Reinsurance and Capital Growth Sensitivities within the Group Insurance in the Pre- and Post-Sarbanes-Oxley Periods

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May 8, 2017

Abstract

This paper utilizes SOX as an external shock to investigate how insurers allocate capital among affiliated companies and whether the roles of actuaries and auditors are important. I found that SOX *decreased* the sensitivity of internal capital transaction growth to premiums growths among smaller insurers, which suggest that costs of internal capital transaction increased due to effective monitoring mechanism. Quality actuaries and auditors are crucial in the process. I also document that the results among the under-reserving insurers are different i.e. SOX *increased*

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the sensitivity of internal capital transaction growth to premiums growths. The possible driver behind this phenomenon is that the benefits of using internal capital exceed the costs: the under-reserving insurers tend to be relatively poor financial conditions and have strong motive for earnings management. Raising capital through the external sources could incur larger costs. Hence, the insurers need to finance the unexpected losses by raising capital through affiliated companies.

JEL Classification: G22, G34, M48.

Keywords: Insurance Holding Company, Reinsurance, Corporate Governance, Financial Reporting.

1 Introduction

The main objective of this paper is to investigate the effect of the Sarbanes-Oxley Act on internal capital transactions among insurance affiliated companies. Despite the fact that SOX has been imposed for more than a decade and many papers have studied the impact of SOX in several context, this paper could shed light on the black box of internal capital market transaction as many previous studies have explored in several settings and context[1]. The study of SOX and internal capital market is unprecedented. As suggested by (4) and (5) and regulation and monitoring effort could enhance the efficiency of internal capital market; or, in a weaker sense, could improve the sensitivity of capital allocation and investment growth opportunities. Therefore, I conjecture that SOX could have a significant impact on the internal capital transactions among the insurers as well.

[1]See (3) (8) (10) (12) (25) (16) (20) (26), for examples

Potentially, this study could provide a significant contribution to Cohen, Dey and Lys (6) paper about the unintended consequence of SOX since SOX was initially imposed to combat with the management of financial statement; however, it has proven to be true that it could have an adverse spillover effect to the real transactions and investment decisions.

This paper utilizes SOX as an external shock event to investigate how insurers allocate capital among affiliated companies and whether the roles of actuaries and auditors are important. I adapted the two-step regression methodology from Wurgler (29) i.e. measure the internal capital allocation sensitivity by transaction channel, pre- and post-SOX, and by insurance group in stage one. Then regress the sensitivity measure in stage one with control variables using seemingly unrelated regression model to capture the variation of the sensitivity among different groups. The 'difference-in-differences' approach is used in the second stage to capture the impact of SOX among the SOX-compliance insurance group.

I found that the sensitivity of internal capital transaction growth to premiums growths among smaller insurers *reduces* post-SOX. The results indicate that costs of internal capital transaction rose after SOX due to effective monitoring mechanism. The interaction variable with SOX and quality actuaries and quality auditors are also significant, which suggest that actuaries and auditors are the main factors and crucial in the process.

I also document that SOX *increased* the sensitivity of internal capital transaction growth to premiums growths, which is different from the previous case. The possible explanation is that the benefits of using internal capital exceed the costs: the under-

reserving insurers tend to be relatively poor financial conditions and have strong motive for earnings management. Raising capital through the external sources could incur larger costs. Hence, the insurers need to finance the unexpected losses by substitute the external capital with internal capital i.e. raising capital through affiliated companies. I found no significant substitution effect among different internal capital channels i.e. no substitution between reinsurance and other affiliated capital channel.

This work also extends the existing literature regarding internal capital transfer among affiliates which previously documented that internal transactions among insurers is not a perfect substitute to the capital from external sources (21), internal capital allocation is efficient (22), and can be used to reach targeted capital structure (9). Conventional wisdom as suggested by these previous literature is that insurers are *efficiently* allocating capital via internal capital market. However, heterogeneity among different subgroup has not yet been explored. This paper provide an important evidence showing that there are differences among insurance groups and external factor, i.e. SOX in this case, could disrupt the internal capital market.

Organization of this paper is following: Section 2 discusses recent developments and discussions in internal capital market literatures both in insurance and non-insurance context, as well as the real earnings management literatures; Section 3 shows the hypotheses development, methodology employed and variable selection; Section 4 explains how data are gathered; Section 5 shows and discusses the empirical results, and; Section 6 concludes the study.

2 Literature Review

Internal capital market studies are well-established within the financial economics and corporate finance literatures. Stein (27), and Scharfstein and Stein (24) provided the two main frameworks to analyze the internal capital market i.e. the "bright-side" and the "dark-side" hypotheses. The bright-side or the winner-picking hypothesis, as suggested by Stein (27), states that the headquarter of the group of companies will engage in the practice of actively shifting funds from one project to another via internal capital market to achieve the ultimate goal of value creation despite being credit constrained. The dark-side hypothesis as developed by Scharfstein and Stein (24) suggests that some divisional managers could receive preferential capital budgeting allocations despite being weaker divisions; therefore, the overall firm's value is exacerbated because of the agency problem - overinvest weaker projects and underinvest stronger projects. Another notable paper by Matsusaka and Nanda (18) developed a theory of organization based on costs and benefits of internal capital markets. The paper argues that internal capital market gives the firm a real option to avoid external capital markets in more states of the world than a stand-alone firm. The cost is that the internal capital resources amplify the overinvestment agency problem.

Among the first papers to analyze the internal capital market empirically, Lamont (16) used the oil price decrease in 1986 as an external shock to examine the capital allocation among oil and non-oil subsidiaries. The author found that oil companies reduced their non-oil companies' investment through the means of subsidization. Another notable work by Shin and Park (25) established the difference between investment–cash flow sensitivity of Korean conglomerates ('chaebols') and non-conglomerates. They also

argued that the reason why firm's investment are affected by other firms within the same conglomerates is that there exists an internal capital market within a conglomerate and the market relaxes the financing constraints. Nevertheless, the market does not improve efficiency since firms within the same conglomerate tend to overinvest in projects with poor growth opportunities.

A number of recent papers investigated the (in)efficiency of internal capital markets in various industries and settings. Many of which explored the internal borrowing channel e.g. Egger et al. (8), Buchuk et al. (3), Frey and Kerl (10); internal dividend policy has been studied in Gopalan et al. (12). A paper by Stagliano et al. (26) suggests that firms with access to internal capital market tend to engage in unrelated diversification. Ozbas and Scharfstein (20) conclude in their study that agency problem explains the investment behavior of the conglomerates. Some recent literatures suggest that disclosure regulation and monitoring improves internal capital market efficiency i.e. Cho (4) and Cline et al. (5).

Despite the well-established financial economics and corporate finance literature regarding the internal capital market, there are relatively limited number of studies focusing on the internal capital transactions among affiliated insurers. The work by Powell and Sommer (21) is the first to investigate factors influencing reinsurance purchase differs between internal and external sources. The authors found that internal and external capital are not perfect substitutes since they differ in costs. Moreover, they documented that the proportion of assets invested in tax-favored securities is positively associated with the demand for internal reinsurance but not the external reinsurance. Later work by Powell, Sommer and Eckles (22) further explores efficiency and activities of both internal reinsurance and other internal capital transfers among affiliated insurers. The authors concluded

that internal capital is allocated to insurance subsidiaries with the best expected performance. Another notable work by Fier (9) indicates that internal capital transfers are used to manage deviations from the desired capital structure.

Another strand of literature which this paper contributing to is the effect of SOX and the real earnings management, which is pioneered by Cohen, Dey and Lys (6). The authors found that firms shifted from accrual-based to 'real' earnings management methods after the passage of SOX i.e. reduction in expenses and investment delay. To my knowledge, the effect of SOX on internal capital market has not yet been explored and could provide a substantial contribution to this strand of literature because the evidence on causal effects of disclosure and reporting regulation is still relatively rare, and because the evidence on the real effects of such regulation is infrequently explored, as noted in Leux and Wysocki (17).

3 Hypotheses Development and Identification

3.1 Hypotheses Development

Insurers need supply of capital to support their promises to policyholders in the event of losses. The capital may come from external and/or internal sources. Raising capital through stock market, bond, banks' letter of credit, third-party reinsurance companies or just by raising premiums charged to policyholders are some examples of how insurers can raise their capital via external source. Internal capital can be raised through several channels i.e. retention of profits or through the support from affiliated companies.

This paper provides a supporting evidence of unintended and 'real' consequences as a result of SOX in the context of insurance conglomerates i.e. examine whether the sensitivities of internal capital transactions to firm's growth opportunity, i.e. premiums growth, among insurance affiliated companies have changed because of SOX, and to investigate relevant factors that potentially drive such changes. Generally, SOX would affect the actuarial process and financial reporting of insurance companies because SOX enhances an internal control effectiveness of public companies by increasing the independence of board of directors, enforcing an audit rotation every five years, establishing a PCAOB, enhancing criminal penalty of the managements in the case of fraudulent financial reporting etc.

There are several reasons how SOX regulation could affect the internal capital allocations among insurance affiliated companies. As SOX potentially increased costs of raising external capital, the demand for internal capital would increase post-SOX since it is relatively cheaper to raise capital through affiliated companies than through the market. Therefore, the sensitivity of internal capital growth and investment opportunity growth (as proxied by insurer's premiums growth) would become more positively related.

However, SOX could increase the cost of raising internal capital as well. In the context of insurance conglomerates, reinsurance transactions (i.e. reinsurance credit taken and reinsurance recoverables) among affiliates are the most significant comparing with other capital transfer channels. Reinsurance transactions among related and unrelated parties are heavily monitored regulated both by the state insurance commissioners[2], the

[2]National Association of Insurance Commissioners (NAIC) has issued a number of model laws specifically addressing the reinsurance transactions i.e. the Reinsurance Model Law #785 and Regulation #786.

Actuarial Standards Board (ASB), and by the Financial Accounting Standards Board (FASB)[3]

The traditional view of reinsurance transactions can be found in Adiel's early investigation (1). He found that insurers may enter into financial reinsurance transactions with the reinsurers to alleviate regulatory costs. The author used the reference in Statement of Financial Accounting Standards No. 113 to argue that it is possible to use reinsurance transactions for the purposes other than the transfer of risk.[4] The author used the disproportionate changes in reinsurance recoverables on losses already incurred, which implies that reinsurance recoverables can be used by insurers to manage the regulatory ratios, but not the traditional reinsurance, which its main objective is to transfer insurance risk.

In my paper, the argument about reinsurance transactions is similar to that of Adiel's since it can be used to manage statutory earnings and surpluses; however, my argument is extended to the transactions among the affiliated insurers and reinsurers, which their decision-making processes regarding intragroup transactions are more closely controlled by the group but governed by the market. After SOX is imposed, the earnings management motives should reduce because of a higher monitoring effort from indepen-

[3]Statement of Financial Accounting Standards No. 113 'Accounting and Reporting for Reinsurance of Short-Duration and Long-Duration Contracts' (SFAS 113) is designed to measure the use of traditional reinsurance and financial reinsurance of insurers, which the external auditor and regulator can monitor and observe.

[4]According to Adiel's paper (1), SFAS 113 mentioned that "An insurance enterprise may purchase reinsurance to reduce exposure to losses from events it has agreed to insurer... The insurance enterprise may also contract with a reinsurer to faciliate the writing of contracts larger than those normally accepted, to obtain or provide assistance in entering new types of business, or to accomplish tax or regulatory objectives.

dent parties (independent board of directors, auditors, improved internal control etc.), and hence, affect the reinsurance transactions among affiliates.

The following hypotheses based on the above premises:

H1: SOX changes the net benefit of affiliated reinsurance transactions and other affiliated transactions to support their promises to policyholders. If the benefits (costs) of internal capital transactions exceed the costs (benefits) post-SOX, insurers should increase (decrease) the sensitivity of internal capital transaction growth to premiums growth.

Section 5A of the Insurance Holding Company Regulation Act (Model Law #440) refers to the transactions within the insurance holding company that their terms shall be 'fair and reasonable'. Nevertheless, there are some transactions that, if exceed the limit, must be notified to the state commissioner at least 30 days prior to the execution of the transactions and the commissioner may *disapprove* the transactions within that same period. These transactions include (1) sales, purchases, exchanges, loans, extensions of credit, or investments (2) reinsurance agreements or modifications (3) management agreements, service contracts, tax allocation agreements, guarantees and all cost-sharing arrangements (4) any material transactions which commissioner determines may adversely affect the interests of insurer's policyholders. As for the dividends and other distributions, extraordinary dividend and distribution must be notified and approved.

To my observation, other capital transactions among affiliated insurers are not as heavily regulated or subject to specific accounting standards the same degree as reinsurance transactions. I expect that the cost of capital adjustment through these channels, which may have increased post-SOX, are still relatively lower than that of reinsurance channel. Hence, insurers may *substitute* affiliated reinsurance for other affiliated transac-

tions as the following hypothesis stated:

H2: SOX changes relative net benefits of reinsurance and other capital transaction. If the net benefit of affiliated reinsurance (other affiliated) transaction exceeds the net benefit of other affiliated (affiliated reinsurance) transaction, insurers should increase (decrease) the sensitivity of affiliated reinsurance growth to premiums growth relative to other affiliated transaction growth to premiums growth. In other words, insurers may substitute *affiliated reinsurance for other affiliated transactions.*

To further investigate the mechanism that drives changes in costs and benefits of internal capital transactions, I introduced actuarial service quality and audit service quality to the analysis. As Grace and Leverty (13) suggested, auditor and actuary quality is crucial in determining the quality of financial reporting. Actuaries and auditors are mainly responsible for work relating to financial statements containing material reinsurance transactions as regulated by the two model laws i.e. "Life and Health Reinsurance Agreements Model Regulation" and "Credit for Reinsurnace Model Regulation". Though SOX created a complicated set of regulations that enhances corporate governance and internal control specifically to improve the quality of financial reporting, SOX may have to be carried out by actuaries and auditors in order for the financial reporting quality to be realized.

H3a: SOX, together with high-quality actuary, changes the net benefit of affiliated reinsurance transactions and other affiliated transactions to support their promises to policyholders.

H3b: SOX, together with high-quality auditor, changes the net benefit of affiliated reinsurance transactions and other affiliated transactions to support their promises to

policyholders.

3.2 Identification

To estimate the effect of SOX on the sensitivity of internal capital transaction to premiums growth, this paper adapted a methodology used in Wurgler (29) and later used in Morck et al. (19). The methodology calls for a two-stage regression[5]:

3.2.1 First Stage: Estimate the Internal Capital Sensitivity Measure

For each insurance group g and each transaction type c, I first estimate the internal capital sensitivity measure η using the following equation:

$$log\left(\frac{S_{it-1}+C_{igct}}{S_{it-1}}\right)=\alpha_{gc}+\eta_{1,gc}log\left(\frac{P_{it}}{P_{it-1}}\right)+\eta_{2,gc}D_{post}log\left(\frac{P_{it}}{P_{it-1}}\right)+\epsilon_{igct} \quad (2)$$

S_{igt-1} is the levels of surplus of insurer i at year t-1. The index g denotes that the insurer is affiliated with insurance group g. C_{igct} is the internal capital provided to (or paid from) insurer i's affiliated companies within the same insurance group g. The subscript c in this variable indicates the channel of the internal capital transactions within the

[5]The original "Wurgler's elasticity" is the coefficient η in the following regression:

$$log(I_{ict}/I_{ict-1})=\alpha_c+\eta_c log(V_{ict}/V_{ict-1})+\epsilon_{ict} \quad (1)$$

Wurgler's research objective is to find a relationship between capital allocation efficiency and several characteristics, including state ownership of the economy, amount of firm-specific information in the domestic stock returns, level of legal protection of minority investors, at the country level. The coefficient η in the equation above measures a relationship between industry sector i's value added growth at time t and investment growth in industry i's at time t. Each country will have a unique η as the coefficient η is subscripted.

group i.e. through reinsurance channel (reinsurance recoverable or reinsurance credit) or through other channels. Therefore, $log\left(\frac{S_{it-1}+C_{igct}}{S_{it-1}}\right)$ is the surplus growth of insurer i at year t through channel c allocated by other affiliated within group g. $log\left(\frac{P_{it}}{P_{it-1}}\right)$ is the insurer i's premiums growth. D_{post} is an indicator variable equal to 1 if the year is after or in 2005. Using OLS to estimate this equation by insurance group g and by internal capital transaction c, the coefficients $\eta_{1,gc}$, $\eta_{1,gc} + \eta_{2,gc}$ and their standard errors $\sigma_{\eta_{1,gc}}$, $\sigma_{\eta_{1,gc}+\eta_{2,gc}}$ are obtained. The coefficient $\eta_{1,gc}$ represents sensitivity of internal capital allocation to premiums growth before SOX, and the sum of $\eta_{1,gc}$ and $\eta_{2,gc}$ captures the post-SOX sensitivity. I then construct a panel data of the sensitivity measure, now called η^*_{gcs}, by group g, by internal capital transaction c and by pre- and post-SOX time periods s. When estimating the first-stage regression, the observations in year 2003 and 2004 are dropped so as to be consistent with other SOX literatures[6].

3.2.2 Second Stage: SUR Fixed-Effect Model

For all five internal capital transaction channels as denoted in the previous section, I simultaneously estimate the following equation of all five channels using the seemingly

[6]See Alam et al. (2), for example.

unrelated regression model with insurance group fixed effect:

$$\begin{aligned}\hat{\eta}^{*}_{gcs} =& \beta_0 + \beta_1 Post_s + \beta_2 Treated_g + \beta_3(Post_s x Treated_g) + \\ & \beta_4 Actuary_{gs} + \beta_5(Actuary_{gs} x Post_s) + \beta_6(Actuary_{gs} x Treated_g) + \\ & \beta_7(Actuary_{gs} x Post_s x Treated_g) + \\ & \beta_8 Auditor_{gs} + \beta_9(Auditor_{gs} x Post_s) + \beta_{10}(Auditor_{gs} x Treated_g) + \\ & \beta_{11}(Auditor_{gs} x Post_s x Treated_g) + \Sigma_k \beta_k X_{gs} + \gamma_g + \epsilon_{gcs} \\ & \forall c \in \{\text{Rein.Recov, Rein.Credit, Total Rein., Total Other Capital, Total Capital}\}\end{aligned} \tag{3}$$

Seemingly unrelated regression (SUR) model is used to estimate equation 3 for all five internal capital transaction channels since estimating the parameters β_k by OLS per equation is consistent but inefficient if the error terms for the different insurance group establish contemporaneous correlation, as noted by Zellner (30). Another important econometrics issue potentially arise since $\hat{\eta}^{*}_{gcs}$ are estimated in the first stage regression. According to Saxonhouse (23) and Hornstein and Greene (14), each observation must be weighted with the estimated standard errors from the first-stage regression $\sigma_{\eta_{1,gc}}$ and $\sigma_{\eta_{1,gc}+\eta_{2,gc}}$ because heterogeneity should be explicitly accounted for when the dependent variables in the second-stage regression are estimated.

Variables of interest are $Post_s$, which is an indicator variable equal to one if year is after or in 2005. $Treated_g$ is equal to one if insurance group g is a SOX-compliant group i.e. that insurance group has one or more of its subsidiaries or affiliates trading in NYSE or NASDAQ between 2002 and 2009. $Actuary_{gs}$ and $Auditor_{gs}$ actuarial service quality variable and audit service quality variable, respectively.β_3 captures the overall effect of SOX on capital allocation sensitivity. β_7 and β_{11} indicate the effect of actuary

and auditor quality post-SOX. X_{gs} and γ_g are control variables and insurance group fixed effect, respectively.

I follow NAIC's suggestion regarding insurance holding company analysis in order to select control variables. All control variables are calculated at the group level: for each year, each variable will be calculated at the individual level (if applicable) then weighted by share of total asset within insurance group. Then I take an average across years pre- (1998 - 2002) and post-SOX (2005 - 2009). *Actuary* is a group weighted average of quality of actuarial service provided to an insurer as measured by the percentile of actuary's clients' premiums share. Actuary's clients' premiums share and *Big Four* indicator variable, which equals to one if the actuary is one of the big four companies, are also used for robustness purpose. *Auditor* is a a group weighted average of quality of audit service provided to he insurer as measured by the percentile of auditor's clients' premiums share. Auditor's clients' premiums share and *Big Four* indicator variable, which equals to one if the actuary is one of the big four companies, are also used for robustness purpose.

Group's characteristic variables are: *Mutual* is a group weighted average of an indicator variable equal to one if insurer is a mutual company; *Bank Affiliated* is a group weighted average of an indicator variable equal to one if insurer is affiliated with a bank; *CEO/President Herfindahl* is the group Herfindahl Index measuring the concentration of firms with common CEO/President i.e. if an insurance group are controlled by only one CEO/President across different companies, the index will equal to 10000. Insurer's total asset is used to calculate the share of company with common CEO/President; *CEO/Chair Duality* is a group weighted average of an indicator variable equal to 1 if insurer's CEO and Chair of the board of directors are the same person, and; *Access to Capital Market* is a group weighted average of an indicator variable equal to 1 if insurer is affiliated with

a public company.

Other group's characteristic variables include: *Log of Group Asset* is a log of total group asset; *Vol. of Net Income/Asset: Life/Health* is a standard deviation of group's net income divided by group total asset, only life/health insurers are included in the calculation; *Vol. of Net Income/Asset: Property/Casualty* is a standard deviation of group's net income divided by group total asset, only property/casualty insurers are included in the calculation; *Property/Casualty*is a group weighted average of an indicator variable equal to 1 if insurer is identified as a property/casualty insurer by NAIC; *Investment in Affiliates* is a group weighted average of percentage investment in affiliates per total asset, and; *Reinsurance in Affiliates* is a group weighted average of percentage reinsurance ceded to affiliates per total reinsurance ceded.

3.2.3 Testing the Relative Cost of Capital Adjustment Hypothesis (H1b)

In order to test the fourth hypothesis, I make a minor modification to equation 2 as follows:

$$log\left(\frac{S_{it-1}+C_{igct}}{S_{it-1}+C_{igc^*t}}\right) = \alpha_{gc} + \eta_{1,gc} log\left(\frac{P_{it}}{P_{it-1}}\right) + \eta_{2,gc} D_{post} log\left(\frac{P_{it}}{P_{it-1}}\right) + \epsilon_{igct} \qquad (4)$$

C_{igct} and C_{igc^*t} are the internal capital provided to (or paid from) insurer i's affiliated companies within the same insurance group g. Channel c is the reinsurance channel and channel c^* is the other channel. I use OLS to obtain the coefficients $\eta_{1,gc}$, $\eta_{1,gc}+\eta_{2,gc}$ and their standard errors $\sigma_{\eta_{1,gc}}$, $\sigma_{\eta_{1,gc}+\eta_{2,gc}}$, and process the second-stage regression to test the hypotheses. The negative and significant β_3 in equation 3 suggests that insurance group substitute reinsurance with other capital from the affiliates.

4 Data

This paper examines internal capital transaction among insurers among insurance affiliates. The term 'affiliate' follows the official definition by the NAIC's Model Law 440 'Insurance Holding Company System Regulatory Act' i.e. 'an affiliate... is a person that directly or indirectly through on eof more intermediaries, controls, or is controlled by or is under common control with, the person specified'. To identify which insurers belong to which group, I use 'NAIC Group Code' as recorded in the NAIC regulatory statements. Note that insurer's group may change each year because of merger and acquisition among other reasons; however, since the unit of analysis in this paper is insurance group, not the individual company, I will not disregard companies that may 'join the group' in later years. Both property/casualty (P/C) insurers and life/health (L/H) insurers are considered. All data are obtained from the NAIC regulatory annual statements and SNL database from 1996 to 2009. The relevant time period in equation 2 is from 1998 to 2009 but two lags (1996 - 1997) are used to estimate equation 2 for robustness test purpose.

The internal capital transactions C_{igct} are collected from the Schedule Y Part 2 from the regulatory annual statements. Schedule Y Part 2 records insurer's transactions among insurance holding company system members. It is intended to demonstrate the scope and direction of major fund and/or surplus flows throughout the system. This schedule is prepared on an accrual basis. All recorded transactions must be larger than one-half of one percent or more of the largest insurer's admitted assets as of December 31. Schedule Y does not include transactions between non-insurers that do not involve an affiliated insurer and transactions with the non-insurers that are of a routine nature (e.g. the purchase of insurance coverage).

Schedule Y records internal capital transactions through eight different channels i.e. (1) shareholder dividends; (2) capital contributions; (3) purchases, sales or exchanges of loans, securities, real estate, mortgage loans or other investments; (4) income (disbursements) incurred in connection with guarantees or undertakings for the benefit of any affiliate(s); (5) management agreements and service contracts; (6) income (disbursements) incurred under reinsurance agreements; (7) any other material activity not in the ordinary course of the insurer's business, and; (8) Reinsurance recoverable (payable) on losses and/or reserve credit taken (liability). The term 'other capital' used in this paper refers to the sum of transactions (1) to (7), and the term 'total reinsurance' refers to the transaction (8)[7] These transactions will be positive of insurer i receive the capital contribution in year t (and negative otherwise if paid to other affiliates), and these transactions are recorded on the net basis i.e. if the numbers are zeros, that does not mean there was no transaction from and to insurer i that year.

Table 1 reports the summary statistics of the estimated coefficients from equation 2 and all control variables. According to the table, the values of dependent variables η^* are positive on avarage. This result is in line with those in Powell et al (2008), which the authors suggest that the intragroup transactions 'efficient' in a sense that there is a positive relationship between reinsurance inflow and profitability of the ceding company. In my case, it appears that reinsurance growth is positively associated with the premiums growth (0.03), which could be positively related to the bottom line profitability. The

[7]The treatment of 'other capital' versus 'reinsurance capital' is consistent with Powell, Sommer and Eckles (2008) and consistent with the Schedule Y itself since there is a 'total' column that add columns (1) through (7). However, (6) and (8) are added together as 'reinsurance capital' and I tested it separately. Due to an infrequent and small income (disbursements) incurred under reinsurance agreements in column (6), the bottom line results remain intact.

average sensitivity for the 'Total Other Capital' growth to the premiums growth, however, is negative (-0.01). Nevertheless, simple average is used in table 1; therefore, smaller groups are potentially over-represented.

The methodology used in this paper allows me to directly observe the heterogeneity of intragroup transaction practices. The result in table 2 shows that not every group has a positive sensitivity between intragroup transaction growth and premiums growth. This could suggest that some groups may exhibit a winner-picking motive while some may show a diversification motive.

More notable observations can be inferred from table 2. Insurance group in my sample appointed highly-qualified actuaries and auditors on average; however, the quality of the appointed actuaries appears to be more disperse across groups. There are a fair proportion of mutual group and bank affiliated group in the sample. Most of the groups in the sample are property and casualty, which should not be surprising since there is a higher number of property and casualty insurers than life and health insurers. Lastly, group insurers are more deeply connected through the affiliated reinsurance channel than the affiliated investment channel.

Table 2 shows a cross tabulation results by comparing pre- and post-SOX as well as control and SOX-compliant insurance groups. It is worth noting that the differences between the average η of the treated and control samples are significant, especially among the reinsurance transactions. It appears that the treated groups may reduce the reinsurance growth sensitivity to premiums growth post-SOX. However, the difference-in-differences, as reported in the last column, is not significant. As for the control variables, the treated group insurers (the SOX-compliant groups) consistently appears to be larger, have less

mutual firms within group, have more affiliations with banks, and likely to have more than just one CEO/President overlooking the group (more democratic structure). Meanwhile, actuarial and auditing service quality did not establish a clear change pattern over time.

5 Results

5.1 Effect of SOX on Insurer's Internal Transaction

The purpose of this section is to test the hypotheses that SOX has affected the sensitivity of internal capital transactions among insurance affiliated companies and through which mechanism (SOX, auditor quality, actuary quality or through the combination of these factors). To test the hypotheses, equation 3 is used as the main identification. Each intragroup transaction channel will be separately tested i.e. reinsurance recoverable, reinsurance credit, total reinsurance (the sum of the first two), total other capital, and total capital (the sum of total reinsurance and total other capital).

The results are shown in table 4. Without controlling for actuary or audit quality (identifications 1,4,7,10 and 13), SOX appears to have a significantly negative impact on the sensitivity of reinsurance credit growth to premiums growth; however, the impact on reinsurance recoverable and total other capital appears to be insignificant. The overall sensitivity of the total reinsurance is negative and significant but not the total capital. Once controlled for the actuary quality and audit quality interaction terms (identifications 3,6,9,12 and 15), the significance of the overall SOX disappears neither β_3, β_7 or β_{11} shows a statistical significance, which suggest that each factor (SOX, auditor quality and actuary quality) does not appear to significantly contribute to the reduction of the

intragroup transaction growth sensitivity. However, results suggest that the negative β_3 in identifications (4) and (7) could be driven by the actuary quality variables. The interaction variable between actuary quality and treated (β_6) improves the sensitivity of other capital growth, and reduces the reinsurance credit growth. The auditor quality variable, once interacted with SOX-related variables, appear to be insignificant except the variable *Post x Auditor* which has a positive effect to the total capital growth sensitivity.

I further investigate the effect of SOX by considering the subpopulation i.e. large vs small insurance groups (Tables 5 and 6), highly-interconnnected vs low-interconnected insurance groups (Tables 7 and 8). The effect of SOX shows in the *small asset subsamples*, but not in the large asset subsamples. In table 6, quality actuary and auditor *reduces* the internal transaction growth sensitivity post-SOX among small group insurers. The effect of SOX does not appear in the highly-interconnected and low-interconnected insurance groups.

The results from table 6 support the hypothesis that SOX increases costs of internal transaction exceed its benefits since the monitoring effort within the insurance group has been enhanced post-SOX. The effect of SOX only appears among groups with smaller asset, suggesting that the smaller group insurers may not have been strictly complied with the model laws regarding internal transactions especially the reinsurance credit takens and other capital transactions (except reinsurance recoverables). After SOX was enforced, the monitoring mechanism has been strengthened especially through the quality actuary and auditors, which should not be surprising especially in the case of auditors since the audit partner rotation rule has been enforced post-SOX and they are subject to additional regulations by the PCAOB. The overall costs of raising capital through affiliated companies has increased, which potentially reduce group's profitability at least over the

period of study.

To investigate the substitution between the reinsurance transaction and other capital transactions, I used equation 4 to estimate group's η^*, then reestimate equation 3. Table 9 shows the results. The substitution effect is not detected according to the results shown in tables 7 as well as the analyses of the subsamples. As mentioned, the other capital channel could be less costly for insurers to raise capital from their affiliated companies since the regulation governing the transaction is relative less stringent than reinsurance transactions and does not require a specific set of accounting or actuarial standards. The fact that the substitution effect does not appear indicates that the enforcement of internal transaction monitoring covers all types of transactions. Insurers may prefer one channel over another; however, the overall cost effect from SOX might *overpower* the substitution effect. Hence, insurers may not be able to substitute one channel over the other.

5.2 Heterogeneous Effect of SOX on Under-reserving vs Over-reserving P&C Insurance Groups

To assess the heterogeneous effects of SOX on under-reserving and over-reserving property and casualty insurance groups, I use the property and casualty group subsample i.e. all insurers within the group must be property and casualty insurers. To define insurance groups with under-reserving practices, I construct an indicator variable called *Under*, which is equal to 1 if the asset-weighted average of insurers have been under-reserving during the 1998-2002 period. I use the same identification as before except adding interaction terms i.e. *Post x Treated x Under* which is a product of Post, Treated and Under; *Post x Treated x Actuary x Under* and *Post x Treated x Auditor x Under* are defined in

the same way. The results are shown in table 14.

Consider the odds identification numbers, it appears that the over-reserving insurers may reduce their internal capital transaction growth sensitivities post-SOX. However, once the actuary and audit quality are controlled for, the negative impact disappears. Conversely the results suggest that the under-reserving insurers may have *improved their internal transaction growth sensitivity post-SOX across all identifications* i.e. SOX and actuary quality increase the growth sensitivity of reinsurance recoverable and other capital transactions; SOX with audit quality increase the growth sensitivity of the total reinsurance and other capital transactions. The effect of SOX alone without the interaction terms appear to significantly improve the growth sensitivity of reinsurance credit transactions.

The results suggest that the benefits of internal transactions exceeds the costs among the under-reserving insurers after SOX has been enforced. As discussed, the benefits of internal transactions are derived from the fact that the costs of raising additional capital from the external sources increased post-SOX. The potential costs for the under-reserving group could have increased much greater than other insurance group since having the under-reserving status implies relatively poor financial conditions and higher motive for earnings management. Even though the costs of internal capital transaction have increased, raising capital through the external sources is much more difficult for them. Therefore, to finance the growth of future insurance liabilities, the under-reserving insurers need to seek capital within the internal sources i.e. via affiliated companies. Hence,the internal capital growth sensitivity have increased in all channels.

6 Summary and Conclusion

The main objective of this paper is to investigate the effect of the Sarbanes-Oxley Act on internal capital transactions among insurance affiliated companies. This work extends the existing literature regarding internal capital transfer among affiliates beyond what have been previously documented; internal transactions among insurers is not a perfect substitute to the capital from external sources as documented by Powell and Sommer (21); internal capital allocation is efficient as shown in Powell, Sommer and Eckles (22), and; internal capital can be used to reach targeted capital structure as investigated by Fier (9). Conventional wisdom as suggested by these previous literature is that insurers are *efficiently* allocating capital via internal capital market. However, heterogeneity among different subgroup has not yet been explored. This paper provide an important evidence showing that there are differences among insurance groups and external factor, i.e. SOX in this case, could disrupt the internal capital market.

This paper utilizes SOX as an external shock event to investigate how insurers allocate capital among affiliated companies and whether the roles of actuaries and auditors are important. I found that SOX *decreased* the sensitivity of internal capital transaction growth to premiums growths among smaller insurers, which suggest that costs of internal capital transaction increased due to effective monitoring mechanism. Quality actuaries and auditors are crucial in the process. I also document that the results among the under-reserving insurers are different i.e. SOX *increased* the sensitivity of internal capital transaction growth to premiums growths. The possible driver behind this phenomenon is that the benefits of using internal capital exceed the costs: the under-reserving insurers tend to be relatively poor financial conditions and have strong motive for earnings man-

agement. Raising capital through the external sources could incur larger costs. Hence, the insurers need to finance the unexpected losses by raising capital through affiliated companies. I found no significant substitution effect among different internal capital channels.

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