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保險公司管理策略對再保險、經營績效與風險承擔行為之影響分析

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I. 中文摘要

中文摘要

　　本研究蒐集美國產險公司之實證資料探討相互保險公司在改變成股票型態後，也就是進行非相互化 (demutualization) 後，是否會改變其再保險需求。就保險公司而言，透過再保險的安排轉嫁風險是最直接，也是最方便的方法，而再保險需求一直也是保險研究文獻中的重要問題。過去文獻對於相互保險公司與股票保險公司在再保險需求上的異同與比較已有許多討論，但是針對相互保險公司在改變成股票型態後是否會改變其再保險需求之議題，文獻中則未有任何探討。本研究蒐集美國產險公司之實證資料，探討進行非相互化之產險公司在再保險需求上之變化，我們分析進行非相互化之產險公司在改變成股票型態之前與之後，其再保險需求是否有顯著的改變狀況，並進一步利用迴歸分析方法檢證哪一類型的非相互化產險公司較容易改變其再保險需求。研究發現整體而言，非相互化之產險公司在改變成股票型態之後其再保險需求並沒有顯著的改變。但是，我們也發現非相互化之產險公司在改變成股票型態之前增加對其他非關係企業再保險公司的保險需求，但在改變成股票型態之後，卻降低對其他非關係企業再保險公司的保險需求。

I. Abstract

Abstract

This paper investigates whether the demutualized firms purchase more or less reinsurance after demutulization.　To our knowledge, this study is the first paper to examine the changes in the demand of reinsurance for converting insurers by considering reinsurance demand and demutualization decision simultaneously. We analyze the changs in reinsurance demand of converting insurers before and after demutulization. In addition, we also make a pairs comparison between the converting insurers and their stock/mutual matching firms before or after conversion.　To analyze how converting firms change their demand for reinsurance, we further conduct a regression analysis with reinsurance ratio as dependent variables and firm characteristics as the independent variables to examine what type of demutualized insurers would more likely to change their demand for reinsurance during converting period. Our empirical results show that the overall demand for reinsurance of converting insurers is not statistically different after the conversion. Furthermore, we find that converting insurers decrease the demand for reinsurance from non-affiliated reinsurers, but increase the demand for reinsurance from affiliated reinsurers after the conversion. One possible explanation is that converting insurers may treat reinsurance to affiliated reinsurers as risk retention rather than risk transfer so that they can reduce reinsurance cost. One other interesting finding is that converting insurers increase demand for reinsurance from non-affiliated reinsurers before conversion.

II. Introduction

To protect against non-diversifiable risks, insurers traditionally have used the reinsurance market as a hedge. The ceding insurer can reduce its cash flow volatility and mitigate its financial pressure by transferring risk to reinsurance companies. Thus, purchasing reinsurance represents an important mechanism insurers use to limit their risk. In addition, such purchases shift some portion of the insurer's risk to reinsurers and reduce the probability and expected cost of potential bankruptcy. As a result, reinsurance contracts can be viewed as indispensable and effective risk management tools that insurers employ to confront unexpected losses (Mayers and Smith, 1990; Garven and Lamm-Tennant, 2003).

Prior studies have modeled the demand for reinsurance by considering motives such as investment incentives, probability of bankruptcy, tax effects, and the availability of real services (Mayers and Smith, 1990; Garven and Lamm-Tennant, 2003; Cole and McCullough, 2006). They also find empirical evidence that the size, profitability, geographic concentration, and line of business concentration reduce the demand for reinsurance, whereas tax-favored characteristics, direct business written, and under loss reserve increase demand for it.

Mayers and Smith (1990) suggest that the organizational form of the insurers could influence their risk-taking behavior and alter the demand for reinsurance. Their empirical results show that stock insurers purchase less reinsurance than do mutual insurers. However, several subsequent empirical papers, such as Garven and Lamm-Tennant (2003) and Cole and McCullough (2006), use different data and/or an alternative methodology to reexamine this issue and find evidence that leads them to conclude that stock insurers demand less reinsurance than do the mutuals. In other words, the empirical evidence is mixed. The purpose of this paper is to provide additional evidence and sheds light on this issue by using time-series data and new methodology.

Most previous research has investigated whether stock insurers demand less reinsurance than mutual insurers by using cross-sectional data. In this paper, we reexamine this issue with a specific sample of demutualization insurers. Our approach may be better because we examine the demand for reinsurance for the same insurers before and after the conversions rather than different insurers (stock insurers versus mutual insurers). Using the same insurers has the advantages of observing the changes in demand for reinsurance before and after the conversions. In addition, most of the prior studies use reinsurance ratios to measure the demand for reinsurance. As suggested by Powell and Sommer (2007), reinsurance ratio may be biased because it double counts direct and retroceded premiums in inter-company pooling arrangement. To avoid this problem, we separate the effect of reinsurance transfer of affiliated reinsurers from non-affiliated reinsurers. Finally, we conduct a two-stage selection regression model. In the first stage we examine whether or not insurer demutualized, and in the second stage we investigate the changes in reinsurance demand during the sample period. The two-stage selection regression model is used to control for the joint endogeneity problem which may be caused in the selection issue.

We use recent property-liability insurance conversions during 1990–2004 as our sample. We find that converting insurers decrease their demand for reinsurance from non-affiliated

reinsurers, but increase their demand for reinsurance from affiliated reinsurers. Thus, the overall demand for reinsurance after the conversions is not statistically different.   In other words, we are not able to reject the hypothesis that, all else being equal, demutualized insurers reduce their overall demand for reinsurance after conversion.   We also find the demand for reinsurance from non-affiliated reinsurers is higher before the conversion.   The results are robust when we exclude converting insurers whose purposes of converting are related to mergers and acquisitions (M&A) from our sample.

II. Data and Methodology

Research Hypothesis

In this paper, we extend the line of research regarding demand for reinsurance by using a sample of demutualization insurers. Why do mutual insurers undergo the organizational structure change? A number of previous studies have proposed some solid explanations, such as financial distress and risk diversification, efficiency argument, agency cost consideration, and constraints on financial market (Fitzgerald, 1973; McNamara and Rhee, 1992; Jeng, Lai, and McNamara, 2007; Viswanthan and Cummins, 2003; Viswanathan, 2006). Viswanathan and Cummins (2003) find that the property-liability mutuals with lower surplus-to-asset ratios are more likely to demutualize and that converting life-health mutuals tend to hold a significantly lower proportion of liquid assets. In addition, mutual insurers may take advantages from converting process by considering accounting effects. Mayers and Smith (2004) indicate that converting firms manage accounting information primarily by adjusting liabilities and selectively establishing investment losses. Other factors (such as line of business Herfindahl index, operating ratio, and long tail lines) may also affect the conversion decision, but do not yield the conclusive empirical results.

As mentioned above, Mayers and Smith (1990) suggest that a mutual firm likely has greater difficulty accessing sources of new capital in the event of a large loss and therefore purchases more reinsurance. Thus, we expect that demutualized insurers will decrease their demand for reinsurance after they convert into stock insurers and define the main research hypothesis as follows:

Hypothesis: All else being equal, converting insurers reduce their demand for reinsurance after conversion.

Data and Variables Description

We use recent property-liability conversions during 1990–2004 as our sample.   Appendix 1 presents the list of the demutualization sample insurers. Financial data for the insurance companies are obtained from the NAIC (National Association of Insurance Commissioners) Property and Casualty Database. We include only those samples with complete data during the entire sample period and thus consider only 36 demutualization insurers. The reason for using a 15-year sample period but not longer is that we can evaluate the changes in the demand for reinsurance of demutualized insurers based on homogeneous economic conditions.

For each demutualized insurer, we select its matching insurers from mutual insurers on basis

of commercial lines ratio as well as the firm assets. Specifically, we follow a variation of matching procedure of Barber and Lyon (1996) and Nohel and Tarhan (1998). By using two dimensions (commercial lines ratio and size) sample selection method, we reduce sample selection bias. The demand for reinsurance is often driven by product mix. Thus, we first choose matching insurers on the basis of commercial line ratio and then further control the size to determine the final matching samples. Specifically, the restrictions, where percentages are potential deviation from converting firm's value, are as follows: commercial lines positive/negative 1.5 percent, size positive/negative 1.5 percent. As a result, for each demutualized insurer, we identify 6 mutual matching insurers. Thus, we can compare the changes of demand for reinsurance between the demutualized insurers and their counterpart matching insurers before and after the demutualization.

While prior studies use reinsurance ratios to measure the demand for reinsurance (Mayers and Smith (1990); Garven and Lamm-Tennant (2003); Cole and McCullough (2006)), we use the changes in reinsurance ratios as dependent variables. Specifically, Δ(reins_ratio) represents the changes of reinsurance ratio where reins_ratio is (affiliated reinsurance ceded + non-affiliated reinsurance ceded)/(direct business written plus reinsurance assumed). However, Powell and Sommer (2007) suggest that reinsurance ratio may be biased because it double counts direct and retroceded premiums in inter-company pooling arrangement. To avoid this problem, we also separate the effect of reinsurance transfer of affiliated reinsurers from non-affiliated reinsurers. Specifically, we define Δ(reins_non_ratio) and Δ(reins_aff_ratio) as the changes in reins_non_ratio measured by (non-affiliated reinsurance ceded)/(direct business written plus reinsurance assumed) and reins_aff_ratio measured by (affiliated reinsurance ceded)/(direct business written plus reinsurance assumed), respectively. The above two variables also allow us to test whether the converting insurers demand more reinsurance from affiliated reinsurers and/or non-affiliated reinsurers.

Previous research also suggests several firm-specific characteristics, in addition to organizational form, may affect the demand for reinsurance (Mayers and Smith, 1990; Garven and Lamm-Tennant, 2003; Cole and McCullough 2006). We define our explanatory variables based on the characteristics accordingly.

First of all, the main explanatory variable, demutualized firm dummy variable (demutual_firm dummy) equals 1 if the insurer is the demutualized insurer and 0 otherwise. We use this dummy variable to test the main research hypothesis. With regard to bankruptcy characteristics, we use three variables. First, firm size (lnasset), the natural logarithm admitted assets, is used as a proxy of the firm size (Mayers and Smith, 1990; Hoyt and Khang, 2000; Garven and Lamm-Tennant, 2003; Weiss and Chung, 2004; Cole and McCullough, 2006). Prior studies predict that firm size has a negative impact on the demand for reinsurance, because small insurers should purchase more reinsurance to reduce their probability of bankruptcy. Second, Garven and Lamm-Tennant (2003) and Cole and McCullough (2006) predict a positive relationship between direct business written to surplus and demand for reinsurance. Insurers writing more business relative to their surplus should have a higher insolvency probability and therefore have greater demand for reinsurance. As a proxy for leverage, we consider the direct

business written to surplus (leverage). Third, we use two-year loss development (2_years_loss) to measure potential financial constraints (Petroni, 1992; Weiss, 1985; Grace, 1990; Christensen, Hoyt, and Paterson, 1992; Gaver and Paterson, 1999; Cole and McCullough, 2006). An insurer with a positive loss development (under loss reserving) needs more reinsurance to mitigate its potential financial constraints, whereas an insurer with a negative loss development (over loss reserving) would have less demand for reinsurance. Thus, insurers that adjust their loss reserving will change their demand for reinsurance to target their financial objectives.

To control for profitability, we use return on assets (roa) to measure the profitability of insurers on the basis of their net investment gain divided by assets. Insurers that earn more profits are better able to face losses and financial pressures and thus demand less reinsurance contracts, according to Mayers and Smith (1990), Powell and Sommer (2002), Mayers and Smith (2004), and Cole and McCullough (2006). In addition, we incorporate tax-exempt investment income relative to total investment income (tax_ex) as a proxy for the expected tax liability or tax-favored assets (D'Arcy and Garven, 1990; Garven and Lamm-Tennant, 2003; Cole and McCullough, 2006). The structure of a tax code affects insurers' demand for reinsurance. On the one hand, insurers can reduce their earnings' volatility by purchasing more reinsurance and thereby reduce their expected tax liability (Mayers and Smith, 1990; Smith and Stulz, 1985). In addition, purchasing reinsurance can mitigate the effects of large unexpected losses and advantage from investment in tax-favored assets (Garven and Lamm-Tennant, 2003). As a result, insurers that purchase more reinsurance contracts can reduce their expected tax liabilities and benefit from tax-favored assets.

Following Mayers and Smith (1990), Kim, Mayers, and Smith (1996), Garven and Lamm-Tennant (2003), and Cole and McCullough (2006), we define two real services proxies: geographic Herfindahl index (geo_H), which provides a proxy for geographic concentration, and line of business Herfindahl index (bus_H) as a proxy for line of business concentration. In general, reinsurers not only provide the protection of large and/or unexpected losses to insurers but also supply real services in terms of specialized knowledge and economies of scale. Consequently, if insurers issue policies in multiple lines of business and/or diverse geographic area, they may have a higher incentive to purchase more reinsurance because the more reinsurance they purchase, the more services the reinsurers provide. As a result, from real services hypothesis, a less business- or geography-concentrated insurer may demand more reinsurance. On the other hand, a reinsurance contract offers a mechanism to increase the diversification of risk for insurers. From the viewpoint of risk diversification, insurers with a higher concentration in a given line of business or geographic area may have a higher incentive to purchase more reinsurance. Thus, high levels of concentration may prompt greater demand for reinsurance. In contrast, if insurers issue policies in multiple lines of business and/or diverse geographic area, then the insurers may have a lower incentive to purchase more reinsurance (Cole and McCullough (2006)). As a result, a higher business- or geography-concentrated insurer may demand more reinsurance. According to these conflicting expectations, the influence of business concentration and geographic concentration is ambiguous.

Cole and McCullough (2006) separate affiliated and non-affiliated firms in their samples

and control for the systematic differences with a single dummy variable; we use the dummy variable to control for the difference between affiliated and non-affiliated firms. We also include a group dummy, single (single), to indicate an affiliated insurer or non-affiliated insurer, such that it equals 1 if the insurer is non-affiliated and 0 if it is affiliated. Insurers that belong to a group should demand more reinsurance, which enables them to shift profits within the group and reduce tax payments.   Finally, we use premiums written in each line of business in the model to control for the impact of variations in lines of business on the demand for reinsurance. Mayers and Smith (1990) and Cole and McCullough (2006) control for these variation effects in the different lines of business of their models because some lines of business may have particular effects on the demand for reinsurance, such as liability-related lines, in which higher agency costs give the insurer greater incentive to purchase more reinsurance.

Regression Model

To examine whether demutualized insurers change their demand for reinsurance after conversion, we analyze the changes of the reinsurance ratio for the period of three years before and after conversion (i.e., t= -1, -2, -3, and t =3, 2, 1). We also make pair comparisons between the converting insurers and their mutual matching insurers before and after conversion.

To further analyze how converting insurers change their demand for reinsurance, we conduct regression analyses. As suggested by Studenmund (1997) and Esho et al. (2004), potential feedback effects and selection effect may require the application of simultaneous equations framework. To avoid the possible endogenous problems and sample selection bias simultaneously, we construct a two-stage selection regression model. The model also includes firm-specific factors and other important control variables used in the literature. Panel data method is used to examine the hypothesis proposed in previous section.

Das, Newey, and Vella (2003) provide a nonparametric estimation of sample selection models for controlling these problems. We follow their concept and construct the regression model as follows:

In the first stage, the selection equation is a binary response model as follows,

$$\text{Prob\{firm demutualized} = 1\} = F(X1\beta), \tag{1}$$

where F(.) is Standard Normal CDF with ND(0, 1). X1 is a N1T 1× K1 matrix, and there are K1 explanatory variables indexed by k = 1,…, K1. In addition, X1 represents the independent variables mentioned in the Viswanathan and Cummins (2003) but excluded from the reinsurance ratio, and β is a K1 × 1 vector that represents the coefficients of K1 explanatory variables.

In the second stage, the regression model is setup as follows,

$$Y = X2\alpha + \varepsilon, \tag{2}$$

where Y denotes the changes of the reinsurance ratio and is a N2T2 × 1 vector with cross-sectional unit i = 1, …, N2, and time-series unit j = 1, …, T2. X2 is a N2T2 × K2 matrix, and there are K2 explanatory variables indexed by k = 1, …, K2. In addition, X2 represents the independent variables mentioned in the previous section and error correction terms from selection model, and α is a K2 × 1 vector that represents the coefficients of K2 explanatory variables. Finally, ε is N2T2 × 1 vector and refers to the disturbance terms following i.i.d. ND(0,

σ22).

Following Das, Newey, and Vella (2003), we use the cross-validation (CV) criterion to decide our needing specifications. The CV criterion is the sum of squares of predicted residuals. By using CV to minimize asymptotic mean-square error, where the bias goes to zero at the same rate as the standard deviation, we have the best fitted unbiased estimation in the regression model.

III. Research Results and Conclusion

This study investigates whether converting property-liability insurers change their demand for reinsurance after conversion. Our regression results cannot reject the hypothesis that converting insurers reduce their demand for reinsurance after conversion. When we categorize the reinsurance purchase decision into two sources: from non-affiliated reinsurers and from affiliated reinsurers. We find that converting insurers decrease the demand for reinsurance from the non-affiliated reinsurers, but increase the demand for reinsurance from affiliated reinsurers after conversion. The result is robust when the sample consists of only non-M&A insurers. A possible explanation is converting insurers try to reduce total reinsurance costs through the purchase of reinsurance from affiliated reinsurers.

Consistent with the findings of Viswanathan and Cummins (2003), we also find that converting insurers use more reinsurance from non-affiliated reinsurers than their mutual counterparts before their conversion. This result is in contrast to the result of the demand for reinsurance after conversion. Our conjecture is that converting insurers use more reinsurance from non-affiliated reinsurers to improve their financial statements such that the conversion can be approved by policyholders and regulator before their conversion.

Other major findings are summarized below. First, the evidence implies that converting insurers with higher profits decrease overall reinsurance after conversions. Second, we find that converting insurers with higher leverage would increase demand for reinsurance from non-affiliated reinsurers but decrease from affiliated reinsurers after conversions. One possible explanation is that converting insurers try to protect themselves from bankruptcy. Finally, the evidence shows that firm size is negatively related to the demand for reinsurance.

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