Original Article: SCALE AND ACCURACY OF INCURRED-BUT-NOT-REPORTED RESERVES IN THE CASE OF INSURANCE COMPANIES IN UZBEKISTAN

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Abstract

Accuracy of incurred but not reported (IBNR) reserve estimates impacts the financial health and solvency of insurance companies. In order to estimate future losses and hold reserves accordingly, insurance companies use various methods that are applicable for specific situations. The purpose of this research is to evaluate accuracy of currently required IBNR reserves and compare it with estimates of other two widely used methods such as Chain Ladder and Bornhuetter-Ferguson, in the case of two big insurance companies operating in the Republic of Uzbekistan for the period between 2005 and 2014. The findings can be of interest to regulators and management of the company to further develop organization's reserve estimates.

Key words: Prediction error, insurance claims, IBNR reserve, Chain Ladder method, Bornhuetter-Ferguson method.

Introduction

Identification of right amount of Incurred-but-not-reported (IBNR) reserves is one of the challenging and most discussed topics in insurance industry. Insurance companies operating in Uzbekistan are required to hold IBNR reserves in the amount equal to 10% of their net written premiums for the last calendar year, in accordance with the Provision of Ministry of Finance of the Republic of Uzbekistan (2000) about "On the formation of insurance reserves by types of insurance, other than life-insurance". However, this method is not always accurate due to its dependency only on written premiums for the last 12 months, instead of historical development of losses. On the other hand, reserve estimation methods such as Chain Ladder (CL) and Bornhuetter-Ferguson (BF) are considered to be the most widely used techniques worldwide that are based on past loss development data (Mack, 2008).This paper will examine the accuracy of currently used method and compares it with errors in prediction using CL and BF methods for two big insurance companies for the period of 2005-2014. Finally, recommendations will be given to insurance companies on the implementation of most appropriate method, considering current development trends of insurance market in the country. During the analysis, full names of companies are not presented in order to keep their identities confidential.

Insurance market in Uzbekistan

After achieving its independence in 1991, Uzbekistan has recovered its financial system and was able to develop a competitive insurance market. Increasing

attention to insurance industry by regulatory bodies can be identified by number of legislative documents such as the law about "Insurance operations" (2002), decrees "On measures on further liberalization and development of insurance market" (2002) and "On additional measures on further reforms and development of insurer services market" (2008). Furthermore, implementation of the decrees of Cabinet of Ministers "On compulsory insurance of vehicle owner's third party liability" (2008), and "On compulsory insurance of employer's civil liability" (2009) increased financial results of insurance companies. According to the results of ranking the compatibility of national legislation with international standards and principles of insurance, conducted by the experts of Asian Development Bank (ADB), on the basis of developed norms by IAIS, in 2008-2013, the ranking of Uzbek legislation has reached to 3.12 out of highest 5. In comparison, Italy (4.39) and Singapore (4.81) have reached their results being the members of IAIS for 20 years (Ministry of Finance of the Republic of Uzbekistan, 2014). All developed norms and regulations contributed to the rise in insurance premiums by more than 10 times during 2005-2014.

Highest shift in the industry can be observed in 2009 (166%), where the legislation on compulsory insurance was introduced (Figure 1). Coming to 2013, the share of compulsory insurance in insurance portfolio was equal to 30.4%, comparing with 4.8% in 2007 (Ibid). On the other hand, the proportion of paid claims in relation to premiums is increasing more, indicating the rising need to a more accurate reserve estimate.

Literature review

The application of CL and BF reserving methods on accuracy of future reserve estimates has been studied by various authors (Schmidt, 2006; Gediminaite, 2009; Borodinova, 2011;Collins, 2013). Some of the authors concluded that BF method is the most accurate in the case of their chosen sample (Gediminaite, 2009), whereas, others found the CL method's estimate has the lowest error, as the insurance companies in their sample had several dependent sub-portfolios (Schmidt, 2006). After comparing Russia's reserving technique with other models, Borodinova (2011) concluded that current method has highest accuracy. On the other hand, Kenya's method of reserving as a percentage of net written premiums was found to have significant errors comparing to the methods of CL and BF (Collins, 2013).

Reserve estimation methods

As regards to the estimation methods, Mack (2008) points out that both CL and BF methods are considered to be the most widely used methods based on loss development triangles. The future claims in CL method are equal to the last development period's claims multiplied by a certain factor.

$$E\left[C_{i,j}\right] = C_{i,j-1} * f_{j-1}$$

Where, development factor is defined as follows:

$$f_{j-1} = \frac{\sum_{k=0}^{i*(j)} C_{k,j}}{\sum_{k=0}^{i*(j)} C_{k,j-1}}$$

Considering that the reserves of the company are equal to the outstanding claims for each accident year, we have:

$$R_i^{CL} = C_{i,I} - C_{i,I+1-i} = U_i^{CL} - C_{i,I+1-i}$$.

Not similar to CL estimate of reserves, BF method uses actuary's judgment to forecast future claims by the amount of ultimate losses. Thus the BF reserves are calculated by finding the remaining proportion of ultimate claims, or in the other words, by multiplying eventual losses by outstanding claims percentage.

$$R_i^{BF} = U_i(1 - z_{n+1-i})$$

Where ultimate claims amount is identified by

$$U_i = v_i * q_i$$

with v_i – net written premiums for accident year i; q_i – prior estimate of accident year i. Remaining percentage of outstanding losses for each loss development period is found by development factor of CL method:

$$z_j = \prod_{k=n+1}^{\infty} (f_j)^{-1}$$

More detailed instructions to use CL and BF methods can be found in papers of Mack (1993; 1998).

Results and analysis

In order to measure the accuracy of various reserving methods, financial data of two insurance companies for the period of 2005-2014 is used. There were no straight regulations related to IBNR reserves during the years of observation, which in turn affects the viability of results. When evaluating the applicability of alternative methods, the data in loss development triangle was reduced to five years (2005-2009). This will help to compare the actual losses in accident years of loss development triangle with estimated future claims.

As it was mentioned before, reserving methods generate different results that may vary significantly from original claims. Remind that current regulation suggests insurance companies to hold IBNR reserves in the amount equal to 10% of net written premiums for the last calendar year. The results show, that both companies had reserve insufficiency problems during the years of study when using current method (Table 1).

As it can be seen from Table 1 and Figure 2, insurance companies had significant reserve under estimations during the years of analysis. The highest reserve inaccuracy was observed in 2010, 2011 and 2014 for both companies. However, Company B's reserve errors rose above 100% during these periods. The reserve estimations trends of two insurance companies move correspondingly due to the impact of other economic and firm specific factors.

In the next step of analysis, IBNR claims of companies were measured as a percentage of net written premiums. This will help to identify the true amount of reserve percentage that has had to be kept in order to balance the losses (Collins, 2013).

Thus, in order to be able to compensate their losses fully, both companies have to hold larger amount of reserves as a percentage of NWP (Net Written Premiums). The fluctuations of companies' losses as a percentage of NWP prove that appointment of certain percentages (like 10%) does not give accurate results.

When applying CL and BF methods for reserve estimation, the loss development triangle has been reduced to five years (2005-2009). With this, we can compare the actual losses in development years after 2009 with estimated reserves in those periods. As the results of Chain Ladder and Bornhuetter-Ferguson are based on the total amount of claims of a single accident year in future development periods, further comparisons will be carried out by single accident years (instead of diagonals) in loss development triangles.

The valuation of future claims amount using CL and BF for Company A has given significantly varying results. (Appendix B; Table 3) During the period of 2006 and 2008, current reserve estimate showed more accurate results, when comparing with actual losses. However, for 2009, CL showed twice as accurate result as current method. As regards to BF method, we can see large insurance reserve deviations, except that in 2008. However, the next year's result has further continued to deviate from original losses (Figure 3).

As regards to testing the application of reserving techniques for Company B, one should mention that inaccuracy in IBNR reserve estimates for this company is much higher throughout the period of analysis. (See Figure 2) When implementing BF method, the future reserve estimates were

overstated by higher percentages for most of the years and drop significantly in the last year (-40.15%). However, CL method showed increasing trend with inaccuracies ranging from -2.36 (2006) and reaching 17.01% (2009), whereas, inaccuracy of original reserves was moving with a decreasing trend for the years after 2009 (See Figure 4).

Conclusion

The analysis shows that different legislative documents and decrees assist the development of financial stability of insurance companies in Uzbekistan. But still the issue of currently used reserving methods should be further analyzed and modified.The analysis of sample organizations show that currently established IBNR reserving method varies significantly from actual losses. During the observation period, the average estimate using current method did not deviate significantly from the estimates of other alternative methods. But still the CL model gave more accurate estimates in majority of years. The limitations in the data and observation periods made it not possible to compare the CL and BF methods with actual losses for the period of 2009-2014. But considering the tendency of actual losses to increase in the future, we can assume that CL method gives even more accurate estimates for upcoming years. As regards to BF method, we should mention that this method is best to use in the markets with complete information about future predictions, asin some cases manager's and actuary's judgment is used when implementing the method (Mack, 2008).

Moreover, the paper shows that insurance market in the country is being developed with rapid tendencies. For instance, the total volume of paid insurance claims increased 15.5 times from 4.8 to 74.6 billion UZS during 2005-2014. This can be linked with the increase of compulsory insurance's share in company's portfolio from 4.8% (2007) to 30.4% (2013). However, due to non-proportionate growth of losses in relation to premiums, major reserve inaccuracies were observed after 2010. Taking this into consideration, the future reserve estimates should not be straightly dependent on premiums of insurance companies.

Considering the current developments in insurance market and existing reserve variations, it should be remarked that alternative reserve estimation techniques that are based on past loss development should be used by insurance companies to forecast their future claims and appoint reserves. One of such reserve estimation method with less inaccuracy for the sample companies in Uzbekistan is the Chain Ladder method.

References

Borodinova, I., A., (2011). *The Model of Estimate of a Reserve for Incurred But Not Reported Claims.* Russia: Samara State University.

Collins, W., J., (2013). *Justification for, and Implication of, Regulators Suggesting Particular Reserving Techniques.* Casualty Actuarial Society.

Gediminate, I., (2009). *On the Prediction Error in Several Claims Reserves Estimation Methods.* Royal Institute of Technology.

Mack, T., (1993). *Measuring the Variability of Chain Ladder Reserve Estimates.* Causalty Actuarial Society.

Mack, T., (2008).*The Prediction Error of Bornhuetter-Ferguson.* Causalty Actuarial Society E-Forum.

Republic of Uzbekistan.Ministry of Finance. (2000) *Decree on the Formation of Insurance Reserves for Insurance Companies Other than Life Insurance.* Tashkent: Ministry of Finance.

Republic of Uzbekistan.Ministry of Finance. (2014) *Report on Regulation and Supervision of Insurance activities in the Republic of Uzbekistan for the year 2013.* Tashkent: State Inspection on Insurance supervision.

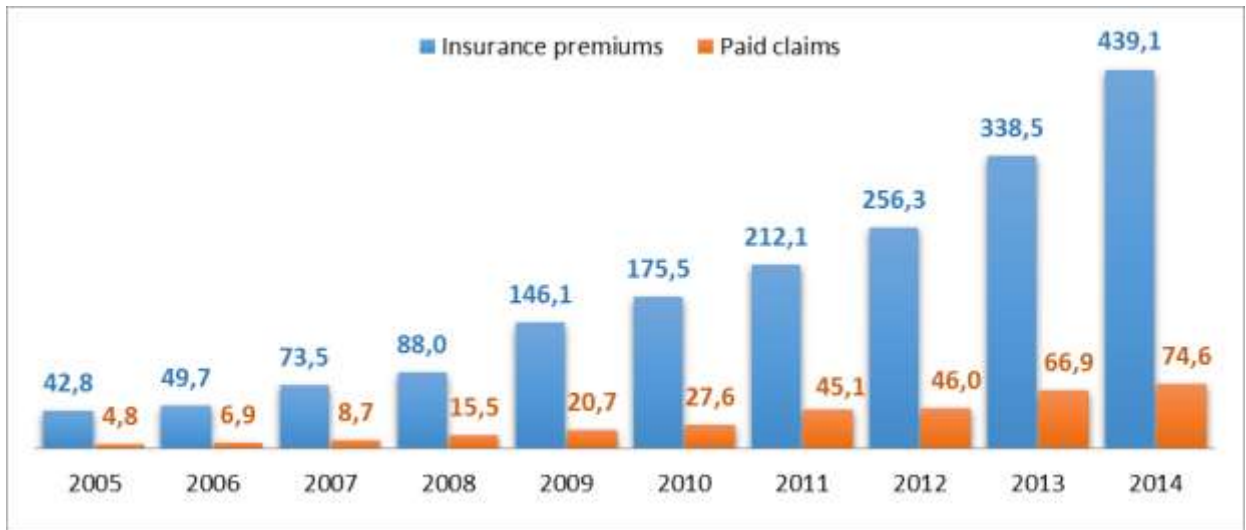Schmidt, K., D., (2006). *Methods and Models of Loss Reserving Based on Run-*

Figure 1. Amount of insurance premiums in UZS billions

Table 1. Reserve Inaccuracies of Companies between 2005 and 2014

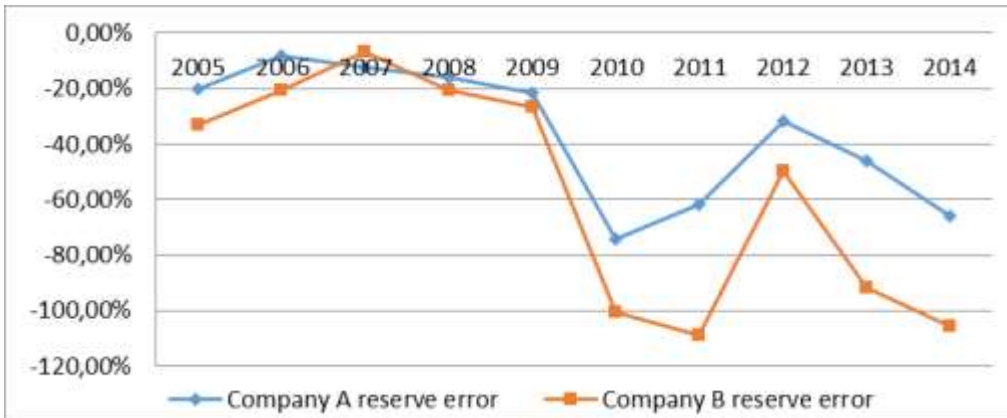| Year	Company A			Company B		
	Total amount of claims	IBNR reserves	Error	Total amount of claims	IBNR reserves	Error
2005	30 067,4	25 067,4	**-19,95%**	221 600,0	166 500,0	**-33,09%**
2006	48 729,4	44 986,3	**-8,32%**	299 000,0	247 500,0	**-20,81%**
2007	62 635,0	55 742,3	**-12,37%**	439 600,0	411 500,0	**-6,83%**
2008	168 348,7	144 897,3	**-16,18%**	594 300,0	492 600,0	**-20,65%**
2009	205 045,9	168 453,0	**-21,72%**	1 029 500,0	812 700,0	**-26,68%**
2010	528 653,0	303 126,5	**-74,40%**	1 895 700,0	945 300,0	**-100,54%**
2011	840 844,2	520 452,1	**-61,56%**	2 508 000,0	1 200 100,0	**-108,98%**
2012	1 261 484,2	959 565,8	**-31,46%**	2 536 300,0	1 695 800,0	**-49,56%**
2013	2 078 815,4	1 423 654,9	**-46,02%**	6 413 200,0	3 343 900,0	**-91,79%**
2014	3 241 839,3	1 955 421,4	**-65,79%**	7 206 100,0	3 502 100,0	**-105,77%**

Figure 2. Reserve errors in Percentages

Table 2. Companies' losses as percentage of NWP

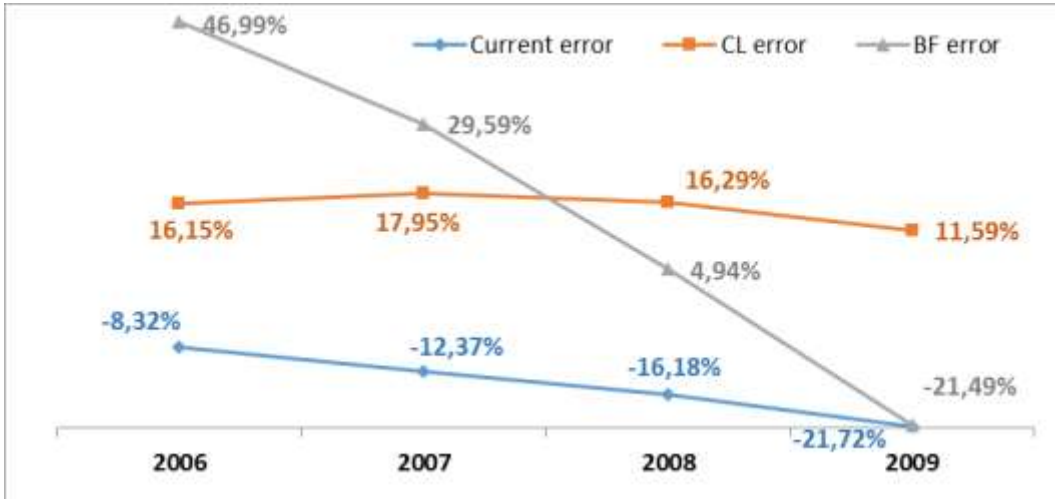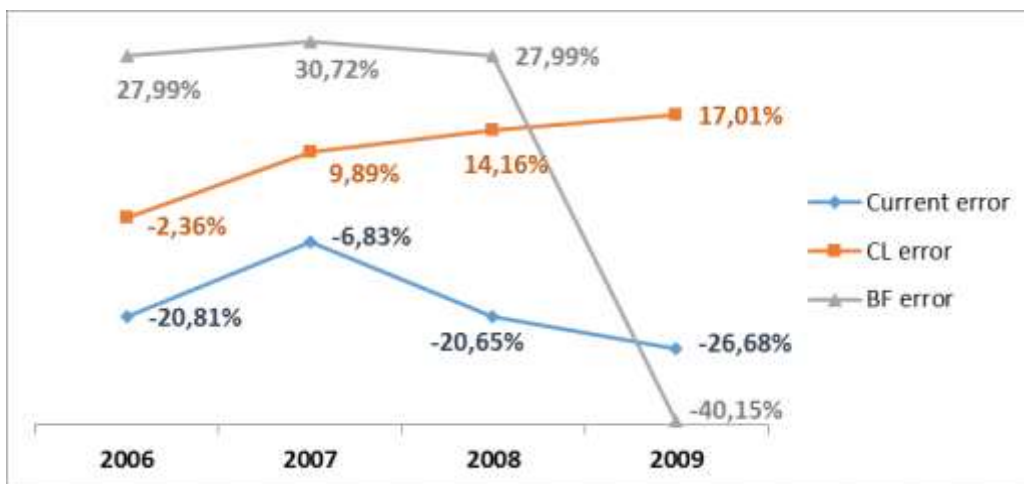| Year	Current percentages	Company A losses as a percentage of NWP	Company B losses as a percentage of NWP
2007	10,0%	10,0%	10,8%
2008	10,0%	11,6%	12,1%
2009	10,0%	12,2%	12,7%
2010	10,0%	17,4%	20,1%
2011	10,0%	16,2%	20,9%
2012	10,0%	13,1%	15,0%
2013	10,0%	14,6%	19,2%
2014	10,0%	16,6%	20,6%

Figure 3. Reserve errors comparison for Company A

Figure 4. Reserve errors comparison for Company B