1. Introduction

The focus of regulator is on the insurance company insolvency. An intuitive way to safeguard the insurer's solvency is setting capital requirements. The National Association of Insurance Commissioners (NAIC) developed a Risk Based Capital (RBC) system in 1994 to regulate insurance companies. Since the Department of Insurance will enforce the RBC system in Taiwan in 2003, it is important to analyze the impact of the RBC system on insurers' risk-taking behavior.

The Risk Based Capital requirement sets the minimum amount of capital, based on an insurer's size and risk to prevent insurance companies from insolvency. The NAIC classifies the risks of property-liability insurers into Asset Risk - including Subsidiary Insurance Companies (R0), Fixed Income (R1), Equity (R2), Credit (R3), Underwriting Risk- including Reserves (R4), and Net Written Premiums (R5). Each category of risk includes many factors, which influence the amount of required capital. Total RBC is determined by the formula, $R0 + \sqrt{R1^2 + R2^2 + R3^2 + R4^2 + R5^2}$. Comparison of total adjusted capital to RBC determines the appropriate actions to be taken by the regulator.

The RBC system has been enforced for a long time in the banking industry and therefore much relevant research has been done. Shrieves and Dahl (1992) begin the

study of risk-based capital standards in the banking industry. They used a three-stage

least squares (3SLS) model to analyze the relationship between changes in capital and

risk in a large sample of banks with assets in excess of $100 million. Their conclusion

supports that the association between risk and capital in the banking industry is

positive and that bank owners' and/or managers' private incentives affect risk-taking

behavior. Kevin and Peter (1997) use a 3SLS model to examine how risk-based

capital standards affect bank capital and portfolio risk during the first year. The

risk-based capital standards are indeed effective. They find that RBC standards caused

significant increases in the capital ratios and decreases in the portfolio risk of banks.

Aggarwal and Jacques (2001) develop a 3SLS model to examine the simultaneous

impact of the regulatory pressure, which brings about prompt corrective action (PCA),

on both bank capital and credit risk. The banks respond to the PCA by increasing their

leverage ratios and reducing their credit risk levels. Rime (2001) uses a simultaneous

equations model to analyze adjustments in capital and risk at Swiss banks. Their

conclusion indicates that regulatory pressures induce banks to increase their capital,

but have no impact on a bank's risk-taking behavior. An increase in available capital

through retained earnings or equity issues is less costly than a downward adjustment

in the risk of the portfolio.

In the insurance literature, Cummins and Sommer (1996) (CS) investigate the

capital and portfolio risk decisions of property-liability insurers. They selected public

insurance firms from the A.M. Best Company data for the period from 1979 to 1990

and used an autoregressive two-stage least squares (A2SLS) model. They find that the

positive relationship between capital and portfolio risk and managerial incentives

plays an important role in determining capital and risk in the insurance market.

Baranoff and Sager (2002) (BS) analyze the relationship between asset risk, product

risk and capital in the life insurance industry based on a simultaneous-equation

partial-adjustment model. They find that the relationship between capital and asset

risk is positive whereas the relationship between capital and product risk is negative.

Prior research has focused on the relationship between capital and risk. However,

little attention has been paid to how the implementation of the RBC standard affects

insurers' risk taking behavior. The regulatory branch of the insurance industry plays

an important role and can have far-reaching influence and effect. The purpose of this

paper is to explore how the RBC regulatory system affects the risk taking behavior of

property-liability insurers.

We analyze the RBC requirement, which influences the change of capital to asset

ratio and insurer's risk taking behavior in the property-liability insurance industry.

Our model is a partial adjustment model, the same as that is used by CS and also by

BS in their studies. The data for our analysis are from the NAIC tapes and the A.M.

Best Key Rating Guide for the period 1994-2000.

We find that property-liability insurers with lower RBC ratios increase their capital ratios and decrease their total risk while insurers with higher RBC ratios also decrease their total risk. These results are contrary to prior research. We then considered two important variables – organization and size. We separate our sample into two groups, stock insurers and mutual insurers, and find that the conclusions are the same. However, there is an interesting result in the classification of size. According to the empirical results, smaller insurers with higher RBC ratios increase their capital ratios and decrease their total risk, while the larger insurers with higher RBC ratios decrease their capital ratios and increase their total risk.

This paper is organized as follows. Section 2 introduces model and variables. Section 3 shows the sample selection, methodology, and empirical results. Section 4 gives the conclusion,