of those inappropriate problems, we can see that it is necessary to

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<sup>1</sup> The Ministry of Finance of Vietnam, the report in 2004.

develop a new model for Vietnam with a view to correcting inappropriate points of both Japanese RBC model and US RBC model when being applied to Vietnam and making sure the new model suitable to the current situation of Vietnam. Now we create some proposals for applying the new RBC model in Vietnam.

**Proposal 1:** *Because of the risk of highly assumed interest rate in Vietnam now, it should be suitable to apply assumed interest rate factor specified in the Japanese RBC model*

**Proposal 2:** *For purpose of keeping Vietnamese life insurance industry secure in the near future when life insurance companies in Vietnam pay more attention to investing in high-risk assets such as shares, special bonds and real estate etc., it should be reasonable to exercise asset management risk factors for shares, deposits, real estate as specified in the US RBC model*

**Proposal 3:** *Because of undue reinsurance regulations for both non-life and life insurance business in Vietnam recently, it should be useful to take reinsurance risk factor as mentioned in the Japanese RBC model*

**Proposal 4:** *In Vietnam, the amount of receivable accounts of unpaid premiums for some life insurance companies has become high, therefore it should be safer to use receivable account risk factor as shown in US RBC model*

**Proposal 5:** *In order to deal with risks of adverse assumed mortality or morbidity rate, it is appropriate to apply insurance risk factor as clarified in the Japanese RBC model*

**Proposal 6:** *It is necessary to take business administration risk factor of US RBC model into consideration with a view to preventing occurrence of loss beyond anticipation in business administration of a life insurance company*

**Proposal 7:** *Because of many catastrophic risks in Vietnam, it is not surprising to use catastrophic risk factor as mentioned in the Japanese RBC model.*

Based on the 7 proposals, we do calculation of solvency margin ratio of each life insurance company and the whole life insurance industry in Vietnam and come out with the results of calculations.

#### **4. Comparative study of the new and the current solvency models**

We calculate the solvency margin ratio for all life insurance companies in Vietnam for the period from 2001 to 2003 based on the proposed RBC model mentioned in section 3. Then we compare results calculated in the new RBC model for Vietnam with those calculated in line with the model specified in the current regulation in Vietnam to know which model seems better than the other. After comparison, we know that BaoViet and BaoMinh-CMG have very good financial positions that are clearly shown in both models. However, there are some financial problems happening to the other three companies such as Prudential, AIA and Manulife. Now we turn to explain in detail those financial problems arising to each of those three companies.

##### ***In case of AIA***

In year 2001, solvency margin calculation was still done in accordance with the old regulation issued by the Ministry of Finance of Vietnam since 1993. Accordance to the old regulation, the solvency margin of each life insurance company shall be equal to the paid capital of each company regardless of gaining profits or incurring losses. As a result, the solvency margin of a life insurance company is different from that company's owner's equity. As specified in the old regulation, AIA met solvency requirement at the end of 2001. However, at the end of 2001, AIA suffered accumulated losses valued at VND 88.3 billion and owner's equity of AIA was VND 0.01 billion (Table A-Appendix 2). AIA actually became insolvent. Therefore, using the new calculation model where the solvency margin is calculated by using the life insurance company's owner's equity rather than paid capital is safer in determining a company's solvency status.

Since the year 2002, the new regulation following the issue of the Insurance Business Law has been effective. In accordance with the new regulation, the solvency margin of each life insurance company shall be determined equal to owner's equity of that company shown in the balance sheet. The solvency margin ratio of a life insurance company shown in relative value (in percentage) shall be calculated by dividing its solvency margin by the total risk amount like other RBC models. With the warning of the Ministry of Finance, AIA increased its capital by the capital injection from its parent

company (AIA Asia) to recover its solvency margin ratio of 510.7 percent (Table B - Appendix 2).

### ***In case of Prudential***

In the year 2001, Prudential had the result of solvency of VND 313.7 billion (Table A- Appendix 2) that was much higher than the minimum solvency requirement of zero (the old regulation). However, according to the proposed RBC model, Prudential had solvency margin ratio of 129.3 percent (Table B - Appendix 2), just a little bit higher than the minimum solvency requirement of 100 percent. Therefore, it can be said that solvency requirement as stipulated by the old regulation was very weak as compared with the proposed RBC model.

In the year 2002, the solvency margin ratio of Prudential, calculated according to the new regulation, was 103 percent (Table A –Appendix 2). It is very clear that the solvency of Prudential was exposed to risk. As a matter of fact, in 2003 the Ministry of Finance required Prudential to increase its capital to support its weak solvency and Prudential decided to increase its capital in November 2003. It can be said that from the end of 2002 to November 2003, before the company increased its capital, Prudential's solvency margin would be lower than 100 percent. As mentioned in Table B Appendix 2, the solvency margin ratio of Prudential of 69.1 percent means that Prudential was insolvent in 2002. We can see that the solvency margin of Prudential in 2002 in Table A and B Appendix 2 was the same. However, the total risk amount of Prudential in Table B was much higher than that in Table A. The main reason for that big difference of total risk amount of two methods is the assumed interest rate risk amount. Prudential has had assumed interest rate of 12 percent a year, much high than government bonds' interest rate (8.5 percent a year) that can make the company suffer higher risk factor as compared with other companies in the proposed RBC model.

In the year 2003, as requested by the Ministry of Finance, the company increased its paid capital from VND 585.6 billion to 973.6 billion by its parent company (Prudential UK). But the accumulated loss of Prudential at the end of 2003 was VND 495.3 billion (Appendix 2). As seen from Table A Appendix 2, the solvency margin ratio of Prudential was 207 percent, showing that Prudential was solvent in 2003. But in Table B, the solvency margin ratio of the company just was 88.8 percent, lower than the

minimum solvency requirement. It means that the company was insolvent in 2003. Based on the solvency margin ratio of 207 percent of Prudential, the Ministry of Finance did not have warning or measures to ask Prudential to improve its solvency. If based on the solvency margin of 88.8 percent calculated by the new model, Prudential should have been required to improve its solvency since then.

### ***In case of Manulife***

As seen from Table B Appendix 2, the solvency margin ratio of Manulife decreased sharply from 531.6 percent in 2001, 246.8 percent in 2002 to 147.7 percent in 2003. Since year 2000 Manulife has not increased its paid capital yet. Increase in the total risk amount and no change in the paid capital have made Manulife's solvency margin ratio decrease quickly.

Manulife has had profits in life insurance business since 2002 and the solvency margin ratio of 279 percent at the end of 2003 as seen from Table A Appendix 2. It can be said that the solvency of Manulife was very good. However, as seen from Table B Appendix 2, although at the end of 2003, Manulife still became solvent, but with quick increase in the volume of business and no increase in paid capital, Manulife may be exposed to insolvency in 2004.

## **5. Conclusion**

After comparing the solvency calculation results of proposed RBC model and currently used solvency regulation in Vietnam, especially for cases of Prudential and AIA, it can be said that the current regulation applied in Vietnam seems so weak in an effort to find out troubles arising in those life insurance companies. On the contrary, proposed RBC model has proved to be an effective measure to identify life insurance companies being exposed to insolvent as well as reasons why those companies facing with insolvency. In process of developing the new model, a balance between the complexity of the formula and the ease of application has been taken into prudent account. When the life insurance market in Vietnam is becoming bigger and bigger as the Vietnamese economy is rapidly growing, it should be more effective to replace the current solvency regulation by the proposed RBC model with a view to strongly

maintaining the solvency of all life insurance companies in Vietnam and public confidence.

In process of comparing solvency margin ratios of each life insurance company between currently using model and the proposed RBC model, we have found that the time at which the Ministry of Finance could recognize the financial difficulties of life insurance companies seems late (in the case of AIA in 2001 and Prudential in 2002). In order to closely supervise solvency of life insurance companies in Vietnam, solvency reports should be submitted to the Ministry of Finance once every quarter rather than once a year like the current model.

The solvency calculation of Vietnam life insurance industry is based on the up-to-date data. However, the business of life insurance is experiencing dramatic changes worldwide that will pose unprecedented challenges for supervisory authorities in the future. The results of solvency calculation should be modified in cases of having remarkable changes in Vietnam life insurance industry.

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## Appendix 1

### Risks and risk factors in RBC models of Japan and the US

	Japan	The US (New York)														
<b>1/ Calculation of total risk amount (minimum solvency margin)</b>																
(1) Insurance risk	<p>- Life insurance risk factor: 0.06% of net amount at risk (A) and 1% of annuity reserve (C), life insurance risk amount = <math>\sqrt{A^2 + C^2}</math></p> <p>- Non-life insurance risk factor: for different classes of insurance the different risk factors are applied to both insurance premium and insurance coverage, the bigger risk amount shall be chosen to calculate non-life risk amount in the following formula:</p> $\sqrt{(1-\rho)*(a^2 + b^2 + c^2 + d^2 + e^2 + f^2) + \rho*(a+b+c+d+e+f)^2}$ <p>where <math>\rho</math> is correlation coefficient of 0.05; a, b, c, d, e and f are risk amount of fire insurance, personal accident insurance, auto insurance, hull insurance, cargo insurance and other insurance respectively.</p>	<p>- Life insurance risk factor: 0.15%, 0.1%, 0.075% and 0.06% for levels of net amount at risk: 0-USD 500 million, 500 million-5 billion, 5 billion-250 billion, and more than 250 billion respectively.</p>														
(2) Assumed interest rate risk	<p>For different assumed interest rate of each life insurance company different risk factors are applied.</p> <table border="1"> <thead> <tr> <th>Assumed interest rate</th> <th>Risk factor</th> </tr> </thead> <tbody> <tr> <td>0%- under 2%</td> <td>0.01</td> </tr> <tr> <td>2%- under 3%</td> <td>0.2</td> </tr> <tr> <td>3%- under 4%</td> <td>0.4</td> </tr> <tr> <td>4%- under 5%</td> <td>0.6</td> </tr> <tr> <td>5%- under 6%</td> <td>0.8</td> </tr> <tr> <td>6% and above</td> <td>1.0</td> </tr> </tbody> </table>	Assumed interest rate	Risk factor	0%- under 2%	0.01	2%- under 3%	0.2	3%- under 4%	0.4	4%- under 5%	0.6	5%- under 6%	0.8	6% and above	1.0	N/A
Assumed interest rate	Risk factor															
0%- under 2%	0.01															
2%- under 3%	0.2															
3%- under 4%	0.4															
4%- under 5%	0.6															
5%- under 6%	0.8															
6% and above	1.0															
(3) Interest rate risk	N/A	Interest rate risk factor of 3.0%, 1.5% and 0.75% of technical reserves for high, medium and low level of risks of interest respectively.														
(4) Asset management risk	<p>- Short term deposits risk factor: 0.1% of investment amount</p> <p>- Long term loans given to or bonds issued by finance institutions and other institutions, risk factor: from 1% to 30%</p> <p>- Joint venture and shares risk factor: 10% of investment amount.</p> <p>- Real estate risk factor: 5% of investment amount</p> <p>- Reinsurance risk factor: 1% of the difference between assumed reinsurance and ceded reinsurance amount.</p>	<p>- Short term deposit risk factor: 0.3% of investment amount</p> <p>- Long term deposits and loans risk factor: 0.3% - 30% based on levels of rating from A~AAA to D</p> <p>- Joint venture and shares risk factor: 30% of investment amount</p> <p>- Real estate risk factor: 10% of investment amount.</p> <p>- Reinsurance risk factor: 0.5% of the difference between assumed reinsurance and ceded reinsurance amount</p> <p>- Account receivable risk factor: 5% of account receivable.</p>														
(5) Operational risk (or business administration risk)	Operational risk factor: 3% of total risk amount of insurance risk, assumed interest rate risk, asset management risk.	Operational risk factor: 2% of the volume of premiums														
(6) Catastrophic risk (for non-life insurance)	Based on the assumed net claims paid on the recurrence of a certain earthquake or typhoon															

(7) Total risk amount (minimum solvency margin)- (R)	Total risk amount can be calculated as the following formula: $(R) = \sqrt{(R_1^2 + (R_2 + R_3)^2)} + R_4 + R_5$ Where $R_1$ : The amount corresponding to insurance risks; $R_2$ : The amount corresponding to assumed interest risks; $R_3$ : The amount corresponding to asset management risks; $R_4$ : The amount corresponding to business administration risks; $R_5$ : The amount corresponding to major catastrophic risks.	Total risk amount can be calculated as the following formula: $(R) = (C - 4a) + \sqrt{((C - 1) + (C - 3a))^2 + (C - 2)^2 + (C - 5)^2}$ Where <sup>1</sup> $C - 1$ : Total risk amount of assets $C - 2$ : Risk amount of insurance risks $C - 3a$ : Risk amount of interest rate risks $C - 4a$ : Risk amount of operational risks $C - 5$ : Risk amount of catastrophic risks
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**2/ Calculation of solvency margin (available solvency margin)**

Total equity (S)	- Owner's equity plus, - Price fluctuation provisions (the balance of contingency reserve) plus, - Subordinated debts (long term debts) based on the remaining period of debts.	Owner's equity
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**3/ Calculation of solvency margin ratio**

Solvency margin ratio (M, in percent)	$M = \frac{(S)}{0.5 * (R)}$	$M = \frac{(S)}{0.5 * (R)}$
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**Maximum limits of investments**

<b>By category of assets</b>		
Real estate	20%	20%
Stocks	30%	20%
Overseas investment	30%	-
Loans	-	-
<b>By category of issuer</b>		
Bonds and loans issued or held by the same person.	3%	-
The aggregate of assets including debentures and stocks, loans and lending of securities, deposits, assets in trust, guarantee of obligation and trading of derivatives to one and the same person.	10%	14%

<sup>1</sup> C-1, C-2, C-3a, C-4a and C-5 are signs of different risk amounts, not formulas.

## Appendix 2

### Table A

Unit: VND billion

Name of company	2001			2002			2003		
	Solvency margin	Total risk amount	The difference between solvency margin and total risk amount (VND billion)	Solvency margin	Total risk amount	Solvency margin ratio (%)	Solvency margin	Total risk amount	Solvency margin ratio (%)
	(1)	(2)	(3)= (1)-(2)	(5)	(6)	(7)= (5)/(6)	(8)	(9)	(10)= (8)/(9)
1/ BAOVIET	620.0	185.4	434.6	1,037.5	432.2	240	1,478.7	587.1	252
2/ PRUDENTIAL	329.2	15.5	313.7	188.4	183.2	103	478.4	231.4	207
3/ MANULIFE	145.3	5.5	139.8	124.9	28.3	441	147.7	52.9	279
4/ AIA	84.3	2.1	82.2	119.0	11.8	1,008	118.5	16.2	729
5/ BAOMINH-CMG	65.0	0.7	64.3	62.7	6.8	919	60.0	13.1	458
Whole Market	1,243.8	209.2	1,034.6	1,477.9	662.3	223	2,283.3	900.7	253

Source: Ministry of Finance of Vietnam

The old regulation ← → The new regulation

### *The new calculation model of RBC*

### Table B

Unit: VND billion

Name of company	2001			2002			2003		
	Solvency margin	Total risk amount	Solvency margin ratio (%)	Solvency margin	Total risk amount	Solvency margin ratio (%)	Solvency margin	Total risk amount	Solvency margin ratio (%)
	(1)	(2)	(3)= (1)/(2)	(4)	(5)	(6)= (4)/(5)	(7)	(8)	(9)= (7)/(8)
1/ BAOVIET	1,424.90	271.0	525.8	1,576.3	358.7	439.5	1,774.4	484.2	366.4
2/ PRUDENTIAL	126.96	98.2	129.3	<b>188.4</b>	<b>272.5</b>	<b>69.1</b>	<b>478.4</b>	<b>538.5</b>	<b>88.8</b>
3/ MANULIFE	104.37	19.6	531.6	125.0	50.6	246.8	147.9	100.1	147.7
4/ AIA	<b>0.01</b>	<b>11.0</b>	<b>0.1</b>	119.0	23.3	510.7	120.4	38.2	315.1
5/ BAOMINH-CMG	44.71	1.6	2731.9	62.7	3.7	1695.4	60.0	9.1	656.6
Whole Market	1,700.95	401.5	423.7	2,071.4	708.8	217.6	2,581.1	1170.2	195.5

Source: Own calculation by using data from life insurance companies in Vietnam

- In 2001, solvency calculation was done based on the old regulation (the circular issued by the Ministry of Finance, taking effect since 1994). As specified in that circular, the solvency margin of a life insurance company shall be equal to paid capital, not owner's equity. In 2001, AIA had accumulated losses of VND 88.3 billion as compared with its paid up capital of 84.3 billion, therefore its owner's equity was 0.01 billion.

- As specified in the old regulation, the total risk amount shall be 0.1% of the sum insured. Also, result of solvency calculation shall be expressed in absolute term. If that result is over zero, it means that the concerned life insurance company meets solvency requirement.

- In 2002, the implementing regulations of Insurance Business Law took effect. As specified in the new regulation, the solvency margin of a life insurance company shall be equal to its owner's equity. If solvency margin ratio of a life insurance company is equal or more than 100%, that company meets solvency requirement. The total risk amount shall be 4 % of the mathematic reserves plus 0.1% of the net amount at risk (for not-over-10-year contracts) and 4% of the mathematic reserves plus 0.3% of the net amount at risk (for over-10-year contracts).