

An Analysis of Internal and External Capital Markets: The Role of Regulation

Abstract

This article examines the impact of regulation on capital market behavior, by examining both internal and external reinsurance transactions. I differentiate between admitted and surplus line insurers in order to determine whether the two types of firms serve different purposes within the overall reinsurance marketplace. Surplus line and admitted insurers differ in many ways, several of which I consider within this article. The overall purpose, however, is to examine whether surplus line and admitted insurers differ in their useage of internal and external reinsurance. A simultaneous equations model (SEM) is implemented to capture the firm's decision regarding capital market transactions. Findings indicate that surplus line insurers cede significantly more affiliated reinsurance premiums than admitted insurers. In addition, I find consistent evidence in support of internal and external reinsurance being used as complements, rather than substitutes.

1 Introduction

Capital market transactions, both internal and external, are longstanding topics of interest within the academic literature. Much prior research has found that particular characteristics of firms impact the amount of internal and external capital transactions. As such, the idea that dissimilarities between firms could result in differing utilization of internal and external capital is not novel at face value. However, of particular interest within this analysis is the level of regulation imposed on individual firms under the umbrella of a common parent organization. Specifically, I examine the manner by which differing levels of regulatory stringency imposed on individual firms within a common group may impact the role played by these firms within both internal and external capital markets.

In this article, I examine the features of capital markets within the context of the insurance industry. The utilization of insurer data offers several advantages, but perhaps the most salient is the setting by which the impact of regulatory stringency may be examined. Within the context of regulation, the insurance industry offers a testable sample of firms facing rate and form regulation, as well as firms that are not subject to such regulatory oversight. Specifically, I consider two types of insurers – admitted and surplus line companies. While specific differences between these two types of insurers are subsequently explained, it is important to recognize, first, that the key difference between these two types of firms is that admitted insurers are subject to rate and policy form regulation while surplus line insurers are not. Because of the coexistence of these two types of firms within the insurance marketplace, I am afforded the opportunity to examine a subsample of companies that may be separated into two groups - those with and without regulatory oversight with regards to rate and form regulation. Additionally, privately held insurers must file financial statements with state insurance departments. This offers an advantage in the sense that both stock and mutual structures are included within the overall sample, allowing the investigation of the impact ownership structure has on capital market transactions. The key contribution of this study is the finding that differing levels of regulatory oversight result in distinct roles being played by firms within capital markets.

Despite the importance of the excess and surplus lines market within the overall insurance economy, it is uncommon for academic research to distinguish between admitted and surplus line insurers. Many differences exist between the surplus line and admitted markets,

especially with regards to regulatory requirements. A glaring question, given the rarity of research on surplus line insurers, is how these firms contribute value to their respective groups. One potential for value contribution likely exists with regard to capital structure decision-making. As reinsurance functions as a substitute for equity capital within the insurance industry (e.g., Berger et al., 1992 and Garven and Lamm-Tennant, 2003), an important consideration is whether surplus line insurers offer value by way of reinsurance transactions. Specifically, surplus line insurers may be valuable to their respective groups within the context of internal capital market transactions, and likewise valuable to standalone insurers, and the overall insurance marketplace, in the context of external capital market transactions.¹

To examine the value that surplus line insurers contribute to their insurance groups, it is important to consider the method by which groups are established, as well as the advantages and disadvantages associated with the group structure. A common phenomenon in the U.S. property-casualty insurance market, insurer grouping results in the creation of an internal capital market (ICM) among group members, which allows capital to be transferred from one group member to another (Powell and Sommer, 2007; Powell, Sommer and Eckles, 2008; Colquitt and Sommer, 2003). The role of a surplus line insurer within the context of an ICM has yet to be examined within academic literature, and prior studies of ICMs have not distinguished between admitted and surplus line insurers despite the significant differences between these two types of companies. This is the first study to simultaneously consider both subject areas.

I expect there to be differences between the roles of surplus line and admitted insurers within the context of capital markets for several reasons. First, these two types of insurers are distinguishable on many different levels. The overarching function of the surplus line industry is to serve as a safety valve to the admitted insurance market. This is a prime reason to suspect that the two types of firms serve different purposes within the context of internal and external capital markets. Yet another reason to suspect differences exist is that of regulatory inconsistencies between the two markets. Surplus line insurers have significantly higher levels of capital and surplus requirements than do admitted insurers, potentially allowing them to fill a very different role within an ICM. Additionally, and also falling under the umbrella of regulation, surplus line

¹ Powell, Sommer and Eckles (2008) argue that if an insurer does not want to increase its chance of insolvency, but wishes to write new business, it must do one of the following: increase capital, increase reinsurance, or change its loss exposure.

insurers are not required to seek approval before modifying rates. Thus, these companies have an advantage in pricing relative to their admitted affiliates in the sense that they do not have to comply with rate ceilings imposed by state regulators. Surplus line insurers are also entitled to modify the policy language within their contracts as they see fit, allowing them to make coverage as restrictive (or expansive) as they deem appropriate. Admitted insurers, on the other hand, must receive produce approvals from the state before making changes to coverages offered to insurance consumers.

An imperative function of the overall insurance economy, surplus line insurers were responsible for writing 14% of the commercial premiums in the property-casualty market in the year 2014. Likewise, 7% of total premiums in all lines of business were written by surplus line insurers in that same year. These numbers mark increased activity in both commercial premiums, as well as total premiums, given these insurers wrote only 6% of commercial premiums, and 3% of total premiums, in 1994.² This growth in the activity of surplus line insurers is a primary area of motivation for this analysis. Furthermore, the consideration of how these insurers contribute to capital markets is relevant, not only to the financial sector, but also to regulatory bodies and policymakers. For instance, if findings indicate that surplus line insurers are functioning in a distinct role relative to admitted insurers within the overall context of capital markets, policies directly impacting admitted insurers will almost certainly indirectly impact surplus line insurers.

This analysis is the first to consider the roles of these regulated and deregulated firms within capital market transaction decision-making. The many distinctions between admitted and surplus line insurers suggests that research should refrain from treating the two as one, indistinguishable class of firms. The overall objective of this study is to examine the role surplus line insurers play within both internal and external capital markets in order to glean implications into the impact of regulatory stringency on overall capital market activity.

By way of preview, I find several interesting results in the empirical analysis section of this study. For instance, in investigating the key characteristics of surplus lines companies, it appears that surplus line insurers tend to write in lines of business that admitted insurers do not predominantly write (e.g., professional liability). Additionally, I find that surplus line insurers

² The figures reported in this paragraph are the result of a study conducted by A.M. Best in 2015.

cede significantly higher levels of reinsurance to their affiliates than do admitted insurers. Larger insurers, as well as those with higher geographic concentration cede significantly lower levels of reinsurance to their affiliates. When examining external reinsurance transactions, I find that larger insurers cede significantly higher amounts of reinsurance. This is likely explained by the argument made in Phifer (1996), which was that large insurers received better terms when accessing external capital markets, and thus it may be in the best interest of the insurer group for the larger affiliate to access the capital externally before distributing amongst group members within the internal capital market. I also find evidence of internal and external reinsurance being used by insurers as complements, as opposed to substitutes.

The remainder of this paper proceeds as follows. In Section 2, I provide a review of prior literature that apply to this analysis. Section 3 consists of the development of capital market hypotheses, while section 4 describes the data used to conduct the empirical analysis, as well as the utilized methodology. I present the corresponding results in Section 5. Section 6 provides a summary of future work, and section 7 concludes.

2 Prior Literature

There are several different streams of literature that are pertinent to this analysis – the practice of insurance grouping and points of contrast between admitted and surplus line insurers, as well as analyses of both internal and external capital market distinctions. These topic areas are briefly discussed below.

The Group Structure

While many prior analyses use multi-divisional firms as the focal point for understanding internal capital market transactions, insurers often choose to organize themselves into a group structure. An insurance group, sometime referred to as an insurance fleet, is composed of both affiliated insurers and a common parent organization (Ligon and Thistle, 2007). The generation of an insurance group, thus, implies the existence of a new, internal capital market by which capital may be allocated across firms within the same group. This transfer of capital is often the

result of affiliated reinsurance transactions.³ Likewise, the existence of unaffiliated reinsurance transactions is representative of external capital market activity. In other words, I examine the behavior of an internal capital market where several individual firms operate under the umbrella of a common parent, as opposed to studying one individual firm with many distinct divisions.

Insurance groups are a common phenomenon in the U.S. property-casualty insurance industry. Originally developed as a response to legal constraints, insurance groups provided a unique solution by allowing two separate insurers to operate alongside one another as opposed to one multi-line insurer operating alone (Vaughn, 1997).⁴ While this rationale is reasonable for explaining the purpose of insurance groups in the past, legal constraints barring the multiline operation of insurers are no longer a concern. One explanation as to why insurance groups are still so popular, considering their original purpose was to bypass legal constraints that no longer exist, is that of inertia. Ligon and Thistle (2007) dismiss this notion due to the higher administrative and legal costs that are inherent in a group structure. The authors contend that, “the group form of organization provides some advantage over a larger multiline firm, at least for some members of the industry” (p.852). Alternative explanations, such as spin-off companies increasing the value of a corporation, also exist to explain the prevalence of insurer groups (MacMinn and Brockett, 1995).

Existing research finds that there are fundamental differences between affiliate and unaffiliated insurers. Insurers belonging to groups are larger, more likely to be licensed in New York, more likely to be organized as stock firms, and were less geographically concentrated than their unaffiliated counterparts (Sommer and Colquitt, 2003). Another difference between affiliated and unaffiliated insurers is the legal obligation for other affiliates to expend their own resources in order to save the failing counterpart. When a group structure is utilized, there is the

³ Powell, Sommer and Eckles (2008) note that capital may be transferred between affiliates via the following methods: reinsurance transactions, dividends, capital contributions, guarantees and exchanges. Additionally, Spivey Dahl, Shrieves, and Spivey (2002) recognize that, within the banking industry, holding companies may transfer capital by inflating the fees charged to affiliates for services provided. This is less likely applicable to the insurance industry, as regulation is in place to avoid such activities (Powell, Sommer, Eckles, 2008). Following their approach, I utilize a single measure of reinsurance activity by examining the quantity of internal reinsurance ceded. The primary reason that I choose this variable over the others is that internal reinsurance has been found to be, by far, the most common method of transferring capital within an insurer group (Powell, Sommer, and Eckles, 2008).

⁴ Specifically, prior laws often stipulated that casualty companies could not also write fire insurance, and vice versa. As a workaround, two separate companies would be formed – one specializing in writing fire policies and the other in writing casualty policies.

opportunity but no obligation for the group members (or the parent organization, for that matter) to save the failing company (Sommer, 1996 and Phillips et al., 1998). Both Cummins and Sommer (1996) and Sommer (1996) argue that consumers should be willing to pay higher premiums for insurance from unaffiliated insurers, given the option insurer groups have of letting one of their members fail. Following this notion, Lei and Schmit (2010) argue that, “policyholders might view consolidated groups as being more risky than identical single unaffiliated insurers” (p.161). This, it seems, allows group members to benefit from the existence of an internal capital market (and a host of other group structure benefits, such as increased diversification) and yet allows them to refuse to expend their resources on saving a failing affiliate.

Internal and External Capital Markets

When a corporate headquarter makes capital allocation decisions to their business units, an ICM exists (Gertner et al., 1994). One explanation as to the existence of ICMs is that they develop as a natural substitute for inactive or nonexistence external capital markets (e.g., Desai et al., 2004; Khanna and Palepu, 1999; Khanna and Yafeh, 2007). ICMs offer an advantage relative to ECMs in regards to the monitoring of scarce assets. When an ICM makes a capital allocation decision, corporate headquarters retains the ability to subsequently reallocate those funds if the project performs poorly (e.g., Gertner et al., 1994; Stein, 1997).⁵ Perhaps the most salient advantage of ICMs relative to ECMs, however, is that of cost. For instance, Desai et al. (2004) find that ICMs are utilized by firms located in countries where ECM transactions are costly, thereby implying that ICMs serve as a cost-efficient substitute to ECMs. However, ICMs could weaken managerial incentives, thereby leading to wasteful activities (Milgrom and Roberts, 1988; Meyer et al., 1992). Additionally, Gertner et al. (1994) cite the potential for managers to act in “an entrepreneurial manner” given they own no residual rights to the scarce assets.

⁵ Note that while Stein (1997) argues that one benefit to ICMs is their ability to reallocate capital, he extends this argument by considering the reallocation by corporate headquarters from “losers” to “winners” (i.e., winner-picking).

Diversification, in terms of the broader finance literature, is typically affirmed by an organization operating in more than one SIC code (see, for example, Montgomery, 1994). Within the insurance industry, however, it's possible for an individual firm to write in many different lines of business, representative of increased levels of diversification. Additionally, insurers may diversify at the group level by affiliating with other firms that write in different lines of business. Overwhelming evidence points to the existence of a diversification discount (see, for example, Matsusaka, 2001; Hyland, 1999; Campa and Kedia, 1999; Villalonga, 1999). However, the reasoning behind why a diversification discount exists is less obvious. In consideration of why a diversification discount exists, Scharfstein and Stein (2000) contend that one common response is related to agency problems. Essentially, the conglomerate structure could lead to management having greater discretion over cash flow, and might explain the overinvestment in weak divisions. They also argue that, one of the biggest problems associated with the conglomerate structure seems to be its inability to put the weakest divisions within the firm on a much-needed diet. In addition, the authors note that many have commented on the socialistic nature of cross-subsidies within internal capital markets, suggesting that the stronger divisions subsidize the weaker divisions. Additionally, Matsusaka and Nanda (2002) show that an overinvestment problem may plague ICMs as a result of the inability of the ICM to constrain management's allocation of resources. Lamont (1997) argues that large, diversified companies may overinvest in and subsidize underperforming segments of business, implying that ICMs may too frequently allocate scarce assets to those firms with poor investment opportunities rather than to firms with high investment opportunities.⁶

Donaldson (1994) considers the allocation of resources between competing strategic investment opportunities to be one of the most critical decisions made by top management within a firm. Later, Stein (1997) defines winner-picking as, "the practice of actively shifting funds from one project to another," and suggests that firms with a narrow focus and those firms whose assets present difficulty in evaluating may experience the greatest value from ICMs.⁷ Winner-picking is also described as a result of a credit-constrained setting, wherein a firm is unable to invest in all positive NPV projects (Stein, 1997). This inevitably leads to different projects

⁶ See also Rejan et al., 2000 and Shin and Stulz, 1998 for supporting evidence.

⁷ Powell, Sommer and Eckles (2008) contend that insurers fit this description with the exception that it's an insurer's liabilities that present difficulty in evaluation.

competing for the scarce assets awarded by corporate headquarters. As the name suggests, winner-picking is a natural method to separate the different projects into winners and losers, with the corporate headquarters selecting the winners to be awarded the scarce funds. A prime measure of ICM efficiency is whether or not firms allocate capital to those affiliates with the highest potential for success, where the potential for success is frequently measured by past performance (see, for example, Powell, Sommer and Eckles, 2008 or Campello, 2002).

Stein (1997) suggests that managers have more information regarding project quality than do outside investors, and uses this as a foundation to suggest that ECMs perform poorly when picking winners and avoiding losers. The informational advantage of the CEO, as well as the CEO's incentives, are key reasons why ICMs perform this task more successfully. Matsusaka and Nanda (2002), while reaching the same conclusion in their main argument, explain the success of ICMs through their ability to take advantage of disparities in investment opportunities. The authors contend that ICMs are able to avoid frictions inherent with ECMs, thereby gaining flexibility in the redistribution of scarce assets.

Based on the assumption that the top management within diversified firms is more knowledgeable regarding investment opportunities than the ECMs, Williamson (1975) argues that ICMs within diversified firms may allocate capital more efficiently than ECMs.⁸ However, the literature on this topic is ambiguous at best. Scharfstein and Stein (2000) argue that, based on the rent-seeking behavior of divisional managers, top management will overinvest in weak divisions and underinvest in strong divisions.⁹ Ozbas and Scharfstein (2009) examine both stand-alone firms and comparable business segments within diversified firms and find that inefficiencies exist within ICMs. Serving as the first analysis within the insurance literature to empirically distinguish between internal and external capital sources, Powell and Sommer (2007) argue that the two are not perfect substitutes. Consistent with the arguments noted above, the authors find that internal capital is cheaper than capital received from external sources. In addition, they find that insurers with high amounts of leverage cede more reinsurance, while those with more assets cede less.

⁸ Evidence of this notion may be found in the work of both Gertner, Scharfstein and Stein (1994) and Stein (1997).

⁹ See Meyer, Milgrom, and Roberts (1992) and Rajan, Servaes, and Zingales (2000) for additional support of ICMs functioning less efficiently than ECMs.

Powell, Sommer and Eckles (2008) offer one of the first examinations of ICMs within groups of insurance companies. In examining the existence and subsequent efficiency of ICMs within the insurance industry, they contend that ICMs are being used to transfer capital to affiliates with the highest potential for success with regards to investment opportunities. Their sample, however, does not differentiate between firms with different levels of regulatory oversight. Fier, McCullough and Carson (2013), in addition to finding evidence in support of target capital structures existing within the insurance industry, find that insurers use ICMs to manage deviations from their target leverage. Thus, it is evident that opportunities within insurer ICMs exist that do not in other industries.

Distinctions between the Excess and Surplus Line (E&S) and Admitted Insurance Markets

An admitted insurance company is required to be licensed in every state in which it operates. Surplus line insurers, on the other hand, must be licensed in at least one state and then are permitted to operate in other states so long as they meet each state's capital and surplus requirements (Brockett et al., 1990). In a state where the surplus line insurer holds a license, it is treated as an admitted insurance company and must meet all rate and form regulations imposed on other admitted insurers. Yet another important component of the surplus line industry is that risks are only placed with surplus line insurers if the admitted market is unable or unwilling to provide coverage.¹⁰ Thus, by nature, surplus line insurers provide insurance for inherently riskier activities (or for inherently riskier policyholders, or both) than do admitted insurers. Many states

¹⁰ Brockett et al. (1990) recognize that, by law, an insured or the insured's agent must first seek coverage in the admitted market and be denied before accessing the surplus lines market. However, this appears to have changed over the years for some states. For instance, in 2011, Florida statute 626.916 was amended to eliminate the due diligence requirement for commercial lines of business specifically referenced in Florida statute 627.062. In lieu of a due diligence requirement, these lines of business now require only a surplus lines disclosure. It is important to note that personal lines of business, such as auto and homeowners, still require a due diligence effort. Commercial lines of business that may be exported without a diligent effort include the following: excess or umbrella; surety and fidelity; boiler and machinery, leakage, and fire extinguishing equipment; errors and omissions; directors and officers, employment practices, and management liability; intellectual property and patent infringement; advertising injury and internet liability; property risks rated under a highly protected risks rating plan; types of commercial lines insurance as determined by the Office of Insurance Regulation (OIR); fiduciary liability general liability; nonresidential property with the exception of collateral protection insurance; nonresidential multi-peril; excess property; and burglary and theft.

require wholesale brokers to retain a particular number of affidavits proving that the risk was not able to be placed in the admitted market before securing coverage from a surplus line insurer (see Schwartz and Mendelson, 1989).¹¹ Thus, these two markets are noncompetitive by legal design. However, as noted by Brockett et al. (1990), “there is no economic reason why a non-admitted insurer cannot directly contest or compete with an admitted insurer on the same risk, policy form, and rate” (p.237-238). Because of the ability of surplus line insurers to solve availability issues during hard markets, the authors contend that surplus line insurers should operate as a safety valve to the admitted market. This serves as yet another motivation on the part of an insurance group to affiliate with a surplus line insurer, as the inclusion of a surplus line affiliate may afford the insurer group a solution to hard markets.

Because surplus line insurers are not required to be licensed in every state in which they conduct business, these companies are regulated to a lesser extent than their admitted counterparts with regard to rate-making, as well as the policy forms utilized. Admitted insurers are required to file rate and policy forms with the state, while surplus lines insurers are not. Thus, surplus line insurers may provide benefits to an insurance group by way of their ability to write potentially riskier business for actuarially fair premiums. As evidence of this, Schwartz and Mendelson (1989) conduct a study on a group of physicians during times of insurability in the admitted market and subsequently during times in which the physicians were insured in the surplus line market. The authors found that, when the physicians were insured in the surplus line market, the premiums were typically several times higher and the deductibles much larger than when they were insured in the standard market.¹²

While the surplus lines market enjoys freedom from rate and form regulation, this sector of the insurance industry is not unregulated. Surplus lines insurers are regulated via capital and surplus requirements established by individual states (Klein, 1995).¹³ In Table 1, a comparison of

¹¹ Commonly, and as discussed by these authors, at least three admitted insurers must refuse to write the risk before it can be exported to the surplus lines market.

¹² It should be noted that this group of physicians had experienced adverse loss history, which contributed to their policies being exported from the standard market to the surplus line industry.

¹³ Refer to Table 1 for a current comparison of admitted versus surplus lines capital and surplus requirements, by state. This information has been collected from two separate sources. The National Association of Insurance Commissioners maintains a compendium of state requirements imposed on admitted insurance companies, found in the Compendium of State Laws on Insurance Topics. Additionally, Locke Lord LLP produces a surplus lines law

admitted versus surplus line capital and surplus requirements, by state, is provided for 2014. As can be seen below, surplus line insurers typically have much higher capital and surplus requirements than admitted insurers. In addition to capital and surplus requirements, the activities of agents and brokers in this market are also regulated. Intermediaries, or wholesale brokers, must be licensed in all states in which they transact business. Surplus lines taxes must also be paid to the state, and this responsibility falls on the wholesale broker. These brokers generally use one of three methods, dictated by the individual states, to determine whether they may place a risk with a particular surplus line insurer – white lists, black lists, or broker responsibility rules.¹⁴ Yet another difference between these two markets is that of guaranty fund access. Consumers insured by surplus lines companies, in all states with the exception of New Jersey, are not protected by the state guaranty fund (Brockett et al., 1990).

[INSERT TABLE 1]

While many of the differences between admitted and surplus line insurers are related to regulation, there are also operational differences between these two types of firms. The first area of consideration, from an operational standpoint, is that of surplus line insurers' business focus relative to admitted insurance companies. When considering the potential advantages of a surplus line company to an insurance group, one rational consideration is that the group may wish to expand into lines of business in which the surplus line insurance company is dominant. To examine this motive further, I consider the key lines of business for both surplus line and admitted insurance companies over the sample period. As can be seen below, in Figure 1, surplus line and admitted insurers have a distinct risk appetite when it comes to the lines of business in which they participate.

manual each year that provides information on current surplus lines laws by individual states. When necessary, individual legal statutes were examined to determine the current requirements for admitted insurance companies.¹⁴ When using a white list, a state will maintain a list of eligible surplus lines insurers and the broker must place business only with insurers who appear on the list. If a state employs a black list, a list of ineligible surplus lines insurers will be maintained and the broker is able to place business with any surplus lines company not found on the list. States employing broker responsibility rules simply require the broker to practice due diligence in selecting a surplus lines carrier for a given insured. Currently, thirty-five states provide white lists of surplus lines companies, one state provides a black list, and the remaining fifteen employ broker responsibility laws.

[INSERT FIGURE 1]

While professional liability and fire/allied lines of business are in the top five lines of business written for surplus line insurers, neither of those types of business appear to be popular among admitted insurers. Likewise, admitted insurance companies dominate in both homeowners and workers' compensation lines of business, while neither of those lines appear in the top five for surplus line insurers. Common between the two insurers are auto, commercial multi-peril, and other liability lines of business.

Alternatively, surplus line insurers may write in different geographic areas, relative to admitted insurance companies. Given surplus line insurers are known to insure inherently riskier policies than admitted insurers, it would be prudent to consider geographic areas that are prone to catastrophes. In Table 2, I conduct a two-tailed t-test on the percentage of premiums written within catastrophe prone areas for both surplus line and admitted insurers over the sample period.¹⁵ Results of a two-tailed t-test indicate that, surplus line insurers write a significantly higher percentage of catastrophe prone business. This variable is also included within the regression analysis below as a measure of catastrophe exposure.

[INSERT TABLE 2]

3 Capital Markets Hypotheses Development

3.1 Internal Capital Market Behavior

In this section, I develop rationale for surplus line insurers ceding more (or less) affiliated reinsurance relative to admitted insurers. It should be noted that the dependent variable used to test the role of surplus line insurers represents the net affiliated transactions via internal reinsurance, and is calculated as the ratio of reinsurance premiums ceded to affiliates less

¹⁵ Note that, adapting from Gron (1994), property premiums written in the following states are included: Texas, Louisiana, Alabama, Mississippi, Florida, Georgia, South Carolina, and North Carolina. Property is considered to be the following lines of business: allied, fire, farmowner's multiperil, homeowner's multiperil, commercial multiperil, inland marine, and auto physical damage. Additionally, earthquake premiums within the state of California are included, as well.

reinsurance premiums assumed from affiliates divided by total premiums earned.¹⁶ Higher amounts of net ceded reinsurance are representative of infusion of capital into other firms, while higher amounts of net assumed reinsurance are representative of other firms infusing capital into the insurer.

I will first present reasoning that supports surplus line insurers ceding higher amounts of reinsurance within their ICMs. A salient advantage to having a surplus line affiliate within an insurer group is that these firms may pass on business to other affiliates via affiliated reinsurance transactions. Surplus line insurers are not required to seek rate approvals from the state. As such, the following scenario could occur.¹⁷ Assume that an ICM is composed of two admitted affiliates, Insurer A and Insurer B, and one surplus line affiliate, Insurer C. It is assumed that Insurer C will write business for higher rates than either Insurer A or Insurer B. However, Insurer C can only write risks that are uninsurable in the admitted market. One could argue that a risk deemed uninsurable within the admitted market may be deemed such due to the inability of admitted insurers to charge actuarially appropriate premiums. Thus, Insurer C could write the policy and then cede the business (via an affiliated reinsurance transaction) back to Insurer A or Insurer B. This example demonstrates that, by proxy, admitted insurers within a surplus line affiliated ICM could write risks for higher rates. This not only allows the affiliate to secure a higher rate for a given risk, but also to potentially expand the types of risks that are found within their book of business. While the affiliate may be unable to underwrite a unique risk initially due to rate constraints, the affiliate could assume that business from the surplus line insurer. If this rationale is true, the surplus line insurer will cede significantly higher amounts of affiliated reinsurance premiums relative to admitted insurers. Following, I develop the hypothesis below.

H1: The amount of net affiliated reinsurance premiums ceded by surplus line insurers will be significantly higher than that of admitted insurers.

Alternatively, surplus line insurers have significant regulatory requirements that ensure they maintain higher levels of capital and surplus than do admitted insurers. Because of this, the

¹⁶ The dependent variable used in this analysis is equivalent to that used in other insurance studies of ICMs, such as Powell, Sommer, and Eckles (2008).

¹⁷ While this phenomenon is intuitive, and likely occurs within ICMs at a high frequency, I am unable to directly test this action without policy-level data.

surplus line insurer could assume more business from its affiliates in an effort to provide the affiliate with surplus relief. Additionally, the surplus line affiliate within an ICM could cede less affiliated reinsurance premiums if the insurance group deems the surplus line insurer a “winner”, and participates in the winner-picking phenomenon discussed earlier. In this case, affiliates would infuse capital into the surplus line firm by way of affiliated reinsurance transactions, which means the surplus line firm would be assuming more business within the ICM. To determine whether this is likely, I conduct t-tests of the return on assets variable. This information may be found in Table 2, and suggests that surplus line insurers have a higher level of performance at the one percent level of statistical significance. If either of these rationales is true, surplus line insurers will cede significantly less affiliated reinsurance premiums than admitted insurers. The following, competing, hypothesis is developed.

H2: The amount of net affiliated reinsurance premiums ceded by surplus line insurers will be significantly lower than that of admitted insurers.

3.2 External Capital Market Behavior

Also of interest is the differentiation between surplus line and admitted insurers within the context of external capital market transactions. Consistent with the discussion above, competing hypotheses are developed in an effort to capture the motives of surplus line insurers within the context of external capital market transactions. In this section, I discuss the rationale behind surplus line insurers ceding significantly different amounts of reinsurance externally and present the last hypothesis for this analysis.

By design, surplus line insurers cover risky policies, as well as risky insureds. Because of this, it is intuitive that surplus line insurers will need to access external capital markets quite often. In addition to the potential for affiliates to have a risk appetite that is different than the surplus line insurer, the internal capital market may not have the capacity to satisfy the reinsurance needs of the surplus line insurer with regard to available capacity. For example, one key area of business for surplus line insurers is that of high-capacity risks. If a surplus line insurer binds coverage for a high-capacity risk (e.g., a nuclear plant), it is likely that the surplus line insurer will retain a portion of that risk and then cede off the remainder of the risk. However,

it should be noted that it is possible surplus line insurers cede significantly less external reinsurance than their admitted counterparts. In consideration of why this could occur, prior literature (e.g., Powell, Sommer and Eckles, 2008) suggests insurers that are large relative to their group likely need to access external markets in order to have their capacity needs met, as it would be difficult for smaller insurers within the group to offer the capacity needed by a larger firm. As shown in Table 2, surplus line insurers, while larger than admitted insurers on a stand alone basis, are actually smaller relative to their group members. It follows that surplus line insurers could, in theory, have capacity needs met by their larger affiliates.

H3: The amount of net unaffiliated reinsurance premiums ceded by surplus line insurers is not significantly different than that of admitted insurers.

4 Data and Methodology

Data for this analysis comes from the National Association of Insurance Commissioners (NAIC) Property Casualty database. The sample covers the time period of 2001 to 2014, but due to the use of several lagged variables in regression models, as well as risk-adjusted variables over a three-year window, the empirical analysis covers a sample period of 2003 to 2014. To be included, firms must have a positive value of both premiums written and assets in each year. I limit the sample to only stock and mutual insurers, dropping ownership structures such as reciprocal exchanges and risk retention groups.¹⁸ To ensure the ability to participate in ICM activity, insurers in the sample must have at least one other affiliate. Additionally, only insurers active throughout the entire sample period are included.¹⁹ Additionally, all continuous variables are winsorized at the one percent level. After applying these filters, the dataset contains 12,888 firm-year observations, representative of 1,074 insurers over a twelve-year panel. A table of summary statistics may be found in Table 2.

¹⁸ The following ownership structures are dropped from the sample: Lloyd's organizations, nonprofits, other, reciprocal exchanges, risk retention groups, and U.S. branches of alien insurers. These ownership structures are known for being unique and very specialized in nature. Thus, the behaviors of these types of ownership structures should be separated from that of stock and mutual firms.

¹⁹ The purpose of this analysis is to examine the behavior of insurers that participate in internal and external capital market transactions as a function of their continuous business operations.

4.1 – Simultaneous Equations Model (SEM)

Due to the fact that a firm's decision regarding quantities of external (internal) reinsurance are likely influenced by the amount of internal (external) reinsurance, I implement a simultaneous equations model (SEM) for the empirical analysis. Several specifications of the SEM are considered, each unique in terms of the measure of performance utilized. In all specifications, year fixed effects are included and standard errors are clustered by firm in efforts to mitigate the existence of both heteroskedasticity and first-order autocorrelation within the sample. Below, I explain the tests run to examine several potential econometric issues, as well as their corresponding results.

Consequences of undiagnosed multicollinearity within a dataset may include large standard errors, wide confidence intervals, as well as small t-statistics. Thus, coefficients must be much larger, in a dataset containing multicollinearity, to appear statistically significant. I examine variance inflation factors (VIFs) of the variables included within the equations below to test for multicollinearity within the sample. Kennedy (2003) suggests that VIFs greater than ten are indicative of harmful multicollinearity. I conclude that there is no multicollinearity problem within my dataset, given the largest VIF within my sample is approximately two. Another potential issue within my sample is that of heteroskedasticity. After running a Breusch-Pagan (1979) / Cook-Weisberg (1983) test for heteroskedasticity, I reject the null of constant variance. The resulting p-value is significant at the one percent level, indicating that heteroskedasticity is a problem within this sample. Lastly, I test for autocorrelation, which could result in biased standard errors. To do so, I turn to the Woolridge test of autocorrelation (see Woolridge, 2003). The null hypothesis associated with this test is that there is no first-order autocorrelation. The resulting p-value, however, is significant at the one percent level, and therefore, I conclude that autocorrelation exists within my sample.

$$\begin{aligned} \text{Net Internal Reins Ceded}_{k,t} = & \beta_0 + \beta_1 * \text{Surplus Line}_{k,t} + \beta_2 * \text{Performance}_{k,t-1} + \beta_3 * \text{Size}_{k,t-1} + \\ & \beta_4 * \text{Surplus}_{k,t-1} + \beta_5 * \text{Relative Size}_{k,t-1} + \beta_6 * \text{Stock}_{k,t} + \\ & \beta_7 * \text{LOB Herfindahl}_{k,t-1} + \beta_8 * \text{Geographic Herfindahl}_{k,t-1} + \beta_9 * \% \text{ Other} \end{aligned} \quad (1)$$

$$Liability_{k,t-1} + \beta_{10} * Catastrophe Exposure_{k,t-1} + \beta_{11} * External Reinsurance + \beta'_{12} YEAR_t + \varepsilon_{k,t}$$

where *Net Internal Reins Ceded* is calculated as the ratio of net affiliated reinsurance ceded to direct premiums earned; *Surplus Line* is a dummy variable equal to one if the insurer is a surplus line firm, zero otherwise; *Performance* is calculated as one of four measures – return on assets, risk-adjusted return on assets, underwriting return on assets, and risk-adjusted underwriting return on assets; *Size* is the natural logarithm of total assets; *Surplus* is the ratio of capital to total assets; *Relative Size* is calculated as the ratio of assets to the group’s total assets; *Stock* is a dummy variable equal to one if the insurer is a stock insurer, zero if it is a mutual; *LOB Herfindahl* and *Geographic Herfindahl* are measures of line-of-business and geographic concentration, respectively, *External Reinsurance* is calculated as the ratio of net reinsurance ceded to nonaffiliates to total reinsurance ceded, and *Catastrophe Exposure* is calculated as property premiums written in Southeastern coastal states and earthquake premiums in California to total premiums. *YEAR* is a vector of year dummies.

In Schedule T, insurance companies report state-level information related to their licensing statuses. In this sample, several different statuses are represented – Licensed or Chartered, Non-Domiciled Risk Retention Group, Not Licensed, Surplus Lines, and Qualified or Accredited Reinsurer. To define an individual insurer as a surplus lines company, I require that the percentage of business written in states where the insurer is “Surplus Lines” or “Not Licensed” is greater than fifty percent of direct premiums written.²⁰

$$\begin{aligned}
Net\ External\ Reins\ Ceded_{k,t} = & \beta_0 + \beta_1 * Surplus\ Line_{k,t} + \beta_2 * Performance_{k,t-1} + \beta_3 * Size_{k,t-1} + \\
& \beta_4 * Surplus_{k,t-1} + \beta_5 * Relative\ Size_{k,t-1} + \beta_6 * Stock_{k,t} + \\
& \beta_7 * LOB\ Herfindahl_{k,t-1} + \beta_8 * Geographic\ Herfindahl_{k,t-1} + \\
& \beta_9 * Catastrophe\ Exposure_{k,t-1} + \beta_{10} * Internal\ Reinsurance + \beta'_{11} YEAR_t \\
& + \varepsilon_{k,t}
\end{aligned} \tag{2}$$

²⁰ This definition is consistent with that used by A.M. Best to identify professional surplus line companies.

where *Net External Reins Ceded* is calculated as the ratio of net external reinsurance ceded to direct premiums earned and *Internal Reinsurance* is calculated as the ratio of net internal reinsurance ceded to total reinsurance ceded. In both equations (1) and (2), the key independent variable is *Surplus Line*. While the sign of this variable is indeterminate, as evidenced by the competing hypotheses discussed earlier, many explanatory variables and their expected signs are discussed below.

As mentioned in the review of prior literature, firms considered to be successful at winner picking are typically those firms who infuse capital into affiliates with the highest potential for success. Measures of future expected performance, all proxied by observed historical performance, will be positive if consistent with prior insurance ICM research (e.g., Powell, Sommer, and Eckles, 2008). However, as discussed in the review of prior literature, many finance and banking studies argue that ICMs are inefficient for a variety of reasons. I expect the coefficient on measures of performance to be positive, consistent with ICM research in the insurance area. Size, surplus, and relative size are expected to be negative, given insurers with higher values for each of these measures likely need less capital relative to their counterparts. Even if larger insurers (either on an individual basis or relative to the size of their group members) do need capital, they are unlikely to find sources of capital among affiliate insurers and will likely need to access capital externally in order to find desired levels of capacity (e.g., Phifer, 1996; Powell, Sommer and Eckles, 2008). With regard to solvency, those insurers with higher levels of solvency likely need capital (internal or external) to a lesser extent than insurers with lower levels of solvency. Phifer (1996) argues that, when participating in external capital market transactions, larger firms receive better terms. Thus, it is also reasonable to observe a positive coefficient on the variable capturing firm size. Specifically, it may be more efficient for the insurer group to send the larger firm to the external capital market and then allow that insurer to redistribute the capital amongst the group via the internal capital market.

I also control for organizational form by including an indicator variable for whether or not an insurer is organized as a stock firm. Given the nature of ownership within a mutual firm, whereby the insurer is owned by its policyholders, mutuals experience greater difficulty with accessing external capital markets (Powell, Sommer, and Eckles, 2008). Additionally, I consider the business mix of the insurer in several different measures. First, I incorporate a line of business

Herfindahl index into the model, which measures the concentration of a firm in terms of the lines of business in which it participates. Next, I include a geographic Herfindahl index, in an effort to control for the geographic concentration of the firm. I also create and include a variable capturing the percentage of catastrophe-prone business that an insurer writes. Given an insurer with riskier policies will likely cede off portions of that risk, I expect the coefficient on this variable to be positive in both equations. Finally, I incorporate a measure of the firm's use of external reinsurance. Ultimately, the inclusion of this variable (as well as the inclusion of an internal measure within the external model) will shed light on whether internal and external reinsurance are used as complements or substitutes. Results are presented in Table 3A and 3B.

Contrary to equation (1), size and relative size are expected to be positive and significant in equation (2). That is, it's likely that larger firms (both alone and relative to group size), will need to access reinsurance via external markets given the limited capacity of affiliate insurers. Surplus, consistent with expectations in equation (1), is hypothesized to have a negative sign. The intuition is also consistent with that found in equation (1), or, firms with higher levels of surplus need capital less, and therefore are less likely to participate in the external reinsurance market.

5 Results

The results from the simultaneous equations model may be found in Table 3A and 3B. Each of the four columns represent specifications of the SEM wherein alternate measures of expected performance were utilized. I will first present results pertaining to equation (1), where the dependent variable is the net affiliated reinsurance ceded. Across all four specifications, the surplus line indicator variable is positive and significant at the one percent level. Thus, it appears that surplus line insurers cede significantly higher levels of affiliated reinsurance than do admitted insurers. This is consistent with the notion that admitted insurers may benefit from affiliation with surplus line companies in the sense that the surplus line insurer could cede risks to its admitted affiliates, allowing the admitted insurers to receive higher rates than if they wrote the risk initially.

Additionally, I find a negative and statistically significant coefficient on the variable capturing firm size. This is consistent with expectations, and suggests that larger firms have less opportunity to reach optimal capacity using ICM transactions. The coefficients on both surplus and relative size are statistically insignificant across all specifications. The geographic Herfindahl index has a negative coefficient across all specifications with a one percent level of statistical significance. From this finding, it appears that insurers with high geographic concentration cede significantly less affiliate reinsurance. This could be explained by the perceived focus strategy utilized by these insurers. It is likely that these firms have high levels of experience with the geographic regions they're concentrating in, and thus have a lesser need for internal reinsurance.

Turning to the equation (2), where the dependent variable is a measure of net external reinsurance ceded, the following results remain consistent across all four specifications. The coefficient on firm size is positive with a five percent level of statistical significance, consistent with expectations. This finding is supportive of the argument made by Phifer (1996), which was that larger firms received better terms when accessing external capital markets and thus may do so on behalf of their insurer group. The line of business Herfindahl index retains a negative coefficient across all four specifications, indicating that insurers with less product concentration cede significantly higher amounts of reinsurance externally. Given insurers may begin writing in new lines of business, and wish to slowly enter a particular market, external reinsurance affords them the security of ceding off portions of their risk in such a way that does not adversely impact affiliates. Additionally, the coefficient on the catastrophe measure is positive and significant, which is consistent with expectations. Insurers writing higher amounts of catastrophe-prone business cede significantly higher amounts of reinsurance externally than do insurers writing lesser amounts of catastrophe-prone business.

Also consistent across both main equations of the SEM, as well as all four specifications within each of those two equations, is the finding that internal and external reinsurance serve as complements rather than substitutes. Given the strategic nature by which insurers may utilize ICMs, this finding is intuitively pleasing. Prior work (e.g., Powell and Sommer, 2007) has noted that internal and external reinsurance are not perfect substitutes. Based on the findings in this

analysis, it appears that insurers strategically use reinsurance transactions (both internal and external).

[INSERT TABLE 3A]

[INSERT TABLE 3B]

6 Future Work

As indicated in prior work (e.g., Brockett et al., 1990), surplus line insurers may provide relief to admitted insurers during hard markets. As hard markets are known for higher rates and stricter underwriting standards, this is likely a time when admitted insurers need additional business and benefit from their affiliation with a surplus line company. While the surplus line market has been referred to as the “safety valve” of the industry (A.M. Best, 2015), this supposition has not been empirically tested. I plan to formally test this notion by examining the change in reinsurance ceded to affiliates by surplus line insurers during periods of market stress. If this notion is true, and surplus line insurers do provide relief during periods of market shocks, then I should observe these surplus line insurers ceding significantly higher amounts of reinsurance during these periods, especially to affiliate insurers.

Additionally, I plan to examine the behaviors of admitted insurers that are affiliated with surplus line companies. Ultimately, I aim to test whether the admitted affiliates to surplus line insurers behave more like surplus line companies than unaffiliated admitted insurers in terms of the lines of business and geographic areas in which they operate. One might expect admitted firms within a surplus line affiliated insurer group to behave much like unaffiliated admitted insurers. However, it is possible that surplus line insurers offer value to their respective insurer groups by allowing their admitted affiliates to learn from their underwriting expertise. A.M. Best (2015) reports that a major class of business written by the surplus line industry is that of emerging risks. However, the report makes note of the fact that, historically, many standard policies were originally covered solely by surplus line insurers (e.g., environmental pollution, directors’ and officers’ liability, cyber liability, etc.). Thus, I may observe admitted insurers behaving more similarly to their surplus line affiliates because it allows a “first mover”

advantage when particular emerging risks cross over to the standard market. This additional empirical analysis will be completed by March 31, 2016.

7 Conclusion

Insurance research has focused a very small amount of energy on the distinctions between surplus line and admitted insurers in prior work. However, I believe that the results of this analysis are evidence that future work should consider the differences between these two markets. While the intricacies of the surplus line market are likely more appropriate within insurance research, the overarching theme of dissimilar regulatory approaches is a valuable contribution to the overall finance literature and the insurance industry provides an excellent setting in which to test the impact of regulatory approaches on capital market behaviors. The findings in this analysis are relevant to industry professionals and regulators, as well as academic researchers. The separation of admitted and surplus line insurers peels back yet another layer of complex capital market structures. In the first portion of this analysis, findings suggest that surplus line insurers are more likely to write in certain lines of business relative to admitted insurers.

The results of this analysis suggest that surplus line insurers cede more reinsurance premiums within the context of both internal capital markets. Additionally, I find evidence of internal and external reinsurance being used by insurers as complements, as opposed to substitutes. This speaks to the strategic nature by which reinsurance is utilized by insurance companies. While surplus line insurers clearly play a vital role within internal capital markets, more work is needed in this area to clearly understand the value of these firms. Such areas may examine diversification versus strategic focus strategies employed by these insurers, and the resulting impact to the insurer. Another area of importance to this segment of the industry that has been left unexplored is the regulatory consideration of taxation on surplus line insurers. Specifically examining how states allowing low surplus line taxes and favorable regulatory environments for surplus line insurers compare against states who do not will be valuable to this line of research, as well as the insurance industry, from a regulatory perspective.

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Table 1 – Capital and Surplus Requirements

	Admitted Market		Surplus Line Market ²¹	
	2014		2014	
	<i>Capital</i>	<i>Surplus</i>	<i>Capital</i>	<i>Surplus</i>
Alabama	1,000,000	1,000,000	15,000,000	15,000,000
Alaska	3,000,000	2,250,000	15,000,000	15,000,000
Arizona	1,000,000	500,000	15,000,000	15,000,000
Arkansas	750,000	112,500	15,000,000	15,000,000
California	2,600,000	2,600,000	45,000,000	45,000,000
Colorado	2,000,000	2,000,000	15,000,000	15,000,000
Connecticut	2,000,000	2,000,000	15,000,000	15,000,000
Delaware	500,000	250,000	15,000,000	15,000,000
District of Columbia	300,000	300,000	15,000,000	15,000,000
Florida	5,000,000	4,000,000	15,000,000	15,000,000
Georgia	1,500,000	1,500,000	15,000,000	15,000,000
Hawaii	2,500,000	1,250,000	15,000,000	15,000,000
Idaho*	1,000,000	1,000,000	15,000,000	15,000,000
Illinois	1,000,000	500,000	15,000,000	15,000,000
Indiana	1,000,000	250,000		NA
Iowa	5,000,000	5,000,000	15,000,000	15,000,000
Kansas	900,000	600,000	4,500,000	4,500,000
Kentucky	1,000,000	2,000,000	15,000,000	15,000,000
Louisiana*	650,000	1,000,000	15,000,000	15,000,000
Maine	2,500,000	2,500,000	15,000,000	15,000,000
Maryland	1,500,000	2,250,000	15,000,000	15,000,000
Massachusetts	500,000	3,000,000	15,000,000	15,000,000
Michigan	7,000,000	7,000,000	15,000,000	15,000,000
Minnesota	1,000,000	500,000	15,000,000	15,000,000
Mississippi	600,000	900,000	15,000,000	15,000,000
Missouri	1,200,000	1,200,000	15,000,000	15,000,000
Montana	800,000	1,000,000	15,000,000	15,000,000
Nebraska*	2,000,000	2,000,000	15,000,000	15,000,000
Nevada	500,000	1,000,000	15,000,000	15,000,000
New Hampshire	800,000	200,000		NA
New Jersey	1,000,000	1,000,000		NA
New Mexico	500,000	500,000	15,000,000	15,000,000
New York	1,000,000	1,000,000	45,000,000	45,000,000
North Carolina	1,000,000	250,000	15,000,000	15,000,000

²¹ For states with “NA” appearing in the field for capital and surplus requirements, surplus line statutes indicate that the insurer must meet the capital and surplus requirements imposed on admitted insurers within their domiciliary state.

North Dakota	500,000	500,000	15,000,000	15,000,000
Ohio	5,000,000	5,000,000	15,000,000	15,000,000
Oklahoma	5,000,000	5,000,000	15,000,000	15,000,000
Oregon	5,000,000	5,000,000	15,000,000	15,000,000
Pennsylvania*	2,350,000	1,175,000	15,000,000	15,000,000
Rhode Island	1,000,000	2,000,000	15,000,000	15,000,000
South Carolina	1,500,000	375,000	15,000,000	15,000,000
South Dakota	400,000	400,000		NA
Tennessee	1,000,000	1,000,000	15,000,000	15,000,000
Texas*	2,500,000	2,500,000		NA
Utah*	2,000,000	2,000,000	15,000,000	15,000,000
Vermont	2,000,000	3,000,000	15,000,000	15,000,000
Virginia	1,000,000	3,000,000	15,000,000	15,000,000
Washington*	3,000,000	3,000,000	15,000,000	15,000,000
West Virginia	1,000,000	1,000,000	15,000,000	15,000,000
Wisconsin	2,000,000	1,000,000	15,000,000	15,000,000
Wyoming	2,000,000	2,000,000	15,000,000	15,000,000

Please note that the requirements for writing multiple lines of insurance are used when possible.

If a state separates requirements for stock and mutual insurers, stock insurer requirements are listed.

Mortgage and financial guarantee lines are outliers and often require significantly higher amounts of capital/surplus.

* Exclude life, title, accident and health, or annuities in the calculation of "multiple lines" requirements.

Figure 1 – Line of Business Comparisons

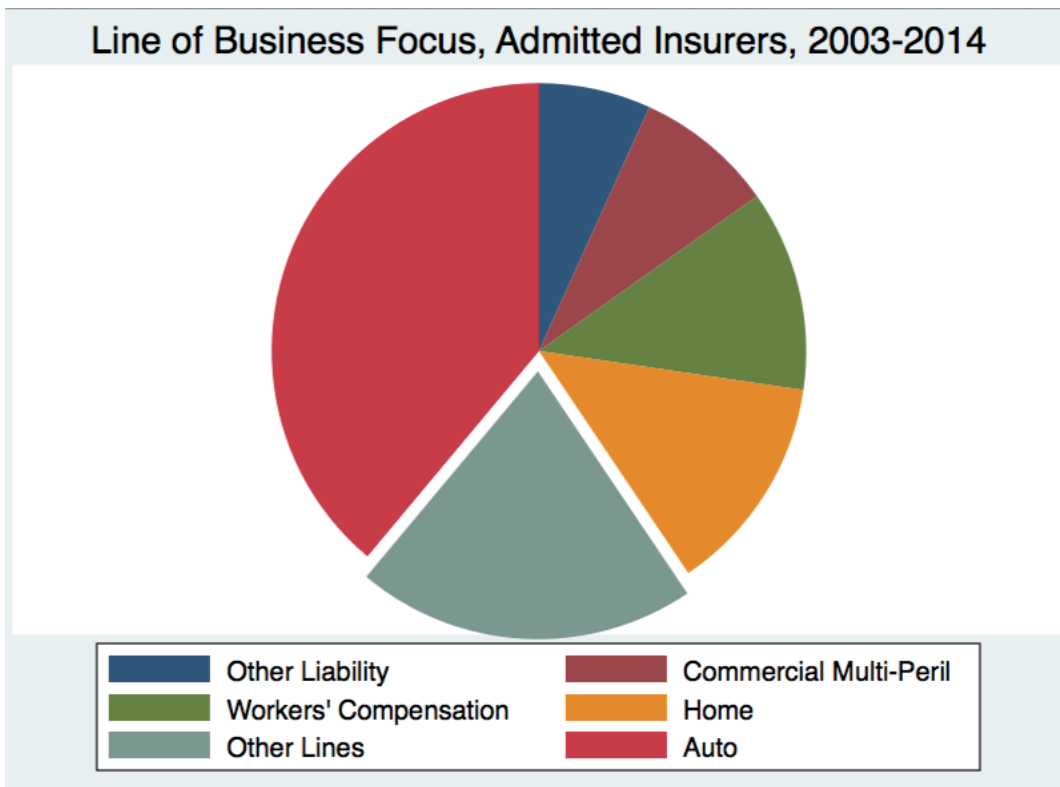
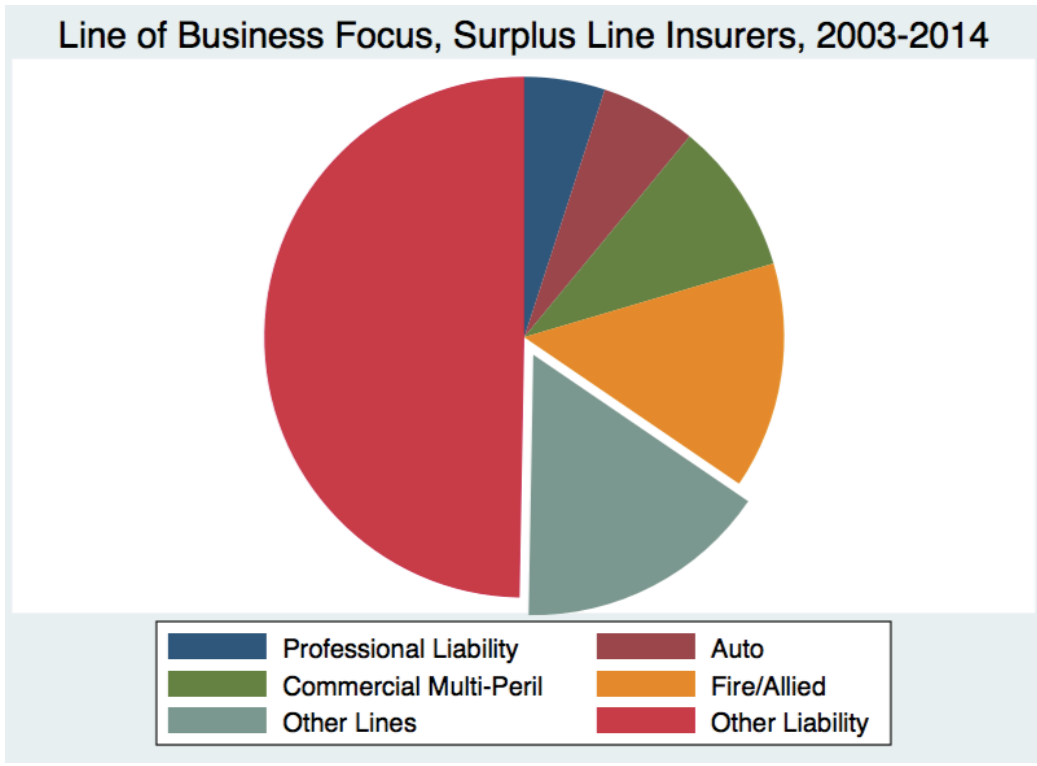


Table 2 – Summary Statistics

Variable	SL Mean	Admitted Mean	Total Mean	T-Test
Net Internal Reinsurance Ceded	0.9742	-0.7086	-0.5822	***
Internal Reinsurance	-0.0074	-0.2659	-0.2465	***
Risk-Adjusted ROA*	0.1493	-0.0628	-0.0469	***
Risk-Adjusted Underwriting ROA*	0.2449	-0.0172	0.0025	***
Return on Assets (ROA)	0.0088	0.0017	0.0022	***
Underwriting ROA	0.0092	0.0018	0.0024	***
Size	12.2680	11.8883	11.9168	***
Surplus	0.5256	0.4922	0.4947	***
Relative Size	0.1140	0.1753	0.1707	***
% Other Liability	0.4971	0.0678	0.1001	***
Stock	0.9793	0.8507	0.8603	***
Line of Business Herfindahl	0.5166	0.6185	0.6108	***
Geographic Herfindahl	0.2328	0.4682	0.4505	***
Catastrophe Exposure	0.1499	0.0934	0.0977	***
External Reinsurance	0.1520	0.1107	0.1138	***
Net External Reinsurance Ceded	0.3972	0.1654	0.1828	***

Total Observations = N = 12,888

* Total Observations = N = 11,814

Table 3A – Simultaneous Equations Model (SEM) Results

Equation 1 - Dependent Variable = Net Internal Reinsurance Ceded

Variable	(1)		(2)		(3)		(4)	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Surplus Line	1.7565	0.6619***	1.7390	0.6639***	1.6822	0.6466***	1.6557	0.6464***
Risk-Adjusted ROA	-0.0949	0.0658						
Risk-Adjusted Underwriting ROA			-0.0374	0.0875				
Return on Assets (ROA)					-3.7653	4.5595		
Underwriting ROA							-2.2116	5.0158
Size	-1.0740	0.2175***	-1.1011	0.2198***	-1.0723	0.2144***	-1.1000	0.2152***
Surplus	-0.0318	0.8444	-0.2681	0.8474	0.0623	0.8480	-0.0969	0.8346
Relative Size	-0.0353	0.6774	-0.0339	0.6777	-0.0763	0.6631	-0.0265	0.6645
% Other Liability	-0.6308	1.2889	-0.4295	1.2863	-0.4931	1.2418	-0.4887	1.2431
Stock	-0.0483	0.3592	-0.1692	0.3572	-0.1626	0.3504	-0.1828	0.3481
Line of Business Herfindahl	-0.7707	0.5484	-0.7164	0.5481	-0.7173	0.5343	-0.7574	0.5362
Geographic Herfindahl	-1.7667	0.3952***	-1.8455	0.4015***	-1.8463	0.3970***	-1.8904	0.3987***
Catastrophe Exposure	-0.1869	0.6673	0.0139	0.6720	0.0286	0.6590	0.0244	0.6599
External Reinsurance	4.3771	1.1805***	4.3485	1.1787***	4.2167	1.0803***	4.1922	1.0795***
Constant	12.5193	2.7683***	12.9836	2.7946***	12.4507	2.6877***	12.8043	2.6843***
Number of Observations		11,814		11,814		12,888		12,888
Year Fixed Effects		Yes		Yes		Yes		Yes
Clustered Standard Errors		Yes		Yes		Yes		Yes
χ^2		156.26		154.01		154.12		150.93

*, **, and *** correspond to the 1%, 5%, and 10% levels of statistical significance, respectively.

Table 3B – Simultaneous Equations Model (SEM) Results

Equation 2 - Dependent Variable = Net External Reinsurance Ceded

Variable	(1)		(2)		(3)		(4)	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Surplus Line	0.1170	0.1012	0.1144	0.1013	0.1282	0.1017	0.1287	0.1016
Risk-Adjusted ROA	-0.0043	0.0076						
Risk-Adjusted Underwriting ROA			-0.0065	0.0104				
Return on Assets (ROA)					-0.2760	0.4932		
Underwriting ROA							-0.0990	0.4962
Size	0.0913	0.0389**	0.0936	0.0393**	0.0897	0.0389**	0.0905	0.0392**
Surplus	-0.1322	0.1194	-0.1232	0.1209	-0.1195	0.1182	-0.1186	0.1179
Relative Size	0.0454	0.1277	0.0455	0.1277	0.0606	0.1276	0.0557	0.1275
Stock	0.1032	0.0725	0.1079	0.0718	0.1103	0.0719	0.1061	0.0714
Line of Business Herfindahl	-0.2374	0.0806***	-0.2389	0.0807***	-0.2481	0.0804***	-0.2467	0.0805***
Geographic Herfindahl	-0.0241	0.0513	-0.0171	0.0522	-0.0311	0.0528	-0.0299	0.0530
Catastrophe Exposure	0.2093	0.1008**	0.1978	0.1010**	0.2032	0.0983***	0.2054	0.0984**
Internal Reinsurance	0.0767	0.0201***	0.0778	0.0202***	0.0756	0.0189***	0.0755	0.0190***
Constant	-0.7406	0.4978	-0.7741	0.5035	-0.6894	0.4953	-0.6930	0.4970
Number of Observations		11,814		11,814		12,888		12,888
Year Fixed Effects		Yes		Yes		Yes		Yes
Clustered Standard Errors		Yes		Yes		Yes		Yes
χ^2		156.26		154.01		154.12		150.93

*, **, and *** correspond to the 1%, 5%, and 10% levels of statistical significance, respectively.