The Brattle Group

The Impact on the U.S. Insurance Market of a Tax on Offshore Affiliate Reinsurance: An Economic Analysis

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SUMMARY

Congress is considering legislation that would impose a significant tax on reinsurance that a foreign-owned U.S. insurance firm buys from an offshore affiliate. The legislation is a response to pressure from some U.S.-owned insurance groups that portray offshore affiliate reinsurance as a tax-avoidance strategy. These groups argue that the tax is necessary to level the playing field and will not harm U.S. consumers. A coalition of insurance firms opposed to the legislation asked us to evaluate the economic impact of the tax. We summarize our conclusions below.

Reinsurance is critical to risk management in the property and casualty (P&C) insurance industry, particularly for natural catastrophes and other infrequent but high-loss events.

- Much of the global demand for reinsurance comes from the United States, which has the world's largest insurance market and faces unique risks from natural disasters and the U.S. legal liability system. The United States accounted for 87 percent of worldwide insured catastrophe losses in 2005 and 61 percent in 2006.

- The key function of reinsurance is risk-pooling and diversification. An insurer can reduce the volatility of its losses by ceding its exposure to particular risks. A reinsurer can bear these risks more efficiently because it assumes them from a variety of sources and many of the risks (*e.g.*, hurricanes in Florida and earthquakes in Japan) are uncorrelated. Reinsurance allows an insurer to write more insurance, or provide a higher limit of protection, than its capital assets would otherwise allow, which makes insurance more affordable.

- The reinsurance market is global because insurers need to be able to diversify across the widest possible geographic area. More than 60 percent of the $59 billion in payments for the 2005 hurricane trio (Katrina, Rita and Wilma) came from foreign insurers and reinsurers, and the distribution of payments for the attack on the World Trade Center is similar.

Affiliate reinsurance is far more prevalent than non-affiliate reinsurance largely because it addresses the problems of adverse selection and moral hazard.

- Affiliate reinsurance is a response to the problems of adverse selection and moral hazard. The insurer often knows more than the reinsurer about the risks it ensures, and this information asymmetry creates an incentive for the insurer to transfer the worst risks and/or to be lax in its underwriting. If the insurer and reinsurer are part of the same corporate group, their incentives are better aligned: vertical integration "internalizes" the costs of adverse selection/moral hazard. This is especially important with respect to infrequent, high-loss events such as natural catastrophes, where the information asymmetry is most pronounced.

- Moreover, as a tool for inter-company transfer of risks, affiliate reinsurance is central to the group structure of the insurance industry. Relative to non-affiliate reinsurance, affiliate reinsurance allows risk and capital to be moved more quickly and easily in response to changing market conditions.

- Because affiliate reinsurance addresses real problems in the market, U.S.-owned insurance groups use it extensively: in 2007, nearly half of U.S.-owned insurers ceded at least 40 percent of their premiums to an affiliate, and a third of them ceded at least 80 percent.

The proposed tax would all but eliminate offshore affiliate reinsurance.

- The legislation defines a benchmark above which offshore affiliate reinsurance is "excess" and thus subject to the tax. But the benchmark is both illogical and perverse, penalizing U.S. subsidiaries for their use of *non-affiliate* (as well as affiliate) reinsurance. Fully 87 percent of offshore affiliate reinsurance ($23.9 billion of $27.4 billion) would be classified as "excess."

- The proposed tax—roughly a 25 percent gross tax on "excess" premiums ceded offshore—is confiscatory: it applies to revenue, not profits. Industry's pre-tax profits are only 11 percent of premiums. Therefore, such a tax would force U.S. subsidiaries to eliminate all $23.9 billion of their "excess" offshore affiliate reinsurance.

U.S. homeowners and businesses would feel the effect of the tax in the form of reduced availability of, and higher prices for, P&C insurance.

- We analyze financial data collected by the National Association of Insurance Commissioners on more than 700 large U.S. P&C firms over a ten-year period (1996–2006). Such information on past industry behavior is the best basis for predicting future industry behavior.

- We first estimate the rate at which U.S. subsidiaries would replace their offshore affiliate reinsurance with capital and/or non-affiliate reinsurance, neither of which is a good substitute. Our key finding is that the net supply of reinsurance (non-affiliate and affiliate combined) would drop by 20 percent as a result of the proposed tax.

- We then analyze how the industry as a whole would adjust to this new market environment (more capital, less reinsurance) in terms of the amount of insurance it would be willing to write. We estimate that the supply of insurance would drop by 1.8–2.1 percent, on average—much more in some lines of business.

- Finally, we observe the change in the price of insurance as a function of supply in our historical data. We estimate that the proposed tax would increase the price of insurance by 1.8–2.1 percent, on average, and as much as 16 percent in some lines of business. U.S. consumers would have to pay $10–$12 billion more per year to obtain the same coverage.

The effects of the tax would fall disproportionately on certain states and lines of business.

- To calculate the variation in effects across states, we apply our estimated nationwide price increases to individual states, based on the value of premiums written in each state. The hardest-hit states (California, Florida, New York, Texas, New Jersey, Massachusetts and Louisiana) have large, diverse economies with huge exposure to property and liability losses.

- The high-risk lines of business that benefit the most from the global diversification would see the largest price increases; these include commercial liability insurance, homeowners insurance in catastrophe-prone states, earthquake insurance, aircraft insurance, and reinsurance covering extreme losses.

Overall, the proposed tax would lead to a degradation of the ability of firms, both inside and outside of the P&C industry, to manage risk.

- The current combination of tools (capital, affiliate and non-affiliate reinsurance) represents the P&C industry's optimal approach to risk management. If Congress were to limit or close off any one option, it would reduce industry's ability to manage its own risk. Limiting the use of offshore affiliate reinsurance in particular would drive U.S. subsidiaries away from the high-risk lines in which they specialize, thus restricting the supply of insurance to these lines.

- Manufacturing, oil and chemical firms would have to pay more for insurance and could face restrictions on coverage. They would have to assume more risk just when their own capital structure is strained, leading to less investment and greater risk of insolvency.

- Adoption of such a tax would be imprudent under the best of conditions. Under current conditions, with the risks due to natural catastrophes growing and the ability of government and private industry to absorb shocks at an historic low, it seems especially unwise.

The Impact on the U.S. Insurance Market of a Tax on Offshore Affiliate Reinsurance: An Economic Analysis

Michael Cragg, J. David Cummins and Bin Zhou[1]

I. INTRODUCTION

Congress is considering legislation that would impose a significant tax on reinsurance that a foreign-owned U.S. insurance company purchases from an affiliate located outside of the United States. Reinsurance — insurance for insurance companies — is a key tool for managing risk: much of the global demand for reinsurance comes from the United States, which has the world's largest insurance market and faces unique risks from natural disasters and the U.S. legal liability system. The United States accounted for fully 87 percent of worldwide insured catastrophe losses in 2005 and 61 percent in 2006.[2]

The draft legislation is a response to pressure from some insurance groups that are headquartered in the United States. These groups claim that the purchase of reinsurance from foreign affiliates is largely a tax-avoidance strategy by U.S. subsidiaries, and that the legislation is necessary to level the playing field. Supporters also claim that the legislation would have no adverse effect on U.S. consumers because, in their words, the affected transactions "add no additional capacity to the market, but rather require a mere bookkeeping entry to move premium from the U.S. company's pocket to the foreign parent's pocket…."

Opponents of the legislation counter that reinsurance represents a genuine transfer of risk and the associated losses from an insurer to a reinsurer, even if the two entities belong to the same corporate group. As evidence that affiliate reinsurance serves a valid non-tax business purpose, they note that U.S.-based insurance groups themselves make extensive use of it. Opponents also dispute the claim that consumers would not be harmed, predicting that the legislation would make property and casualty (P&C) insurance less available and affordable in the United States.

To help inform the debate, a coalition of insurance firms opposed to the legislation has asked us to examine the economic impact it would have on U.S. consumers. Toward that end, we analyze comprehensive financial data collected by the National Association of Insurance Commissioners (NAIC) on more than 700 large U.S. P&C firms over a ten-year period (1996–2006). We use a three-step approach to estimate the direct effect of the tax on the supply of reinsurance and the indirect effect on the supply and price of primary insurance.

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[1] The authors would like to acknowledge Dorothy Robyn of *The Brattle Group* for her help in writing this report.

[2] Swiss Re, 2006, "Natural Catastrophes and Man-Made Disasters in 2005: High Earthquake Casualties, New Dimension in Windstorm Losses," Sigma No. 2/2006; and Swiss Re, 2007, "Natural Catastrophes and Man-Made Disasters in 2006: Low Insured Losses," Sigma No. 2/2007.

We estimate that the legislation, which would impose roughly a 25 percent gross tax on almost all premiums ceded through offshore affiliate reinsurance, would have the following economic impact:

- Reduce the supply of reinsurance in the United States by $19–$22 billion, which represents 20 percent of *all* reinsurance and 40 percent of all *foreign* reinsurance (non-affiliated as well as affiliated);
- Reduce the supply of primary insurance in the United States by 1.8–2.1 percent;
- Increase the price of primary insurance by 1.8–2.1 percent, overall, and by more than 16 percent in some lines of business; and
- As a result of higher prices, require U.S. consumers to pay $10–$12 billion more per year to obtain the same insurance coverage.

Moreover, these estimates likely understate the real impact of the proposed tax, in part because our analysis of historical data does not take into account the current turmoil in capital markets.

We extend our analysis to measure the variation in the effects of the tax across states. First, we simply apply the estimated nationwide price increases to individual states, based on the value of premiums written in each state. For example, we know that U.S. insurers wrote nearly $1.1 billion of earthquake insurance in California in 2007. Based on the nationwide price increase for earthquake insurance (4.9 percent), Californians would have to pay an additional $52 million as a result of the tax. We present these results for 13 states and 14 lines of business. Second, because our nationwide estimates significantly understate the impact of the tax on some markets, we modify the approach used to derive those estimates to incorporate a proxy for state-level data on reinsurance. We estimate, by way of illustration, that Florida would see a 14 percent increase in the price of commercial multiperil property insurance (compared to a 1.4 percent increase nationwide).

We conclude that the legislative proposals would lead to a degradation of the ability of firms to manage risk, both inside and outside of the P&C industry. The financial burden of excess catastrophe risk, in particular, would fall more heavily on government. Adoption of such legislation would be imprudent under the best of conditions. Under current conditions, with the risks due to natural catastrophes growing and the ability of the government and private industry to absorb shocks at an historic low, it seems especially unwise.

The report is organized as follows. In the next section (section II), we discuss the P&C industry and the important role of reinsurance, particularly affiliate reinsurance. Section III summarizes the current tax treatment of offshore affiliate reinsurance transactions and the proposals to subject "excess" transactions to an extremely large tax. In section IV, we use the formula specified in the legislation to calculate the amount of insurance ceded to offshore affiliate reinsurers that would be deemed "excess." Section V summarizes our analysis of the economic impact of the proposed tax. (We provide a more technical description of our methodology in Appendix A.) In Section VI, we look at the state-level impact of the proposed tax. Finally, in section VII, we offer a brief conclusion.

II. P&C INSURANCE AND THE ROLE OF REINSURANCE

Property and casualty insurance protects businesses, homeowners and others against a wide range of risks, including earthquakes and hurricanes (property catastrophe), crop failure, workers' compensation claims, and general liability including class action lawsuits. In 2007, U.S. P&C insurers earned $451 billion in premiums and incurred $305 billion in claims and $122 billion in underwriting expenses.[3]

Insurance companies attempt to manage risks so that, on average, the premiums they collect minus their expenses equal or exceed the present value of their losses (*i.e.*, their claims payments). For some lines of business, risk management is straightforward. For instance, millions of automobile drivers are insured every year and insurance companies can predict the annual rate of accidents and injuries and the magnitude of losses with a great deal of accuracy. For other lines of business, however, risk management is much more complex. For example, natural disasters such as hurricanes and earthquakes occur infrequently but impose catastrophic losses, making actuarial analysis much more challenging.

Risk management has become more complex in recent years. Prior to 1989, the U.S. insurance industry had never suffered a loss of more than $1 billion from a single disaster. That year, Hurricane Hugo cost insurers $7 billion, and numerous catastrophes since then, most of them natural disasters, have surpassed Hugo, as shown in Figure 1. In 1992, Hurricane Andrew caused $22 billion in insured losses in Florida and Louisiana, and in 1994, insured losses from the Northridge earthquake in southern California totaled $17 billion. In 2005, the trio of hurricanes that hit Florida and the Gulf Coast (Katrina, Rita and Wilma) caused $59 billion in insured losses.[4] The losses from natural disasters will almost certainly continue to grow because of the residential and commercial development that has occurred along coastlines and in other areas prone to earthquakes, hurricanes and floods.[5] In addition to the rise in catastrophe losses, the U.S. P&C industry has experienced several liability crises in recent decades, such as occurred due to asbestos and environmental litigation.

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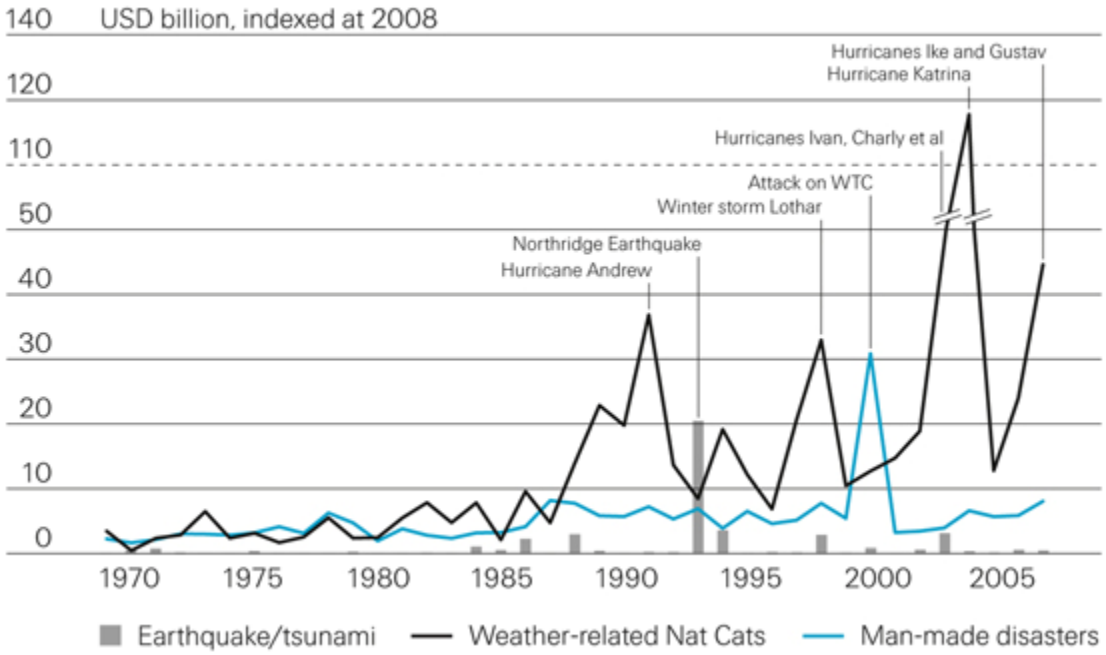
3 A. M. Best Company, *Best's Aggregates and Averages: Property/Casualty: United States and Canada*, 2008 Edition.

4 "The III Insurance Fact Book 2008," Insurance Information Institute. Losses are expressed in 2006 dollars.

5 See, for example, "Catastrophe Modeling: A New Approach to Managing Risk," Knowledge@Wharton, April 6, 2005; available at http://knowledge.wharton.upenn.edu/article.cfm?articleid=1170.

Figure 1. Worldwide Catastrophe Losses (1970–2008)



Note: Swiss Re, "Natural Catastrophes and Man-Made Disasters in 2008: North America and Asia Suffer Heavy Losses," Sigma Study No 2/2009.

The Critical Role of Capital and Reinsurance

The amount of insurance an individual P&C company can sell is partly a function of how much capital it maintains. The greater the volatility of its loss claims, the more capital the company will need to keep to satisfy regulators and rating agencies that it will be able to pay policyholder claims. Capital acts as a shock absorber for volatility – it gets depleted when times are bad and accumulates when times are good.

Capital is a scarce resource in the insurance industry. When insurance companies are not able to cover their losses, or when lack of capital limits their ability to write insurance in the first place, the burden can fall to government and ultimately taxpayers. Effective management of capital is thus a primary concern of U.S. insurance regulators and rating agencies.

A substitute for capital – and a critical tool for managing risk – is reinsurance. Reinsurance is insurance for insurance companies. An insurer transfers (or cedes) premiums collected from customers to a reinsurer that agrees contractually to bear a portion of the insured losses. Because reinsurance transfers the actual risk, the insurer typically does not have to maintain capital or reserves to cover the losses it cedes.

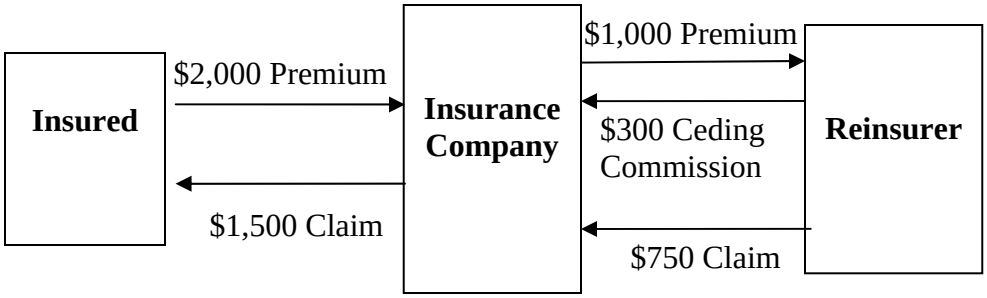
There are two types of reinsurance: proportional and non-proportional. With proportional (or quota share) reinsurance, the reinsurer provides insurance for a fixed percentage of the primary

insurer's losses. With non-proportional reinsurance, also known as excess-of-loss reinsurance, the reinsurer agrees to cover losses above a pre-determined threshold up to a pre-determined cap.

Most reinsurance of U.S. subsidiaries by foreign affiliates is proportional reinsurance. With proportional reinsurance, the reinsurer pays a "ceding commission" that covers the originating insurer's underwriting and administrative costs as well as its estimated lost profit potential.

Figure 2 shows the flow of payments in the hypothetical example of a 50-percent proportional reinsurance contract with a 30-percent ceding commission. The insurance company cedes half of the premium it receives from policyholders ($1000) to the reinsurer, for which it receives $300. When the insurer suffers a loss of $1500, the reinsurer provides 50-percent reimbursement.[6]

Figure 2. Insurance and Reinsurance



Reinsurance and Economic Efficiency

Reinsurance enhances the efficiency of the insurance market in several ways. First, reinsurance allows an insurance company to reduce the volatility of its losses and hence increase the amount of insurance it can support with its existing capital. Insurance companies accomplish this by laying off onto reinsurer's exposure to particular risks or concentrations of risk. Reinsurers can bear these risks more efficiently because they assume them from a variety of sources and because many of the risks are uncorrelated.

To illustrate, an insurance company that writes a substantial amount of California homeowners insurance can reduce the potential volatility of its losses by laying off on a reinsurer some of its exposure to losses from earthquakes. An insurance company that writes a substantial amount of Florida homeowners insurance can achieve the same goal by ceding to a reinsurer some of its exposure to losses from hurricanes. Because the occurrence of California earthquakes and Florida hurricanes is uncorrelated, the volatility of losses from the reinsurer's pool of risks, which includes both sets of exposures, will be lower than that from the pool of risks held by either of the primary insurers.

[6] Note that the reinsurer pays out more than it receives in this example. This is not unusual, especially in recent years.

Not surprisingly, much of the demand for reinsurance comes from insurance companies in catastrophe-prone regions, which use it to insure their extreme risks. In addition to writing more business, an insurer covered by reinsurance can provide a higher limit of protection than its capital assets would otherwise allow. By allowing for more efficient use of capital, reinsurance makes the coverage of risk—particularly, the risk of catastrophic losses—more affordable.

A second way that reinsurance enhances economic efficiency is by facilitating the transfer of risk and capital within individual groups of affiliated insurance companies. As market conditions change, the relative profitability of insurance in different regions and lines of business shifts over time. Reinsurance allows the parent company to build capital in a centrally managed pool and then deploy it quickly to subsidiaries around the globe in response to these changing conditions. For instance, after Hurricanes Andrew and Katrina, foreign reinsurance companies quickly mobilized to replenish their capital base, which they used to fund additional risk-bearing entities and to support new business written by their U.S. subsidiaries and other entities.

This capital-generation function of reinsurance helps to lessen the effects of the cycles and crises to which the insurance industry is susceptible.[7] Following catastrophic losses in 2004 and 2005, reinsurers raised about $30 billion in new capital, including through new equity capital for startup companies, seasoned equity issues and catastrophe bonds.[8] Despite the large unexpected losses, reinsurance prices began to soften as early as the end of 2006 and the beginning of 2007.

Third, reinsurance enhances the efficiency of the insurance market by channeling risk to entities that have highly specialized expertise. For example, Bermuda's reinsurers specialize in the highly volatile lines of business characterized by large, infrequent claims, such as hurricanes and earthquakes and class action lawsuits. They provide sophisticated data analysis and risk modeling capabilities critical to helping insurers understand how diversification affects their expected losses and capital requirements. Small insurance companies in particular benefit from the technical and financial expertise that these specialty reinsurance companies provide.

The Importance of Foreign Reinsurance

The reinsurance market is global because the insurance industry needs to be able to diversify risk across the widest possible geographic area. U.S. insurers in particular must be able to diversify across the globe because the United States represents such a large concentration of insured risk. Figure 3 shows the regional distribution of insurance payments for the 2005 hurricane trio. More than 60 percent of the roughly $59 billion in insurance payments came from foreign insurers and reinsurers. The distribution of payments for the attack on the World Trade Center is similar.[9]

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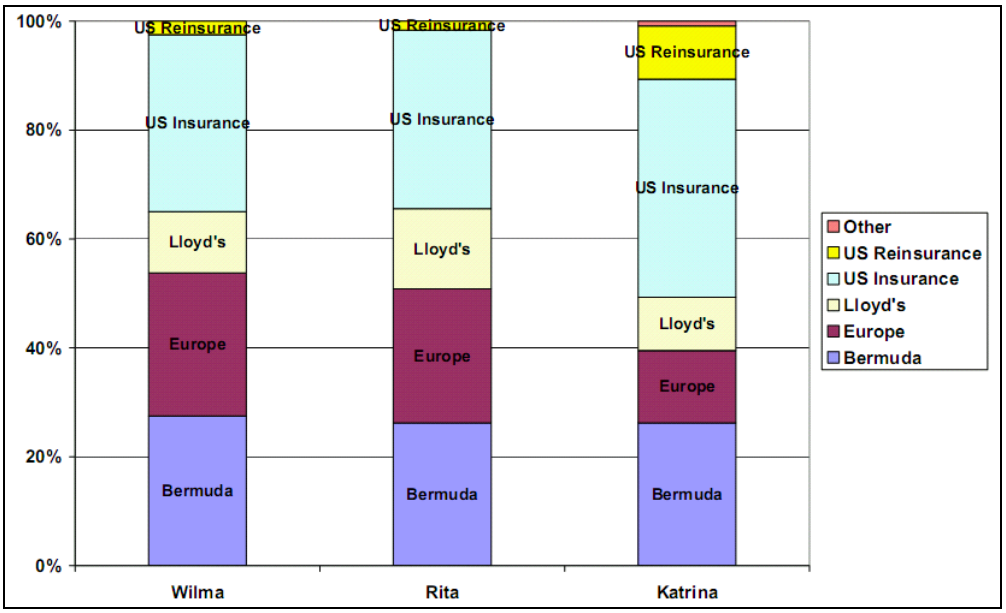
7 J. David Cummins, Georges Dionne, Robert Gagné and Abdelhakim Nouira, 2008, "The Costs and Benefits of Reinsurance." Available at: http://ssrn.com/abstract=1142954.

8 J. David Cummins, 2007, "Reinsurance for Natural and Man-Made Catastrophes in the United States: Current State of the Market and Regulatory Reforms." Available at: http://ssrn.com/abstract=997928.

9 J. David Cummins, "*The Bermuda Insurance Market: An Economic Analysis*," 2008. Available at: http://www.bermuda-insurance.org/pdf-downloads/CumminsReport08.pdf.

While the United States has the largest insurance market in the world, roughly half of the $100 billion in reinsurance purchased by U.S. insurers comes from non-U.S. reinsurers[10] (for property catastrophe reinsurance, that fraction is two-thirds[11]). A key reason is that foreign reinsurers are more nimble and better able to raise capital in a global market than U.S.-owned firms, which are handicapped by our country's state-dominated insurance regulatory system. The licensing process is lengthy and complex, which makes it almost impossible for a start-up insurer or reinsurer to enter the U.S. market in a timely fashion to serve a new insurance need. And because regulation makes it difficult for insurers to quickly adjust rates or coverage terms, U.S. firms have shied away from the highly volatile risks that Bermuda firms have in turn embraced. Moreover, although large U.S. corporations often export these extreme risks to international underwriting centers such as London and Bermuda primarily to achieve geographic diversification, they also seek to avoid the rigidity of the U.S. regulatory system.

Figure 3. Regional Distribution of 2005 Hurricane Insurance Payments



Source: J. David Cummins, "*The Bermuda Insurance Market: An Economic Analysis,*" 2008.

[10] See, for example, Figure 6.1 in J. David Cummins, "*The Bermuda Insurance Market,*" *op. cit.*

[11] Donald Kramer, "Statement of the Association of Bermuda Insurers and Reinsurers," Hearing before the Senate Finance Committee, September 26, 2007. Available at: http://finance.senate.gov/sitepages/hearing092607.htm.

The Importance of Affiliate Reinsurance

U.S. P&C companies rely heavily on other companies in the same insurance group (*i.e.*, affiliates) for reinsurance. Table 1 shows the distribution of U.S.-owned P&C insurers in terms of the fraction of premiums received from their customers that they ceded to a related reinsurer in 2007. Nearly half of the U.S.-owned insurers ceded at least 40 percent of their premiums to an affiliate, and more than a third of them ceded at least 80 percent.

Table 1. Distribution of U.S.-Owned P&C Companies by Net Premiums Ceded to Related Reinsurers as a Percent of Gross Premiums

Net Premium Ceded to Affiliates/Gross Premiums (3)	Number of Companies	Percent of All Companies
>= 0%	744	100%
> 10%	443	60%
> 20%	413	56%
> 30%	388	52%
> 40%	361	49%
> 50%	341	46%
> 60%	317	43%
> 70%	289	39%
> 80%	268	36%
> 90%	219	29%

Notes: (1) The sample includes only companies that belong to a U.S.-owned insurance group which has at least $500 million in annual gross written premiums (GWP). Companies with less than $10 million in annual GWP were excluded in an effort to eliminate largely inactive firms.
(2) A company is "U.S. owned" if its self-reported level of foreign ownership is below 50 percent.
(3) Net premiums ceded to affiliates equals reinsurance premiums ceded to affiliates less reinsurance premiums assumed from affiliates. Gross premiums are defined here as direct insurance premiums written plus assumed reinsurance premiums from unrelated insurance companies.

Source: Horst Frisch Incorporated.

It is not hard to understand why affiliate reinsurance would play a central role in the insurance market. After all, the key rationale for reinsurance—namely, risk pooling and diversification—applies no less when the reinsurance is provided by an affiliate within a related group of insurance companies than when it is provided by a non-affiliated reinsurer. Absent reinsurance, regulators would require each company within an insurance group to have enough capital on a standalone basis to support the business it writes. With affiliate reinsurance, a group of related companies can reduce the total amount of capital needed to support their combined business.

One must look beyond this common risk-pooling function, however, to understand why affiliate reinsurance is so much more prevalent than non-affiliate reinsurance. Most important, affiliate reinsurance is a response to the problems of adverse selection and moral hazard.[12] These

[12] See, for example, Lawrence S. Powell, and David W. Sommer, "Internal Versus External Capital Markets in the Insurance Industry: The Role of Reinsurance," *Journal of Financial Service Review*, 2007, Vol. 31,

problems arise because the insurer often knows more than the reinsurer about the risks it insures, and this information asymmetry creates an incentive for the insurer to transfer the worst risks to the reinsurer (adverse selection) and/or to be lax in its underwriting (one form of moral hazard). If the insurer and the reinsurer are part of the same corporate group, their incentives are better aligned. Stated differently, vertical integration serves to "internalize" the costs of adverse selection and moral hazard.[13] This is especially beneficial with respect to the coverage of low-frequency, high-loss events such as natural catastrophes and product liability lawsuits, where the information asymmetry between the insurer and reinsurer is most pronounced.

Second, as a tool for inter-company transfer of risks, affiliate reinsurance is central to the group structure of the insurance industry. As discussed above, insurance groups organize subsidiaries around the world in order to diversify risk across the widest possible geographic area. Use of affiliate reinsurance allows an insurance group to transfer risk far more quickly and easily than it could with non-affiliate reinsurance, which requires lengthy negotiations with a third party over the terms and price of the contract—a contract that typically must be renegotiated annually. Because of its greater flexibility, affiliate reinsurance is also less susceptible to price increases and supply restrictions over the hard-market phase of the underwriting cycle.

These two explanations are closely linked. Affiliate reinsurance allows for the relatively rapid transfer of risk in large part because the costs of adverse selection and moral hazard have been internalized. Conversely, negotiations over non-affiliate reinsurance are complex and time consuming largely because a third-party reinsurer must scrutinize potential risks for evidence of these problems. To be sure, non-affiliate reinsurers have devised mechanisms to reduce the cost of adverse selection and moral hazard. These mechanisms are not perfect, however. Moreover, they are expensive, which raises the cost of non-affiliate reinsurance.

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pp. 173–188; and Lawrence S. Powell, David W. Sommer, and David L. Eckles, "The Role of Internal Capital Markets in Financial Intermediaries: Evidence from Insurer Groups," *The Journal of Risk and Insurance*, 2008, Vol. 75, No. 2, pp. 439-461.

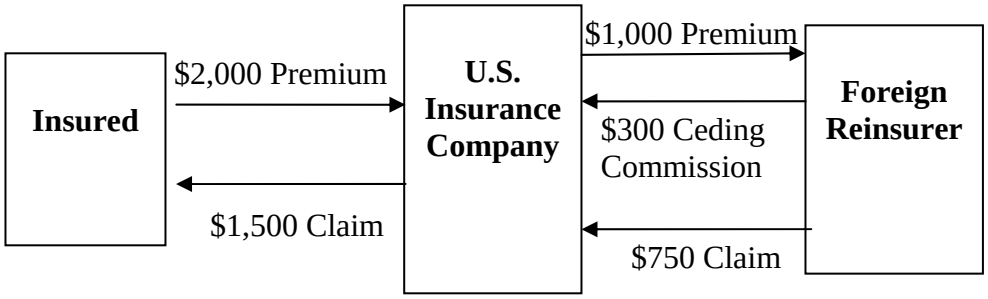
[13] One of the central questions in economics has been why and when firms opt to vertically integrate—*i.e.*, to acquire goods and services internally versus through an external market exchange. Most theories of vertical integration turn on the presence of some type of market imperfection. Traditional theories emphasized issues of market power (*e.g.*, a firm may seek to capture monopoly profits earned downstream by gaining control of a distribution channel). Over time, however, economists have focused increasingly on the critical role of transaction costs. One branch of work in this area, led by Oliver Williamson, has looked at conditions under which giving decision making authority to management in a combined firm (vertical integration) is more efficient than contracting out. Another branch of work, for which economists Joseph Stiglitz and George Akerlof won the Nobel Prize, emphasizes that information asymmetries lead to costly moral hazard and adverse selection problems, and that firms integrate vertically to internalize and control these costs. The differences between these branches of work are less important than the similarities, however—namely, a view that the governance structure that an individual firm voluntarily adopts tends to be the most efficient one possible, given the nature of its transactions.

III. TAX TREATMENT OF OFFSHORE AFFILIATE REINSURANCE: CURRENT LAW AND PROPOSED CHANGE

Currently, an offshore reinsurer that derives income abroad from reinsuring risks that originate in the United States is generally not subject to U.S. federal income tax. For example, if a U.S. insurer cedes $1,000 in premiums and receives a 30 percent ($300) ceding commission, income on the net premium ceded of $700 is earned and taxed abroad, because that is where the risk resides. (See Figure 4.) Bermuda reinsurers, however, pay a one percent U.S. federal excise tax on the full amount of the ceded premiums ($1,000 in our example).[14]

The U.S. insurer in this example can deduct the gross premium ceded ($1,000) from its U.S. federal income tax return but it must treat the ceding commission ($300) as taxable income. Moreover, the U.S. insurer foregoes the deduction for losses ($750) that it would have been able to take had it not ceded that risk to the reinsurer. Over time, the deduction for the ceded premium tends to be fully offset because, with actuarially fair insurance, expected losses plus underwriting expenses are equal to premiums plus investment income.

Figure 4: Offshore Reinsurance



Proposed Legislation

The proposed legislation would limit the tax deductibility of premiums that foreign-owned U.S. insurers (U.S. subsidiaries) cede to *affiliate* reinsurers offshore.[15] Specifically, the legislation creates a benchmark, known as the "industry fraction," which represents the average industry level of *non-affiliate* reinsurance by line of business. When the share of premiums ceded to an offshore reinsurer (non-affiliate as well as affiliate) by a U.S. subsidiary exceeds this industry fraction, the "excess" affiliate reinsurance is taxable as corporate income.

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[14] Under existing U.S. tax treaties, reinsurers based in a number of other countries such as Germany and Switzerland pay no federal excise tax.

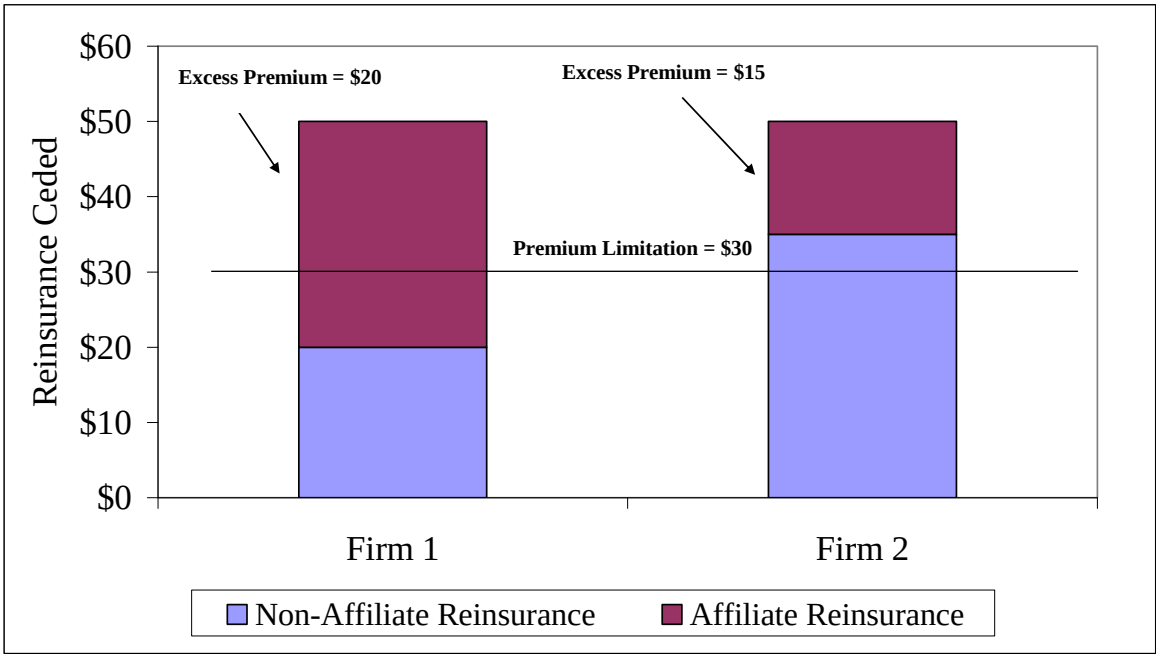
[15] The legislation exempts cessions from U.S. insurers to offshore non-affiliate reinsurers. It also exempts cessions to offshore affiliates that are subject to U.S. income taxation.

On the face of it, the proposal raises concerns. First, the use of industrywide reliance on *non-affiliate* reinsurance as the relevant benchmark is illogical. If, as supporters of the legislation claim, U.S. subsidiaries are relying excessively on (offshore) affiliate reinsurance in order to reap tax benefits, then the logical benchmark would be some measure of reliance on *affiliate* reinsurance. It would appear that the legislative drafters chose an illogical benchmark because it has the effect of setting the bar for what is considered "excess" very low.

Second, the application of the benchmark is perverse. Because non-affiliated reinsurance is counted first against the permissible threshold, the proposal penalizes those U.S. subsidiaries that are *most* reliant on non-affiliate reinsurance. Figure 5 below illustrates this phenomenon. In each scenario, a U.S. subsidiary has written $100 in premiums, of which it has ceded half ($50) to offshore reinsurers, both affiliate and non-affiliate. The threshold above which offshore affiliate reinsurance is taxed is assumed to be $30. Firm 1 cedes $20 to non-affiliate reinsurers; thus some of its affiliate reinsurance ($10 out of $30) falls below the threshold and escapes the tax. Firm 2 cedes $30 to non-affiliate reinsurers; thus all of its affiliate reinsurance exceeds the threshold. This outcome makes no economic sense.

Moreover, U.S. subsidiaries already make extensive use of non-affiliate reinsurance—it accounts for more than a third ($15 billion) of the $42 billion in reinsurance that they purchase. That, together with the low industry fraction, ensures that most of the premiums that U.S. subsidiaries cede to offshore affiliate reinsurers would fall above the threshold.

Figure 5. Determination of Excess Premium



Third, the tax is extremely large. Under the example in Figure 4 above, if the U.S. insurer is foreign-owned and the foreign reinsurer is a related company, the net premium ceded of $700 would no longer be deductible and hence would be subject to U.S. income tax (assuming the transaction is "excess"). Note, however, that the losses that the U.S. subsidiary recovers from the offshore reinsurer ($750 in this example) would continue to be treated as taxable income. Since the corporate income tax rate is 35 percent, the proposal amounts to a 24.5 percent gross tax on the $1,000 premium ceded offshore (700 × 0.35/ 1,000 = 0.245).[16]

To put this into perspective, note that the pre-tax income of the U.S. P&C industry has been 11.1 percent of premiums on average over the last ten years.[17] Thus, the proposed tax on "excess" premiums far exceeds the average pre-tax income that U.S. insurers earn per dollar of premium. Far from "leveling the playing field," such a tax is confiscatory.

In sum, the draft legislation imposes a confiscatory tax on offshore affiliate reinsurance deemed to be "excess." Moreover, it defines "excess" in an illogical way. It is hard to discern a legitimate economic rationale for such an approach.

[16] This calculation assumes a 30 percent ceding commission. Although ceding commissions vary, 30 percent is representative. If anything, the average ceding commission may be slightly lower than 30 percent, in which case the legislative proposal would represent an even higher gross tax on premium ceded offshore.

[17] Highline Database.

IV. HOW MUCH PREMIUM WOULD BE SUBJECT TO THE TAX?

In this section, we carry out a set of straightforward calculations to show the amount of insurance ceded by U.S. insurers to offshore affiliate reinsurers that would be considered "excess" and therefore subject to the proposed tax. First, we calculate the benchmark "industry fraction" for each line of business and overall. Next we identify the foreign-owned insurance groups that do business in the United States and calculate the value of the insurance premiums ceded to offshore affiliates by their U.S. subsidiaries. Finally, we combine the first two calculations to show the amount of offshore affiliate reinsurance that would be deemed "excess" under the legislation and therefore subject to the proposed tax.

Calculation of the "Industry Fraction"

We first calculate the "industry fraction" for each line of business and overall. To do this, we use 2007 aggregate industry data on premiums in five categories, as shown in Table 2. Included in the data are all large U.S. insurers, including U.S. subsidiaries of foreign-owned insurance groups, which report to the National Association of Insurance Commissioners. Column 1, "direct business," records the amount of premiums written directly to policyholders. Columns 2 and 3 show the amount of "reinsurance assumed" by NAIC-reporting firms from affiliates and non-affiliates, respectively. Columns 4 and 5 show the amount of "reinsurance ceded" by NAIC-reporting firms to the same two subgroups.

The legislative proposals define "industry fraction" as the amount of premium ceded to non-affiliate reinsurers, both domestic and offshore (column 5), divided by gross premiums (column 7). The proposals define gross premiums as the sum of direct business (column 1) and reinsurance assumed from non-affiliate insurers (column 3). Gross premiums, by this definition, represent a measure of the amount of insurance written by U.S. P&C companies—both as primary insurers covering direct insureds and as reinsurers covering non-affiliate insurers.

Our calculation of the industry fraction is shown in column 8. Although there is considerable variation across the 34 lines of business, the average industry fraction—that is, the average level of reliance on non-affiliate reinsurance industrywide—is only 12 percent. Moreover, the industry fraction for the top four lines of business, as measured by gross premiums, is even less than 12 percent: private passenger auto liability (3.5 percent), auto physical damage (2.7 percent), homeowners multiple peril (10.9 percent) and workers' compensation (10.6 percent).

Table 2. Calculation of Industry Fraction (2007, $ in Millions)

	1	Reinsurance Assumed		Reinsurance Ceded		6	7	8
		2	3	4	5	Net Prem. Written		
	Direct Business	From Affiliates	From Non-Affil.	To Affiliates	To Non-Affil.	1 + 2 + 3 - 4 - 5	Gross Premiums 1 + 3	Industry Fraction 5 / 7
Fire	11,943	446	2,148	1,542	3,197	9,798	14,091	22.7%
Allied lines	18,615	477	4,858	1,413	11,809	10,727	23,473	50.3%
Farmowners multiple peril	2,613	65	183	88	349	2,424	2,796	12.5%
Homeowners multiple peril	63,766	228	1,323	1,157	7,090	57,070	65,090	10.9%
Commercial multiple peril	36,101	271	1,333	1,902	4,456	31,346	37,434	11.9%
Mortgage guaranty	6,152	50	51	39	1,022	5,192	6,203	16.5%
Ocean marine	3,923	119	778	536	1,023	3,261	4,701	21.8%
Inland marine	15,316	258	436	2,498	3,717	9,794	15,752	23.6%
Financial guaranty	3,555	479	184	505	674	3,039	3,739	18.0%
Medical malpractice - occurrence	2,439	7	114	68	125	2,368	2,553	4.9%
Medical malpractice - claims made	9,153	26	368	749	1,183	7,616	9,521	12.4%
Earthquake	2,045	32	286	405	697	1,261	2,331	29.9%
Group accident and health	4,091	620	1,161	608	799	4,465	5,252	15.2%
Credit accident and health (group and indiv.)	527	62	55	44	290	310	582	49.8%
Other accident and health*	2,702	163	216	535	204	2,342	2,918	7.0%
Workers' compensation	46,862	454	1,559	2,850	5,156	40,869	48,421	10.6%
Other liability - occurrence	35,831	534	2,726	4,242	8,006	26,841	38,557	20.8%
Other liability - claims made	18,773	91	1,577	3,057	2,814	14,570	20,350	13.8%
Products liability - occurrence	3,417	41	137	514	313	2,769	3,555	8.8%
Products liability - claims made	639	13	71	94	92	538	711	12.9%
Private passenger auto liability	97,301	1,113	2,132	2,069	3,466	95,011	99,433	3.5%
Commercial auto liability	22,003	149	1,100	2,023	2,213	19,016	23,103	9.6%
Auto physical damage	74,572	515	1,425	3,097	2,026	71,390	75,998	2.7%
Aircraft (all perils)	3,004	124	402	710	1,059	1,762	3,406	31.1%
Fidelity	1,301	61	111	103	118	1,253	1,412	8.3%
Surety	5,463	255	441	627	686	4,845	5,904	11.6%
Burglary and theft	172	7	14	17	15	161	186	8.2%
Boiler and machinery	1,224	218	841	131	411	1,741	2,065	19.9%
Credit	1,769	141	297	455	347	1,405	2,066	16.8%
International	73	8	152	44	53	137	226	23.4%
Reinsurance - Nonprop. Assumed Property	-	335	7,204	1,219	724	5,596	7,204	10.0%
Reinsurance - Nonprop. Assumed Liability	-	1,204	8,357	3,635	188	5,738	8,357	2.2%
Reinsurance - Nonprop. Assumed Financial	-	10	347	74	14	269	347	3.9%
Agg. Write-ins for Other Lines of Business	4289	10	251	357	947	3,245	4,540	20.9%
Totals	**499,637**	**8,583**	**42,638**	**37,407**	**65,280**	**448,171**	**542,275**	**12.0%**

Source: Highline Database

* Adjusted by removing negative premiums for Westport from the aggregate. Without the adjustment, the industry fraction is negative.

Amount of Insurance Ceded by U.S. Affiliates

Next we identify the foreign-owned insurance groups that do business in the United States and calculate the value of the insurance premiums ceded offshore by their U.S. subsidiaries by line of business. This step requires us to make two assumptions.

First, the relevant data on cessions is available only for the consolidated U.S. operation of an insurance group, whereas the information on foreign ownership is available only for individual U.S. insurance companies. To determine whether a consolidated U.S. operation is foreign- or domestic-owned, we calculate the average level of foreign ownership of all the U.S. members of an insurance group (we use a simple average). We treat an insurance group (and its respective consolidated U.S. operation) as foreign-owned if this figure is equal to or greater than 50 percent.

Second, the information on individual companies, which is recorded in the format of Table 2 above, does not specify whether reinsurance is ceded offshore or onshore. Thus, we assume that, in the case of a foreign-owned U.S. entity, any and all of the premiums it cedes to affiliates go offshore.

Table 3 below provides data on the U.S. operations of foreign-owned insurance groups. Column 4 shows the value of the insurance that these U.S. subsidiaries cede to offshore affiliates by line of business. Overall, U.S. subsidiaries cede $27.4 billion in premiums to offshore affiliate reinsurers.

Amount of Ceded Insurance Subject to Proposed Tax

Table 3 also shows, by line of business, the amount of this offshore affiliate reinsurance that would be deemed "excess" under the legislation and therefore subject to a 35 percent corporate income tax. (See columns 6 and 7.) Overall, $23.9 billion, or 87 percent, of the $27.4 billion in offshore affiliate reinsurance would be subject to the tax. Stated differently, only $3.5 billion, or 13 percent, of the total supply of offshore affiliate reinsurance would escape the proposed tax.

Certain lines of business would be especially vulnerable to the tax, as measured by the fraction of offshore affiliate reinsurance that would be considered "excess": non-proportional (excess-of-loss) reinsurance for liability (98.2 percent), workers' compensation (95.9 percent) and "other liability—claims made" (92.3 percent). Non-proportional (excess-of-loss) reinsurance for property and financial also would be disproportionately harmed, with 88.0 and 92.1 percent of offshore affiliate reinsurance, respectively, deemed "excess."[18] These are the very lines of business for which diversification through reinsurance is most important.

[18] In keeping with the way NAIC collects and compiles industry data, we treat as insurance the three lines of business labeled "non-proportional reinsurance."

Table 3. Summary of U.S. Operations of Foreign-Owned Insurers ($ in Millions)

		Reinsurance Assumed		Reinsurance Ceded			
Foreign Firms	Direct Premiums (1)	From Affiliates (2)	From Non-Affil (3)	To Affiliates (4)	To Non-Affil. (5)	Excess Premiums (6)	Excess as % of Offshore Affil Reins (7)=(6)/(4)
Fire	2,190	163	1,018	1,185	857	1,004	84.7%
Allied lines	4,696	68	2,676	1,072	3,724	515	48.0%
Farmowners multiple peril	175	4	89	23	81	13	55.5%
Homeowners multiple peril	6,124	43	623	536	445	251	46.9%
Commercial multiple peril	6,995	102	768	1,574	1,359	1,332	84.6%
Mortgage guaranty	0	0	2	2	0	1	77.8%
Ocean marine	1,219	70	391	452	186	305	67.6%
Inland marine	2,823	145	258	924	736	725	78.5%
Financial guaranty	1,182	250	23	468	226	404	86.3%
Medical malpractice - occurrence	112	2	28	10	14	9	91.0%
Medical malpractice - claims made	726	0	162	242	166	236	97.4%
Earthquake	821	21	210	337	371	259	77.0%
Group accident & health	1,089	42	859	508	363	439	86.4%
Credit A&H (group & individual)	1	0	-5	3	0	2	75.0%
Other accident & health	80	48	-340	82	14	79	95.8%
Workers' compensation	7,289	-34	346	2,185	1,141	2,095	95.9%
Other liability - occurrence	9,373	127	1,553	3,429	2,230	2,963	86.4%
Other liability - claims made	5,435	-206	640	3,011	843	2,779	92.3%
Products liability - occurrence	993	16	78	521	141	508	97.6%
Products liability - claims made	134	12	0	94	16	87	92.5%
Private passenger - auto liability	7,270	445	420	1,179	137	993	84.2%
Commercial - auto liability	4,109	82	503	1,490	803	1,415	95.0%
Auto physical damage	5,920	235	263	1,690	268	1,606	95.0%
Aircraft (all perils)	953	14	219	496	307	389	78.6%
Fidelity	144	4	20	71	20	69	97.9%
Surety	922	83	272	464	144	406	87.5%
Burglary & theft	18	0	8	10	2	9	91.1%
Boiler & machinery	181	12	122	128	74	109	84.8%
Credit	529	59	115	263	76	218	82.7%
International	30	1	113	30	51	26	84.8%
Rein: Non-prop. assumed property	0	121	2,906	1,184	233	1,042	88.0%
Rein: Non-prop. assumed liability	0	647	5,739	3,352	64	3,290	98.2%
Rein: Non-prop. assm financial lines	0	9	192	70	0	64	92.1%
Write-ins for other lines of business	565	-1	30	269	140	227	84.5%
TOTALS	**72,097**	**2,582**	**20,303**	**27,354**	**15,231**	**23,871**	**87.3%**

Source: Authors' calculation based on data from Highline. Excess premiums (6) are sums of excess premiums for each foreign-owned company and each line of business.

V. ANALYSIS OF ECONOMIC IMPACT

In this section, we analyze the economic impact of the proposed tax on offshore affiliate reinsurance through a statistical analysis of comprehensive NAIC financial data. We use a three-step approach that combines regression analysis with a mathematical simulation of the U.S. insurance market to estimate the effect of the tax on the supply of reinsurance (step one) and on the supply and price of primary insurance (steps two and three). Our base-case analysis produces a lower-bound estimate of the impact of the tax because we do not constrain how U.S. subsidiaries can respond to it. We then modify the analysis to include a constraint on their response that is implicit in the legislation. That modification to our base-case gives us an upper-bound estimate. (See Appendix A for a technical description of our methodology.)

Impact on the Supply of Reinsurance (Step One)

In step one of our analysis, we estimate the direct effect of the proposed tax on the supply of reinsurance. First, as we calculated in the last section, 87 percent, or $23.9 billion, of offshore affiliate reinsurance would be considered "excess" under the proposed legislation. Moreover, as we showed in section III, the proposed tax on "excess" premiums far exceeds the average pre-tax income that U.S. insurers earn per dollar of premium. Thus, it is reasonable to assume that U.S. subsidiaries would eliminate all $23.9 billion of their "excess" offshore affiliate reinsurance.

Of course, U.S. subsidiaries would partially offset this loss of offshore affiliate reinsurance by raising their level of capital and/or non-affiliate reinsurance, so as to maintain their existing book of business. Neither is a perfect substitute for affiliate reinsurance, however. Compared to reinsurance of any kind, capital is more expensive because it does not provide for diversification, and it is less flexible because it carries a greater regulatory burden. Likewise, non-affiliate reinsurance is more expensive than affiliate reinsurance, because it entails additional transaction costs, including the costs of adverse selection and moral hazard.

To estimate the net impact of this "offset" process, we calculate the level of substitution between affiliate insurance on the one hand, and capital and non-affiliate reinsurance on the other. We analyze some 7,400 observations from the NAIC data, each of which represents a financing decision made by a U.S. insurer between 1996 and 2006.[19] We control statistically for the level of risk facing individual firms by taking into account risk-related measures such as the insurer's business mix, the geographic concentration of its business, and the size and age of the firm.

[19] U.S.-owned insurers account for about 80 percent of this sample, and U.S. subsidiaries of foreign-owned groups account for the rest. Although we are interested in the behavior of U.S. subsidiaries at this step of the analysis, we include data on U.S.-owned insurers as well. In doing so, we assume that domestic and foreign insurers make financing decisions in a similar manner. Our results validate this assumption. When we eliminate U.S. subsidiaries from our sample, there is no change in the substitution coefficient of non-affiliate reinsurance for affiliate reinsurance and only a small drop in the substitution coefficient of capital for affiliate reinsurance. More generally, our results are not particularly sensitive to variations in the statistical specification and/or the data sample.

We estimate that, for each dollar of affiliate reinsurance that is lost, insurers would substitute 29 cents worth of non-affiliate reinsurance and 56 cents worth of capital, assuming that the supply of insurance remained constant.[20] This implies that the $23.9 billion drop in affiliate reinsurance would be offset by a $6.9 billion increase in non-affiliate reinsurance and a $13.4 billion increase in capital. Thus, assuming a constant supply of insurance, imposition of the proposed tax would lead to a net loss of $17 billion in reinsurance ($23.9 billion less $6.9 billion).[21]

When we relax the assumption that the insurance supply remains constant, our estimate of the net loss in reinsurance increases somewhat—to $18.7 billion. (We do not actually relax this assumption until step two of our analysis, but we report the results here for clarity of exposition.) That is a significant decline: it represents about one-fifth of *all* the reinsurance purchased by U.S. insurers and some 40 percent of all the *foreign* reinsurance supplied to the United States.

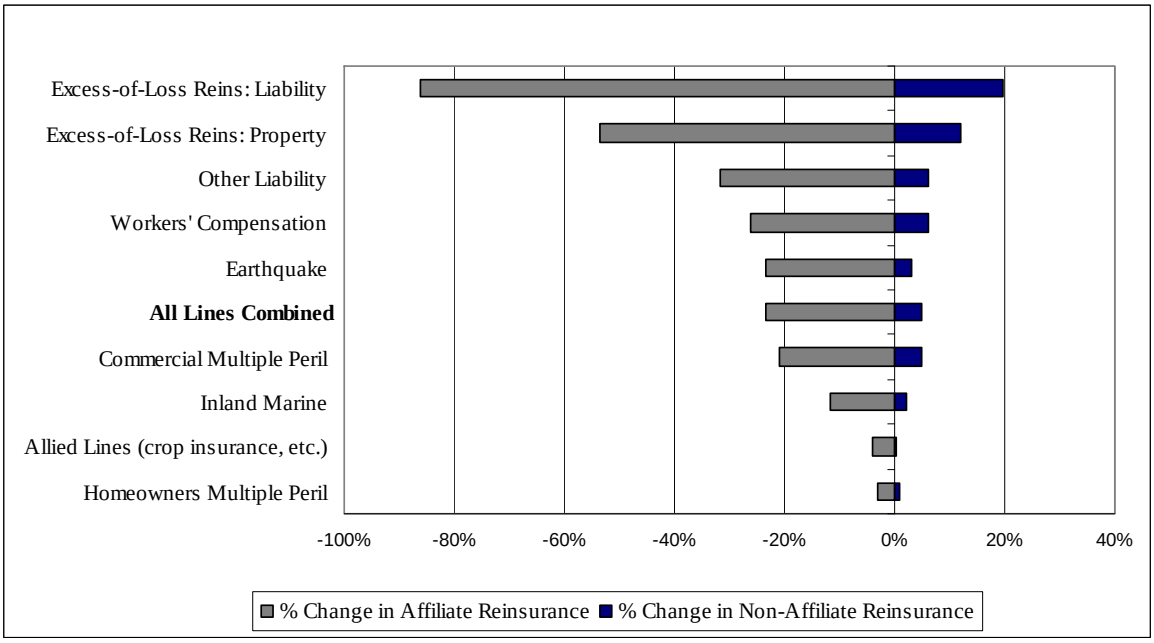
For certain lines of business, the proposed tax would lead to an even higher percentage loss, as shown in Figure 6.[22] For example, approximately three-quarters of the excess-of-loss reinsurance for liability and two-fifths of the excess-of-loss reinsurance for property would be eliminated. More generally, the lines of business that would be most affected by the tax are the ones that benefit the most from the global pooling of risks that reinsurance provides.

[20] In technical terms, the substitution coefficient of non-affiliate reinsurance for affiliate reinsurance is 0.29 and the substitution coefficient of capital for affiliate reinsurance is 0.56. These results are consistent with the academic literature as well as our discussions with industry officials.

[21] Note that the substitution of non-affiliate reinsurance for "excess" affiliate reinsurance would in many cases have the effect of making additional affiliate reinsurance "excess." Although we ignore that effect here, we take it into account below, in our modified analysis.

[22] For certain lines of business, such as homeowners multiple peril (HMP), the seeming lack of a significant impact is misleading, for reasons we discuss in section VI on state-level effects.

Figure 6. Impact of the Proposed Legislation on Affiliate and Non-Affiliate Reinsurance



Note: Both percentages are calculated based on total reinsurance for the particular line of business.

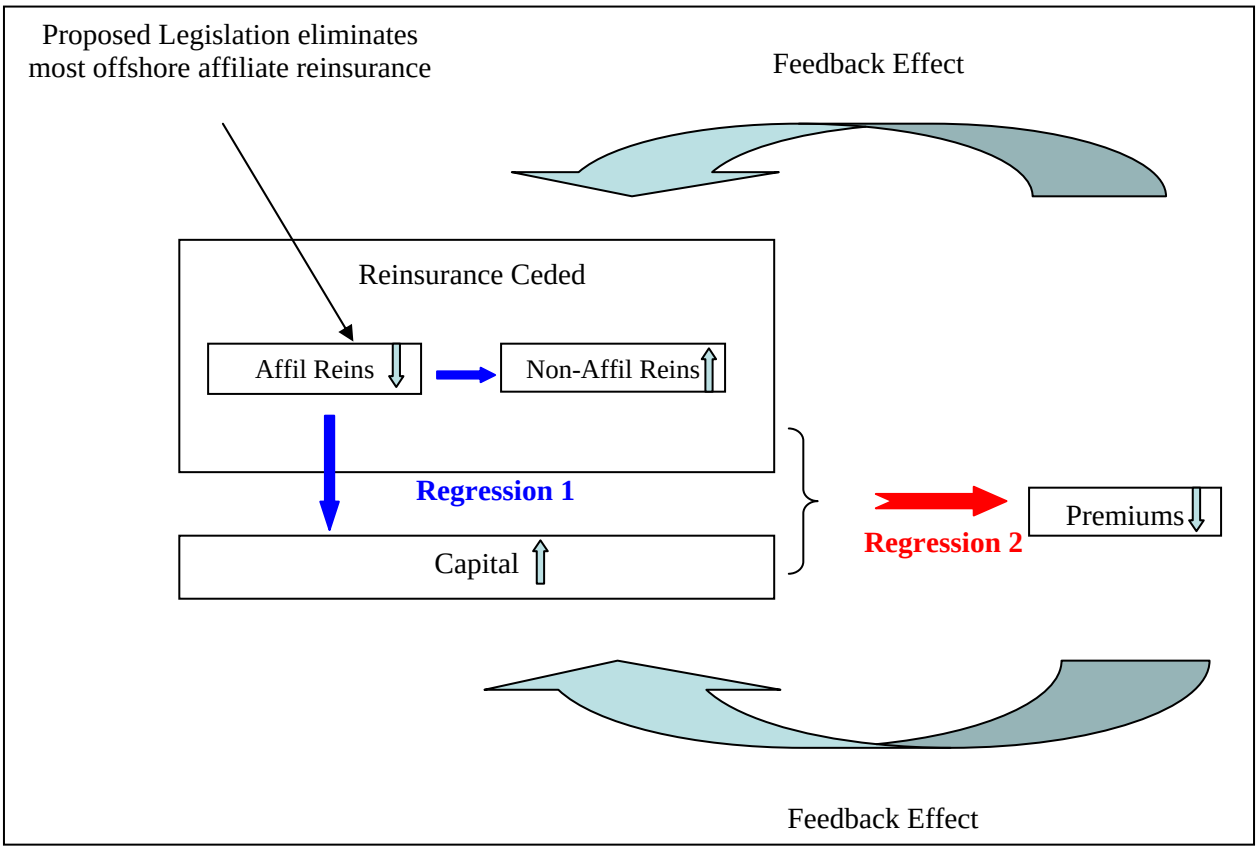
Impact on the Supply of Insurance (Step Two)

In step two of our analysis, we trace the impact of a tax on offshore affiliate reinsurance through to its effect on the supply of primary insurance. First, we use regression analysis to estimate the impact on the insurance supply of the two direct effects we identified in step one—namely, a net decrease in the supply of reinsurance purchased by U.S. insurers and an increase in their supply of capital. Specifically, we employ a statistical model that measures the percent change in total insurance written as a function of the percent change in both reinsurance and capital. We use the same basic sample of companies that we analyzed in step one, although we drop those companies for which we lack sufficient data to measure a change in their behavior over time.

Our regression analysis indicates that the supply of primary insurance would drop by 0.68 percent for each 1 percent decrease in the amount of reinsurance purchased by U.S. insurers and would go up by 0.36 percent for each 1 percent increase in the amount of capital they maintain. Overall, these results accord well with economic intuition: one would expect a unit decrease in reinsurance to cause the supply of insurance to drop by more than the equivalent increase in capital would cause it to rise, because of the greater "leverage" that reinsurance provides relative to capital.

Although our regression analysis captures part of the process by which the insurance market would respond to the proposed tax on offshore affiliate reinsurance, it does not capture all of it. Specifically, while the supply of primary insurance would drop in response to the combination of direct effects analyzed above (less reinsurance and more capital), the drop in the insurance supply would in turn reduce the need for capital and reinsurance. (See Figure 7.)

Figure 7. Simulation of Impact of Proposed Legislation on U.S. Insurance Market



To reflect this dynamic process, we develop a mathematical simulation of the P&C market that captures the simultaneous changes in reinsurance, capital and insurance premiums. The simulation begins with 2007 figures on premiums written and reinsurance purchased by U.S. insurers by line of business. We use the results of our two regression analyses to calculate aggregate figures for the amount of non-affiliate insurance and capital that U.S. subsidiaries insurers would substitute to offset the loss of foreign affiliate reinsurance. We simulate as well the decrease in reinsurance and capital that would follow from the drop in premiums written.

Based on this dynamic-effects simulation, we calculate that the overall supply of insurance would decline from $551 billion to $541 billion, a drop of $10 billion or about 1.8 percent overall. Table 4 shows our results by line of business.

Table 4. Impact on U.S. P&C Industry — Lower Bound ($ in Millions)

	2007		Lower Bound			
	Gross Premium	Total Reinsurance Ceded	Gross Premium	Change in Total Reinsurance Ceded	% Drop in GPW	% Increase in Price
Fire	14,537	4,738	14,091	-825	-3.1%	3.1%
Allied lines	23,949	13,222	23,756	-464	-0.8%	0.8%
Farmowners multiple peril	2,861	437	2,861	-9	0.0%	0.0%
Homeowners multiple peril	65,318	8,247	65,338	-176	0.0%	0.0%
Commercial multiple peril	37,704	6,359	37,147	-1,020	-1.5%	1.5%
Mortgage guaranty	6,253	1,061	6,266	1	0.2%	-0.2%
Ocean marine	4,819	1,558	4,686	-249	-2.8%	2.8%
Inland marine	16,010	6,215	15,711	-598	-1.9%	1.9%
Financial guaranty	4,218	1,179	4,034	-323	-4.4%	4.4%
Medical malpractice - occurrence	2,560	193	2,561	-6	0.0%	0.0%
Medical malpractice - claims made	9,548	1,932	9,457	-181	-0.9%	0.9%
Earthquake	2,363	1,102	2,247	-224	-4.9%	4.9%
Group accident and health	5,872	1,407	5,676	-344	-3.3%	3.3%
Credit accident and health (group and indiv.)	644	334	644	-1	0.1%	-0.1%
Other accident and health*	3,081	739	3,052	-59	-0.9%	0.9%
Workers' compensation	48,876	8,007	47,977	-1,598	-1.8%	1.8%
Other liability - occurrence	39,090	12,249	37,766	-2,416	-3.4%	3.4%
Other liability - claims made	20,441	5,871	19,153	-2,206	-6.3%	6.3%
Products liability - occurrence	3,596	827	3,359	-392	-6.6%	6.6%
Products liability - claims made	724	186	684	-68	-5.6%	5.6%
Private passenger auto liability	100,546	5,535	100,286	-715	-0.3%	0.3%
Commercial auto liability	23,252	4,236	22,628	-1,080	-2.7%	2.7%
Auto physical damage	76,513	5,123	75,910	-1,163	-0.8%	0.8%
Aircraft (all perils)	3,530	1,768	3,357	-338	-4.9%	4.9%
Fidelity	1,473	220	1,443	-52	-2.0%	2.0%
Surety	6,158	1,313	5,979	-314	-2.9%	2.9%
Burglary and theft	193	32	189	-7	-1.9%	1.9%
Boiler and machinery	2,283	542	2,236	-86	-2.1%	2.1%
Credit	2,207	802	2,112	-175	-4.3%	4.3%
International	233	97	222	-21	-4.9%	4.9%
Reinsurance - Nonprop. Assumed Property	7,539	1,943	7,058	-809	-6.4%	6.4%
Reinsurance - Nonprop. Assumed Liability	9,561	3,823	8,025	-2,535	-16.1%	16.1%
Reinsurance - Nonprop. Assumed Financial	356	87	327	-49	-8.4%	8.4%
Agg. Write-ins for Other Lines of Business	4,550	1,304	4,451	-184	-2.2%	2.2%
Total	**550,858**	**102,236**	**540,690**	**-18,688**	**-1.8%**	**1.8%**
Capital	**529,843**		**533,043**			

Impact on the Price of Insurance (Step Three)

In step three of our analysis, we estimate the impact of the proposed tax on the price of insurance. In keeping with a basic tenet of economics, a decline in the supply of insurance will lead to an increase in price. The magnitude of the increase will depend on the sensitivity of prices to changes in the industrywide supply of insurance. To calculate the price effect in the current context, we observe the change in the price of insurance as a function of supply using industrywide NAIC data that includes standalone insurance companies as well as those that belong to insurance groups.[23]

We estimate that the price of insurance would increase by 1 percent for every 1 percent decrease in the industrywide supply of insurance. (In technical terms, the price elasticity of primary insurance is equal to 1.0.) This translates into an overall increase in price of 1.8 percent per unit of insurance, as shown in the last column of Table 4. Based on the amount of insurance written in 2007, U.S. consumers would have to pay an additional $10 billion a year in premiums to obtain the same insurance coverage.

The last column of Table 4 also shows the percent increase in price by line of business. Note that some lines would experience a price increase far higher than the overall average. For example, we estimate that the price of excess-of-loss liability reinsurance would increase by 16.1 percent. Other excess-of-loss reinsurance lines would also see a significant increase in price: financial (8.4 percent) and property (6.4 percent). The earthquake and aircraft-related lines would see significant price increases as well (4.9 percent), as would product liability coverage.

Modified Analysis

In our base-case analysis, we assumed that U.S. subsidiaries would eliminate that portion of their offshore affiliate reinsurance that was deemed "excess" ($23.9 billion) and retain the rest ($3.5 billion). Among other things, we calculated the amount of non-affiliate reinsurance that U.S. subsidiaries would substitute in response to the elimination of that quantity of affiliate reinsurance. In reality, however, that very substitution process would render some of the retained offshore affiliate reinsurance "excess." That is so because U.S. subsidiaries already cede a large amount of premium to non-affiliate reinsurers. Thus, given the peculiar way the legislation is written, a further increase in U.S. subsidiaries' use of non-affiliate reinsurance would push some of their "non-excess" offshore affiliate reinsurance above the premium limitation threshold.[24] Recall Firm 1 in Figure 5 above.

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[23] In keeping with the standard approach taken in the academic literature, we define "price" as the ratio of premium earned to losses incurred. The intuition is straightforward: the price that a consumer pays for insurance is equivalent to the premium charged per unit of risk, where risk is defined as losses incurred.

[24] For most lines of business, the substitution of non-affiliate reinsurance would displace 100 percent of the offshore affiliate reinsurance. That is so because, under the proposed legislation, close to 90 percent of the offshore affiliate reinsurance for these lines would be deemed "excess" to start with (see Table 3 above). The exceptions include those lines (*e.g.*, allied lines and homeowners multiple peril) for which less than 70 percent of the offshore affiliate reinsurance would initially be deemed "excess."

Table 5. Impact on U.S. P&C Industry — Upper Bound ($ in Millions)

	2007		Upper Bound			
	Gross Premium	Total Reinsurance Ceded	Gross Premium	Change in Total Reinsurance Ceded	% Drop in GPW	% Increase in Price
Fire	14,537	4,738	14,006	-974	-3.6%	3.6%
Allied lines	23,949	13,222	23,493	-994	-1.9%	1.9%
Farmowners multiple peril	2,861	437	2,857	-17	-0.1%	0.1%
Homeowners multiple peril	65,318	8,247	65,218	-392	-0.2%	0.2%
Commercial multiple peril	37,704	6,359	37,039	-1206	-1.8%	1.8%
Mortgage guaranty	6,253	1,061	6,267	1	0.2%	-0.2%
Ocean marine	4,819	1,558	4,615	-371	-4.2%	4.2%
Inland marine	16,010	6,215	15,622	-764	-2.4%	2.4%
Financial guaranty	4,218	1,179	4,003	-374	-5.1%	5.1%
Medical malpractice - occurrence	2,560	193	2,561	-7	0.1%	-0.1%
Medical malpractice - claims made	9,548	1,932	9,456	-185	-1.0%	1.0%
Earthquake	2,363	1,102	2,209	-292	-6.5%	6.5%
Group accident and health	5,872	1,407	5,643	-399	-3.9%	3.9%
Credit accident and health (group and indiv.)	644	334	644	-2	0.0%	0.0%
Other accident and health*	3,081	739	3,051	-62	-1.0%	1.0%
Workers' compensation	48,876	8,007	47,946	-1,665	-1.9%	1.9%
Other liability - occurrence	39,090	12,249	37,546	-2,800	-4.0%	4.0%
Other liability - claims made	20,441	5,871	19,039	-2,392	-6.9%	6.9%
Products liability - occurrence	3,596	827	3,353	-401	-6.8%	6.8%
Products liability - claims made	724	186	680	-74	-6.0%	6.0%
Private passenger auto liability	100,546	5,535	100,222	-850	-0.3%	0.3%
Commercial auto liability	23,252	4,236	22,597	-1,137	-2.8%	2.8%
Auto physical damage	76,513	5,123	75,889	-1,224	-0.8%	0.8%
Aircraft (all perils)	3,530	1,768	3,306	-432	-6.3%	6.3%
Fidelity	1,473	220	1,443	-53	-2.1%	2.1%
Surety	6,158	1,313	5,952	-359	-3.4%	3.4%
Burglary and theft	193	32	189	-7	-2.1%	2.1%
Boiler and machinery	2,283	542	2,227	-102	-2.5%	2.5%
Credit	2,207	802	2,091	-212	-5.3%	5.3%
International	233	97	220	-25	-5.8%	5.8%
Reinsurance - Nonprop. Assumed Property	7,539	1,943	6,987	-920	-7.3%	7.3%
Reinsurance - Nonprop. Assumed Liability	9,561	3,823	7,993	-2,583	-16.4%	16.4%
Reinsurance - Nonprop. Assumed Financial	356	87	324	-53	-9.1%	9.1%
Agg. Write-ins for Other Lines of Business	4,550	1,304	4,432	-218	-2.6%	2.6%
Total	**550,858**	**102,236**	**539,119**	**-21,545**	**-2.1%**	**2.1%**
Capital	**529,843**		**533,423**			

Stated differently, U.S. subsidiaries would be constrained in their response to the imposition of the proposed tax. Our base-case analysis ignored this constraint, giving us a lower-bound estimate of the impact of the proposed tax. To give us an upper-bound estimate of the impact of the tax, we assume the worst case—namely, that U.S. subsidiaries would be forced to eliminate all of their offshore affiliate reinsurance as "excess."[25]

Table 5 above reports these upper-bound results. We estimate that, if U.S. subsidiaries were forced to eliminate all of their offshore affiliate reinsurance, the total supply of reinsurance would drop by $21.5 billion, or more than 20 percent. The supply of primary insurance would in turn go down by 2.1 percent. We know from our earlier analysis that a decrease in the supply of insurance leads to an equivalent increase in price. Thus, we estimate that the price of P&C insurance would increase by 2.1 percent, or $12 billion a year.

Summary

In sum, under our best-case (*i.e.*, base-case) scenario, in which U.S. subsidiaries retain some of their offshore affiliate reinsurance, the supply of P&C insurance in the United States would drop by 1.8 percent and the price would increase by 1.8 percent, or $10 billion a year. Under the alternative, worst-case scenario, in which U.S. subsidiaries forego all of their offshore affiliate reinsurance, supply would drop by 2.1 percent and price would increase by the same amount, or $12 billion a year.

The difference between our two sets of estimates may seem surprisingly modest. The explanation is simple, however. Even under our best-case scenario, the proposed legislation would eliminate almost all (87 percent) of the offshore affiliate reinsurance. Thus the elimination of all offshore affiliate reinsurance in our worst-case scenario increases the magnitude of the adverse effects identified in our best-case scenario by a relatively small amount.

[25] As a technical matter, we incorporate that assumption by modifying the inputs to step one of our three-step analysis. In other respects, the analysis is the same.

VI. STATE-LEVEL IMPACT

Our analysis thus far has focused on how a tax on offshore affiliate reinsurance would affect U.S. consumers nationwide. Although this is a necessary first step, since most of the relevant data are available only at the national level, the results obscure the fact that some states and regions are more vulnerable than others. In this section, we estimate the impact of the tax on individual states in two ways. First, we apply the estimated nationwide price increases from Table 4 to state-level data on the value of premiums written to estimate the increase in costs to individual states. We present these results for 13 states and 14 lines of business. Second, recognizing that the nationwide estimates significantly understate the impact of the tax on a few sub-national markets, we modify the three-step approach we used to derive those estimates so as to incorporate a proxy for state-level data on reinsurance. By way of illustration, we use this approach to show how the tax will affect multiperil property insurance in Florida.

Linear Allocation of Nationwide Price Increases

Our first approach is a simple linear allocation of the nationwide price increases that we estimated in section V to individual states, based on the value of premiums written in each state. For example, we know that U.S. insurers wrote nearly $1.1 billion of earthquake insurance in California in 2007. If we apply our estimated nationwide price increase for earthquake insurance (4.9 percent) to that figure, we find that Californians would have to pay an additional $52 million for earthquake insurance as a result of the tax ($1.06 billion × .049 = $52 million).

In Appendix B, we present these results for 13 states and 14 lines of business. We limit our analysis to those lines of business that would experience a nationwide price increase of 2 percent or higher as a result of the tax (see last column of Table 4). Although the non-proportional reinsurance lines would experience among the highest nationwide price increases, the data on premiums written for those lines is not reported by state. Thus, they are not included in the analysis.

Table 6 below shows the total estimated cost increase, by state, for all 14 lines of business combined. The hardest-hit states (California, Florida, New York, Texas, New Jersey, Massachusetts and Louisiana) have large, diverse economies with huge exposure to property and liability losses.

Table 6. Summary of State-Level Impact
Linear Allocation ($ in Millions)

State	Direct Premiums Written	Increase in Cost in Selected Lines
Arkansas	857	31
California	14,871	591
Florida	9,083	501
Iowa	894	34
Louisiana	2,118	76
Massachusetts	2,836	108
Montana	289	11
Nevada	1,087	42
New Jersey	4,366	168
New York	11,872	468
North Dakota	188	7
South Carolina	1,165	43
Texas	9,332	350

Source: Appendix B.

California Earthquake Insurance versus Florida Multiperil Insurance

The linear-allocation approach to calculating state-level effects is straightforward, and the results should be reasonably accurate. This approach assumes, however, that the estimated nationwide price increases, by line of business, are a good proxy for the corresponding state-level price increases. That this assumption does not always hold is shown by the contrast between earthquake insurance in California and multiperil insurance in Florida.

Our estimated nationwide price increase for earthquake insurance (4.9 percent) appears to be a good proxy for the price increase that Californians would see for that type of insurance. Earthquake insurance covers a narrow set of risks, and those risks are heavily concentrated in California. Moreover, the share of earthquake insurance premiums written in California (about half) corresponds to the share of risk that the state contributes to the national total.

Florida multiperil property insurance offers a contrast. Homeowners multiperil (HMP) and commercial multiperil (CMP) insurance provide protection against losses from a great many sources, ranging from wind and hailstorms to fire, theft and lawsuits.[26] Although every state experiences such losses, states like Florida and Louisiana are disproportionately hard hit because of their exposure to hurricanes: in 2007, Florida alone accounted for 10 percent of the HMP

[26] In addition to commercial businesses, CMP covers losses to commercial properties including condominiums.

insurance and 4 percent of the CMP insurance sold in the United States. In part, for these reasons, our estimated nationwide price increases for HMP and CMP (0.0 and 1.4 percent, respectively) understate the price increases that these states would see.

The key reason, however, that our national estimates for HMP and CMP understate the impact on some states is that there is a significant disparity between the state's share of nationwide premiums, on the one hand, and its contribution to the corresponding risk, on the other. Thus, even though Florida accounts for a large share of nationwide HMP and CMP premiums (10 percent and 4 percent, respectively), it accounts for an even greater share of the national risk from multiperil property losses. This disparity reflects the fact that U.S. insurance companies are using reinsurance to insure the extreme risk from hurricanes, both because the alternative (capital) is prohibitively expensive and because hurricane risk can be most effectively diversified on a worldwide basis. Because of this heavy reliance on reinsurance, particularly foreign reinsurance, the proposed tax will have an especially large effect on the price of Florida multiperil insurance—more so than our nationwide estimates suggest.

Modified Three-Step Analysis Using Tail Risk

To estimate the actual effect of the tax on multiperil insurance in Florida, we run a modified version of our three-step analysis. Since state-level data on reinsurance is not reported, we obtained data from Risk Management Solutions (RMS) on Florida's contribution to the total risk that the United States faces from the kind of HMP and CMP losses that occur only once every 100 or 250 years (almost all such risk, known as "tail risk," is reinsured). According to RMS, a nationally recognized authority on catastrophe risk-modeling, Florida accounts for 56 percent of nationwide hurricane and earthquake tail risks for HMP and 37 percent for CMP.

We modify our three-step analysis in several ways. First, we treat Florida HMP and CMP insurance as two additional lines of business. Second, we use the RMS figures on tail risk to approximate Florida's share of the national totals for offshore affiliate reinsurance and excess premiums.[27] Third, because of the prohibitively high cost of insuring tail risk with capital, we exclude the possibility of capital substitution in step one of the analysis.[28]

Based on this analysis, we estimate that the tax would have the following effects in Florida:

- increase the price of CMP insurance by 14 percent, which represents $218 million a year in added costs for the same coverage; and
- increase the price of HMP insurance by 1 percent, or $66 million a year in added costs.

[27] From column 4 of Table 3, we know the total amount of offshore affiliate reinsurance that U.S. insurers purchase for HMP ($536 million) and CMP ($1.574 billion). Based on the RMS figures, we assume that 48 percent of the HMP total and 32 percent of the CMP total goes to cover risks in Florida. Similarly, we use the RMS figures to calculate Florida's share of the total "excess premiums" for HMP and CMP, as reported in column 6 of Table 3.

[28] Published commentary and anecdotal evidence suggest that the insurance companies that provide catastrophic insurance in Florida are thinly capitalized and rely primarily on reinsurance to insure hurricane risk. See, for example, Dowling & Partners, *IBNR Weekly*, January 9, 2009, p. 19. More generally, insurers in catastrophe-prone states appear to rely largely on reinsurance to insure tail risks, because the alternative (capital) is so expensive.

Moreover, these figures probably underestimate the impact of the proposed tax on Florida HMP and CMP prices. Much of the reinsurance for catastrophe risks, including hurricanes, is provided in the two lines of business labeled non-proportional reinsurance (liability and property).[29] As we showed in section V, these two lines of business would see significant price increases—6.4 percent and 16.1 percent, respectively—as a result of the proposed tax. Given that non-proportional reinsurance has become a key input to HMP and CMP, those increases will contribute to yet higher prices for multiple peril insurance.

[29] We understand that, although NAIC requests that companies report non-proportional reinsurance for HMP and CMP under "Reinsurance: Non-Proportional Assumed Liability," some companies report it under "Reinsurance: Non-Proportional Assumed Property."

VII. CONCLUSION

We analyze how the U.S. insurance industry would respond to the imposition of a large tax on one particular tool for risk management—the purchase of reinsurance by U.S. subsidiaries from their foreign affiliates. We find that the supply of reinsurance would contract by 20 percent or more because neither of the alternatives to affiliate reinsurance (capital and non-affiliate reinsurance) is an adequate substitute. This severe contraction of reinsurance in turn would harm the market for primary insurance: supply would drop, and prices would rise, by 1.8–2.1 percent, on average, and significantly more in some lines of business. U.S. consumers, overall, would have to pay $10–$12 billion more a year for insurance, but the burden of reduced supply and higher prices would fall disproportionately on those states most vulnerable to catastrophic losses, such as California, Florida, New York and Texas.

Although these estimated effects are large, they are if anything conservative. First, our analysis relies on industry data from a period (1996–2006) during which capital was abundant. U.S. insurance companies recently have suffered large investment losses due to the financial crisis, and those losses have significantly depleted their capital supply. Moreover, raising new capital under current market conditions is far more difficult and costly. If our analysis were to reflect today's market turmoil, it would show the effects of the proposed tax to be even more severe.

Second, our analysis assumes that foreign-owned insurance groups could freely transfer capital to their U.S. subsidiaries to make up for reinsurance that is lost. Foreign regulators could impede that process, however, partly in retaliation for a change in longstanding U.S. tax policy that they will clearly view as protectionist. If foreign capital could not flow freely to U.S. insurance subsidiaries, the impact of the proposed tax would be even larger than our estimates indicate.

These statistical estimates do not fully capture the harm that a confiscatory tax on offshore affiliate reinsurance would cause, moreover. Insurance companies use a variety of tools to manage risk, and there are tradeoffs between them. There are compelling economic reasons to believe that the current combination of tools represents the optimal way for the U.S. insurance industry to manage risk. If Congress were to limit or close off any one option, it would reduce the ability of the insurance industry to manage its own risk. As a result, the industry would take on less risk and/or charge more to manage it.

Limiting the use of offshore affiliate reinsurance is especially problematic. Affiliate reinsurance is critical to risk management, because it internalizes the costs of moral hazard and adverse selection and allows insurance groups to transfer risk and losses around the globe quickly and easily. Forcing U.S. subsidiaries to rely more heavily on non-affiliate reinsurance and the capital markets would drive them away from the very high risk lines in which they have traditionally specialized. This would severely restrict the supply of insurance to such lines as non-proportional reinsurance, homeowners insurance in catastrophe-prone states, and commercial liability insurance.

Nor would the effects of the proposed tax be limited to the insurance industry. Consider oil, chemical or manufacturing firms that rely on the P&C industry for liability coverage. At a

minimum, they will have to pay more for insurance, and they may face restrictions on the coverage they can get (recall that one way the P&C industry responded to the contraction in the supply of reinsurance in our analysis was by writing less primary insurance). These firms will have to assume more risk themselves at a time when their own capital structure is strained, which could lead them to cut back on investment and might even raise the risk of insolvency. This could have a non-trivial effect on the economy.

In sum, the legislative proposals would lead to a degradation of the ability of firms to manage risk, both inside and outside of the P&C industry. The financial burden of catastrophe risk, in particular, would fall more heavily on the United States, including the U.S. government as the insurer of last resort. Moreover the government would have to bear that burden in the context of an economy weakened by the lack of an adequate capacity for risk-management.

Adoption of such legislation would be imprudent under the best of conditions, and current conditions are anything but good. The risks due to natural catastrophes have been growing for 20 years, and that trend is likely to continue because of the development that has occurred in areas prone to earthquakes and floods. Moreover, the ability of the government and private industry to absorb shocks is at an historic low, because of a financial crisis that stems from poor risk management in the banking and mortgage industries. Thus this is an especially poor time to impose a tax that would further jeopardize our economy's capacity to manage risk.

APPENDIX A

REGRESSION ANALYSIS AND SIMULATION

This appendix provides more details of the regression analyses and the simulation of U.S. P&C insurance market under the proposed legislation. The regression analyses consist of three separate regressions.[1] First, we estimate the degree of substitutability of non-affiliated reinsurance and capital (surplus) for affiliated reinsurance. In the second regression, we investigate the sensitivity of insurance premium written to ceded reinsurance and surplus. The last regression assesses the impact of a change in industry-wide growth of premiums written on the price of insurance, defined as the ratio of premium earned over the losses incurred. Finally, this appendix describes a simulation of the U.S. P&C insurance market under the proposed legislation. Each of these steps is described in greater detail below.

REGRESSION ANALYSIS #1: SUBSTITUTION FOR AFFILIATED REINSURANCE

Insurance companies manage their business through three main tools — surplus, affiliated reinsurance, and non-affiliated reinsurance. They are jointly determined. In the regression framework, this results in a system of simultaneous equations where surplus, affiliated, and non-affiliated reinsurance should all be treated as endogenous variables. Because the tax proposals would directly impact the affiliated reinsurance, we estimate the responses from the other two variables. More specifically, the two regressions are:

$$RCTNA_{i,t} = \beta_0 + \beta_1*NetRCTA_{i,t} + \beta_2*Surplus_{i,t} + \beta_3*Ln(Age_i) + \beta_4*CatExposure_{i,t} + \beta_5*HERFGEO_{i,t} + \beta_6* HERFLOB_{i,t} + \beta_7*Ln(Assets_{i,t}) + \beta_8*Mutual_i + \Sigma\beta_n*LineShare_{i,t} + \varepsilon_{i,t},$$

$$Surplus_{i,t} = \varphi_0 + \varphi_1*NetRCTA_{i,t} + \varphi_2*RCTNA_{i,t} + \varphi_3*Ln(Age_i) + \varphi_4*Ln(Assets_{i,t}) + \varphi_5*CoC_t + \Sigma\varphi_n*LineShare_{i,t} + \zeta_{i,t}.$$

where the variables are defined as in Table A1.[2]

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[1] The first two regressions are built on two papers by Prof. Lawrence Powell (see citations below). He assisted us in updating and adapting his research for our research agenda. Errors are ours, though.

[2] Note the affiliate reinsurance is defined as the reinsurance ceded to affiliates less reinsurance assumed from affiliates.

Table A1: Description of the Variables in Regression Analysis #1

Variable	*Variation Dimensions*	*Description*
RCTNA	Across companies and time	Reinsurance ceded to non-affiliates divided by total premium written, where the latter measure is defined as direct premium written plus reinsurance assumed from non-affiliates.
NetRCTA	Across companies and time	Reinsurance ceded to affiliates (net of reinsurance assumed from affiliates) divided by total premium written.
Surplus	Across companies and time	Surplus (i.e., total assets net of total liabilities) divided by total premium written.
Age	Across companies	Age of the company as of 2008.
CatExposure	Across companies and time	Direct premium written by the insurer in property insurance lines in coastal states and earthquake coverage in California divided by total direct premium written.
HERFGEO	Across companies and time	Herfindahl index of geographic concentration based on direct premium written in each state by the insurer.
HERFLOB	Across companies and time	Herfindahl index of line of business concentration based on direct premium written in line of business by the insurer.
Assets	Across companies and time	Total assets of the insurer.
CoC	Across time	Cost of capital assuming the beta of 1, defined as the market risk premium plus the 3-month Treasury bill rate.
Mutual	Across companies	A dummy variable equal to 1 if the insurer is a mutual and to 0, otherwise.
Line shares	Across companies and time	Direct premium written in each of the lines of business divided by total direct premium written

To account for endogeneity of the reinsurance variables and surplus in the above equations, we utilize the instrumental variable (2-stage least squares) method. Under this method, we first regress the two endogenous variables in each equation on the independent variables listed in Table A1 as well as the natural logarithm of the number of affiliates, and the company-to-group size ratio (defined as the ratio of the insurer's assets to the sum of the group's assets). These additional instruments play a role in explaining the instrumented (endogenous) variables.[3] In the

[3] For example, affiliated reinsurance may be affected by the company-to-group size ratio. If the company is large relative to the entire group, its affiliates may be unable to assume a large share of the premiums that the company decided to cede. On the other hand, the number of affiliates may be important in explaining the affiliated reinsurance as larger number of affiliates can result in better chances of finding an affiliated insurer ready to assume reinsurance from the company in question. Furthermore, if each of the affiliates is targeting a different line of business or geographic area, then the group companies may distribute their risks internally.

second step, we run the above equations using the fitted values for the endogenous variables from the first step.

The first regression is in many ways similar to the one performed in Powell and Sommer (2005)[4] and Mayers and Smith (1990).[5] As affiliated and non-affiliated reinsurance are not perfect substitutes, the expected coefficient on NetRCTA variable is between zero and negative one. The other variables are included in the regression to control for other factors affecting the dependent variable:[6]

- The age variable, a proxy for informational asymmetries inherent in reinsurance transactions among non-affiliated entities, is expected to have a positive sign: as insurers get more informed about one another over time, older insurers should be able to find non-affiliated reinsurance more easily than the newly formed ones.
- Catastrophe exposure should increase demand for non-affiliated reinsurance because of higher capitalization requirements.[7]
- Geographic and line of business concentration could affect demand for reinsurance, although their impact is an empirical matter: On one hand insurers having high geographic or line-of-business concentrations are more susceptible to catastrophic loss. On the other hand, as Powell and Sommer (2005) argue, insurers concentrating in fewer lines or geographic areas may choose less risky lines or choose less risky clients inside their chosen lines.
- Company size, measured by the natural logarithm of total assets, is a proxy for financial strength of an insurer. Thus larger companies may have fewer incentives to shift part of their risk via reinsurance transactions than smaller companies exposed to greater risk of insolvency.
- Organizational form of the insurance company may also play a role as found in Mayers and Smith (1990). For example, the agency problems may be less alarming for mutual insurers because their policyholders are also the equity holders of the company. The expected sign is positive.
- Following Mayers and Smith (1990) and Powell and Sommer (2005), we include the percentage share variables for each line of business, which are proxies for different risks in terms of expected magnitude, cash flow uncertainty and timing.[8] These differences across the lines may potentially impact insurer's demand for reinsurance.

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4 Powell, Lawrence and David Sommer, "Internal versus External Capital Markets in the Insurance Industry: The Role of Reinsurance," *SSRN*, 2005.

5 Mayers, David and Clifford W. Smith, Jr, "On the Corporate Demand for Insurance: Evidence from the Reinsurance Market," *Journal of Business*, 1990, vol. 63, no. 1, pt 1.

6 Two variables in Powell and Sommer (2005) --- tax-exempt interest income and publicly traded dummy variable --- are not included because they are not statistically significant. We also exclude the industry leverage variable since it was collinear with another exogenous variable.

7 The link between catastrophe exposure and affiliated reinsurance is less clear-cut. Powell and Sommer (2005) provide reasons for why insurers with high catastrophe exposure may have fewer incentives to cede less to their affiliates. One of the explanations is that some subsidiaries are created to pigeonhole catastrophic loss risks so that they do not impact other group members.

8 Note that for the purposes of calculating the "Line shares" variables, 31 proportional lines are regrouped into 24 lines by combining "Medical malpractice – occurrence" with "Medical malpractice – claims made", "Other liability – occurrence" with "Other liability – claims made", "Products liability – occurrence" with "Products liability – claims made", as well as combining the three accident and health

- Finally, we expect a negative relationship between surplus and non-affiliated reinsurance since higher surplus implies higher cushion against unexpected future losses and, all else equal, creates less incentives for seeking reinsurance.

As for the second equation, both types of reinsurance are expected to have a negative coefficient estimates. Line variables are important as companies having different business mix may have different capitalization requirements. Coefficient estimate on company size is likely to be negative as larger companies are likely to be both financially stronger and better diversified and will therefore require less surplus per unit of premiums written. We include age to account for possible impact of the years the company has been in business on its surplus. The expected sign on the cost of capital variable is negative as its higher value makes it costly to hold an extra dollar of surplus per unit of premiums written.

Following the academic literature, we delete observations with abnormal values such as negative assets, ceded or assumed reinsurance, and direct premiums written. We also remove observations surplus ratio larger than ten or negative, HERFGEO, HERFLOB, and leverage variables outside the zero to one interval, as well as catastrophic exposure and company-to-group asset ratio variables exceeding one.

We also eliminate all reciprocal and Lloyd's member companies, as well as those which are not part of an affiliated group or which have been created less than two years prior to the observation year. Additionally, we limit our attention to companies that write direct premiums in excess of USD 50 million and those who have reinsurance assumed from non-affiliates not exceeding 75 percent of total premiums written. The former restriction is imposed to capture only the non-trivial participants who are active in the market, while the latter assumption is imposed to eliminate the companies who primarily act as reinsurers.

Table A2 provides a summary of the estimation results.[9]

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lines into one line and the three auto lines into one line. We subsequently drop the line variable for "Commercial multiple peril" to avoid singularity in the regression.

[9] The coefficient estimates for 23 line variables and the year dummies are not reported.

Table A2: Estimation Results

	RCTNA	Surplus
Constant	0.828***	1.536***
	[0.212]	[0.566]
NetRCTA	-0.429***	-1.276***
	[0.034]	[0.134]
RCTNA		-2.494***
		[0.406]
Surplus	-0.253***	
	[0.087]	
Ln(Age)	0.021***	0.085***
	[0.008]	[0.013]
CatExposure	0.043	
	[0.051]	
HERFGEO	0.005	
	[0.013]	
HERFLOB	-0.018	
	[0.021]	
Ln(Assets)	-0.031**	-0.044*
	[0.012]	[0.026]
CoC		0.349
		[0.413]
Mutual	0.016	
	[0.013]	
Observations	7,415	7,415

Standard errors are shown in brackets.

Depenedent variables are RCTNA and Surplus

** significant at 10%*

*** significant at 5%*

**** significant at 1%*

All of the variables that are statistically significant have the expected signs. As our objective is to quantify the sensitivity of non-affiliated reinsurance and surplus to changes in affiliated reinsurance, we are particularly interested in coefficients on net affiliated reinsurance and surplus in the first equation and coefficients on net affiliated and non-affiliated reinsurance in the second equation. Taking into account that surplus and non-affiliated reinsurance are endogenous in this system, we quantify their sensitivities to a unit shock in affiliated reinsurance ratio as follows:

$$\partial \text{ RCTNA} / \partial \text{ NetRCTA} = (\beta_1 + \beta_2\varphi_1) / (1-\beta_2\varphi_2) =$$

$$= (-0.429+(-0.253)\times(-1.276))/(1-(-0.253)\times(-2.494)) = -0.29$$

$$\partial \text{ Surplus} / \partial \text{ NetRCTA} = (\varphi_1 + \varphi_2\beta_1) / (1-\beta_2\varphi_2) =$$

$$= (-1.276+(-2.494)\times(-0.429))/\ (1-(-0.253)\times(-2.494)) = -0.56$$

Therefore, all else equal, a unit negative shock to affiliated reinsurance to premiums written ratio will translate into 0.29 units of increment in non-affiliated reinsurance to premiums written ratio and 0.56 units of increment in surplus to premiums written ratio.

REGRESSION ANALYSIS #2: IMPACT OF REINSURANCE AND SURPLUS ON INSURANCE PREMIUM

The analysis in the second regression analysis follows Powell, Sommer, and Eckles (2008).[10] Because in the first step of our analysis we have already assessed the impact on surplus and aggregate (*i.e.*, affiliated plus non-affiliated) ceded reinsurance ratios from a unit change in affiliated reinsurance ratio, in the second step we intend to quantify the magnitude of a change in the total premium written by a company per unit change in the aggregate ceded reinsurance. We define our regressions in terms of the growth rates rather than levels. As in the first step of our analysis, we use NAIC data from 1996 through 2006. The following regression is estimated:

$$\Delta TPW_{i,t} = \gamma_0 + \gamma_1*\Delta RC_{i,t} + \gamma_2*\Delta Surplus_{i,t} + \gamma_3*\Delta HERFLOB_{i,t} + \gamma_4*\Delta HERFGEO_{i,t} + \gamma_5*\Delta CatExposure_{i,t} + \gamma_6*\Delta LongTail_{i,t} + \gamma_7*Mutual_i + \Sigma\ \gamma_k*YearK_t + \Sigma\ \gamma_m*CompanyM_i + \eta_{i,t},$$

where the variables are defined as in Table A3.

Intuition behind this regression specification is straightforward. All else equal, increased reliance on reinsurance should allow an insurance company to write more premiums since by ceding reinsurance it partially protects itself from the risk of unexpected losses. Thus the expected sign on the ceded reinsurance variable is positive in our regression. Instead of relying on reinsurance, an insurance company may increase its surplus, which serves as a cushion against unexpected losses. Keeping everything else constant, increased surplus should enable the company to write more insurance premiums. Thus the growth in surplus represents the company's ability to write more premiums without ceding more reinsurance. Therefore, it is expected that the growth in surplus variable does also have a positive coefficient.

[10] Powell, Lawrence, David Sommer, and David Eckles, "The Role of Internal Capital Markets in Financial Intermediaries: Evidence from Insurer Groups," *The Journal of Risk and Insurance*, 2008, Vol. 75, No. 2, 439-461.

Table A3: Description of the Variables

Variable	*Variation Dimensions*	*Description*
ΔTPW	Across companies and time	Percentage change in the total premium written.
ΔRC	Across companies and time	Change in the sum of RCTNA and NetRCTA variables.
ΔSurplus	Across companies and time	Percentage change in surplus, where surplus is defined as the difference between insurer's assets and liabilities.
ΔHERFLOB	Across companies and time	Change in the level of the line-of-business concentration.
ΔHERFGEO	Across companies and time	Change in the level of the geographic concentration.
ΔCatExposure	Across companies and time	Change in the level of the catastrophe exposure.
ΔLongtail	Across companies and time	Change in the level of long tail exposure, defined as the ratio of direct premium written in long tail (liability) lines to the total direct premium written by the insurer.
Mutual	Across companies	A dummy variable equal to 1 if the insurer is a mutual and to 0, otherwise.
Year	Across time	Year dummies
CompanyCode	Across companies	Company fixed effects / dummies

While surplus adjustments and ceded reinsurance volumes are important drivers of total premiums written, one needs to control for risk exposure variables as well: even if an insurer keeps the ceded reinsurance ratio and surplus levels constant, decreasing its underwriting exposure via less geographic, line of business concentration or catastrophe exposure should enable it to increase the total premiums written. An insurer's ability to write premiums may also depend on the change in relative magnitude of premiums written in the long-tail lines. On the one hand, higher long-tail exposure may mitigate the pressure on the insurer's capital due to losses being discounted over a longer horizon and therefore allow the insurer to increase total premiums written, all else equal. On the other hand, long-tail lines are associated with higher uncertainty, and increasing long-tail exposure may require additional capital. Depending on which of the two effects dominates, the sign on the long-tail variable can be either negative or positive. Mutual dummy is included to control for the organizational form of the insurer. We also add the year and company dummies to control for fixed effects.

Similar to our regression analysis #1, we drop all the companies whose direct premiums written were less than USD 50 million. To account for possible endogeneity of the growth in ceded reinsurance variable, we utilize the instrumental variable (2-stage least squares) approach by using the all of the remaining independent variables in the regression above as well as the line share variables (see Step 1 regressions). As an additional sensitivity test, we estimate regression where both ceded reinsurance and surplus growth are treated as endogenous variables.

The estimation results are reported in Table A4. In the last column of Table A4, we also report the original estimates from a similar regression in Powell, Sommer, and Eckles (2008) which was estimated using the Generalized Least Squares approach while using the first lag of the growth in surplus variable and treating both change in reinsurance and growth in surplus as exogenous variables.

Table A4: Estimation Results

	Exogenous Surplus	Endogenous Surplus	Powell, Sommer, and Eckles (2008)
Constant	0.095	0.351	0.072***
	[0.200]	[0.264]	[0.011]
ΔRC	0.545**	0.677**	0.562***
	[0.246]	[0.272]	[0.029]
ΔSurplus	0.034*	0.360*	0.137***
	[0.018]	[0.201]	[0.026]
ΔHERFLOB	0.185***	0.146**	-0.017
	[0.062]	[0.070]	[0.044]
ΔHERFGEO	-0.139**	-0.131*	-0.534***
	[0.067]	[0.071]	[0.054]
ΔCatExposure	-0.011	-0.035	-0.046
	[0.062]	[0.067]	[0.051]
ΔLongtail	0.319***	0.309***	0.199***
	[0.077]	[0.082]	[0.051]
Mutual	-0.078	-0.088*	-0.029***
	[0.049]	[0.052]	[0.011]
Observations	4,876	4,876	4,984

Standard errors are shown in brackets.

Depenedent variable is ΔTPW

** significant at 10%*
*** significant at 5%*
**** significant at 1%*

Coefficient on the change in reinsurance ratio is positive and significant in all three regressions. So is the coefficient on the percentage change in surplus (at least, at the 10% level of significance). Coefficient on the reinsurance variable is also relatively stable across different specifications, which however is not the case with the surplus growth variable. When using these regression results to arrive at the policy implications, we will start with the base case assumption utilizing our fully endogenous specification (middle column of Table A4) and then apply Powell, Sommer, and Eckles (2008) estimates to perform the sensitivity analysis.

REGRESSION ANALYSIS #3: PRICING IMPACT OF REDUCTION IN INSURANCE PREMIUM

In the last regression analysis, we look at how insurance pricing paid by the insured changes per one percent change in the industry-wide premiums written. We define the price of insurance charged by an insurer in each year as the ratio of net premium earned by the company in that year over the losses incurred. Both the definition of the price and the nature of our Step 3 analysis bear certain resemblance to Weiss and Chung (2004)[11] who analyzed reinsurance prices in non-proportional property and liability lines.

While in the previous two exercises of our empirical analysis we were dealing only with the insurance companies which have affiliates, in this step we include both companies which have affiliates and stand-alone companies not affiliated with any other insurer. The reason is simple – the prices are determined based on competition among all participants both group-member companies and stand-alone insurers. Additionally, since the main focus of our Step 3 is the pricing impact of a change in growth rate of industry-wide premiums written and this variable varies only across time and not in the cross section, we restrict our attention to the subset of companies that were in existence prior to 1996 and that do not have any missing or incomplete data since 1996.

For the company-specific information we use NAIC data. For industry-wide total premium written we use data from Total US PC Industry Underwriting and Investment Exhibit as reported by Highline Data. Our regression has the following form:

$$Ln(Price_{i,t}) = \delta_0 + \delta_1 * Ln(Price_{i,t-1}) + \delta_2 * TreasuryRate_t + \delta_3 * \Delta ATPW_{t-1} + \delta_4 * STL_{i,t-1} +$$

$$\delta_5 * Ln(Assets_{i,t-1}) + \delta_6 * Foreign_i + \delta_7 * Mutual_i + \Sigma \delta_m * CompanyM_i + \xi_{i,t},$$

where the variables are defined as in Table A5.

[11] Weiss, Mary A. and Joon-Hai Chung, "U.S. Reinsurance Prices, Financial Quality, and Global Capacity," *The Journal of Risk and Insurance*, 2004, Vol. 71, No. 3, 437-467.

Table A5: Description of the Variables

Variable	*Variation Dimensions*	*Description*
Price	Across companies and time	Price of insurance defined as premium earned divided by the insurer's losses incurred.
Treasury Rate	Across time	Constant maturity 1-year treasury rate obtained from H-15 database of the Federal Reserve.
ΔATPW	Across time	Percentage change in industry-wide total premium written.
STL	Across companies and time	The ratio of policyholders surplus over total liabilities of the insurer.
Assets	Across companies and time	Total assets of the insurer.
Foreign	Across companies	A dummy variable equal to 1 if the insurer is owned by a parent domiciled outside the United States and to 0, otherwise.
Mutual	Across companies	A dummy variable equal to 1 if the insurer is a mutual and to 0, otherwise.
CompanyCode	Across companies	Company fixed effects / dummies

The intuition behind the choice of the variables is as follows. First, we expect that reduction in the growth of total premiums written will lead to higher prices charged by the companies. Thus our expectation is that the sign on the industry-wide premium growth variable is negative. Lagged price variable is included to capture the time dependency of prices throughout underwriting cycle. Further, according to the "risky debt hypothesis,"[12] the buyers of insurance are concerned with the financial quality of the insurance companies. Therefore more financially sound firms command higher prices. Surplus-to-liability ratio and the size of the company, measured by the natural logarithm of total assets, are included as proxies of the financial strength. The expected sign is positive for both variables. Additionally, we include dummy variables for organizational structure (Mutual), ownership domicile (Foreign), as well as company fixed effects.

The regression results are reported in Table A6. As can be seen from Table A6, 1 percent decline in industry-wide premium written growth will lead to nearly 1 percent increment in the prices for insurance. As a robustness check, we also re-estimated our regression using panel fixed effects estimator and found the results to be nearly identical, with the coefficient on ΔATPW equal to -1.057 and statistically significant at the 1% level. Estimation using the lagged 1-year Treasury rate produces a coefficient that is slightly smaller (in absolute value) but is still statistically significant at the 1% level.[13] Statistical significance and positive sign on one of the two financial quality variables (namely, the natural logarithm of total assets) provides support for the risky debt hypothesis.

[12] Cummins, J. David and Patricia M. Danzon, "Price, Financial Quality, and Capital Flows in Insurance Markets," *Journal of Financial Intermediation*, 1997, Vol. 6, 3-38.

[13] The estimate is equal to -0.92 for the least squares regression and -0.93 with the panel fixed effects estimator.

Table A6: Estimation Results

Constant	2.100***
	[0.186]
Ln(Price (lagged))	0.224***
	[0.010]
Treasury Rate	-2.169***
	[0.370]
ΔATPW (lagged)	-1.049***
	[0.128]
STL (lagged)	0.000**
	[0.000]
Ln(Assets (lagged))	0.036***
	[0.008]
Foreign	0.036
	[0.029]
Mutual	-0.054
	[0.035]
Observations	11,061

Standard errors are shown in brackets.

Depenedent variable is Ln(Price)

** significant at 10%*

*** significant at 5%*

**** significant at 1%*

SIMULATION ANALYSIS: INTERACTION OF REDUCTION IN INDUSTRY-WIDE PREMIUMS AND CHANGE IN REINSURANCE AND CAPITAL LEVELS

Given the parameters estimated from regression analyses #1 and #2, we conduct a simulation to estimate the impact on the U.S. P&C industry. This simulation is necessary because of the feedback loops (see Figure 7 in the report). As the regression analyses show, each insurance company's offering of insurance policies (premiums), and its risk management in terms of capital and reinsurance depend on a number of factors such as size, cost of capital, geographic and line concentration. After controlling for these factors, we estimate the key regression coefficients to reflect the responses of an average insurance company. They correspond to the industry-wide premiums and capital. Hence, we use the industry-wide statistics to simulate the tax proposals' impact. An additional advantage of this approach is that using the industry aggregates smoothes out the "noise" contained in each individual company's premium and capital levels.

In particular, the following equations are used in the simulation:[14]

[14] The simulation is performed on industry-wide premiums from Highline Data. Because Highline eliminates inter-company reinsurance, the reinsurance premiums assumed to and ceded from affiliates

$$\frac{\text{RCTNA}_i}{\text{GPW}_i} - \frac{\text{RCTNA}(-1)_i}{\text{GPW}(-1)_i} = \beta_1 \left(\frac{\text{RCTA}_i}{\text{GPW}_i} - \frac{\text{RCTA}(-1)_i}{\text{GPW}(-1)_i}\right) \quad \text{for each } i, \qquad (1a)$$

$$\frac{\text{CAPITAL}}{\text{GPW}_i} - \frac{\text{CAPITAL}(-1)_i}{\text{GPW}(-1)_i} = \beta_2 \left(\frac{\sum_i \text{RCTA}_i}{\sum_i \text{GPW}_i} - \frac{\sum_i \text{RCTA}(-1)_i}{\sum_i \text{GPW}(-1)_i}\right). \qquad (1b)$$

Equation (1a) is the substitution function of non-affiliate reinsurance (RCTNA_i) for affiliate reinsurance (RCTA_i). The functional form of reinsurance ratios follows from the specification in regression analysis #1. Equation (1b) models how capital responds to changes in reinsurance in aggregates. Note that since premium levels (for both direct insurance and reinsurance) are available for each NAIC line, but capital is only available for each line, the regression coefficient for non-affiliate reinsurance (β_1) is applied to each NAIC line, but the coefficient for capital (β_2) is applied to all lines combined. In the equations above (34 lines plus capital), all variables denoted with a (-1) suffix are known, and NetRCTA_i is also known. We need to solve for RCTNA_i, Capital, and GPW_i. At this stage, there are a total of 35 equations and 69 unknowns (34 RCTNA_i, 1 Capital, and 34 GPW_i).

From regression analysis #2, we know how GPW_i would react if there are changes in reinsurance ratios and capital growth

$$\frac{\text{GPW}_i}{\text{GPW(-1)}_i} - 1 = \gamma_1 \left(\frac{\text{RCTA}_i + \text{RCTNA}_i}{\text{GPW}_i} - \frac{\text{RCTA(-1)}_i + \text{RCTNA(-1)}_i}{\text{GPW}(-1)_i}\right) + \gamma_2 \left(\frac{\text{CAPITAL}}{\text{CAPITAL(-1)}} - 1\right) \qquad (2)$$

Equation (2) adds 34 additional constraints on the unknowns. Thus, equations (1a), (1b), and (2) can now be solved simultaneously to obtain RCTNA_i, Capital, and GPW_i.

In our simulation exercise, we choose the following parameters:

Regression #1: $\beta_1 = 0.29$, $\beta_2 = 0.56$

Regression #2:

Base Case:	$\gamma_1 = 0.68$, $\gamma_2 = 0.36$
Alt Case 1:	$\gamma_1 = 0.56$, $\gamma_2 = 0.13$
Alt Case 2:	$\gamma_1 = 0.55$, $\gamma_2 = 0.04$

represent reinsurance between NAIC-reporting entities and non-reporting entities. At the industry level, we choose to define gross premium written and reinsurance ceded to affiliates differently from those for each individual the regression analyses. In particular, we include reinsurance assumed from affiliates (these are from non-NAIC-reporting entities) in gross premiums written (GPW), and not to net resinruance assumed from affiliate from reinsurance ceded to affiliates.

APPENDIX B

INCREASE IN THE COST OF INSURANCE FOR SELECTED LINES OF BUSINESS IN SELECTED STATES

Illustration of Minimum Level of Impact on Arkansas Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
AR - Aircraft (all perils)	22,315,080	4.9%	1,093,439
AR - Boiler Machinery	11,832,919	2.1%	248,491
AR - Com Auto No Fault	1,066,928	2.7%	28,807
AR - Credit	6,716,943	4.3%	288,829
AR - Earthquake	16,398,485	4.9%	803,526
AR - Fidelity	9,622,588	2.0%	192,452
AR - Financial Guaranty	7,387,522	4.4%	325,051
AR - Fire	128,157,534	3.1%	3,972,884
AR - Group Accident Health	27,871,499	3.3%	919,759
AR - Ocean Marine	18,688,411	2.8%	523,276
AR - Other Com Auto Liability	211,253,590	2.7%	5,703,847
AR - Other liability	343,939,456	4.4%	15,133,336
AR - Products liability	19,229,628	6.4%	1,230,696
AR - Surety	32,375,346	2.9%	938,885
			31,403,277

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on California Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
CA - Aircraft (all perils)	223,653,466	4.9%	10,959,020
CA - Boiler Machinery	105,963,381	2.1%	2,225,231
CA - Com Auto No Fault	2,262,938	2.7%	61,099
CA - Credit	112,820,905	4.3%	4,851,299
CA - Earthquake	1,061,400,806	4.9%	52,008,639
CA - Fidelity	126,734,589	2.0%	2,534,692
CA - Financial Guaranty	347,387,829	4.4%	15,285,064
CA - Fire	1,450,081,570	3.1%	44,952,529
CA - Group Accident Health	199,644,612	3.3%	6,588,272
CA - Ocean Marine	289,605,447	2.8%	8,108,953
CA - Other Com Auto Liability	2,292,597,458	2.7%	61,900,131
CA - Other liability	7,327,403,860	4.4%	322,405,770
CA - Products liability	594,577,321	6.4%	38,052,949
CA - Surety	736,543,614	2.9%	21,359,765
Total			591,293,413

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on Florida Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
FL - Aircraft (all perils)	150,246,075	4.9%	7,362,058
FL - Boiler Machinery	54,875,297	2.1%	1,152,381
FL - Com Auto No Fault	72,383,605	2.7%	1,954,357
FL - Commercial Multiperil Non-Liab	1,444,650,626	14.0%	217,859,822
FL - Credit	67,181,348	4.3%	2,888,798
FL - Earthquake	35,432,257	4.9%	1,736,181
FL - Fidelity	56,885,581	2.0%	1,137,712
FL - Financial Guaranty	116,101,785	4.4%	5,108,479
FL - Fire	1,223,198,832	3.1%	37,919,164
FL - Group Accident Health	151,896,243	3.3%	5,012,576
FL - Ocean Marine	313,145,690	2.8%	8,768,079
FL - Other Com Auto Liability	1,539,897,601	2.7%	41,577,235
FL - Other liability	3,170,708,936	4.4%	139,511,193
FL - Products liability	254,165,769	6.4%	16,266,609
FL - Surety	432,505,480	2.9%	12,542,659
Total			500,797,303

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis. Refer to Section VI of the text for commentary on the increase in costs for FL CMP Non-Liab.

Illustration of Minimum Level of Impact on Iowa Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
IA - Aircraft (all perils)	13,350,126	4.9%	654,156
IA - Boiler Machinery	18,569,048	2.1%	389,950
IA - Com Auto No Fault	2,698	2.7%	73
IA - Credit	6,854,393	4.3%	294,739
IA - Earthquake	3,014,212	4.9%	147,696
IA - Fidelity	9,927,399	2.0%	198,548
IA - Financial Guaranty	6,381,708	4.4%	280,795
IA - Fire	67,959,841	3.1%	2,106,755
IA - Group Accident Health	46,576,665	3.3%	1,537,030
IA - Ocean Marine	6,941,891	2.8%	194,373
IA - Other Com Auto Liability	212,152,764	2.7%	5,728,125
IA - Other liability	430,630,574	4.4%	18,947,745
IA - Products liability	34,918,786	6.4%	2,234,802
IA - Surety	36,607,309	2.9%	1,061,612
Total			33,776,400

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on Louisiana Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
LA - Aircraft (all perils)	65,297,529	4.9%	3,199,579
LA - Boiler Machinery	19,524,487	2.1%	410,014
LA - Com Auto No Fault	7,718,437	2.7%	208,398
LA - Credit	20,548,765	4.3%	883,597
LA - Earthquake	6,385,134	4.9%	312,872
LA - Fidelity	11,464,656	2.0%	229,293
LA - Financial Guaranty	27,639,617	4.4%	1,216,143
LA - Fire	249,439,953	3.1%	7,732,639
LA - Group Accident Health	25,248,160	3.3%	833,189
LA - Ocean Marine	315,425,251	2.8%	8,831,907
LA - Other Com Auto Liability	465,458,762	2.7%	12,567,387
LA - Other liability	755,373,585	4.4%	33,236,438
LA - Products liability	50,274,013	6.4%	3,217,537
LA - Surety	98,581,600	2.9%	2,858,866
Total			75,737,858

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on Massachusetts Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
MA - Aircraft (all perils)	24,571,807	4.9%	1,204,019
MA - Boiler Machinery	27,770,150	2.1%	583,173
MA - Com Auto No Fault	14,839,055	2.7%	400,654
MA - Credit	29,869,754	4.3%	1,284,399
MA - Earthquake	16,287,533	4.9%	798,089
MA - Fidelity	33,972,286	2.0%	679,446
MA - Financial Guaranty	62,711,603	4.4%	2,759,311
MA - Fire	282,490,495	3.1%	8,757,205
MA - Group Accident Health	36,553,475	3.3%	1,206,265
MA - Ocean Marine	92,340,394	2.8%	2,585,531
MA - Other Com Auto Liability	580,844,746	2.7%	15,682,808
MA - Other liability	1,418,390,861	4.4%	62,409,198
MA - Products liability	106,002,339	6.4%	6,784,150
MA - Surety	109,642,707	2.9%	3,179,639
Total			108,313,886

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on Montana Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
MT - Aircraft (all perils)	12,585,018	4.9%	616,666
MT - Boiler Machinery	3,730,693	2.1%	78,345
MT - Com Auto No Fault	1,449	2.7%	39
MT - Credit	1,990,181	4.3%	85,578
MT - Earthquake	3,424,475	4.9%	167,799
MT - Fidelity	2,798,477	2.0%	55,970
MT - Financial Guaranty	3,620,875	4.4%	159,319
MT - Fire	20,452,681	3.1%	634,033
MT - Group Accident Health	5,342,487	3.3%	176,302
MT - Ocean Marine	2,113,885	2.8%	59,189
MT - Other Com Auto Liability	85,025,770	2.7%	2,295,696
MT - Other liability	120,980,249	4.4%	5,323,131
MT - Products liability	8,413,642	6.4%	538,473
MT - Surety	18,308,004	2.9%	530,932
Total			10,721,471

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on Nevada Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
NV - Aircraft (all perils)	35,247,567	4.9%	1,727,131
NV - Boiler Machinery	12,245,797	2.1%	257,162
NV - Com Auto No Fault	4,840	2.7%	131
NV - Credit	26,035,099	4.3%	1,119,509
NV - Earthquake	13,958,265	4.9%	683,955
NV - Fidelity	7,713,284	2.0%	154,266
NV - Financial Guaranty	17,900,225	4.4%	787,610
NV - Fire	95,882,621	3.1%	2,972,361
NV - Group Accident Health	8,701,262	3.3%	287,142
NV - Ocean Marine	7,001,626	2.8%	196,046
NV - Other Com Auto Liability	199,254,661	2.7%	5,379,876
NV - Other liability	519,272,970	4.4%	22,848,011
NV - Products liability	40,360,997	6.4%	2,583,104
NV - Surety	103,653,472	2.9%	3,005,951
Total			42,002,252

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on New Jersey Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
NJ - Aircraft (all perils)	69,480,462	4.9%	3,404,543
NJ - Boiler Machinery	34,008,553	2.1%	714,180
NJ - Com Auto No Fault	25,004,065	2.7%	675,110
NJ - Credit	49,159,576	4.3%	2,113,862
NJ - Earthquake	12,244,482	4.9%	599,980
NJ - Fidelity	47,067,531	2.0%	941,351
NJ - Financial Guaranty	58,677,868	4.4%	2,581,826
NJ - Fire	316,116,395	3.1%	9,799,608
NJ - Group Accident Health	66,727,995	3.3%	2,202,024
NJ - Ocean Marine	130,708,702	2.8%	3,659,844
NJ - Other Com Auto Liability	971,062,943	2.7%	26,218,699
NJ - Other liability	2,206,833,805	4.4%	97,100,687
NJ - Products liability	211,976,190	6.4%	13,566,476
NJ - Surety	166,729,981	2.9%	4,835,169
Total			168,413,358

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on New York Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
NY - Aircraft (all perils)	208,990,803	4.9%	10,240,549
NY - Boiler Machinery	75,278,210	2.1%	1,580,842
NY - Com Auto No Fault	158,336,745	2.7%	4,275,092
NY - Credit	133,268,126	4.3%	5,730,529
NY - Earthquake	36,518,464	4.9%	1,789,405
NY - Fidelity	154,858,432	2.0%	3,097,169
NY - Financial Guaranty	1,439,254,880	4.4%	63,327,215
NY - Fire	807,449,557	3.1%	25,030,936
NY - Group Accident Health	203,216,204	3.3%	6,706,135
NY - Ocean Marine	524,673,815	2.8%	14,690,867
NY - Other Com Auto Liability	1,555,542,190	2.7%	41,999,639
NY - Other liability	5,872,455,313	4.4%	258,388,034
NY - Products liability	322,143,289	6.4%	20,617,170
NY - Surety	379,753,816	2.9%	11,012,861
Total			468,486,443

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Illustration of Minimum Level of Impact on North Dakota Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
ND - Aircraft (all perils)	6,356,428	4.9%	311,465
ND - Boiler Machinery	7,115,129	2.1%	149,418
ND - Com Auto No Fault	2,377,642	2.7%	64,196
ND - Credit	763,668	4.3%	32,838
ND - Earthquake	252,011	4.9%	12,349
ND - Fidelity	2,533,669	2.0%	50,673
ND - Financial Guaranty	2,070,715	4.4%	91,111
ND - Fire	17,950,250	3.1%	556,458
ND - Group Accident Health	2,503,849	3.3%	82,627
ND - Ocean Marine	972,797	2.8%	27,238
ND - Other Com Auto Liability	47,828,932	2.7%	1,291,381
ND - Other liability	77,396,247	4.4%	3,405,435
ND - Products liability	7,452,856	6.4%	476,983
ND - Surety	12,489,005	2.9%	362,181
Total			6,914,353

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on South Carolina Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
SC - Aircraft (all perils)	16,896,024	4.9%	827,905
SC - Boiler Machinery	14,616,602	2.1%	306,949
SC - Com Auto No Fault	200,424	2.7%	5,411
SC - Credit	28,583,112	4.3%	1,229,074
SC - Earthquake	30,157,735	4.9%	1,477,729
SC - Fidelity	9,405,981	2.0%	188,120
SC - Financial Guaranty	16,295,045	4.4%	716,982
SC - Fire	177,508,193	3.1%	5,502,754
SC - Group Accident Health	24,606,352	3.3%	812,010
SC - Ocean Marine	30,617,953	2.8%	857,303
SC - Other Com Auto Liability	292,108,400	2.7%	7,886,927
SC - Other liability	418,997,953	4.4%	18,435,910
SC - Products liability	41,861,205	6.4%	2,679,117
SC - Surety	62,788,135	2.9%	1,820,856
Total			42,747,046

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of Minimum Level of Impact on Texas Consumers of Affiliated Reinsurance Tax Proposal

Line of Business	DPW	% increase in cost	$ increase in cost
TX - Aircraft (all perils)	220,956,853	4.9%	10,826,886
TX - Boiler Machinery	89,120,305	2.1%	1,871,526
TX - Com Auto No Fault	19,479,407	2.7%	525,944
TX - Credit	317,609,987	4.3%	13,657,229
TX - Earthquake	29,385,503	4.9%	1,439,890
TX - Fidelity	69,438,786	2.0%	1,388,776
TX - Financial Guaranty	103,319,561	4.4%	4,546,061
TX - Fire	1,385,449,645	3.1%	42,948,939
TX - Group Accident Health	320,990,083	3.3%	10,592,673
TX - Ocean Marine	382,908,991	2.8%	10,721,452
TX - Other Com Auto Liability	1,664,953,984	2.7%	44,953,758
TX - Other liability	4,039,870,288	4.4%	177,754,293
TX - Products liability	260,527,194	6.4%	16,673,740
TX - Surety	427,834,459	2.9%	12,407,199
Total			350,308,365

The above figures illustrate the minimum impact of the proposal to insurance consumers in the state and were calculated by applying the estimated national increase in insurance costs to direct premiums written in the state. Only lines of business with a 2% or higher increase were included. These figures do not include additional increases in costs that would result from the non-proportional reinsurance lines, which are not reported on a state by state basis. A blended rate of increase was used for products and other liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

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