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The Impact on the U.S. Insurance Market of H.R. 3424 on Offshore Affiliate Reinsurance: An Updated Economic Analysis

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SUMMARY

Congress is considering H.R. 3424, 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. United States accounted for 76 percent of worldwide insured losses for natural catastrophes between 2000 and 2009.

- 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 insures, 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 2009, 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 ($26.0 billion of $29.8 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 9.9 percent of premiums over the last decade. Therefore, such a tax would force U.S. subsidiaries to eliminate all $26.0 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, as measured by insurance premiums, would drop by 2.1 – 2.4 percent, on average—much more in some lines of business.

- 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 2.1 – 2.4 percent, on average, and as much as 9 percent in some lines of business. U.S. consumers would have to pay $11 – $13 billion more per year to obtain the same coverage.

- Corresponding to the reduction in insurance premiums and the increase in insurance price, the insurance coverage (for future losses and expenses) drops by 4.1 – 4.8 percent, on average, and as much as 16 percent in some lines of business.

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 still tentative due to an uncertain economic recovery, it seems especially unwise.

The Impact on the U.S. Insurance Market of H.R. 3424 on Offshore Affiliate Reinsurance: An Updated Economic Analysis[1]

Michael Cragg, J. David Cummins and Bin Zhou

I. INTRODUCTION

Congress is considering H.R. 3424, legislation introduced by Rep. Richard E. Neal (D-Mass) in 2009, which 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. United States accounted for 76 percent of worldwide insured losses for natural catastrophes between 2000 and 2009, and it has been involved in each of the top 9 most costly insurance losses between 1970 and 2009.[2]

H.R. 3424 is a response to pressure from some insurance groups that are headquartered in the United States, who 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.[3] 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

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[1] The original study, published two months before H.R. 3424 was introduced in July 2009, was based on a proposed legislation that was fundamentally the same as H.R. 3424. While substantially the same as the original study, this revised study updates the previous analysis with more recent data. Any other significant changes in inputs and assumptions from the original study are noted in the report. The authors would like to acknowledge Dorothy Robyn, a former *The Brattle Group* principal, for her help in writing the original report.

[2] Swiss Re, *Natural Catastrophes and Man-Made Disasters* from http://www.swissre.com/sigma/.

[3] For instance, W.R. Berkley Group, one of the strongest advocates of H.R. 3424, makes extensive use of affiliate reinsurance: 17 of the 22 companies in the Berkley group reinsure most of their business with affiliates.

(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 proposed tax on the supply of reinsurance and the indirect effect on the supply and price of primary insurance.

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, as measured by the insurance premiums, in the United States by $20 – $24 billion, which represents 20 percent of *all* reinsurance and nearly 40 percent of all *foreign* reinsurance (non-affiliated as well as affiliated);
- Reduce the supply of primary insurance in the United States by 2.1 – 2.4 percent;
- Increase the price of primary insurance by 2.1 – 2.4 percent, overall, and by close to 9 percent in some lines of business;
- Reduce the insurance coverage by 4.1 – 4.8 percent, overall, and by 16 percent in some lines of business; and
- As a result of higher prices, require U.S. consumers to pay $11 – $13 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, U.S. insurers wrote nearly $977 million of earthquake insurance in California in 2009. Based on the nationwide price increase for earthquake insurance (7.4 percent), Californians would have to pay an additional $72 million as a result of the tax. We present these results for 13 states and 18 lines of business in the report (impacts for all 50 states and District of Columbia are contained in Appendix B). Second, because our nationwide estimates significantly understate the impact of the tax on some markets, especially those catastrophe-related lines of business in the coastal states, we incorporate a proxy for state-level data on reinsurance to account for the role of foreign reinsurance in catastrophe prone areas. We estimate, by way of illustration, that Florida would see a 13 percent increase in the price of commercial multiple peril property insurance (compared to a 3 percent increase nationwide).

We conclude that H.R. 3424 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 still tentative due to an uncertain economic recovery, 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 proposal in H.R.

3424 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 2009, U.S. P&C insurers earned $428 billion in premiums and incurred $256 billion in claims and $173 billion in underwriting expenses.[4]

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 $15 billion in insured losses in Florida and Louisiana, and State Farm's losses alone ($4.6 billion) were equal to the entire capital of State Farm P&C at the time. In 1994, insured residential losses from the Northridge earthquake in southern California (totaled $17 billion) exceeded the cumulative dollars ever collected for earthquake insurance in the state.[5] In 2005, the trio of hurricanes that hit Florida and the Gulf Coast (Wilma, Rita, and Katrina) caused $59 billion in insured losses.[6]

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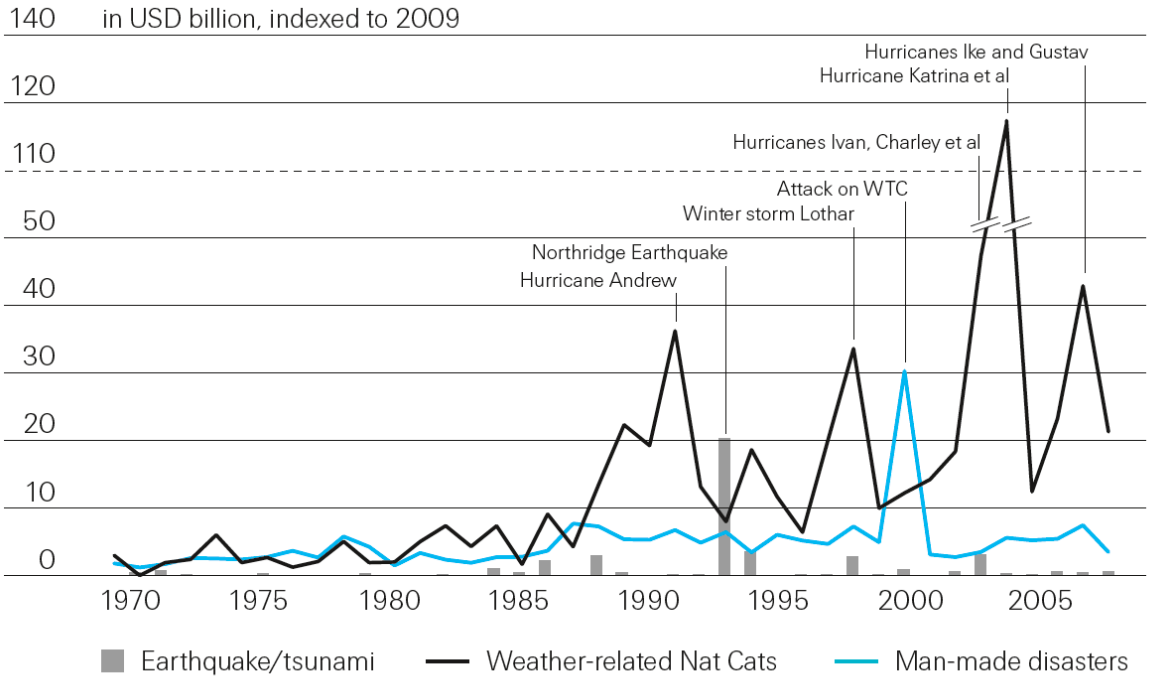
4 Highline database.

5 Raymond James, "Florida Hurricane Catastrophe Fund: Financing Observations and Perspective," presented to Florida Insurance Council, 2009 Summer Insurance Symposium, June 2, 2009.

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

Figure 1. Worldwide Catastrophe Losses (1970–2009)



Source: Swiss Re, "Natural Catastrophes and Man-Made Disasters in 2009: Catastrophes Claim Fewer Victims, Insured Losses Fall," Sigma Study No 1/2010.

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: According to the U.S. Census Bureau, the population in hurricane exposed states will increase by 36.3 percent between 2000 and 2030, accounting for 53 percent of the increase in the entire U.S. population.[7]

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.[8] And the U.S. businesses are continuing to face significant commercial liability for coverage on error and omissions, directors and officers, multiple peril, product liability, *etc*. Table 1 shows that U.S. is by far the largest commercial liability insurance market in the world, accounting for 54 percent of the worldwide market in 2008 ($77.2 out of $142 billion). Premiums spend on commercial liability coverage in the U.S. represents 0.54 percent of the GDP, more than any other country.

[7] Robert P. Hartwig and Claire Wilkinson, "Residual Market Property Plans: From Markets of Last Resort to Markets of First Choice," Insurance Information Institute, September 2009 at p. 12.

[8] See, *e.g.*, Swiss Re, "Commercial liability: a challenge for businesses and their insurers," Sigma No. 5/2009 at pp. 23 - 24.

Table 1. The Global Commercial Insurance Market, 2008

Rank		Premium Spent on Commercial Liability	GDP	Premium/GDP
1	**US**	**77.2**	**14,301**	**0.54%**
2	UK	11.7	2,673	0.44%
3	Germany	11.6	3,684	0.31%
4	France	6.9	2,864	0.24%
5	Canada	4.9	1,517	0.32%
6	Italy	4.9	2,312	0.21%
7	Japan	4.7	4,932	0.10%
8	Australia	3.8	966	0.39%
9	Spain	2.7	1,614	0.17%
10	China	1.2	4,478	0.03%
	Top 10	**129**	**39,343**	**0.33%**
	World	**142**	**60,775**	**0.23%**

Source: Swiss Re, "Commercial liability: a challenge for businesses and their insurers," Sigma No 5/2009.

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.

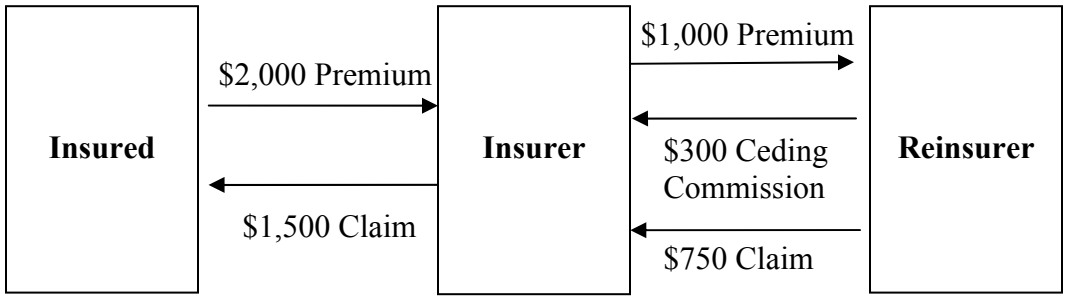
A substitute for capital — and a critical tool for managing risk — is reinsurance. Reinsurance is insurance for insurance companies. An insurer transfers (or cedes) premiums collected from customers to a reinsurer that agrees contractually to bear a portion of the insured losses. Because reinsurance 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.[9]

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.

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.

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

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.[10] 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.[11] 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. Access to foreign reinsurance allows U.S. insurers to provide greater amounts of coverage to U.S. consumers at more affordable prices.

This critical reliance on foreign reinsurance by the United States can be seen in several ways: concentration of insurable loss, recovery experience, and reinsurance premiums ceded to foreign reinsurers. First, the United States accounted for 76 percent of worldwide insured losses from natural catastrophes between 2000 and 2009 (Figure 3). Its annual share of the worldwide insured losses ranges from 30 percent in 2007 to over 90 percent in 2005. In 2005 alone, the total U.S. insured losses exceeded $100 billion (in 2009 dollars).

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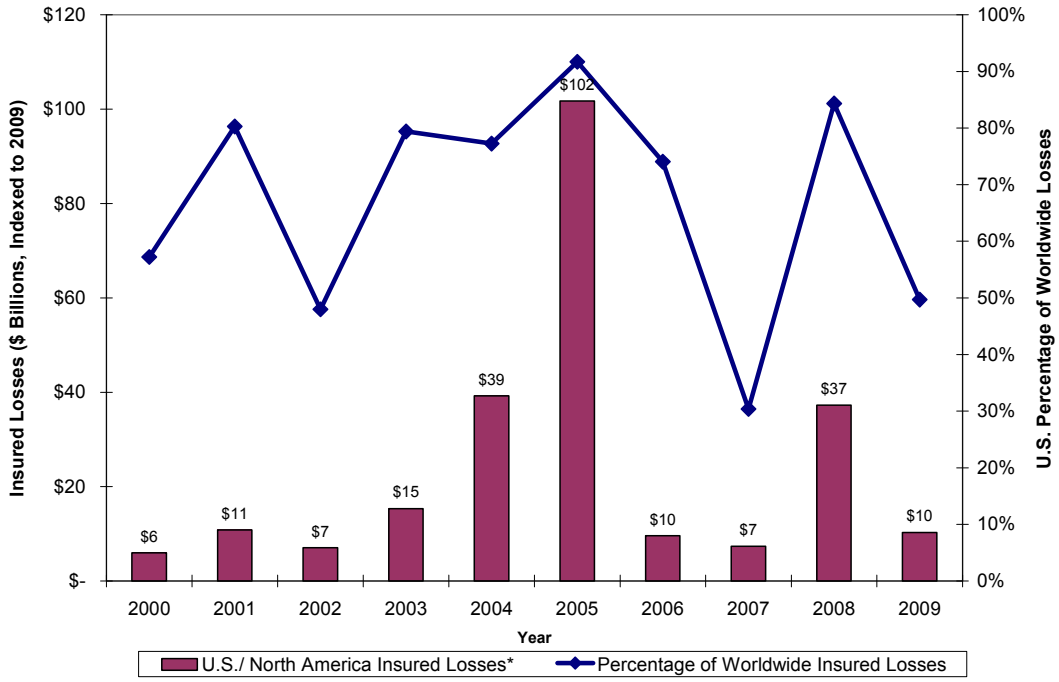
[10] J. David Cummins, Georges Dionne, Robert Gagné and Abdelhakim Nouira, 2008, "The Costs and Benefits of Reinsurance." Available at: http://ssrn.com/abstract=1142954.

[11] 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.

Figure 3. U.S. Insured Catastrophe Losses (2000 - 2009)



Source: Swiss Re, Natural Catastrophes and Man-Made Disasters.

Furthermore, eight of the most costly catastrophes in the U.S. occurred in the last ten years (Table 2). The importance of foreign reinsurance for the United States market, in particular the natural catastrophes, can simply not be overemphasized.

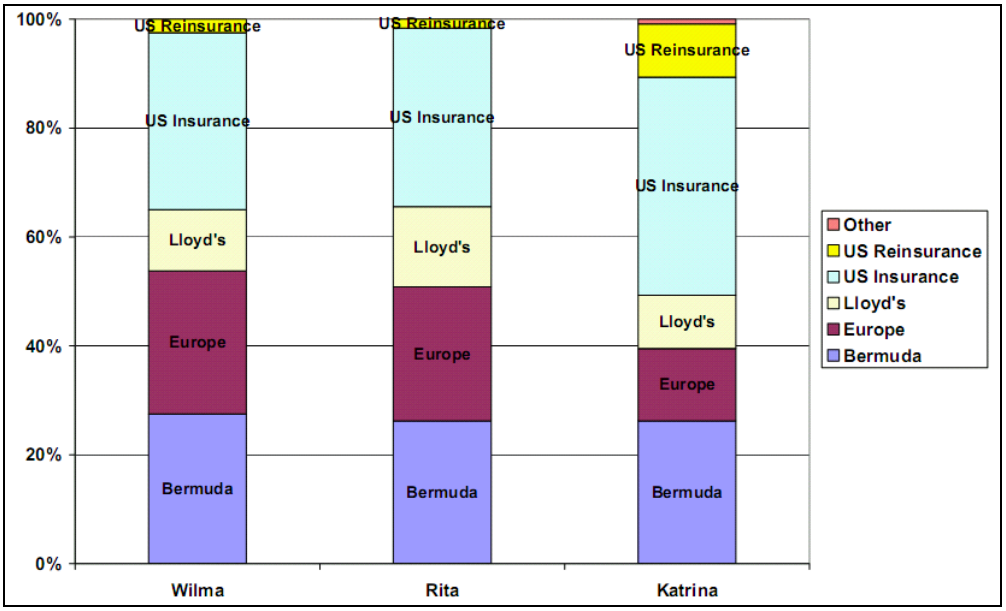
Table 2. Top 10 Most Costly Insurance Losses (1970 - 2009)

Date (start)	Event	Country	Insured losses (Millions in 2009 Dollars)
Aug. 2005	Hurricane Katrina; floods, dams burst, damage to oil rigs	US, Gulf of Mexico, Bahamas, North Atlantic	71,163
Aug. 1992	Hurricane Andrew; floods	US, Bahamas	24,479
Sept. 2001	Terror attack on WTC, Pentagon, and other buildings	US	22,767
Jan. 1994	Northridge earthquake (M 6.6)	US	20,276
Sept. 2008	Hurricane Ike; floods, offshore damage	US, Caribbean, Gulf of Mexico et al	19,940
Sept. 2004	Hurricane Ivan; damage to oil rigs	US, Caribbean, Barbados et al	14,642
Oct. 2005	Hurricane Wilma; floods	US, Mexico, Jamaica, Haiti et al	13,807
Sept. 2005	Hurricane Rita; floods, damage to oil rigs	US, Gulf of Mexico, Cuba	11,809
Aug. 2004	Hurricane Charley; floods	US, Cuba, Jamaica et al	9,148
Sept. 1991	Typhoon Mireille / No 19	Japan	8,899

Note: Swiss Re, "Natural Catastrophes and Man-Made Disasters in 2009: Catastrophes Claim Fewer Victims, Insured Losses Fall," Sigma Study No 1/2010.

Second, the United States' heavily concentrated catastrophe risk is also borne out in the fact that U.S. businesses and customers have recovered billions of dollars of losses from foreign insurers and reinsurers. Figure 4 shows the regional distribution of insurance payments for the 2005 hurricane trio (Wilma, Rita, and Katrina). 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.[12]

Figure 4. Regional Distribution of 2005 Hurricane Insurance Payments



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

Finally, 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[13] (Figure 5). The fraction of foreign reinsurance is higher for high-risk lines of business, such as commercial liability insurance, homeowners insurance in catastrophe-prone states, earthquake insurance, and reinsurance covering extreme losses. For example, foreign reinsurers account for two-thirds of U.S. property catastrophe reinsurance.[14] In the state of Florida, Bermuda reinsurers provided 70 percent of the private reinsurance to the Florida domestic company home insurance market in 2008, and foreign reinsurers altogether provided 94 percent.[15]

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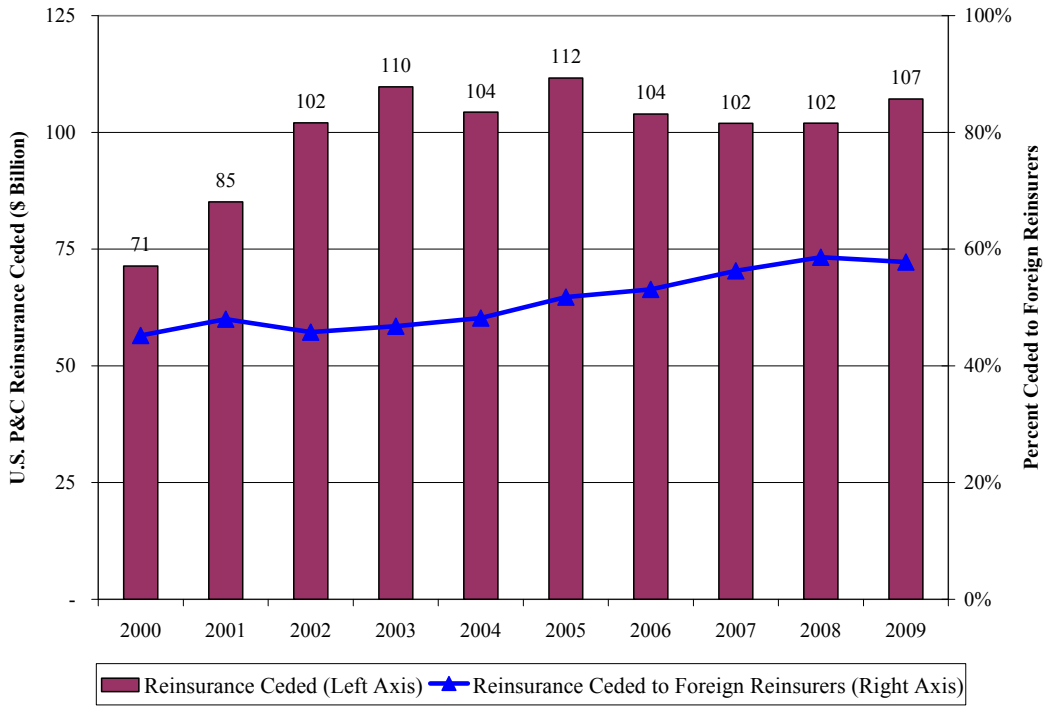
12 J. David Cummins, "*The Bermuda Insurance Market: An Economic Analysis,*" 2008. Available at: http://www.bermuda-insurance.org/pdf-downloads/CumminsReport08.pdf.

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

14 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.

15 Raymond James, *op cit*. As will be discussed further in Section V below, Florida's property catastrophe risk insurance relies heavily on state-sponsored reinsurance through Florida Hurricane Catastrophe Fund.

Figure 5. U.S. P&C Reinsurance and Foreign Reinsurers



Source: Highline database (reinsurance ceded) and RAA (foreign reinsurers' percentages).

A key reason for U.S.'s heavy reliance on foreign reinsurance 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 fragmentation of the U.S. regulatory system.[16]

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 3 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 2008. 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.

[16] U.S. members of Congress have recognized some of the problems with the existing state regulation system in the Dodd-Frank Bill (H.R. 4173, the comprehensive U.S. financial services reform bill), where the U.S. Treasury will gain power to pre-empt state law that is inconsistent with international solvency regulation agreements which Treasury can negotiate with foreign governments.

Table 3. Distribution of U.S.-Owned P&C Companies by Net Premiums Ceded to Related Reinsurers as a Percent of Gross Premiums

Net Premiums Ceded to Affiliates/Gross Premiums	Number of Companies	Percent of All Companies
>= 0%	677	100%
> 10%	413	61%
> 20%	385	57%
> 30%	365	54%
> 40%	350	52%
> 50%	330	49%
> 60%	302	45%
> 70%	284	42%
> 80%	253	37%
> 90%	213	31%

Notes: (1) The sample includes only companies that belong to a U.S.-owned insurance group which has at least $500 million in gross written premiums (GWP) in 2008. Companies with less than $10 million in annual GWP in 2009 were excluded in an effort to eliminate laragely inactive companies.
(2) Foreign control is defined here as 50 percent or greater ownership by foreign persons.
(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 written assumed reinsurance premiums from unrelated insurance companies

Source: Horst Frisch Incorporated. Tabulations of data from the Highline Data U.S. P&C Insurance database.

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.[17] These 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

[17] 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, 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.

selection and moral hazard.[18] 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.

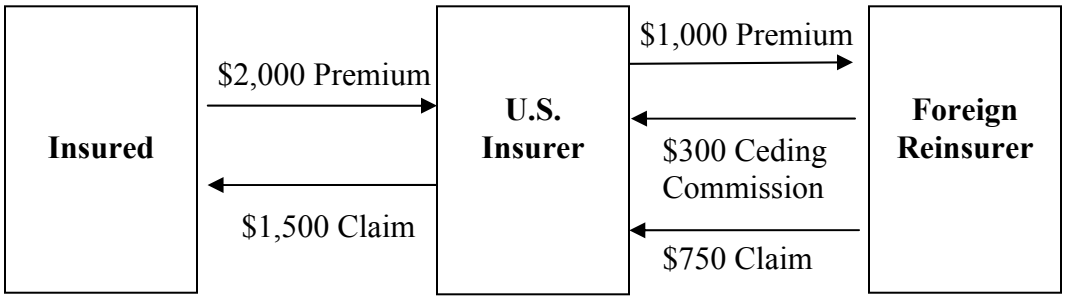
[18] One of the central questions in economics has been why and when firms opt to vertically integrate — *i.e.*, to acquire goods and services internally versus through an external market exchange. Most theories of vertical integration turn on the presence of some type of market imperfection. Traditional 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 (the 2009 Nobel Prize laureate in economics), 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 6.) 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).[19]

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 6. Offshore Reinsurance



H.R. 3424

The legislation would limit the tax deductibility of premiums that foreign-owned U.S. insurers (U.S. subsidiaries) cede to *affiliate* reinsurers offshore.[20] 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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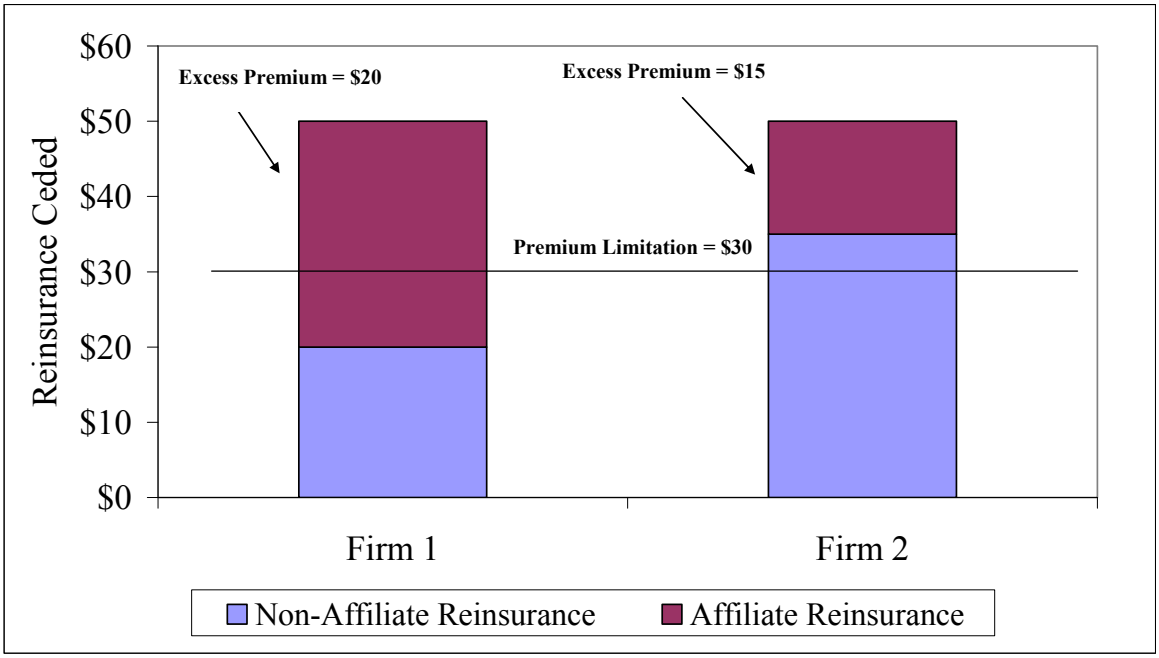
[19] Under existing U.S. tax treaties, reinsurers based in a number of other countries such as Germany and Switzerland pay no federal excise tax.

[20] 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 legislation raises significant 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 and as will be shown shortly, effectively excludes foreign insurance companies.

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 7 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 $35 to non-affiliate reinsurers; thus all of its affiliate reinsurance exceeds the threshold. This outcome makes no economic sense.

Figure 7. Determination of Excess Premium



Moreover, U.S. subsidiaries already make extensive use of non-affiliate reinsurance — it accounts for more than two fifths ($22 billion) of the $52 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.

Third, the tax is extremely large. Under the example in Figure 6 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"). 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).[21]

To put this into perspective, note that the pre-tax income of the U.S. P&C industry has been 9.9 percent of premiums on average over the last ten years.[22] 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 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.

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. 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 2009 aggregate industry data on premiums in five categories, as shown in Table 4.[23] 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.

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[21] 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.

[22] Highline database.

[23] Technically speaking, H.R. 3424 stipulates that the industry fraction to be used for any given year would be calculated on the industry data during the second proceeding calendar year.

Table 4. Calculation of Industry Fraction (2009, $ in Millions)

	1	Reins. Assumed		Reins. Ceded		6	7	8
		2	3	4	5	Net Prem. Written	Gross	Industry
	Direct Business	From Affiliates	From Non-Affil.	To Affiliates	To Non-Affil.	1 + 2 + 3 - 4 - 5	Premiums 1 + 3	Fraction 5 / 7
Fire	12,661	559	2,544	1,973	3,553	10,238	15,205	23.4%
Allied lines	21,360	884	5,157	2,048	13,555	11,797	26,517	51.1%
Farmowners multiple peril	2,824	46	223	145	331	2,616	3,047	10.9%
Homeowners multiple peril	67,497	292	1,941	2,361	8,861	58,508	69,438	12.8%
Commercial multiple peril	34,000	625	1,339	2,722	4,299	28,943	35,339	12.2%
Mortgage guaranty	5,435	41	(0)	144	768	4,564	5,435	14.1%
Ocean marine	3,740	327	770	962	929	2,946	4,510	20.6%
Inland marine	13,408	326	497	1,315	4,225	8,691	13,905	30.4%
Financial guaranty	1,916	3,169	(74)	3,206	12	1,793	1,842	0.6%
Medical professional liability - occurrence	2,279	(32)	110	76	153	2,127	2,389	6.4%
Medical professional liability - claims made	8,463	46	455	926	953	7,085	8,918	10.7%
Earthquake	1,988	65	322	402	671	1,301	2,309	29.0%
Group accident and health	4,021	493	891	605	773	4,027	4,912	15.7%
Credit accident and health (group and indiv.)	245	25	98	66	109	194	343	31.7%
Other accident and health	3,203	1	299	781	285	2,437	3,502	8.1%
Workers' compensation	37,558	313	1,467	2,968	4,114	32,257	39,025	10.5%
Other liability - occurrence	28,215	568	2,445	3,733	5,797	21,698	30,660	18.9%
Other liability - claims made	18,019	780	1,990	3,470	2,895	14,425	20,010	14.5%
Excess workers' compensation	917	17	241	96	138	941	1,159	11.9%
Products liability - occurrence	2,425	102	91	431	193	1,993	2,516	7.7%
Products liability - claims made	457	31	15	63	68	372	472	14.3%
Private passenger auto liability	98,306	1,172	2,349	3,246	3,542	95,039	100,656	3.5%
Commercial auto liability	18,841	141	1,005	1,403	1,982	16,601	19,846	10.0%
Auto physical damage	71,552	453	1,308	3,515	1,808	67,990	72,860	2.5%
Aircraft (all perils)	1,989	195	499	607	852	1,224	2,488	34.2%
Fidelity	1,120	60	100	72	109	1,099	1,220	8.9%
Surety	5,193	265	510	557	535	4,876	5,703	9.4%
Burglary and theft	168	3	14	18	13	153	182	7.3%
Boiler and machinery	1,373	117	1,143	251	578	1,804	2,516	23.0%
Credit	1,889	108	304	595	480	1,225	2,193	21.9%
International	63	9	155	60	25	143	219	11.6%
Warranty	2,654	40	59	302	693	1,757	2,713	25.5%
Reinsurance - Nonprop. Assumed Property	XXX	150	8,103	1,213	830	6,210	8,103	10.2%
Reinsurance - Nonprop. Assumed Liability	XXX	34	7,538	1,405	846	5,321	7,538	11.2%
Reinsurance - Nonprop. Assumed Financial	XXX	2	294	54	6	236	294	1.9%
Agg. Write-ins for Other Lines of Business	1,438	101	104	150	212	1,281	1,542	13.7%
Totals	**475,219**	**11,528**	**44,306**	**41,945**	**65,193**	**423,916**	**519,526**	**12.5%**

Highline Database.

H.R. 3424 defines "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 36 lines of business,[24] the average industry fraction — that is, the average level of reliance on non-affiliate reinsurance industrywide — is only 12.5 percent. Moreover, the industry fraction for four of the top five lines of business, as measured by gross premiums, is even less than 12.5 percent: private passenger auto liability (3.5 percent), auto physical damage (2.5 percent), workers' compensation (10.5 percent), and commercial multiple peril (12.2). The industry fraction of 12.8 percent for homeowners multiple peril, the third largest line of business, is only slightly above the overall average of 12.5 percent.[25]

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 direct-premiums-weighted 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 25 percent.[26]

Second, the information on individual companies, which is recorded in the format of Table 4 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 5 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 $29.8 billion in premiums to offshore affiliate reinsurers.

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[24] Our original report used NAIC 2007 data, which included only 34 separate lines of business.

[25] Although the overall average is close to the overall fraction in Table 3 of the original report (12.0 percent), there are some notable differences in certain lines. For example, the fraction for "Financial guarantee" dropped from 18 percent from the original report to 0.6 percent currently.

[26] H.R. 3424 at p. 9 defines the threshold for a foreign-owned company at 25 percent. Our original analysis in 2009 used a higher 50 percent threshold.

Table 5. Summary of U.S. Operations of Foreign-Owned Insurers ($ in Millions)

	Direct Premiums (1)	Reins. Assumed From Affiliates (2)	Reins. Assumed From Non-Affil (3)	Reins. Ceded To Affiliates (4)	Reins. Ceded To Non-Affil (5)	Excess Premiums (6)	Excess as % of Offshore Affil Reins (7)=(6)/(4)
Fire	2,659	212	1,466	1,376	919	1,126	81.8%
Allied lines	5,911	504	2,693	1,588	3,937	774	48.7%
Farmowners multiple peril	180	0	128	87	25	74	85.2%
Homeowners multiple peril	8,427	46	1,116	2,029	1,517	1,749	86.2%
Commercial multiple peril	8,246	418	919	2,582	1,268	2,314	89.6%
Mortgage guaranty	0	0	0	0	0	0	76.0%
Ocean marine	1,121	50	434	475	229	379	79.7%
Inland marine	2,410	114	255	877	576	618	70.5%
Financial guaranty	989	504	85	673	9	672	99.9%
Medical professional liability - occurrence	111	0	68	30	6	27	91.2%
Medical professional liability - claims made	786	12	185	350	157	325	92.8%
Earthquake	870	119	219	436	363	377	86.6%
Group accident and health	1,084	3	651	480	377	435	90.5%
Credit accident and health (group and indiv.)	0	1	0	2	0	1	90.7%
Other accident and health	63	60	127	146	34	142	97.2%
Workers' compensation	6,090	113	465	2,120	966	2,035	96.0%
Other liability - occurrence	7,827	378	1,581	2,979	2,007	2,736	91.8%
Other liability - claims made	6,332	148	1,088	3,275	1,045	2,944	89.9%
Excess workers' compensation	247	0	62	102	50	83	81.6%
Products liability - occurrence	774	53	62	411	100	397	96.5%
Products liability - claims made	104	4	7	66	15	59	89.2%
Private passenger auto liability	9,196	326	614	2,368	230	2,158	91.1%
Commercial auto liability	3,580	102	504	1,080	668	1,032	95.6%
Auto physical damage	6,891	161	419	2,153	337	2,073	96.3%
Aircraft (all perils)	942	-3	227	405	303	268	66.2%
Fidelity	141	0	25	59	21	58	97.9%
Surety	922	76	309	457	118	415	90.8%
Burglary and theft	25	0	10	15	2	14	91.5%
Boiler and machinery	252	16	794	164	107	116	70.6%
Credit	667	80	145	327	103	240	73.4%
International	27	1	38	26	13	22	86.1%
Warranty	489	36	37	101	169	94	92.8%
Rein: Non-prop. assumed property	0	5	2,954	1,111	334	977	88.0%
Rein: Non-prop. assumed liability	0	5	4,039	1,285	509	1,109	86.3%
Rein: Non-prop. assm financial lines	0	-1	187	51	3	50	97.0%
Write-ins for other lines of business	282	0	21	108	37	92	85.5%
TOTALS	**77,645**	**3,544**	**16,552**	**29,794**	**21,933**	**25,986**	**87.2%**

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.

Amount of Ceded Insurance Subject to H.R. 3424

Table 5 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, $26.0 billion, or 87.2 percent, of the $29.8 billion in offshore affiliate reinsurance would be subject to the tax. Stated differently, only $3.8 billion, or 12.8 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": workers' compensation (96.0 percent), "other liability - occurrence" (91.8 percent), and "other liability - claims made" (89.9 percent). Non-proportional (excess-of-loss) reinsurance for property, liability, and financial also would be disproportionately harmed, with 88.0, 86.3, and 97.0 percent of offshore affiliate reinsurance, respectively, deemed "excess."[27] These are the very lines of business for which diversification through reinsurance is most important.

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, 87.2 percent, or $26.0 billion, of offshore affiliate reinsurance would be considered "excess" under the 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 $26.0 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,

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

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.[28] 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.

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.[29] This implies that the $26.0 billion drop in affiliate reinsurance would be offset by a $7.5 billion increase in non-affiliate reinsurance and a $14.6 billion increase in capital. Thus, assuming a constant supply of insurance, imposition of the proposed tax would lead to a net loss of $18.5 billion in reinsurance ($26.0 billion less $7.5 billion).[30]

When we relax the assumption that the insurance supply remains constant, our estimate of the net loss in reinsurance increases somewhat — to $20.4 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 nearly 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 8.[31] For example, approximately half of the excess-of-loss reinsurance for liability and 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.

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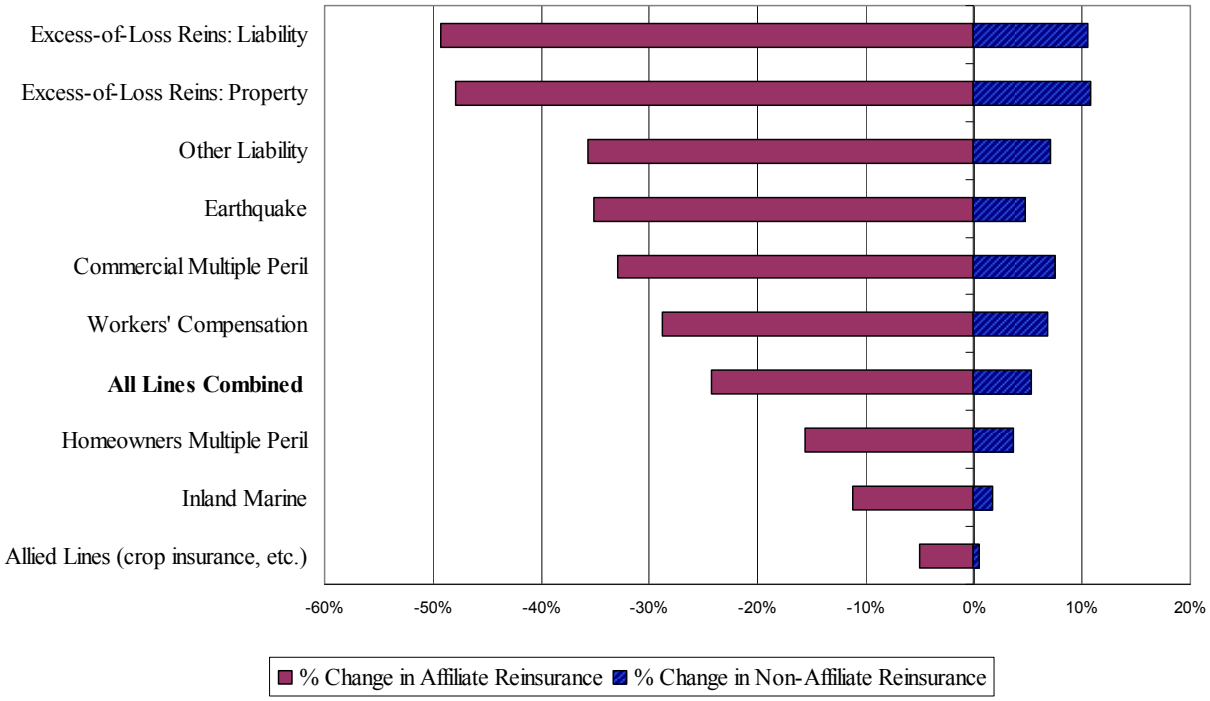
[28] U.S.-owned insurers account for about 80 percent of this sample, and U.S. subsidiaries of foreign-owned groups account for the rest. Although we are interested in the behavior of U.S. subsidiaries at this step of the analysis, we include data on U.S.-owned insurers as well. In doing so, we assume 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.

[29] 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.

[30] 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.

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

Figure 8. Impact of H.R. 3424 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)

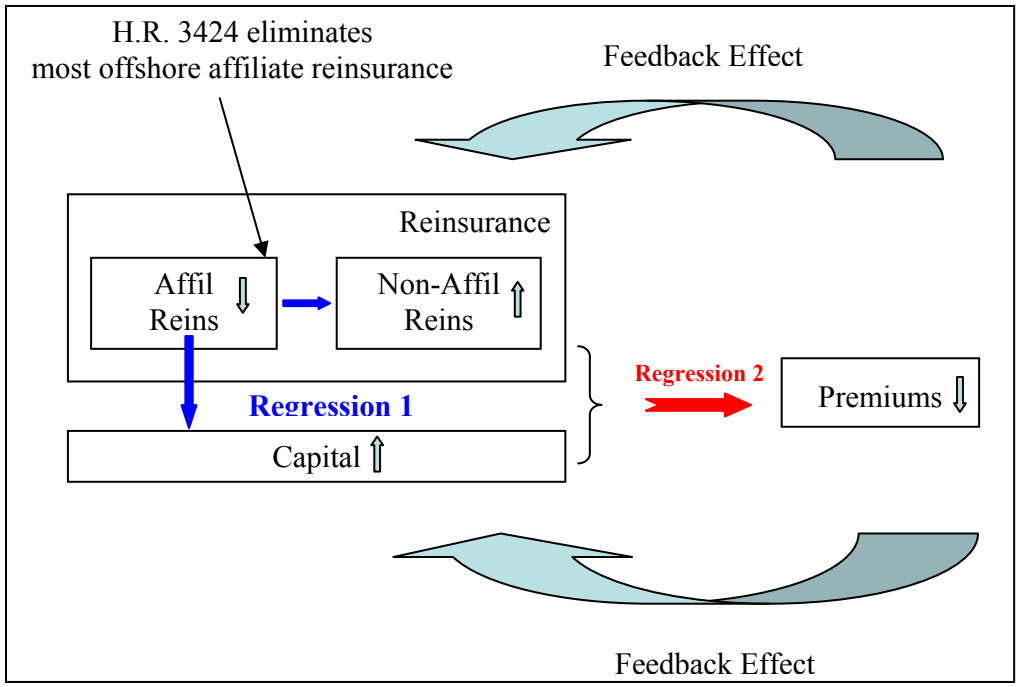
In step two of our analysis, we trace the impact of a tax on offshore affiliate reinsurance through to its effect on the supply of primary insurance. First, we use regression analysis to estimate the impact on the insurance supply of the two direct effects we identified in step one—namely, a net decrease 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 9.)

Figure 9. 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 2009 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 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 $531 billion to $520 billion, a drop of $11 billion or about 2.1 percent overall. Table 6 shows our results by line of business. (The last two columns will be discussed in the next sub-section.)

Table 6. Impact on U.S. P&C Industry — Lower Bound ($ in Millions)

	2009		Lower Bound				
	Total Premium Written (TPW)	Total Reins Ceded	TPW	Change in Total Reins Ceded	% Drop in TPW	% Increase in Price	% Drop in Coverage
Fire	15,764	5,526	15,267	(930)	-3.2%	3.2%	-6.1%
Allied lines	27,401	15,604	27,092	(709)	-1.1%	1.1%	-2.2%
Farmowners multiple peril	3,093	476	3,064	(56)	-0.9%	0.9%	-1.9%
Homeowners multiple peril	69,730	11,222	69,036	(1,337)	-1.0%	1.0%	-2.0%
Commercial multiple peril	35,965	7,021	34,929	(1,790)	-2.9%	2.9%	-5.6%
Mortgage guaranty	5,477	912	5,488	2	0.2%	-0.2%	0.4%
Ocean marine	4,837	1,891	4,674	(310)	-3.4%	3.4%	-6.5%
Inland marine	14,231	5,540	13,969	(524)	-1.8%	1.8%	-3.6%
Financial guaranty	5,011	3,218	4,762	(524)	-5.0%	5.0%	-9.5%
Medical professional liability - occurrence	2,356	229	2,348	(20)	-0.3%	0.3%	-0.7%
Medical professional liability - claims made	8,964	1,879	8,831	(249)	-1.5%	1.5%	-2.9%
Earthquake	2,374	1,073	2,198	(326)	-7.4%	7.4%	-13.8%
Group accident and health	5,405	1,379	5,210	(343)	-3.6%	3.6%	-7.0%
Credit accident and health (group and indiv.)	368	175	368	(1)	0.0%	0.0%	0.0%
Other accident and health	3,503	1,066	3,447	(109)	-1.6%	1.6%	-3.2%
Workers' compensation	39,338	7,082	38,449	(1,557)	-2.3%	2.3%	-4.4%
Other liability - occurrence	31,228	9,530	29,993	(2,215)	-4.0%	4.0%	-7.6%
Other liability - claims made	20,790	6,365	19,430	(2,345)	-6.5%	6.5%	-12.3%
Excess workers' compensation	1,175	234	1,138	(64)	-3.2%	3.2%	-6.2%
Products liability - occurrence	2,618	624	2,433	(304)	-7.1%	7.1%	-13.2%
Products liability - claims made	503	131	476	(46)	-5.4%	5.4%	-10.2%
Private passenger auto liability	101,827	6,788	101,005	(1,568)	-0.8%	0.8%	-1.6%
Commercial auto liability	19,987	3,386	19,535	(787)	-2.3%	2.3%	-4.4%
Auto physical damage	73,313	5,323	72,475	(1,504)	-1.1%	1.1%	-2.3%
Aircraft (all perils)	2,683	1,459	2,567	(235)	-4.3%	4.3%	-8.3%
Fidelity	1,280	181	1,255	(44)	-2.0%	2.0%	-3.8%
Surety	5,968	1,092	5,783	(316)	-3.1%	3.1%	-6.0%
Burglary and theft	185	32	178	(11)	-3.5%	3.5%	-6.7%
Boiler and machinery	2,633	829	2,584	(94)	-1.9%	1.9%	-3.7%
Credit	2,300	1,075	2,197	(200)	-4.5%	4.5%	-8.6%
International	228	85	218	(18)	-4.2%	4.2%	-8.0%
Warranty	2,752	995	2,714	(77)	-1.4%	1.4%	-2.7%
Rein: Non-prop. assumed property	8,253	2,043	7,805	(758)	-5.4%	5.4%	-10.3%
Rein: Non-prop. assumed liability	7,572	2,251	7,063	(872)	-6.7%	6.7%	-12.6%
Rein: Non-prop. assm financial lines	296	60	272	(37)	-7.8%	7.8%	-14.5%
Write-ins for other lines of business	1,643	362	1,603	(72)	-2.5%	2.5%	-4.8%
Total	**531,053**	**107,138**	**519,855**	**(20,350)**	**-2.1%**	**2.1%**	**-4.1%**
Capital	**521,736**		**524,791**				

Note: TPW is the sum of columns (1) to (3) of Table 4.

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. Adopting 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. (Loss incurred, or the amount of risk insured, is the insurance equivalent of "quantity" in classic microeconomics.)

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. Note the supply of insurance is defined as premiums, not the amount of risk insured or losses incurred. 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.

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 2.1 percent per unit of insurance, as shown in the second to the last column of Table 6. Based on the amount of insurance written in 2009, U.S. consumers would have to pay an additional $11 billion a year in premiums to obtain the same insurance coverage.

The second to last column of Table 6 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 earthquake insurance would increase by 7.4 percent. Excess-of-loss reinsurance lines would also see a significant increase in price: property (5.4 percent), liability (6.7 percent), and financial (7.8 percent). The product liability coverage lines would see significant price increases as well (7.1 and 5.4 percent, respectively, for occurrence and claims made).

The last column reports the change in insurance coverage for each line of business: given a reduction in premiums and an increase in the price per unit of risk, the insurance coverage must drop by more than the increase in price. For example, the overall reduction of insurance supply of 2.1 percent and a 2.1 percent increase in the price result in an insurance coverage drop by 4.1 percent (= (1 - 0.021) / (1 + 0.021) – 1). The drops in non-proportional reinsurance lines and the earthquake line are far larger than the overall average drop.

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" ($26.0 billion) and retain the rest ($3.8 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. 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.[32] Recall Firm 1 in Figure 7 above.

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."[33]

Table 7 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 $23.5 billion, or more than 20 percent. The supply of primary insurance would in turn go down by 2.4 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 2.4 percent, or $13 billion a year on the same insurance coverage.

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[32] For almost all lines of business, the substitution of non-affiliate reinsurance would displace 100 percent of the offshore affiliate reinsurance. That is so because, under H.R. 3424, close to 90 percent of the offshore affiliate reinsurance for these lines would be deemed "excess" to start with (see Table 5 above). The exceptions include those lines (*e.g.*, allied lines and aircraft (all perils)) for which less than 70 percent of the offshore affiliate reinsurance would initially be deemed "excess."

[33] 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.

Table 7. Impact on U.S. P&C Industry — Upper Bound ($ in Millions)

	2009		Upper Bound				
	Total Premium Written (TPW)	Total Reins Ceded	TPW	Change in Total Reins Ceded	% Drop in TPW	% Increase in Price	% Drop in Coverage
Fire	15,764	5,526	15,149	(1,138)	-3.9%	3.9%	-7.5%
Allied lines	27,401	15,604	26,704	(1,487)	-2.5%	2.5%	-5.0%
Farmowners multiple peril	3,093	476	3,058	(66)	-1.1%	1.1%	-2.2%
Homeowners multiple peril	69,730	11,222	68,915	(1,552)	-1.2%	1.2%	-2.3%
Commercial multiple peril	35,965	7,021	34,804	(1,998)	-3.2%	3.2%	-6.3%
Mortgage guaranty	5,477	912	5,489	2	0.2%	-0.2%	0.5%
Ocean marine	4,837	1,891	4,629	(389)	-4.3%	4.3%	-8.2%
Inland marine	14,231	5,540	13,847	(747)	-2.7%	2.7%	-5.3%
Financial guaranty	5,011	3,218	4,762	(524)	-5.0%	5.0%	-9.5%
Medical professional liability - occurrence	2,356	229	2,348	(22)	-0.4%	0.4%	-0.7%
Medical professional liability - claims made	8,964	1,879	8,821	(268)	-1.6%	1.6%	-3.1%
Earthquake	2,374	1,073	2,168	(378)	-8.7%	8.7%	-16.0%
Group accident and health	5,405	1,379	5,188	(379)	-4.0%	4.0%	-7.7%
Credit accident and health (group and indiv.)	368	175	368	(1)	0.0%	0.0%	0.0%
Other accident and health	3,503	1,066	3,446	(112)	-1.6%	1.6%	-3.2%
Workers' compensation	39,338	7,082	38,417	(1,622)	-2.3%	2.3%	-4.6%
Other liability - occurrence	31,228	9,530	29,879	(2,412)	-4.3%	4.3%	-8.3%
Other liability - claims made	20,790	6,365	19,265	(2,612)	-7.3%	7.3%	-13.7%
Excess workers' compensation	1,175	234	1,129	(79)	-3.9%	3.9%	-7.6%
Products liability - occurrence	2,618	624	2,426	(315)	-7.3%	7.3%	-13.6%
Products liability - claims made	503	131	472	(52)	-6.1%	6.1%	-11.5%
Private passenger auto liability	101,827	6,788	100,926	(1,721)	-0.9%	0.9%	-1.8%
Commercial auto liability	19,987	3,386	19,516	(823)	-2.4%	2.4%	-4.6%
Auto physical damage	73,313	5,323	72,453	(1,562)	-1.2%	1.2%	-2.3%
Aircraft (all perils)	2,683	1,459	2,501	(357)	-6.8%	6.8%	-12.7%
Fidelity	1,280	181	1,255	(44)	-2.0%	2.0%	-3.9%
Surety	5,968	1,092	5,763	(348)	-3.4%	3.4%	-6.6%
Burglary and theft	185	32	178	(12)	-3.8%	3.8%	-7.3%
Boiler and machinery	2,633	829	2,561	(134)	-2.7%	2.7%	-5.3%
Credit	2,300	1,075	2,156	(273)	-6.3%	6.3%	-11.8%
International	228	85	217	(20)	-4.9%	4.9%	-9.3%
Warranty	2,752	995	2,711	(83)	-1.5%	1.5%	-2.9%
Rein: Non-prop. assumed property	8,253	2,043	7,740	(862)	-6.2%	6.2%	-11.7%
Rein: Non-prop. assumed liability	7,572	2,251	6,975	(1,011)	-7.9%	7.9%	-14.6%
Rein: Non-prop. assm financial lines	296	60	272	(38)	-8.1%	8.1%	-15.0%
Write-ins for other lines of business	1,643	362	1,595	(84)	-2.9%	2.9%	-5.6%
Total	**531,053**	**107,138**	**518,103**	**(23,526)**	**-2.4%**	**2.4%**	**-4.8%**
Capital	**521,736**		**525,125**				

Note: TPW is the sum of columns (1) to (3) of Table 4.

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 2.1 percent, the price would increase by 2.1 percent, or $11 billion for the same insurance coverage. Under the alternative, worst-case scenario, in which U.S. subsidiaries forego all of their offshore affiliate reinsurance, supply would drop by 2.4 percent and price would increase by the same amount, or $13 billion.

The difference between our two sets of estimates may seem surprisingly modest. The explanation is simple, however. Even under our best-case scenario, the legislation would eliminate almost all (87.2 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.

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 6 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 18 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 multiple peril property insurance in Florida, Louisiana, and Texas.

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 $977 million of earthquake insurance in California in 2009. If we apply our estimated nationwide price increase for earthquake insurance (7.4 percent) to that figure, we find that Californians would have to pay an additional $72 million for earthquake insurance for the same coverage as a result of the tax ($977 million × .074 = $72 million).

In Appendix B, we present these results for all 50 states plus District of Columbia, and 18 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 the second to last column in Table 6). 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 8 below shows the total estimated cost increase for the same insurance coverage as in 2009, by state, for all 18 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 8. Summary of State-Level Impact: — Linear Allocation ($ in Millions)

	Direct Premiums Written (2009)	Increase in Cost in Selected Lines
Arkansas	1,239	41
California	22,289	797
Florida	10,225	344
Iowa	1,716	56
Louisiana	3,268	106
Massachusetts	4,383	159
Montana	543	17
Nevada	1,340	45
New Jersey	6,903	238
New York	15,459	579
North Dakota	297	10
South Carolina	2,042	66
Texas	12,630	437

Source: Appendix B.

California Earthquake Insurance versus Florida Multiple Peril Property 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 multiple peril insurance in Florida.

Our estimated nationwide price increase for earthquake insurance (7.4 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 multiple peril property insurance offers a contrast. Homeowners multiple peril (HMP) and commercial multiple peril (CMP) insurance provide protection against losses from a great many sources, ranging from wind and hailstorms to fire, theft and lawsuits.[34] Our estimated nationwide price increases for HMP and CMP (1.0 and 2.9 percent, respectively) understate the price increases that these states would see. This is because states like Florida and Louisiana are disproportionately hard hit because of their exposure to hurricanes, and therefore are relying more on reinsurance, especially foreign reinsurers, to insure the extreme risk from hurricanes. Heavy reliance on reinsurance also results from the facts that (1) the alternative (capital) is prohibitively expensive, and (2) hurricane risk can be most effectively diversified on a worldwide basis.

Before modifying the linear allocation approach to the state-level impact, we note that the private insurance and reinsurance markets in Florida, Louisiana and several other states do not have sufficient capacity to meet insurance demand for catastrophe coverage. Consequently, state-sponsored entities like Florida Citizens Property Insurance Corporation, Florida Hurricane Catastrophe Fund ("FHCF"), Louisiana Citizens Property Insurance Corporation, and Texas Windstorm Insurance Association fill an increasingly large gap unmet by private markets. For example, Citizens Property in Florida provides 30 percent of homeowners insurance policies, and FHCF supplies 50% of the market demand for reinsurance.[35]

Modified Three-Step Analysis Using Coastal Exposure

Because of this heavy reliance on reinsurance, particularly foreign reinsurance, the proposed tax will have an especially large effect on the price of Florida, Louisiana and Texas multiple peril insurance — more so than our nationwide estimates suggest.

To estimate the actual effect of the tax on multiple peril insurance in Florida, Louisiana and Texas, we run a modified version of our three-step analysis. Since state-level data on reinsurance is not reported, we obtain value of insured residential and commercial coastal exposure for 18 coastal states in 2007 from AIR Worldwide[36] and apportion the national reinsurance ceded in HMP and CMP lines to each coastal state in proportion to the state's residential and commercial exposure (see Table 9). For example, the value of Florida's residential coastal exposure is $1,239 billion in 2007, and its commercial coastal exposure is $1,220 billion. The 18 states' residential and commercial coastal exposures total $3,867 and $5,024 billion. (Each state's percentage contribution to the total is reported in the column next to the dollar exposure.) As these states are more heavily exposed to natural disasters such as hurricanes, we assume that these and only these 18 states will purchase reinsurance in the HMP and CMP lines. As a result, we allocate to Florida 32 percent of the national HMP reinsurance ceded, including "excess" offshore affiliate reinsurance. The state's allocation of national CMP reinsurance ceded is 24.3 percent.[37]

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

[35] Raymond James, *op cit.*, at p. 4.

[36] See Hartwig and Wilkonson, *op cit.*, Figures 12 and 13.

[37] In our previous study, we obtained data from Risk Management Solutions (RMS), a nationally recognized authority on catastrophe risk-modeling, on Florida's contribution to the total risk that the United States

Table 9. Value of Insured Coastal Exposure in 2007 ($ in Billions)

	Residential Exposure	Percentage of Total	Commercial Exposure	Percentage of Total
Florida	$1,238.6	32.0%	$1,220.0	24.3%
New York	$660.4	17.1%	$1,718.6	34.2%
Texas	$388.3	10.0%	$506.8	10.1%
Massachusetts	$373.0	9.6%	$399.8	8.0%
New Jersey	$319.5	8.3%	$316.0	6.3%
Connecticut	$250.8	6.5%	$229.1	4.6%
Louisiana	$96.9	2.5%	$127.5	2.5%
S. Carolina	$90.1	2.3%	$101.8	2.0%
Maine	$81.1	2.1%	$65.9	1.3%
N. Carolina	$78.4	2.0%	$54.4	1.1%
Virginia	$72.6	1.9%	$86.2	1.7%
Alabama	$46.5	1.2%	$46.0	0.9%
Georgia	$38.1	1.0%	$47.5	0.9%
Delaware	$36.7	0.9%	$23.8	0.5%
Rhode Island	$31.9	0.8%	$22.2	0.4%
New Hampshire	$30.8	0.8%	$24.9	0.5%
Mississippi	$25.7	0.7%	$26.1	0.5%
Maryland	$7.2	0.2%	$7.7	0.2%
Total	$3,866.6	100.0%	$5,024.3	100.0%

Source: AIR Worldwide.

We modify our three-step analysis in several ways. First, we extend our methodology in Section IV (line-by-line insurance at the national level) to Florida, Louisiana, and Texas multiple peril property insurance. Second, as described above, we use the percentages in Table 9 above to approximate these states' shares of the national totals for offshore affiliate reinsurance and excess premiums. Third, because of the prohibitively high cost of insuring tail risk with capital in these three states, we exclude the possibility of capital substitution in step one of the analysis.[38]

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). As a comparison, we allocated 56 percent of nationwide HMP and 37 percent of nationwide CMP to Florida. We switch to the current approximation to reflect not just the risk distribution given an extreme tail risk, but also the frequency of less extreme events. The exposures measure both the loss distribution given a loss and also the probabilities of losses.

[38] 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 (private reinsurers and

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

- increase the price of CMP insurance by 12.6 percent, which represents $264 million a year in added costs for the same coverage; and
- increase the price of HMP insurance by 4.2 percent, or $266 million a year in added costs.

We estimate that the tax would have the following effects in Louisiana:

- increase the price of CMP insurance by 5.5 percent, which represents $28 million a year in added costs for the same coverage; and
- increase the price of HMP insurance by 1.4 percent, or $21 million a year in added costs.

Similarly, the effects in Texas are:

- increase the price of CMP insurance by 5.2 percent, which represents $112 million a year in added costs for the same coverage; and
- increase the price of HMP insurance by 1.5 percent, or $84 million a year in added costs.

Moreover, these figures probably still underestimate the impact of the proposed tax on Florida, Louisiana and Texas HMP and CMP prices, for at least two reasons. First, since FHCF provides 50 percent of the reinsurance needs, and it depends on bond markets to fund hurricane losses, the credit crunches and prolonged economic downturn had exacerbated the financial conditions of FHCF.[39] State-sponsored entities in Louisiana and Texas face similar challenges. Second, much of the reinsurance for catastrophe risks, including hurricanes, is provided in the two lines of business labeled non-proportional reinsurance (liability and property).[40] As we showed in section V, these two lines of business would also see significant price increases — 6.7 percent and 5.4 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.

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state-sponsored funds) to insure tail risks, because the alternative (capital) is so expensive. See also Hartwig and Wilkinson, *op cit*.

[39] Hartwig and Wilkinson, *op cit*.

[40] 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 2.1 – 2.4 percent, on average, and significantly more in some lines of business. U.S. consumers, overall, would have to pay $11 – $13 billion more a year for insurance while at the same time total insurance coverage would decline 4 to 5 percent. 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, Louisiana, and Texas.

Although these estimated effects are large, they are if anything conservative. First, our regression analysis relies on industry data from a period (1996 – 2006) during which capital was abundant. U.S. insurance companies recently suffered large investment losses due to the financial crisis. While the capital has largely been rebuilt, the financial crisis serves as a cautionary tale as to why affiliated reinsurance is so important: Parental reinsurance support, which can be more easily arranged and which will be reliable year after year, is a far more desirable risk management tool when access to capital was substantially restricted. If our analysis were to reflect the most recent financial crisis and the 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 proposal 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 still remains tentative due to an uncertain economic recovery, 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 endogeneous 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 Δ TPW

** 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.

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:

$$\text{Ln}(\text{Price}_{i,t}) = \delta_0 + \delta_1*\text{Ln}(\text{Price}_{i,t-1}) + \delta_2*\text{TreasuryRate}_t + \delta_3*\Delta\text{ATPW}_{t-1} + \delta_4*\text{STL}_{i,t-1} +$$

$$\delta_5*\text{Ln}(\text{Assets}_{i,t-1}) + \delta_6*\text{Foreign}_i + \delta_7*\text{Mutual}_i + \Sigma\, \delta_m*\text{CompanyM}_i + \xi_{i,t},$$

where the variables are defined as in Table A5.

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

[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.

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 6 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 proposal's 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

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

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

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 TPW_i. At this stage, there are a total of 35 equations and 69 unknowns (34 RCTNA_i, 1 Capital, and 34 TPW_i).

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

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

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 TPW_i.

In our simulation exercise, we choose the following parameters:

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

Regression #2: $\gamma_1 = 0.68$, $\gamma_2 = 0.36$

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 total premiums written, and not to net reinsurance assumed from affiliate from reinsurance ceded to affiliates.

APPENDIX B

STATE-LEVEL INCREASE IN THE COST OF INSURANCE FOR SELECTED LINES OF BUSINESS

Illustration of State-Level Impact of H.R. 3424

($ in Thousands)

A. State-by-State Direct Premium Written (DPW)

Line of Business	Total DPW	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia
Aircraft (all perils)	1,833,577	15,707	33,712	63,164	17,643	182,273	46,460	34,017	13,698	9,857
Burglary & Theft	162,795	1,729	243	1,769	1,631	18,698	2,704	3,257	1,819	1,502
Com Auto	18,527,488	280,601	51,523	297,498	187,942	1,937,673	269,785	268,285	73,287	33,727
Commerical Multiperil	33,325,511	528,630	109,471	521,665	264,588	4,316,198	598,470	519,668	271,587	138,917
Credit	1,654,534	15,278	1,104	11,088	8,305	98,774	16,123	24,027	26,133	6,079
Earthquake	1,860,464	7,238	20,840	6,774	19,113	977,221	8,351	5,140	747	1,782
Excess Work Comp	901,704	12,960	6,762	6,768	2,863	201,651	9,357	13,286	785	3,225
Fidelity	1,067,218	11,851	1,908	10,205	7,759	114,306	17,610	31,210	4,741	14,249
Financial Guaranty	1,749,901	18,495	2,268	6,420	7,033	90,901	11,972	11,499	71,363	2,279
Fire	11,926,237	185,500	32,373	139,333	131,263	1,546,771	153,806	121,308	22,738	36,119
Group Accident Health	3,766,914	26,801	5,637	38,936	22,861	261,939	38,561	18,439	525,071	113,504
Ocean Marine	2,843,136	33,581	29,125	12,824	14,188	228,043	10,981	48,112	5,782	3,118
Other Liability Occur	27,336,288	309,739	87,501	392,484	188,216	3,294,430	523,665	443,567	149,543	100,103
Other Liability CM	17,374,160	159,551	34,293	201,989	87,908	2,393,323	331,121	368,874	75,462	204,997
Products Liability	2,690,497	32,840	6,443	28,414	16,643	370,465	53,435	40,120	4,720	6,582
Surety	5,103,369	71,828	32,401	98,305	37,428	658,136	100,712	61,933	15,385	102,950
Work Comp	36,745,280	317,546	255,649	417,503	223,867	5,598,397	308,960	593,398	135,669	132,472
Total	168,869,074	2,029,874	711,253	2,255,140	1,239,253	22,289,198	2,502,076	2,606,140	1,398,528	911,460

B. State-by-State Allocated Cost Increase

Line of Business	% increase in cost	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia
Aircraft (all perils)	4.3%	675	1,450	2,716	759	7,838	1,998	1,463	589	424
Burglary & Theft	3.5%	60	9	62	57	654	95	114	64	53
Com Auto	2.3%	6,454	1,185	6,842	4,323	44,566	6,205	6,171	1,686	776
Commerical Multiperil	2.9%	15,330	3,175	15,128	7,673	125,170	17,356	15,070	7,876	4,029
Credit	4.5%	688	50	499	374	4,445	726	1,081	1,176	274
Earthquake	7.4%	536	1,542	501	1,414	72,314	618	380	55	132
Excess Work Comp	3.2%	415	216	217	92	6,453	299	425	25	103
Fidelity	2.0%	237	38	204	155	2,286	352	624	95	285
Financial Guaranty	5.0%	925	113	321	352	4,545	599	575	3,568	114
Fire	3.2%	5,936	1,036	4,459	4,200	49,497	4,922	3,882	728	1,156
Group Accident Health	3.6%	965	203	1,402	823	9,430	1,388	664	18,903	4,086
Ocean Marine	3.4%	1,142	990	436	482	7,753	373	1,636	197	106
Other Liability Occur	4.0%	12,390	3,500	15,699	7,529	131,777	20,947	17,743	5,982	4,004
Other Liability CM	6.5%	10,371	2,229	13,129	5,714	155,566	21,523	23,977	4,905	13,325
Products Liability	6.8%	2,229	437	1,929	1,130	25,149	3,627	2,724	320	447
Surety	3.1%	2,227	1,004	3,047	1,160	20,402	3,122	1,920	477	3,191
Work Comp	2.3%	7,304	5,880	9,603	5,149	128,763	7,106	13,648	3,120	3,047
Total		67,882	23,058	76,195	41,386	796,609	91,255	92,096	49,765	35,550

The above figures illustrate the 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 and international, which are not reported on a state by state basis. A blended rate of increase was used for products liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of State-Level Impact of H.R. 3424

($ in Thousands)

A. State-by-State Direct Premium Written (DPW)

Line of Business	Total DPW	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky
Aircraft (all perils)	1,833,577	113,674	74,250	10,279	13,870	65,161	22,022	11,054	20,214	9,812
Burglary & Theft	162,795	9,725	4,791	400	346	8,747	2,487	1,421	1,245	1,219
Com Auto	18,527,488	1,252,996	550,484	85,541	89,951	713,421	350,855	163,251	151,767	235,968
Commerical Multiperil	33,325,511	1,976,445	818,167	144,531	168,380	1,441,208	675,644	290,680	315,424	421,238
Credit	1,654,534	151,494	36,153	4,140	3,537	68,385	23,920	9,802	8,816	14,053
Earthquake	1,860,464	31,645	13,713	7,878	2,372	49,999	31,161	3,629	5,564	35,141
Excess Work Comp	901,704	55,976	29,261	4,123	987	42,352	9,350	4,843	8,479	12,530
Fidelity	1,067,218	52,065	28,673	4,249	2,445	56,693	15,457	9,775	10,306	8,668
Financial Guaranty	1,749,901	44,303	8,116	5,845	49	37,867	8,532	4,280	7,590	7,301
Fire	11,926,237	1,505,354	317,931	74,833	30,236	386,136	215,175	74,043	86,343	110,557
Group Accident Health	3,766,914	149,397	95,197	10,532	18,639	144,044	130,349	70,521	33,805	27,413
Ocean Marine	2,843,136	264,340	57,741	13,641	3,364	65,320	23,172	7,105	7,142	19,526
Other Liability Occur	27,336,288	1,682,162	629,203	165,256	85,958	1,391,348	409,988	332,474	200,160	229,294
Other Liability CM	17,374,160	760,694	449,998	77,138	43,931	1,000,642	224,247	127,105	114,594	132,226
Products Liability	2,690,497	155,211	69,180	8,159	8,370	119,634	46,266	30,014	27,374	27,264
Surety	5,103,369	319,283	147,653	43,056	19,231	177,212	74,219	39,356	48,306	69,065
Work Comp	36,745,280	1,700,422	1,034,407	189,808	118,843	2,348,943	621,187	536,192	412,286	539,816
Total	168,869,074	10,225,184	4,364,917	849,410	610,509	8,117,112	2,884,030	1,715,545	1,459,415	1,901,092

B. State-by-State Allocated Cost Increase

Line of Business	% increase in cost	Florida	Georgia	Hawaii	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky
Aircraft (all perils)	4.3%	4,888	3,193	442	596	2,802	947	475	869	422
Burglary & Theft	3.5%	340	168	14	12	306	87	50	44	43
Com Auto	2.3%	28,819	12,661	1,967	2,069	16,409	8,070	3,755	3,491	5,427
Commerical Multiperil	2.9%	57,317	23,727	4,191	4,883	41,795	19,594	8,430	9,147	12,216
Credit	4.5%	6,817	1,627	186	159	3,077	1,076	441	397	632
Earthquake	7.4%	2,342	1,015	583	176	3,700	2,306	269	412	2,600
Excess Work Comp	3.2%	1,791	936	132	32	1,355	299	155	271	401
Fidelity	2.0%	1,041	573	85	49	1,134	309	196	206	173
Financial Guaranty	5.0%	2,215	406	292	2	1,893	427	214	380	365
Fire	3.2%	48,171	10,174	2,395	968	12,356	6,886	2,369	2,763	3,538
Group Accident Health	3.6%	5,378	3,427	379	671	5,186	4,693	2,539	1,217	987
Ocean Marine	3.4%	8,988	1,963	464	114	2,221	788	242	243	664
Other Liability Occur	4.0%	67,286	25,168	6,610	3,438	55,654	16,400	13,299	8,006	9,172
Other Liability CM	6.5%	49,445	29,250	5,014	2,856	65,042	14,576	8,262	7,449	8,595
Products Liability	6.8%	10,537	4,696	554	568	8,122	3,141	2,038	1,858	1,851
Surety	3.1%	9,898	4,577	1,335	596	5,494	2,301	1,220	1,497	2,141
Work Comp	2.3%	39,110	23,791	4,366	2,733	54,026	14,287	12,332	9,483	12,416
Total		344,384	147,353	29,009	19,923	280,571	96,185	56,284	47,732	61,643

The above figures illustrate the 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 and international, which are not reported on a state by state basis. A blended rate of increase was used for products liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of State-Level Impact of H.R. 3424

($ in Thousands)

A. State-by-State Direct Premium Written (DPW)

Line of Business	Total DPW	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Aircraft (all perils)	1,833,577	69,377	4,255	20,361	19,709	36,068	26,799	12,062	29,409	9,706
Burglary & Theft	162,795	1,932	635	2,788	4,751	4,663	2,953	1,110	3,208	335
Com Auto	18,527,488	438,492	83,819	349,933	505,092	397,806	283,652	208,592	329,886	80,984
Commerical Multiperil	33,325,511	479,461	175,690	553,279	917,686	896,377	590,273	289,024	633,152	138,519
Credit	1,654,534	30,737	5,701	12,489	25,744	54,614	30,084	17,422	35,679	1,629
Earthquake	1,860,464	8,430	1,428	6,559	15,207	6,265	4,242	17,851	88,542	3,460
Excess Work Comp	901,704	42,304	3,353	7,653	17,989	30,089	1,857	12,742	19,857	6,427
Fidelity	1,067,218	12,050	3,181	20,043	34,533	31,652	24,082	6,940	20,198	2,665
Financial Guaranty	1,749,901	25,083	1,129	16,231	17,867	10,328	18,723	4,280	6,463	464
Fire	11,926,237	266,936	41,436	155,063	300,109	323,799	148,711	132,590	192,209	26,154
Group Accident Health	3,766,914	32,518	4,892	32,624	48,168	82,979	99,693	36,638	163,222	6,395
Ocean Marine	2,843,136	244,916	28,258	81,605	89,075	40,862	21,794	20,375	33,423	3,715
Other Liability Occur	27,336,288	539,191	79,668	372,105	677,277	628,399	470,134	181,128	634,749	78,623
Other Liability CM	17,374,160	173,321	46,167	314,345	711,301	504,717	357,253	77,851	292,849	35,610
Products Liability	2,690,497	38,444	6,027	44,601	85,228	67,113	66,490	18,218	40,983	6,840
Surety	5,103,369	117,136	14,671	150,060	99,950	67,446	62,712	52,107	77,768	23,675
Work Comp	36,745,280	748,142	200,217	543,488	813,002	859,044	731,401	292,219	743,944	118,188
Total	168,869,074	3,268,472	700,526	2,683,227	4,382,690	4,042,221	2,940,853	1,381,151	3,345,541	543,391

B. State-by-State Allocated Cost Increase

Line of Business	% increase in cost	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana
Aircraft (all perils)	4.3%	2,983	183	876	847	1,551	1,152	519	1,265	417
Burglary & Theft	3.5%	68	22	98	166	163	103	39	112	12
Com Auto	2.3%	10,085	1,928	8,048	11,617	9,150	6,524	4,798	7,587	1,863
Commerical Multiperil	2.9%	13,904	5,095	16,045	26,613	25,995	17,118	8,382	18,361	4,017
Credit	4.5%	1,383	257	562	1,159	2,458	1,354	784	1,606	73
Earthquake	7.4%	624	106	485	1,125	464	314	1,321	6,552	256
Excess Work Comp	3.2%	1,354	107	245	576	963	59	408	635	206
Fidelity	2.0%	241	64	401	691	633	482	139	404	53
Financial Guaranty	5.0%	1,254	56	812	893	516	936	214	323	23
Fire	3.2%	8,542	1,326	4,962	9,603	10,362	4,759	4,243	6,151	837
Group Accident Health	3.6%	1,171	176	1,174	1,734	2,987	3,589	1,319	5,876	230
Ocean Marine	3.4%	8,327	961	2,775	3,029	1,389	741	693	1,136	126
Other Liability Occur	4.0%	21,568	3,187	14,884	27,091	25,136	18,805	7,245	25,390	3,145
Other Liability CM	6.5%	11,266	3,001	20,432	46,235	32,807	23,221	5,060	19,035	2,315
Products Liability	6.8%	2,610	409	3,028	5,786	4,556	4,514	1,237	2,782	464
Surety	3.1%	3,631	455	4,652	3,098	2,091	1,944	1,615	2,411	734
Work Comp	2.3%	17,207	4,605	12,500	18,699	19,758	16,822	6,721	17,111	2,718
Total		106,218	21,937	91,979	158,962	140,978	102,438	44,736	116,738	17,490

The above figures illustrate the 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 and international, which are not reported on a state by state basis. A blended rate of increase was used for products liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of State-Level Impact of H.R. 3424

($ in Thousands)

A. State-by-State Direct Premium Written (DPW)

Line of Business	Total DPW	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio
Aircraft (all perils)	1,833,577	9,840	25,869	7,952	53,542	8,195	120,225	55,007	8,699	46,109
Burglary & Theft	162,795	965	1,307	604	5,880	557	18,451	4,001	215	7,640
Com Auto	18,527,488	118,252	165,153	80,981	847,124	114,099	1,567,234	490,699	48,266	540,667
Commerical Multiperil	33,325,511	200,410	265,438	190,119	1,204,386	198,276	3,096,679	769,687	94,861	1,067,418
Credit	1,654,534	7,928	5,506	5,670	88,638	3,451	109,683	72,202	1,168	42,458
Earthquake	1,860,464	2,385	17,708	2,217	12,147	1,857	29,825	9,053	329	26,665
Excess Work Comp	901,704	5,454	14,392	1,314	23,076	6,285	53,610	15,286	1	54,804
Fidelity	1,067,218	7,092	6,914	3,026	43,091	3,813	142,067	26,579	1,954	36,247
Financial Guaranty	1,749,901	4,449	5,493	991	27,704	1,534	1,030,131	21,976	172	17,141
Fire	11,926,237	45,246	102,625	32,809	333,534	38,881	767,144	260,856	19,443	344,512
Group Accident Health	3,766,914	32,298	12,898	7,573	59,004	13,292	184,089	98,108	2,114	110,448
Ocean Marine	2,843,136	3,223	6,429	11,718	125,855	1,518	450,468	33,748	979	35,290
Other Liability Occur	27,336,288	160,087	214,693	115,019	1,182,462	121,351	2,993,258	492,560	69,588	853,482
Other Liability CM	17,374,160	82,832	102,589	45,640	797,611	53,331	2,255,611	363,636	23,041	517,268
Products Liability	2,690,497	19,583	14,099	11,223	168,942	10,537	181,504	76,809	8,165	87,213
Surety	5,103,369	27,368	80,540	15,711	150,907	45,015	344,863	119,107	15,112	118,899
Work Comp	36,745,280	314,389	298,746	220,770	1,779,193	231,884	2,113,718	1,161,288	2,642	18,225
Total	168,869,074	1,041,799	1,340,399	753,336	6,903,100	853,874	15,458,560	4,070,603	296,749	3,924,483

B. State-by-State Allocated Cost Increase

Line of Business	% increase in cost	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio
Aircraft (all perils)	4.3%	423	1,112	342	2,302	352	5,170	2,365	374	1,983
Burglary & Theft	3.5%	34	46	21	206	19	646	140	8	267
Com Auto	2.3%	2,720	3,799	1,863	19,484	2,624	36,046	11,286	1,110	12,435
Commerical Multiperil	2.9%	5,812	7,698	5,513	34,927	5,750	89,804	22,321	2,751	30,955
Credit	4.5%	357	248	255	3,989	155	4,936	3,249	53	1,911
Earthquake	7.4%	176	1,310	164	899	137	2,207	670	24	1,973
Excess Work Comp	3.2%	175	461	42	738	201	1,716	489	0	1,754
Fidelity	2.0%	142	138	61	862	76	2,841	532	39	725
Financial Guaranty	5.0%	222	275	50	1,385	77	51,507	1,099	9	857
Fire	3.2%	1,448	3,284	1,050	10,673	1,244	24,549	8,347	622	11,024
Group Accident Health	3.6%	1,163	464	273	2,124	479	6,627	3,532	76	3,976
Ocean Marine	3.4%	110	219	398	4,279	52	15,316	1,147	33	1,200
Other Liability Occur	4.0%	6,403	8,588	4,601	47,298	4,854	119,730	19,702	2,784	34,139
Other Liability CM	6.5%	5,384	6,668	2,967	51,845	3,466	146,615	23,636	1,498	33,622
Products Liability	6.8%	1,329	957	762	11,469	715	12,322	5,214	554	5,921
Surety	3.1%	848	2,497	487	4,678	1,395	10,691	3,692	468	3,686
Work Comp	2.3%	7,231	6,871	5,078	40,921	5,333	48,616	26,710	61	419
Total		33,977	44,634	23,925	238,080	26,932	579,336	134,133	10,464	146,848

The above figures illustrate the 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 and international, which are not reported on a state by state basis. A blended rate of increase was used for products liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of State-Level Impact of H.R. 3424

($ in Thousands)

A. State-by-State Direct Premium Written (DPW)

Line of Business	Total DPW	Oklahoma	Oregon	Pensvylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah
Aircraft (all perils)	1,833,577	20,300	35,428	40,164	21,101	11,624	4,990	41,638	186,589	21,563
Burglary & Theft	162,795	1,545	1,698	5,498	609	1,468	373	3,491	9,675	695
Com Auto	18,527,488	239,792	211,635	822,724	70,438	230,240	53,419	327,239	1,507,164	168,127
Commerical Multiperil	33,325,511	394,281	397,872	1,442,352	132,658	421,762	102,114	587,217	2,031,466	212,694
Credit	1,654,534	15,190	18,733	55,009	4,439	36,568	1,168	35,248	279,444	5,639
Earthquake	1,860,464	4,845	53,777	13,303	2,218	30,515	440	59,612	30,264	29,121
Excess Work Comp	901,704	6,669	6,401	35,997	2,274	6,660	1,583	14,934	27,734	3,235
Fidelity	1,067,218	8,454	8,296	47,362	4,028	8,623	2,990	15,857	66,702	6,082
Financial Guaranty	1,749,901	2,548	1,050	51,625	8,371	6,644	1,335	7,422	71,614	3,439
Fire	11,926,237	117,984	89,285	421,830	39,835	172,012	17,660	217,086	1,456,038	75,757
Group Accident Health	3,766,914	40,285	20,502	182,426	39,970	26,872	11,508	59,671	368,582	44,355
Ocean Marine	2,843,136	17,620	26,653	45,654	24,114	24,624	743	39,834	360,875	5,528
Other Liability Occur	27,336,288	293,603	278,390	1,127,202	123,063	263,613	59,446	388,951	2,278,091	209,905
Other Liability CM	17,374,160	116,864	124,714	821,682	64,444	122,567	28,772	246,779	1,125,931	95,043
Products Liability	2,690,497	37,139	26,197	125,730	9,645	28,554	6,767	47,434	198,216	24,557
Surety	5,103,369	61,855	63,645	187,610	14,886	62,216	15,320	74,736	446,524	64,202
Work Comp	36,745,280	486,315	551,210	2,003,487	155,908	587,027	136,206	709,892	2,185,468	345,826
Total	168,869,074	1,865,291	1,915,487	7,429,655	718,003	2,041,591	444,834	2,877,043	12,630,377	1,315,769

B. State-by-State Allocated Cost Increase

Line of Business	% increase in cost	Oklahoma			Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah
Aircraft (all perils)	4.3%	873	1,523	1,727	907	500	215	1,790	8,023	927
Burglary & Theft	3.5%	54	59	192	21	51	13	122	339	24
Com Auto	2.3%	5,515	4,868	18,923	1,620	5,296	1,229	7,526	34,665	3,867
Commerical Multiperil	2.9%	11,434	11,538	41,828	3,847	12,231	2,961	17,029	58,913	6,168
Credit	4.5%	684	843	2,475	200	1,646	53	1,586	12,575	254
Earthquake	7.4%	358	3,980	984	164	2,258	33	4,411	2,240	2,155
Excess Work Comp	3.2%	213	205	1,152	73	213	51	478	887	104
Fidelity	2.0%	169	166	947	81	172	60	317	1,334	122
Financial Guaranty	5.0%	127	52	2,581	419	332	67	371	3,581	172
Fire	3.2%	3,775	2,857	13,499	1,275	5,504	565	6,947	46,593	2,424
Group Accident Health	3.6%	1,450	738	6,567	1,439	967	414	2,148	13,269	1,597
Ocean Marine	3.4%	599	906	1,552	820	837	25	1,354	12,270	188
Other Liability Occur	4.0%	11,744	11,136	45,088	4,923	10,545	2,378	15,558	91,124	8,396
Other Liability CM	6.5%	7,596	8,106	53,409	4,189	7,967	1,870	16,041	73,185	6,178
Products Liability	6.8%	2,521	1,778	8,535	655	1,938	459	3,220	13,456	1,667
Surety	3.1%	1,918	1,973	5,816	461	1,929	475	2,317	13,842	1,990
Work Comp	2.3%	11,185	12,678	46,080	3,586	13,502	3,133	16,328	50,266	7,954
Total		60,217	63,407	251,358	24,679	65,888	14,000	97,544	436,561	44,187

The above figures illustrate the 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 and international, which are not reported on a state by state basis. A blended rate of increase was used for products liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of State-Level Impact of H.R. 3424

($ in Thousands)

A. State-by-State Direct Premium Written (DPW)

Line of Business	Total DPW	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming
Aircraft (all perils)	1,833,577	2,504	36,170	61,845	3,964	20,575	5,069
Burglary & Theft	162,795	383	5,460	2,965	464	2,558	187
Com Auto	18,527,488	41,872	386,959	353,426	91,983	329,957	47,229
Commerical Multiperil	33,325,511	137,921	668,563	690,958	166,983	572,968	84,057
Credit	1,654,534	5,762	76,359	18,964	3,588	19,091	1,318
Earthquake	1,860,464	860	10,013	134,970	1,352	3,796	2,902
Excess Work Comp	901,704	1,064	16,887	25,707	3,809	6,679	18
Fidelity	1,067,218	2,640	28,491	15,229	3,875	18,940	1,352
Financial Guaranty	1,749,901	4,041	29,304	3,799	445	1,849	142
Fire	11,926,237	19,191	203,247	183,517	56,787	133,784	20,346
Group Accident Health	3,766,914	3,012	50,487	43,189	15,671	90,119	11,664
Ocean Marine	2,843,136	10,572	53,590	124,049	3,086	25,034	805
Other Liability Occur	27,336,288	67,397	506,664	540,181	149,780	507,371	63,763
Other Liability CM	17,374,160	27,440	447,526	295,720	43,649	254,180	15,783
Products Liability	2,690,497	5,999	49,321	50,172	11,127	59,817	6,667
Surety	5,103,369	7,205	163,390	137,393	36,497	43,656	24,725
Work Comp	36,745,280	147,835	782,728	20,502	406,039	1,547,896	3,074
Total	168,869,074	485,700	3,515,158	2,702,586	999,097	3,638,269	289,101

B. State-by-State Allocated Cost Increase

Line of Business	% increase in cost	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming
Aircraft (all perils)	4.3%	108	1,555	2,659	170	885	218
Burglary & Theft	3.5%	13	191	104	16	90	7
Com Auto	2.3%	963	8,900	8,129	2,116	7,589	1,086
Commerical Multiperil	2.9%	4,000	19,388	20,038	4,843	16,616	2,438
Credit	4.5%	259	3,436	853	161	859	59
Earthquake	7.4%	64	741	9,988	100	281	215
Excess Work Comp	3.2%	34	540	823	122	214	1
Fidelity	2.0%	53	570	305	77	379	27
Financial Guaranty	5.0%	202	1,465	190	22	92	7
Fire	3.2%	614	6,504	5,873	1,817	4,281	651
Group Accident Health	3.6%	108	1,818	1,555	564	3,244	420
Ocean Marine	3.4%	359	1,822	4,218	105	851	27
Other Liability Occur	4.0%	2,696	20,267	21,607	5,991	20,295	2,551
Other Liability CM	6.5%	1,784	29,089	19,222	2,837	16,522	1,026
Products Liability	6.8%	407	3,348	3,406	755	4,061	453
Surety	3.1%	223	5,065	4,259	1,131	1,353	766
Work Comp	2.3%	3,400	18,003	472	9,339	35,602	71
Total		15,288	122,703	103,699	30,168	113,213	10,022

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 and international, which are not reported on a state by state basis. A blended rate of increase was used for products liability as the split between claims made and occurrence policies was not available on a state-by-state basis.

Illustration of State-Level Impact of H.R. 3424 on Florida Businesses and Consumers

($ in Thousands)

Line of Business	DPW	% increase in cost	$ increase in cost
FL - Aircraft (all perils)	113,674	4.3%	4,888
FL - Burglary & Theft	9,725	3.5%	340
FL - Com Auto	1,252,996	2.3%	28,819
FL - Commerical Multiperil	2,090,654	12.6%	264,411
FL - Credit	151,494	4.5%	6,817
FL - Earthquake	31,645	7.4%	2,342
FL - Excess Work Comp	55,976	3.2%	1,791
FL - Fidelity	52,065	2.0%	1,041
FL - Financial Guaranty	44,303	5.0%	2,215
FL - Fire	1,505,354	3.2%	48,171
FL - Group Accident Health	149,397	3.6%	5,378
FL - Homeowners Multiperil	6,344,553	4.2%	266,381
FL - Ocean Marine	264,340	3.4%	8,988
FL - Other Liability Occur	1,682,162	4.0%	67,286
FL - Other Liability CM	760,694	6.5%	49,445
FL - Products Liability	155,211	6.8%	10,537
FL - Surety	319,283	3.1%	9,898
FL - Work Comp	1,700,422	2.3%	39,110
FL - Total	16,683,946		817,858

Source: Brattle Report Section VI for commerical and home multiperil, and Appendix B for other lines of business.

Illustration of State-Level Impact of H.R. 3424 on Loiusiana Businesses and Consumers

($ in Thousands)

Line of Business	DPW	% increase in cost	$ increase in cost
LA - Aircraft (all perils)	69,377	4.3%	2,983
LA - Burglary & Theft	1,932	3.5%	68
LA - Com Auto	438,492	2.3%	10,085
LA - Commerical Multiperil	507,166	5.5%	28,064
LA - Credit	30,737	4.5%	1,383
LA - Earthquake	8,430	7.4%	624
LA - Excess Work Comp	42,304	3.2%	1,354
LA - Fidelity	12,050	2.0%	241
LA - Financial Guaranty	25,083	5.0%	1,254
LA - Fire	266,936	3.2%	8,542
LA - Group Accident Health	32,518	3.6%	1,171
LA - Homeowners Multiperil	1,458,856	1.4%	21,056
LA - Ocean Marine	244,916	3.4%	8,327
LA - Other Liability Occur	539,191	4.0%	21,568
LA - Other Liability CM	173,321	6.5%	11,266
LA - Products Liability	38,444	6.8%	2,610
LA - Surety	117,136	3.1%	3,631
LA - Work Comp	748,142	2.3%	17,207
LA - Total	4,755,034		141,433

Source: Brattle Report Section VI for commerical and home multiperil, and Appendix B for other lines of business.

Illustration of State-Level Impact of H.R. 3424 on Texas Businesses and Consumers

($ in Thousands)

Line of Business	DPW	% increase in cost	$ increase in cost
TX - Aircraft (all perils)	186,589	4.3%	8,023
TX - Burglary & Theft	9,675	3.5%	339
TX - Com Auto	1,507,164	2.3%	34,665
TX - Commerical Multiperil	2,148,855	5.2%	111,625
TX - Credit	279,444	4.5%	12,575
TX - Earthquake	30,264	7.4%	2,240
TX - Excess Work Comp	27,734	3.2%	887
TX - Fidelity	66,702	2.0%	1,334
TX - Financial Guaranty	71,614	5.0%	3,581
TX - Fire	1,456,038	3.2%	46,593
TX - Group Accident Health	368,582	3.6%	13,269
TX - Homeowners Multiperil	5,798,124	1.5%	84,372
TX - Ocean Marine	360,875	3.4%	12,270
TX - Other Liability Occur	2,278,091	4.0%	91,124
TX - Other Liability CM	1,125,931	6.5%	73,185
TX - Products Liability	198,216	6.8%	13,456
TX - Surety	446,524	3.1%	13,842
TX - Work Comp	2,185,468	2.3%	50,266
TX - Total	18,545,890		573,645

Source: Brattle Report Section VI for commerical and home multiperil, and Appendix B for other lines of business.

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The Brattle Group provides consulting and expert testimony in economics, finance, and regulation to corporations, law firms, and governments around the world. We combine in-depth industry experience, rigorous analyses, and principled techniques to help clients answer complex economic and financial questions in litigation and regulation, develop strategies for changing markets, and make critical business decisions. For more information visit www.brattle.com.

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