Personal Taxes, Cost of Insurer Equity Capital, and the Case of Offshore Hedge Fund Reinsurers

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Abstract:

The movement of hedge fund capital into the offshore insurance/reinsurance industry, is attributed, in part, to the savings in personal taxes that these transactions provide the hedge fund investors. The consideration of personal taxes implies that the tax costs on insurer equity finance depends on an insurer's investment policy (modeled here as the percentage of asset returns generated by interest, dividends, and both realized and unrealized short-term and long-term capital gains). The effects of the U.S. 2017 tax reform on the tax cost of insurer equity finance are also analyzed.

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1. Introduction

Over the past 15 years, a small number of hedge funds invested capital in offshore reinsurance operations, and also became the reinsurer's primary asset manager.[1] One potential explanation for this flow of hedge fund capital into the reinsurance industry is the reduction in the personal taxes paid by the hedge fund investors who participate in the transactions.[2] If, as these transactions suggest, savings on personal taxes motivates capital flows into the reinsurance/insurance industry, then personal taxes must be a determinant of the cost of equity capital for reinsurers and insurers. While several papers have examined how corporate taxes affect insurers' cost of equity capital (e.g., Myers and Cohn, 1987; Derrig, 1994; Harrington and Niehaus, 2003; Gatzert and Schmeiser, 2008), the literature pays minimal attention to personal tax issues when analyzing the cost of insurer equity capital.[3] The main purpose of this paper is to analyze the tax costs of insurer equity capital, focusing on personal taxes. In addition, descriptive evidence about offshore hedge fund reinsurers (OSHFRs) is presented as a case study of the relevance of personal taxes.[4] Since OSHFRs are an example of what is sometimes called "alternative capital" in the reinsurance industry, the paper also examines other forms of alternative capital, such as side cars, collateralized reinsurance, and insurance linked securities (catastrophe bonds) to determine whether personal taxes can explain their structure. Since all but a few of the alternative reinsurance capital arangements are private, the "evidence" presented within is descriptive, not empirical.

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[1] The investment can take multiple forms, including the purchase of a reinsurer or joint venture with a reinsurer. Later in the paper, I discuss some individual cases. Also, see the Joint Committee on Taxation (2014) for a description and for a listing of some offshore hedge fund reinsurers. Two public OSHFRs that have rececived considerable press are Greenlight Re and Third Point Re.

[2] Another possible motivation is that these transactions allow hedge funds to use the "float" of an reinsurer as leverage for the asset portfolio. However, the "float" explanation does not correspond with the limited leverage of most OSHFRs. For example,Third Point Re's insurance liabilities were less than 25% of assets from 2014-2017. Another possible explanation is that these transactions are motivated by inefficiencies in the product market, i.e., they provide an opportunity to earn economic profits from the underwriting side of the business.

[3] Harrington and Niehaus (2003) have a short section discussing personal taxes, but not a formal analysis. Hartwig and Young (2015) mention tax benefits of alternative capital, but do not analyze it

[4] The term "hedge fund reinsurer" is used here even though most of the points would apply to hedge fund insurers, as well. Another name that is sometime used is "total return reinsurers."

The different tax treatment of investment returns earned via a U.S. hedge/mutual fund versus a U.S. re/insurer are central to the analysis in the paper. The returns earned on the assets of a re/insurer are subject to both corporate taxes and personal taxes. In contrast, hedge/mutual funds do not pay corporate tax on the fund's earnings; instead, the investors in the fund are only taxed at the personal level. This difference is the corporate tax disadvantage of investing in assets via an insurance company relative to a hedge/mutual fund.

Regarding personal taxes, asset returns from a hedge/mutual fund are passed-through to investors and taxed as they are realized. Specifically, annual *interest and realized short-term capital gains are taxed at the income tax rate*, and dividends (assuming that they are qualified) and realized long-term capital gains are taxed at the lower long-term capital gains rate. In contrast, investment returns earned by an re/insurer are taxed at the personal level when the returns are distributed via a dividend or when the investor sells his/her shares. In either case (assuming the dividends are qualified or the investor holds the shares for more than a year), all of *investment returns on an insurer's assets are taxed at the long-term capital gains rate*.[5] The difference between a re/insurer and a hedge/mutual fund is that interest and short-term capital gains on the assets held by an re/insurer are taxed at the long-term capital gains rate, but taxed at the higher income tax rate if the assets are held by a hedge/mutual fund. Thus, there is a personal tax advantage of investing via an re/insurer compared to a hedge/mutual fund.

As mentioned above, the existing literature on the cost of insurer capital has emphasized the corporate tax disadvantage and largely ignored the personal tax advantage. Therefore, I develop a simple model to assess the implications of personal taxes for the tax costs of insurer equity capital and the impact of of the 2017 tax reform. The focus of the analysis is on how an insurer/reinsurer's tax cost of equity capital vary with how the insurer's assets are invested and managed (with respect to the realization of capital gains). All else equal, asset portfolios that focus exclusively on long-term capital gains have the highest tax costs, and those that only earn interest income and/or realized short-term capital gains have the lowest tax costs. This is because the former do not utilize the personal tax advantage of investing in an insurer versus a hedge fund, and the latter fully utilizes the personal tax

[5] Qualified dividends are taxed at the long-term capital gains rate since 2003.

advantage. All else equal, the tax costs are lower when more short-term capital gains are realized. Not surprisingly, the 2017 tax reform, which lowered the corporate tax rate to 21%, reduces the corporate tax costs on traditional insurer equity, but benchmark analysis presented in the paper indicates that the overall tax costs on capital are still material.

Offshore hedge fund reinsurers (OSHFRs) provide an interesting example of the relevance of personal taxes for cost of insurer equity capital. Consider a reinsurer that has a "traditional" reinsurer balance sheet with assets equal to A^I and policyholder liabilities equal to L, where L equals say 60 percent of A^I. In other words, it is reasonably well-capitalized. Now suppose that a hedge fund contributes additional capital equal to A^H, so that the combined entity now has an insurance leverage ratio equal to $L/(A^I + A^H)$, and that the hedge fund manages all of the assets. If, for example, A^H is twice the value of A^I, then insurance leverage ratio is only 20 percent, which makes the reinsurer extremely well capitalized. If the IRS treats the combined entity as a reinsurer, then the investment returns on the entire asset portfolio obtain the personal tax advantage associated with an investment via an insurer. If the combined entity is located offshore in a jurisdiction with a zero corporate tax rate (e.g., Bermuda), then the investors obtain the personal tax advantage without incurring the corporate tax disadvantage. The net effect of the combination is that the personal tax rate applied to interest and realized short-term capital gains is lower for the hedge fund investors. There is effectively a negative marginal tax cost of capital for existing hedge fund investors to provide equity capital to the offshore reinsurance business, because doing so reduces the personal taxes that the hedge fund investors incur.[6] The more hedge fund capital that can be placed in this advantageous tax setting, the greater the personal tax savings. Thus, there is an incentive to operate with a low ratio of insurance liabilities to assets.

The personal tax advantage to hedge fund investors of investing in offshore reinsurance vehicles depends on the differential between the long-term capital gains tax rate and the income tax rate. Since the 2017 tax reform did not substantially change these rates, the 2017 tax reform does not directly impact the tax benefits to hedge fund investors of creating an OSHFR. However, the lower U.S. corporate tax rate after 2017 could impact the competitiveness of OSHFRs compared to U.S. domiciled insurers. Also, changes in the legal definition of a controlled foreign corporation (CFC) and

[6] There are of course other costs and risks associated with creating a OSHFR, such as transaction and reputation costs, which can offset the tax benefits..

the new leverage requirements needed to be considered an insurer, both of which I discuss below, could make OSHFRs less attractive.

OSHFRs have characteristics of what is often called alternative insurance capital, i.e., insurer capital that is provided in non-traditional ways often by institutional investors. Other examples of alternative capital are funds raised through catastrophe bonds, side cars, and collateralized reinsurance. In most cases, these transactions use offshore entities and have insurance liabilities that are fully collateralized. The use of alternative capital has grown from virtually zero in 1998 to $19 billion or about 5 percent of total reinsurance capital in 2008, to $97 billion or about 17 percent of total reinsurance capital in 2018 (AON, 2019). As Lakdawalla and Zanjani (2012) highlight, the full collateralization of alternative reinsurance capital arrangements do not take advantage of diversification like traditional reinsurers and therefore hold much higher amounts of capital/collateral per dollar of expected claims than traditional insurers. This inefficiency in the quantity of capital must be made up by having lower frictional costs per dollar of capital than traditional equity (or subordinated debt) capital of traditional reinsurers.

Given the offshore location of most of the alternative capital arrangements, it would seem that taxes might help explain the rise of these vehicles. However, I find that, while personal taxes might have motivated some of these transactions, personal taxes do not explain most of the alternative capital arrangements. Furthermore, the 2017 tax reform, which changed the criteria for being classified as a PFIC of a CFC, makes it even more likely that alternative capital arrangements will not obtain the personal tax benefit going forward. I therefore discuss alternative hypotheses for why alternative capital arrangements might have lower frictional costs.

The paper contributes to the literature on insurers' cost of capital and therefore the amount and type of capital backing insurance liabilities, an important issue for managers and regulators. More specifically, the paper addresses the gap in the literature regarding the impact of personal taxation on the cost of insurer capital and its implications for insurers' asset management. The paper also contributes to the literature on the underlying explanations for the development of alternative capital arrangements. In addition, mini case studies of OSHFRs are presented to provide institutional structure to the otherwise conceptual arguments.

The paper also provides an industry specific contribution to the more general literature on the impact of personal taxes on corporate capital structure decisions that largely began with Miller's (1977) analysis. Graham (2003) provides an extensive review of how taxes impact corporate financial decisions. Recent evidence on the importance of personal taxes for capital structure issues include Lin and Flannery (2013) and Faccio and Xu (2015).

In the next section, I provide a conceptual framework for identifying the tax costs of insurer equity capital. Section 3 describes the simple framework used to measure the tax effects and presents the basic results concerning the tax costs of equity capital. (The actual model is presented in the Appendix A.) In section 4, I analyze the tax benefits of creating an OSHFR for hedge fund investors and also compare the cost of equity capital for an OSHFR to a traditional U.S. insurer. Individual cases of OSHFRs are also presented. In section 5, I discuss whether other forms of alternative capital in the insurance/reinsurance industry can be explained by personal taxes, and discuss other potential explanations. (Appendix B provides institutional and descriptive information on alternative capital arrangements.) The paper ends with a short summary and a brief discussion of public policy issues and avenues for future research.

2. Conceptual Framework for Identifying the Cost of Insurer Equity Capital

Economic capital, defined here as the market value of an insurer's assets minus the present value of the expected claim payments discounted at the risk-free rate is an important input for insurers. Capital provides a cushion to cover claim costs that are greater than expected. For an investor to make an equity investment in an insurer, he or she must expect a return after-taxes equal to what could be earned on a comparable risky investment. From a pure financial perspective, an insurer is a levered investment vehicle, i.e., it borrows funds by issuing policies and takes those funds along with contributed equity capital and invests in an asset portfolio. Thus, a comparable risky investment would be an equity investment in a hedge fund (or mutual fund) with the same portfolio of assets as the insurer and the same financial leverage as the insurer.[7]

[7] Alternatively, the investor could borrow on personal account to obtain the same leverage as the insurer.

There are, however, a number of differences between an equity investment in a hedge fund versus in an insurer. Some of the differences are related to taxes, and the others arise from the nature of the insurer's leverage, i.e., from the sale of insurance policies. The differences are

1. Expected Underwriting Profits. Part, or even all, of the equity invested in an insurer could be used to pay unexpected costs associated with the insurer's policies. The flip-side, of course, is that claim costs could be lower than expected and the equity investors receive underwriting profits. For simplicity, I assume that insurance premiums equal the present value of all of the insurer's expected costs, plus an expected return to capital providers equal to what they could earn on a comparable risky investment.[8]

   Suppose, for example, that an investor can earn 5% after-tax by investing in a hedge fund, and that an investor can also earn 5% after-tax on the same asset portfolio if it was held by an insurer. In other words, insurer investors do not give up any asset returns relative to what they could get from a hedge fund. Then, in a competitive insurance market, premiums would be bid down until the present value of expected underwriting profits equaled zero. On the other hand, if an investor can only earn 3% after-tax if the asset portfolio is held by an insurer, then underwriting profits would need to cover the 2% shortfall relative to the hedge fund, in order for the insurer to attract capital. Thus, the insurance policy premiums reflect the difference in the after-tax returns earned by a hedge fund investor (ATR^H) and the after-tax asset returns earned by an insurer with the same asset portfolio as the hedge fund (ATR^I).[9]

2. Distress Costs. As is true of other types of liabilities, policyholder liabilities create the possibility of financial distress and its associated costs, including its effects on the willingness of

[8] This assumption about pricing is consistent with a competitive product market. Alternatively, the same conclusion could be reached if regulators set prices so that equity investors received the same return as they could have from an alternative investment (Myers and Cohn, 1987).

[9] A potential concern with this framework is that it ignores the uncertainty associated with insurance claims (and therefore underwriting profit), and that insurer investors will require a higher expected return for this risk. One response is to assume that underwriting profits are uncorrelated with the returns on other assets, and therefore investors do not require additional compensation for underwriting risk. However, to the extent that there is systematic risk associated with insurance claims (see Barinov, Pottier, and Xu, 2014), a risk premium would need to be incorporated into the analysis. Given the focus here is on taxes, I assume underwriting profits are uncorrelated with the returns on other assets.

policyholders to purchase the company's policies (Froot, 2007). These distress related costs are ignored in the analysis.

3. Agency Costs. The policyholder liabilities likely make the monitoring and assessment of insurer managers more difficult than that of a pure asset manager. This is because insurer managers are involved in a number of tasks/activities that are irrelevant to a pure asset manager. For example, an insurer manager is involved in how policies are marketed, underwritten, priced, and how claims are handled. The management of the insurer liabilities therefore likely makes an insurer more opaque than a pure investment fund (see e.g., Kielholz, 2000), which in turn causes insurers to have greater agency costs. These agency costs are ignored in the analysis.

4. Corporate Taxes. The returns on the portfolio held by the insurer are double taxed if it is domiciled in a country with a positive corporate tax rate such as the U.S. -- once at the corporate level and then again at the personal level. In contrast, the hedge fund investment returns are taxed only at the personal level. Thus, to provide the same after-tax expected return to investors as a hedge fund with the same asset portfolio, an insurer has to offer a higher before-tax return. This is the corporate tax disadvantage of an equity investment in a U.S. insurer.[10] If an insurer is located in a jurisdiction that does not have a corporate income tax, then an insurer can avoid the corporate tax disadvantage.

   Dividend Received Deduction (DRD). A percentage of stock dividends received by a U.S. corporation are exempt from corporate tax. The logic is that the dividend income received by a corporation has already been taxed at the corporate level when it was earned by the dividend paying firm and therefore should not be taxed as much on the second round of taxation. The consequence of the dividend received deduction (DRD) is that only $(1-\varepsilon)$ of the dividends received by an insurer are subject to corporate tax, where ε is the exclusion percentage. The tax reform in 2017 changed the dividend exclusion from 70 percent to 50 percent. When combined with the corporate tax rate drop from 35 percent to 21 percent, the net corporate tax on dividends remained at 10.5%, because

   $(1-0.7) \times 0.35 = (1-0.5) \times 0.21 = 0.105$ or 10.5%.

[10] Harrington and Niehaus (2003) analyze and estimate the impact of corporate taxes on catastrophe insurers' costs of capital.

5. Personal Taxes. I assume that insurers either distribute investments earnings via a qualified dividend or reinvest investment earnings in the asset portfolio and investors receive their investment earnings when they dispose of their shares in the insurer at least one year after they were purchased. In either case, investment earnings are taxed at the personal level at the long-term capital gains rate.[11] This differs from how the returns on a hedge fund are taxed. The hedge fund investor pays the long-term capital gains rate on qualified dividends and long-term capital gains, but pays the higher income tax rate on interest and short-term capital gains. Herein lies the personal tax advantage of investing through an insurance company. Interest and short-term capital gains are taxed at the long-term capital gains rate for insurer investors, but at the higher income tax rate for the hedge fund investors. [12] Table 1 provides a recent history of U.S. corporate and personal tax rates.

The previous discussion can be summarized as follows. In order to attract equity capital, a traditional insurer needs to compensate insurer equity investors for the additional corporate tax costs that they incur relative to a hedge fund investor (point 4). The personal taxes, however, are lower for the insurer investor because he/she pays the long-term gains rate on interest and short-term capital gains; whereas, the hedge fund investor pays the income tax rate on these returns.

3. Modeling the Tax Costs of Insurer Equity Capital

To quantify the tax costs, the Appendix presents a simple model to compare the tax costs on an asset portfolio held by a traditional U.S. insurer to the tax costs associated with a U.S. hedge fund holding the same portfolio. The essential aspects of the model are described here.

Assume that the investor makes an investment at the beginning of the period and liquidates the position at some date in the future beyond one year. On an annual basis, the total annual investment return can be divided into the following six components with the proportion of the total return denoted in parentheses:

(1) interest (α),

[11] Prior to 2003, dividends were taxed at the ordinary income tax rate. See Table 1.
[12] The hedge fund investor can reinvest the distribution in the fund by purchasing additional shares, but cannot avoid the taxes on the distributions by reinvesting.

(2) dividends (β),

(3) realized short-term capital gains ($\rho_S\kappa$),

(4) unrealized short-term capital gains ($(1-\rho_S)\kappa$),

(5) realized long-term capital gains ($\rho_L(1-\alpha-\beta-\kappa)$), and

(6) unrealized long-term capital gains ($(1-\rho_L)(1-\alpha-\beta-\kappa)$).

Regardless of the form of returns, assume that the insurer incurs corporate tax (τ_c) on the return, with the exception of dividends that are subject to the Dividend Received Deduction (DRD). The DRD is incorporated by assuming that ε% of dividends are excluded from corporate taxes, leaving $(1-\varepsilon)$% subject to corporate taxes. In practice, corporate taxes would be incurred in the current year on realized returns and in the future for unrealized returns. For simplicity, assume that the future corporate tax on unrealized returns equals, in present value terms, the same amount as if the corporate tax were paid in the current year. This simplification allows the analysis to be conducted using a single period.

For the insurer, assume that the realized investment returns (components 1, 2, 3, and 5) that are distributed to shareholders are done through a qualified dividend, which makes them taxable at the long-term capital gains rate. The returns generated in the current period that are unrealized (components 4 and 6) and the realized returns that the insurer does not distribute to shareholders are reinvested in the portfolio. The investor would receive these returns when he or she sells the shares in the future and would be taxed at that time at the long-term capital gains tax rate. Thus, regardless of the origin of the investment returns (whether from interest, dividends, etc.), the investment returns are taxed at the long-term capital gains rate. In practice, there would also be a deferral of personal tax on any investment returns that are not distributed to shareholders. To simplify the analysis, I assume that the returns not distributed to shareholders in the current year are taxed in the current year at the long-term tax rate. This assumption allows the analysis to be conducted using a single period model and still capture the essence of the tax treatment, albeit by ignoring the additional benefit of deferring personal taxes.[13]

[13] As a consequence, the model understates the actual tax benefits from not distributing returns. For example, if the annual expected non-distributed before personal tax return is 10% each year for five years, and the long-term tax rate is 15%, then the model would yield an after-tax annual return equal to 8.5%; whereas, the actual annual return would equal 8.7%. The difference is due to the compounding of before-tax returns over the five year holding period and the deferral of tax for five years. In addition, the model ignores any value from tax-loss timing options.

For a hedge fund investor, the interest and realized short-term returns would be taxed at the income tax rate and all of the other components (assuming the dividends are qualified) would be taxed at the long-term capital gains rate. Thus, the difference between the hedge fund investor and the insurer investor is that (1) the insurer investor incurs corporate taxes on all investment returns except dividends that are subject to the Dividend Received Deduction (DRD), but the hedge fund investor does not, and (2) the insurer investor pays the long-term capital gains rate on interest and realized short-term capital gains, but the hedge fund investor pays the higher income tax rate on these returns. Table 2 compares the taxation of investment income earned by U.S. insurers to the taxation of the same investment income earned by a U.S. hedge fund or mutual.

Appendix A derives expressions for the after-tax asset return for a U.S. hedge fund (ATR^H), for a U.S. domiciled insurer (ATR^I), and for the difference (ATR^H - ATR^I), assuming that both earn the before-tax rate of return on assets equal to R. The difference between ATR^H and ATR^I is a measure of the tax costs associated with traditional insurer capital. Stated differently, (ATR^H - ATR^I) is the amount that the insurer needs to earn after-taxes on its underwriting activities in order for shareholders to receive the same after-tax return as they would through a hedge fund.

The subsequent subsections provide examples of the tax cost measure, ATR^H - ATR^I, scaled by the before-tax return, R. For convenience, the formula for the tax cost measure, which is derived and explained in the Appendix, is reproduced here:

$$(ATR^H – ATR^I)/R = \tau_c (1-\tau_L) (1 - \varepsilon\beta) - (\alpha + \kappa \rho_S) (\tau_S – \tau_L) . \quad (1)$$

The first term is the corporate tax disadvantage and the second term is the personal tax advantage of investing through an insurer.

To provide additional insight about this tax cost measure (ATR^H - ATR^I), it is useful to compare it to a tax cost measure that has been used by the literature focusing on corporate taxes. Assume that all personal income is taxed at the same rate, τ_L, and ignore the DRD. The difference between the after-tax returns to a hedge fund investor and an insurer investor (as a percentage of the before-tax return) in this special case equals $\tau_c (1-\tau_L)$, where τ_c is the corporate tax rate. This is the additional underwriting return that the insurer needs to generate *after taxes* to provide an insurer investor the same after-tax total return as an investor in a hedge fund with the same asset portfolio. If U is the before-

tax underwriting return on assets that needs to be generated, then the after-tax underwriting return would equal $U(1-\tau_c)(1-\tau_L)$. Setting this equal to $\tau_c(1-\tau_L)$ and solving for U yields:

$$U(1-\tau_c)(1-\tau_L) = \tau_c R (1-\tau_L) \quad \rightarrow \quad U = \tau_c R / (1-\tau_c),$$

This expression is also found in the literature that focuses on the corporate tax costs of insurer equity capital (e.g., Harrington and Niehaus, 2003). It equals the corporate taxes on R, grossed up by the corporate tax rate because the additional return generated also is taxable. Thus, the measure used here is the after-tax amount that needs to be generated from underwriting to give investors the same after-tax total return as hedge fund investors; whereas, the measure used in other papers is the before-tax amount that needs to be generated from underwriting to give investors the same after-tax total return, ignoring personal taxes and the DRD. Using post 2017 tax rates (τ_c = 21%, τ_L = 20%), the tax costs measures reported in this paper would need to be scaled up by a factor of about 1.58 to obtain the before-tax amount that would be needed from underwriting profits.

3.1 The Effect of a Lower Corporate Tax Rate

To provide a benchmark of the tax costs and to indicate the effect of a lower corporate tax rate as a result of the 2017 tax reform, I calculate the tax costs under the following assumptions. Prior to 2017 Tax Reform, the corporate tax rate is 35% and the dividend received deduction (DRD) is 70%. Post-2017 tax reform the corporate tax rate is 21% and the DRD is 50%. The return is equally divided between interest, dividends, short-term capital gains, and long-term capital gains (i.e., 25% from each), and one-half of the capital gains (both short-term and long term) are realized. I also assume that the personal tax rate on long-term capital gains is 20% pre- and post-2017, and that the personal income tax rate equals 39.6% pre-2017 and 37% after 2017, consistent with the Tax Cuts and Jobs Act of 2017.

The results are presented in Table 2. Prior to the 2017 tax reform, the total tax costs (row 3 of Table 2) equal 17.15% of the before-tax return. After the tax reform, the total tax costs equal 8.325% of the before-tax return. The change is primarily due to the lowering of the corporate tax disadvantage from 24.5% to 14.7% (row 1). The personal tax advantage (row 2) also decreases, but by a smaller amount. These results illustrate that while the lower corporate tax rate has a substantial effect on the cost of insurer equity capital, the tax costs remain economically relevant.

3.2 Tax Costs and the Type of Returns Generated

I now illustrate how the tax costs are affected by the portfolio characteristics, i.e., the type of returns that are generated and the realization of capital gains. In each of the following examples, the corporate tax rate is assumed to be 21% and the Dividend Received Deduction is 50%, as is the case under the 2017 tax reform. The personal tax rate on long-term capital gains and qualified dividends is 20% and the personal tax rate on interest and short-term capital gains is 37%.

To examine the effect of different asset portfolio strategies on the tax costs, I consider four extreme portfolio strategies:

The Interest Fund only generates interest income (α=1).

The Dividend Fund only generates dividend income (β=1).

The STCG Fund only generates short-term capital gains (κ =1).

The LTCG Fund only generates long-term capital gains ($\alpha+\beta+\kappa=0$).

The results for the tax costs for the four portfolios are presented in Figure 2, as a function of the proportion of short-term capital gains that are realized (ρ_S), which only influences the tax costs for the STCG Fund. If the asset portfolio is the LTCG Fund, the insurer has tax costs equal to 16.8%. Intuitively, the tax costs are highest for the LTCG Fund, because the fund does not take advantage of the personal tax advantages of an insurer to offset the corporate tax disadvantage of an insurer.

If the asset portfolio is the STCG Fund, the insurer's tax costs decline as the proportion of short-term capital gains that are realized (ρ_S) increases. In this example, the tax costs decline from 16.8% to -0.2% of the before-tax return. This is because as ρ_S increases, hedge fund investors are forced to pay the short-term rate on more of their returns; whereas, insurer investors pay the long-term capital gains rate on all of their returns (assuming they are distributed as a qualified dividend or reinvested and taxed when the investor sells his/her shares at least one year after purchase). Thus, the difference between the after-tax return earned by a hedge fund investor versus an insurer investors declines as ρ_S increases.

If the portfolio is the Dividend Fund, the tax costs equal 8.4% of the before-tax return. Tax costs are lower for the Dividend Fund compared to the LTCG Fund, because 50% of the dividend

income is exempt from corporate tax. Finally, if the portfolio is the Interest Fund, then the tax costs equal -0.2% of the before-tax return on the asset portfolio. This is because investing through an insurer essentially converts interest income to either qualified dividends or long-term capital gains, both taxed at the long-term capital gains rate; whereas, a hedge fund investor would pay the income tax rate on interest income.

3.3 Minimum Tax Costs

Total tax costs are minimized by choosing a portfolio that makes expression (1) smallest. Using post-2017 tax parameters ($\tau_c = 0.21$, $\tau_S = 0.37$, $\tau_L = 0.20$, $\varepsilon = 0.5$), an increase in dividend income (β) lowers total tax costs by $0.084 \times \Delta\beta$. However, an increase in interest income plus realized short-term capital gains ($\alpha + \kappa \rho_S$) lowers total tax costs $0.17 \times \Delta(\alpha + \kappa \rho_S)$. Since the latter effect is greater, tax costs are minimized by setting $\alpha + \kappa \rho_S = 1$, i.e., by having all investment returns in the form of interest and realized short-term capital gains. When this is done, the corporate tax disadvantage is almost exactly offset by the personal tax advantage, as the total tax costs equal -0.2% of the total investment return.

An implication of this analysis is that the tax cost of insurer equity capital depends on the asset portfolio of the insurer. The tax costs are lower for an insurer that has a larger percentage of its asset returns in the form of interest and realized short-term capital gains compared to an insurer that has a large percentage of its asset returns in the form of long-term capital gains. The reason is that the former approach makes greater use of an insurer's personal tax advantage relative to a hedge fund. The latter approach does not utilize the insurer's advantage relative to a hedge fund and therefore the insurer's corporate tax disadvantage imposes larger tax costs.

Certainly, other issues, that are ignored in this analysis, are important for the optimal portfolio choice for an insurer. For example, portfolio liquidity and the correlation of assets and liabilities are important considerations. Nevertheless, this analysis implies that the cost of insurer equity capital also depends on an insurer's portfolio choice for tax reasons.

3.4 Predictions from the 2003 Personal Tax Change

In 2003, the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) reduced the personal tax rate on dividends from 38.6% to 15% and on long-term capital gains from 20% to 15%.[14] I will focus on the tax rate on dividends given the greater magnitude of the change.

The assumptions underlying expression (1), which gives the tax costs on insurers under the current tax system, is that dividend income on assets held by hedge funds or by insurers is taxed at the long-term capital gains rate. Prior to 2003, however, this was not the case; instead, dividends on assets held by hedge funds or mutual funds were taxed at the income tax rate. However, if insurers did not pay out the dividend income on their assets and instead investors received these dividend returns when they sold their shares at a future date, then insurer investors would convert dividend income into capital gains and taxed at the capital gains rate. Assuming insurers did not pay out dividends and that investors held their insurer shares for more than one year, then there was an additional personal tax advantage of investing in an insurer compared to a hedge fund prior to 2003. Incorporating this benefit into the analysis would change expression (1) to:

$$(ATR^H - ATR^I)/R = \tau_c (1-\tau_L) (1 - \varepsilon\beta) - (\alpha + \beta + \kappa \rho_S) (\tau_S - \tau_L) . \qquad (1)'$$

Comparing expression (1)' to (1) indicates that the 2003 tax change reduced the personal tax advantage of investing through an insurer by $\beta (\tau_S - \tau_L)$. Assuming insurers try to reduce their tax costs on capital, this analysis predicts that insurers would have shifted assets from dividend paying stocks to assets generating either interest or short-term capital gains following the 2003 tax law change. Testing this prediction is left for future research. Offshore hedge fund reinsurers, however, provide an interesting case study on how personal taxes influence the cost of insurer capital and therefore the amount of capital in the insurance industry.

[14] As illustrated in Table 1, both of these tax rates increased from 15% to 20% in 2013.

4. Offshore Hedge Fund Reinsurers (OSHFRs)

4.1 Benefits of OSHFRs

As the individual cases discussed below will illustrate, offshore hedge fund reinsurers (OSHFR) can be formed in different ways. The essential aspect is the addition of assets from a hedge fund to the balance sheet of an offshore reinsurer with the intention of the hedge fund managing the assets. In this section I discuss how offshore reinsurers (including OSHFRs) have lower tax costs of equity capital compared to U.S domiciled re/insurers, and how OSHFRs offer hedge fund investors higher after-tax investment returns compared to U.S. hedge funds. It is worth highlighting that an OSHFR is treated the same as any offshore re/insurer and therefore the comparisons of OSHFRs with U.S. re/insurers also apply to other offshore re/insurers.

The algebraic expression for the after-tax return for an OSHFR is found by using the formula for the after-tax return on an insurer, derived in the Appendix, and setting the corporate tax rate to zero. Assuming that the OSHFR pays out all returns as either qualified dividends or the investors realize returns via long-term capital gains, then investors pay the long-term capital gains rate on all returns. Under these conditions, the only taxes incurred by OSHFR investors are at the personal level using the long-term capital gains rate on all of the fund's returns. Thus,

$$ATR^{OSHFR} = \quad R\,(1-\tau_L)\,. \qquad (2)$$

This expression can now be used to find the tax benefits to U.S. hedge fund investor if the hedge fund becomes an OSHFR.

OSHFR compared to a U.S. Hedge Fund. The marginal tax benefit to a U.S. hedge fund investor from combining with an offshore reinsurer equals the difference in the after-tax return earned by an OSHFR versus a U.S. hedge fund:

$$(\,ATR^{OSHFR} - ATR^{H}\,) / R \;=\; (\alpha + \kappa\,\rho_S)\,(\,\tau_S - \tau_L)\,. \qquad (3)$$

This expression indicates that the benefit arises from paying the long-term capital gains rate as opposed to the income tax rate on interest (α) and realized short-term capital gains ($\kappa\,\rho$). Assuming all returns are in the form of interest or realized short-term capital gains and that τ_S = 37% and τ_L = 20%, the marginal tax benefit of becoming a OSHFR is 17% of the before-tax return on the asset portfolio. For

example, if the fund return is 8%, then all else equal hedge fund investors gain 136 basis points by being an OSHFR compared to a U.S. based hedge fund.

Note that a hedge fund cannot simply move to a country such as Bermuda and obtain the same tax benefits for its U.S. investors; it needs to combine with an insurer or reinsurer. This is because a standalone offshore hedge fund would be considered a Passive Foreign Investment Company (PFIC), defined as an entity with passive income equal to at least 75 percent of its total income, or passive income generating assets equal to at least 50 percent of its assets. For the U.S. owners of a passive foreign investment company, passive income is taxed like income from a domestic mutual fund or hedge fund, i.e., investment earnings are passed through to the investor and taxed as they are realized. However, there is an insurance company exemption to the PFIC rules. Prior to 2018, income is not considered passive if it is "derived in the conduct of an insurance business by a corporation which is predominantly engaged in an insurance business" (U.S. Code Section 1297 (b)(2)(B)).[15] Thus, prior to 2018, if a hedge fund combined with an insurance operation and the combined entity was predominantly engaged in insurance, then the investment returns would not be considered passive income. Instead, the investment earnings would be taxed at the personal level in the same way as an insurance company's returns would be taxed, i.e., when they are paid out or realized by selling the securities.

4.2 Effects of the 2017 Tax Reform

The 2017 tax reform does not significantly alter the marginal tax benefit of becoming an OSHFR to a U.S. hedge fund investor as presented in equation (3), because this benefit depends on the difference between long-term and short-term capital gains rates, which were only marginally affected by the tax reform.[16] The tax reform, however, could indirectly impact the benefit of becoming an OSHFR for three reasons. First, the competitiveness of OSHFRs is negatively affected relative to U.S.

[15] For a more precise definition, see U.S. Code Section 1297 – Passive Foreign Investment Company and Section 954(c) – Foreign Personal Holding Company Income. Note that without the insurance company exemption, almost all foreign insurers would be designated as a PFIC.

[16] Policy officials have been concerned about the tax treatment of offshore hedge fund reinsurers (OSHFRs) at least since 2002 (see e.g., McCinnon, 2002). In 2015, Senator Wyden introduced legislation ("The Offshore Reinsurance Tax Fairness Act") to limit the extent to which hedge funds could gain a tax advantage associated with combining with an offshore insurer. The controversy even reached the 2016 presidential campaign, with Hillary Clinton pledging to "end the Bermuda reinsurance loophole" (Briefing, 2016).

insurers because of the reduction in the U.S. corporate tax rate to 21%. Second, the new law states that to obtain the insurance company exemption to the PFIC rules, an entity must have insurance liabilities, excluding unearned premium reserves, greater than 25 percent of assets or greater than 10 percent of assets if the company can qualitatively demonstrate that it is predominantly engaged in insurance. Third, the law's new classification of a foreign controlled corporation (CFC) could cause investment income to be taxed at income tax rates if individual investors take large stakes in OSHFRs (as well as other alternative capital arrangements). I briefly address each of these possibilities.

Competitiveness of OSHFRs. Relative to a U.S. reinsurer, an OSHFR (or any reinsurer located in a jurisdiction with a zero corporate tax rate) has the advantage of not paying corporate taxes on returns, which gives the OSHFR a competitive advantage. The magnitude of the tax advantage is given by the difference in the after-tax returns earned by an OSHFR compared to a traditional U.S. based insurer. This difference equals

$$ATR^{OSHFR} - ATR^{I} = \tau_c (1 - \tau_L) R (1 - \varepsilon \beta) .$$

Intuitively, the difference in tax treatment between an OSHFR and a U.S. insurer is that the OSHFR does not pay corporate taxes on all investment returns, whereas the latter do pay corporate taxes on investment returns except for dividends that are subject to the DRD ($\varepsilon \beta R$). By lowering the corporate tax rate to 21% from 35% (a percentage change of 40%), the 2017 tax reform therefore reduces OSHFRs' competitive advantage relative to U.S. insurers, which could indirectly reduce the desirability of creating an OSHFR, given there are legal, administrative, and potentially political costs of forming an OSHFR.

Insurance Exemption to being a PFIC. To avoid being classified as a PFIC, the 2017 tax reform requires that entities have minimum leverage requirements. The 25 percent leverage requirement essentially limits the extent to which hedge fund investors can overcapitalize insurance liabilities, so that for a given book of liabilities with value equal to L, the assets backing the liabilities is limited to 4L. Even though the new tax law was signed in December of 2017, uncertainty about its implementation remains. In July of 2019, the IRS and the Department of Treasury released proposed regulations and sought input regarding how the new PFIC rules will be applied. Willkie, Farr, and Gallagher (2019) state that these regulations "could have substantial ramifications for U.S. investors

in offshore insurance and reinsurance structures …", indicating uncertainty about the circumstances under which insurance structures would be classified as PFICs.

CFC Classification. An OSHFR could also be classified as a Controlled Foreign Corporation (CFC),[17] in which case, U.S. shareholders would be required to include Subpart F income as part of their current taxable income regardless of whether the Subpart F income is distributed as dividends. Subpart F income would include both underwriting and investment income. An entity is considered a *CFC* if U.S. shareholders own more than 50 percent of the voting power or more than 50 percent of the total value of all classes of stock. Prior to 2018, a person was considered a *U.S. shareholder* if the person had more than 10 percent of the *voting power* (IRS, 2019). Thus, prior to 2018, entities could avoid being classified as a CFC by including in their by-laws that no shareholder can cast more than 9.9% of the votes, which would imply that the entity has no U.S. shareholders and therefore the entity would not be considered a CFC.[18]

The 2017 tax reform, however, expanded the definition of a *U.S. shareholder*. To avoid being classified as a U.S. shareholder, the investor must have less than 10 percent of the voting power and less than 10 percent of the value of the entity. This change implies that U.S. investors with large stakes in offshore entities could be considered U.S. shareholders, in which case the entities in which they invest will be considered CFCs, which implies that they would have to recognize Subpart F income as taxable in the current year (Mayer Brown, 2018).

4.3 Evidence from Mini-Case Studies of OSHFRs

I now describe individual cases of hedge funds combining with or creating offshore reinsurers. The purpose is to examine whether their structure and operations are consistent with personal taxes being a primary motivator for these institutions. At the outset, it is worth noting that finding systematic evidence OSHFRs is difficult; therefore, the information in the following paragraphs is collected from the SEC filings of three public OSHFRs and sporadic press reports for the private OSHFRs.

[17] CFC status is based on ownership and PFIC status is based on how the entity operates. Thus, an entity can be a CFC and not a PFIC or a PFIC but not a CFC. If an entity meets both the CFC and PFIC criteria, it is generally viewed as a CFC. See Harrison and Lee (2019) for more details.

[18] For example, Greenlight Capital (to be discussed further below) has the following statements in their 2018 10K: "No shareholder will be allocated voting rights that would cause it to have 9.9% or more of the total voting power of our ordinary shares."

Greenlight Capital Re (GLRE) was established in 2004 in the Cayman Islands. Its principal wholly-owned subsidiary, Greenlight Re, began providing property and casualty reinsurance in 2006. In 2007, Greenlight Re went public; it is traded on NASDAQ. To manage their assets, Greenlight had a joint venture agreement with DME Advisors (also known as Greenlight Capital Advisors and managed by David Einhorn). In 2018, the reinsurers became limited partners in Solasglas Investments, which also is managed by DME Advisors.

The company states that it has an "emphasis on deriving superior returns from both sides of the balance sheet," and that it "manages its assets according to a value-oriented equity-focused strategy that supports the goal of long-term growth in book value per share." They primarily take long and short equity positions. Provided the investment strategy involves realizing short-term capital gains, the stated investment strategy is consistent with personal taxes being an important consideration for the creation of OSHFRs. Greenlight Re' insurance-liability to asset ratio was less than 20% each year from 2007 to 2017 and jumped to 43% in 2018.[19] The relatively high capitalization also is consistent with personal taxes motivating OSHFRs.

Greenlight Capital Re's stock price dropped from over $30 a share in 2014 to $10 a share in August of 2019. The poor performance can be attributed to both poor underwriting and investment performance. The arithmetic average of the annual returns on assets from 2014 through 2018 is -6.6 percent. The average combined ratio over the same period ranged from 101.4% to 108.6%. In June, 2019, A.M. Best maintained Greenlight Re's A- rating, but changed its outlook from stable to negative.

Third Point Re Ltd. was founded in 2011 and is traded on the NYSE. It has two wholly-owned subsidiaries that write reinsurance: Third Point Re (USA) is located in New Jersey and Third Point Re is located in Bermuda. They describe themselves as having a total return business model that combines "exceptional underwriting talent with market-leading investment management." The latter is provided exclusively by Third Point LLC, a hedge fund owned and managed by Daniel Loeb. Shareholders with large stakes include BlackRock, Vanguard, and Dimensional Fund.

Third Point LLC states that they "employ an event-driven, value-oriented investment style" with an "emphasis on "special situation equities, distressed debt, and risk arbitrage." In 2019, it moved

[19] Insurance liabilities do not include unearned premium reserves, consistent with …

assets into fixed income investments (Dyson and Rupawaia, 2019). In 2014, its insurance-liability to asset ratio was 10 percent; it did not exceed 25 percent until 2018 when it reached 33 percent. Its combined ratio averaged 106 between 2014 and 2018. The arithmetic average of the annual returns on assets from 2014 through 2018 is 3.0 percent. The stock price was $16.30 at the beginning of 2014, hit a high $18.35 in 2017 and in September of 2019 was trading at about $10. In May 2019, A.M. Best affirmed it's A- rating, but revised its outlook to negative.

Watford Re, was founded in 2014 in Bermuda with $1.1 billion in capital. It is a subsidiary of Watford Holdings Ltd., which is traded on NASDAQ. It describes its approach as "bringing together underwriting and investment expertise." It exclusively uses subsidiaries of Arch Capital group for underwriting activities and uses HPS Investment Partners, LLC (formerly known as Highbridge Principal Strategies), a firm that focuses on non-investment grade credit, for the majority of investment portfolio ($1.8 billion). The remainder of its invested assets (0.9 billion) are held in investment grade fixed-income securities. Watford Holding's insurance-liabilities to asset ratio in 2018, the only year for which data are available, was 32 percent.

Overall, the three cases examined above indicate that public OSHFRs increased their insurance-liability to asset ratio in 2018, likely in response to the 2017 tax reform. The recent poor performance of Greenlight and Thirdpoint indicate that they have performed poorly on both the asset and liability side of the balance sheet.

Private Companies. Panel A of Table 4 provides a brief overview of several privately held OSHFRs. The primary takeaway from these brief summaries is that the total return strategy (a focus on earning abnormal returns from both the asset and liability sides of the balance sheet) has not been successful in general. Four of the five cases listed either no longer exist or have exited the hedge fund strategy for asset management.

Panel B of Table 4 lists some "sponsored hedge fund reinsurers"; typically, these were formed through a joint venture between a hedge fund and an established insurer. For example, Chubb and Blackrock formed ABR Re and AXIS and Blackstone formed Harrington Re. My research indicates that that all four of these entities continue to operate.

5. Other Forms of Alternative Capital

Over the past 25 years, other non-traditional ways for institutional investors to provide capital to back reinsurance liabilities have developed. These alternative capital arrangements include sidecars, collateralized reinsurance, and insurance linked securities (ILS) such as catastrophe bonds. In each of these cases, the insurance liabilities are fully collateralized. AON (2019) reports that these types of instruments together provided $97 billion of capital to the reinsurance industry in 2018, which is roughly 17% of total reinsurance capital.[20] In Appendix B, I briefly describe these transactions and present some data on their use that updates information found Cummins and Barrieu (2013) and Hartwig and Lynch (2015).

As Lakdawalla and Zanjani (2012) highlight, the full collateralization of insurance liabilities in these alternative capital arrangements implies that they are not taking advantage of diversification to economize on the amount of capital backing the liabilities as is done in traditional insurers and reinsurers. Consequently, to explain why they exist and have grown in importance, one needs to identify why the capital arrangement have lower frictional costs than traditional debt and equity securities. Stated differently, the new structures must be reducing the costs associated with some market imperfection relative to conventional subordinated debt or equity securities of traditional re/insurers (Modigliani and Miller, 1958).

Personal taxes would explain these transactions if the alternative capital vehicle is not classified as a PFIC or a CFC and if the returns to investors of the alternative capital arrangement are in the form of qualified dividends or long-term capital gains. In this case, U.S. investors in these deals would pay a lower tax rate on interest and realized short-term capital gains on the underlying assets collateralizing the insurance liabilities than they would if the same returns were generated from a hedge fund or mutual fund. That is, investors would have a negative marginal tax cost of directly investing in these vehicles, which in turn would help explain why full collateralization is observed.

While some of the alternative capital transactions developed prior to the 2017 tax reform might have provided this personal tax advantage, my conversations with several market participants suggest

[20] Note that the full collateralization of insurance liabilities does not expand the supply of insurance/reinsurance per dollar of collateral as much as investment in traditional equity capital of insurance companies.

that most of the transactions did not because they were classified as PFICs or CFCs. Consistent with this view, an early discussion of the tax treatment of ILS by Kaplan and Lefebvre (2003) indicates that ILS were typically classified as PFICs. Moreover, the 2017 tax law change makes it even more difficult to avoid being classified as a PFIC or CFC. More specifically, the new requirement of having at least a 25 percent insurance-liability to asset ratio will cause most alternative capital arrangements backing natural catastrophe risk to be classified as PFICs, as the expected claims relative to the limit on the reinsurance policy (which given full collateralization equals the value of the assets backing the claims) is typically less than 5%.[21] Thus, personal taxes do not seem to be the source of the lower frictional costs that would explain the full collateralization in most of these transactions.

So what frictional costs explain these transactions.[22] One possibility is provided by Lakdawalla and Zanjani (2012), who show that if policyholders are heterogeneous with respect to their expected claims, pro-rata insolvency rules that are based on the value of actual claims can be an inefficient method of allocating assets when an insurer becomes insolvent, and that segregating collateral for different packets of liabilities can improve efficiency in this setting. Intuitively, separately collateralizing the liabilities of policyholders with a relatively low probability of incurring a loss protects these policyholders from having a lower expected recovery rate (paid claims relative to claims incurred) compared to policyholders with a higher probability of claims.

I put forward another potential explanation that is based on (1) the emergence over the past 25 years of more sophisticated catastrophe risk (cat) models and (2) the role that traditional reinsurers play in the

[21] For example, Braun (2016) reports expected losses on catastrophe bonds of a little over 2 percent of the face value of the bond.

[22] An explanation that is often provided by practitioners is that alternative capital vehicles provide insurers and reinsurers with direct access to the capital markets. The problem with this argument is that insurers/reinsurers have directly accessed capital markets for decades by issuing conventional debt and equity securities. Thus, access does not seem to be the answer. Another common argument is that alternative capital market arrangements have become popular because they provide investors exposure to a risk that has low or zero correlation with the assets in their portfolio. This argument, however, is incomplete, as low or zero correlation securities can be obtained in other ways. Moreover, investors in the debt and equity securities of traditional insurers and reinsurers presumably understood that they were taking on both asset and liability risk and that the latter had low correlation with their other assets. Thus, the low correlation by itself cannot explain the deals. A more sophisticated version of this story is that the alternative capital market arrangements allow investors to earn a positive abnormal expected return for taking on the liability risk that adds virtually zero risk to their portfolio. In other words, economic rents in the product market exist, and the alternative capital arrangements are the way for institutional investors to claim some of these rents. Even if this is true, it does not explain why investors are using the alternative capital market arrangements, as opposed to traditional equity securities.

market place. Cat models imply that investors now can have access to essentially the same information about the probability distribution of catastrophe losses as an re/insurer. As a consequence, cat models have reduced the opacity and asymmetric information associated with reinsuring catastrophe risk. These models therefore reduce the "demand" for institutional arrangements that mitigate the costs associated with opacity and asymmetric information. Using existing theory on the role of traditional reinsurers, I suggest that traditional reinsurers are one of the institutions that mitigate costs arising from opacity and asymmetric information.

Plantin (2006) presents a model in which reinsurers are assumed to be better informed about a primary insurer's underwriting activities than are investors. Stated differently, reinsurers are "informed capital" and capital market investors are "uninformed capital." Reinsurers therefore are good monitors of primary insurers. In this setting, it is efficient for primary insurers to use both uninformed investors and reinsurers, with the latter improving the terms that primary insurers obtain when raising capital from the uninformed investors. Assuming Plantin's theory is correct, cat models take away the information advantage of reinsurers, which allows insurers to go directly to investors to reinsure their catastrophe risk.

This argument provides an explanation for why catastrophe risk can be reinsured by capital market investors without reinsurers being an intermediary, but it does not explain why these transactions use full collateralization, thus foregoing the benefits of using less capital which diversification would allow. Perhaps taxes (or the lack of thereof) is the explanation. If there are no corporate taxes costs (as a result of being offshore), no personal tax costs (as a result of being taxed the same as a U.S. mutual fund), and virtually no agency costs (as a result of cat models), but insolvency costs are positive, then theory implies re/insurers should hold a lot of capital (Froot and Stein, 1998 and Froot, 2007), perhaps even full collateralization.

6. Summary, Further Research, and Policy Issues

The main point of the paper is that personal taxes affect the cost of insurer equity capital. The magnitude of the effect depends on the portfolio strategy of the insurer with respect to the type of returns that its portfolio generates and the realization of capital gains. All else equal, securities that generate interest income and/or realized short-term capital gains have the lowest tax costs; and

strategies that involve long-term capital gains have the highest tax costs. Also, the cost of equity capital decreases as the percentage of short-term gains that are realized increases.

Offshore hedge fund reinsurers (OSHFRs) provide an interesting case study of how personal taxes affect the cost and therefore the flow of capital to insurance industry. The personal tax benefit to hedge fund investors of creating an OSHFR helps to explain the large capitalization/collateralization of insurance liabilities in these entities. Personal taxes, however, do not seem to explain the majority of other types of alternative capital – side cars, insurance linked securities (cat bonds), and collateralized reinsurance.

Numerous commentators over the past several years have highlighted that the inflow of capital has kept reinsurance and insurance prices low (e.g., Hartwig and Young, 2014). An empirical study of this proposition would be interesting. It would also be useful to measure the tax costs of equity finance for a sample of insurers taking into account the variation across insurers in their investment and payout policies. Another empirical research question is whether personal taxes influence insurer investment choices; the 2003 tax cut could be used for this purpose.

Regarding public policy, multiple objectives are likely to be relevant. If the main goal is to promote insurer solvency and stability of the financial system, then one would want to have policies that provide strong incentives for insurers to attract and hold substantial amounts of capital. This can be done by reducing the tax costs on insurer equity capital, which includes both corporate and personal tax costs. Of course, lowering tax costs on capital would also reduce tax revenues. As a general policy goal, greater consistency across jurisdictions in the tax treatment of insurers and reinsurers would potentially reduce the legal and transaction costs incurred by re/insurers in locating to tax-advantged jurisdictions.

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1.

Appendix A – Model for the Tax Costs of Insurer Equity Capital

The purpose of the appendix is to derive the after-tax return on the assets of a hedge fund and compare it to the after-tax return on the same assets held by an insurer. The total before-tax return in both cases is R. The taxation of R depends on the type of return of returns generated and the institution. For simplicity, tax rates are assumed to be constant over time and risk is ignored.

The following parameters describe the portfolio and how it is managed.

R = before-tax expected rate of return on the asset portfolio in each year

α = proportion of R that is interest

β = proportion of R from qualified dividends

κ = proportion of R from short-term capital gains

$(1-\alpha-\beta-\kappa)$ = proportion of R from long-term capital gains.

ρ_S = proportion of short-term capital gains that are realized

ρ_L = proportion of long-term capital gains that are realized

τ_c = corporate tax rate.

τ_S = personal income tax rate.

τ_L= personal long-term capital gains tax rate $< \tau_S$

ε = percentage of dividends that are subject to the Dividend Received Deduction (DRD) and therefore not subject to corporate tax.

A hedge fund must pay out all realized returns to investors, which makes realized returns taxable at the personal level.[23] Unrealized returns are reinvested and the fund owner pays the long-term capital gains tax on these returns when the investor sells his or her shares at a future date. By assumption, the reinvestment is a zero net present value investment, implying that the present value of the expected future value is equal to the current value of the unrealized gains. This simplifies the

[23] Of course, investors can choose to reinvest the distribution, but they do not avoid the personal tax by doing so.

model to be a single period. Under these assumptions, the after-tax return on the portfolio held by a hedge fund equals

$$ATR^H = R \{ (\alpha + \kappa \rho_S)(1 - \tau_S) + \beta (1-\tau_L) + (1 - \alpha - \beta - \kappa) \rho_L (1-\tau_L) + \kappa (1 - \rho_S)(1 - \tau_L) + (1 - \alpha - \beta - \kappa) (1 - \rho_L)(1-\tau_L) \} \quad (A1)$$

The first row is the after-personal tax return on the realized returns: The investor pays the income tax rate on interest and short-term realized gains ($(\alpha + \kappa\rho_S)R$), pays the long-term capital gains rate on qualified dividends (β), and pays the long-term capital gains rate on realized long-term capital gains ($((1-\alpha-\beta-\kappa)\rho_L R)$. The second row is the after-personal tax return on the unrealized short-term gains ($\kappa(1-\rho_s)R$) and unrealized long-term gains ($(1 - \alpha - \beta - \kappa) (1 - \rho_L)$), which are reinvested and taxed at the long-term rate.

Now consider the after-tax return to an equity investor in an insurer. Insurers receive a Dividend Received Deduction (DRD) on x percent of the dividends earned on the portfolio, implying that they pay corporate tax on only (1-x) percent of dividends received.[24] Stated differently, the effective tax on each dollar of dividends is $\tau_c(1-x)$. The 2017 tax reform reduced x from 70% to 50% and τ_c from generally 35% to 21%, which keeps the effective tax on dividends constant at 10.5% (0.7 x 0.35 = 0.5 x 0.21).

The returns that the insurer does not distribute to shareholders via a dividend are reinvested in the asset portfolio and are "distributed" to the shareholder when the shareholder sells the stock in the future. Corporate taxes are paid on realized capital gains, but not unrealized capital gains. I assume, however, that the future corporate taxes on unrealized gains equal in present value terms to what the tax would be if the unrealized gain were taxed when earned.[25] Under these assumptions, the after-tax return to the shareholders of the insurer equals

[24] Limits on the dividend received deductions are ignored for simplicity here.
[25] This is essentially the same assumption made above about the value of unrealized gains in a hedge fund. In both cases, it ignores the option value of timing the realization of losses to offset gains.

$$
\begin{aligned}
ATR^{I} \;=\; & \alpha\, R && (1-\tau_c)\,(1-\tau_L) \\
& + \beta\,(1-\varepsilon)\, R && (1-\tau_c)\,(1-\tau_L) \\
& + \varepsilon\,\beta\, R && (1-\tau_L) \\
& + \kappa\,\rho_S\, R && (1-\tau_c)\,(1-\tau_L) \\
& + \kappa\,(1-\rho_S)\, R && (1-\tau_c)\,(1-\tau_L) \\
& + (1-\alpha-\beta-\kappa)\,\rho_L\, R && (1-\tau_c)\,(1-\tau_L) \\
& + (1-\alpha-\beta-\kappa)(1-\rho_L) R && (1-\tau_c)\,(1-\tau_L)
\end{aligned}
\qquad \text{(A2)}
$$

Each line of expression (A2) gives the after-corporate and after-personal tax return on a particular type of return. In the order in which they apprear in the expression, the returns types are interest, dividends not subject to the dividend received deduction (DRD), dividends subject to the (DRD), realized short-term capital gains, unrealized short-term capital gains, realized long-term capital gains, and unrealized long-term capital gains.

Table 2 provides a comparison of the taxation of returns on a portfolio held by an insurer versus a hedge fund. The difference between the after-tax return to the hedge fund investor and the after-tax return to the shareholder of the insurer is

$$
ATR^{H} - ATR^{I} = \tau_c\,(1-\tau_L)\,(1-\varepsilon\beta)\; R \;-\; (\alpha + \kappa\,\rho_S)\,(\tau_S - \tau_L)\, R\,. \qquad \text{(A3)}
$$

The first term is the corporate tax disadvantage on all returns earned except those subject to the Dividend Received Deduction (1-eβ). The second term is the personal tax advantage from having interest and realized short-term capital gains taxed at the long-term capital gains rate as opposed to the income tax rate.

Appendix B

Description of Alternative Capital Arrangements

Sidecars. Reinsurers can sponsor a sidecar by creating a special purpose vehicle (SPV) or using a cell of a protected cell company (either created by the reinsurer or a third party). In this way, a particular set of assets and liabilities are legally segregated from other assets and liabilities.[26] The reinsurer typically would place a portion of its liabilities it has written in a cell along with the assets that it raises from investors (e.g., a hedge fund). Figure B1 provides a simplified illustration of a side car transaction. In this example, suppose that a reinsurer has a book of business with total premiums equal to $25 million and an aggregate claim limit of $500 million. The reinsurer could transfer the liabilities along with $20 million of the premiums from those policies to the cell, which could then be capitalized by a hedge fund through the purchase of $480 million of preferred equity. The insurer(s) that ceded the risk to the reinsurer is likely to be fine with this transaction, as the side car is fully collateralized.[27] All of the assets would then typically be placed in a trust and invested in highly rated debt securities.

Figure B2 presents the amount of assets invested in side cars each year using data from Artemis. In 2006, following Hurricanes Katrina, Rita, and Wilma, side cars became popular. However, the amount invested in side cars dropped dramatically during the financial crisis and only slowly rebounded. In the past few years, side cars have become more popular again, but they account for only about $4 billion of capital in 2018, roughly 4% of total alternative capital (AON, 2019).

Insurance Linked Securities (ILS). The most common type of exposures underlying ILS are losses arising from natural catastrophes (Artemis, 2019). A simplified illustration of the structure of an ILS is provided in Figure B3. In this case,the sponsoring insurer creates a SPV in Bermuda, which (1) sells the insurer a reinsurance contract ($100 million of coverage in excess of $50 million) in exchange for a premium and (2) issues a bond to investors with a face amount equal to the limit on the insurance

[26] Terminology used to describe protected cell companies can differ across juridisctions. Other names include segregated account companies (Bermuda) and segregated portfolio companies (Cayman Islands). Protected cell companies have two basic parts: the core and the set of cells.

[27] As an example, French reinsurer Scor SE recently announced that "as part of a wider initiative to use more alternative capital," it plans to set up an external balance sheet backed by investors. For a fee, Scor would underwrite business on behalf the investors backing the off-balance sheet vehicle (Dyson, 2019).

policy ($100 million) and maturity typically of say two or three years.[28] In this way, the insurance contract is fully collateralized. Although the term cat "bond" is used, the securities issued to investors are treated as non-voting equity for tax purposes, as there are no equity claims on the SPV. The premiums and the proceeds of the bond issue are placed in a trust and invested in highly rated securities. If there are no claims on the reinsurance contract, at the maturity of the bond issue, investors would receive their principal ($100 million) plus the promised coupon. If there are claims, then the sponsoring insurer is compensated for the claim costs and the investors' payoff is reduced accordingly.

The ILS market began in the late 1990s and has grown steadily with some setbacks during and following the financial crisis. The Artemis website, reports that there is about $40 billion of outstanding ILS principal as of August 2019. Recent issuers include Arch Capital (mortgages), FEMA (flood), the World Bank (pandemic), and PG&E (wildfire), as well as traditional issuers such as USAA and Nationwide (catastrophe). The intermediaries that are most active in this market include AON, Guy Carpenter Securities, Swiss Re, Goldman Sachs, and Credit Suisse. Specialized ILS funds are the primary purchasers of ILS; Table 5 lists the 25 largest ILS funds as of 2019.

Collateralized Reinsurance. The largest type of alternative reinsurance capital is collateralized reinsurance, which accounted for about $55 billion of the $97 billion in alternative capital transactions in 2018 (AON, 2019). In these private transactions, a ceding insurer essentially buys reinsurance from an investment fund, which either commits enough capital to a trust fund to fully collateralize the potential loss or pays a rated reinsurer to "front" the business (which may also require collateral).[29] The collateral is typically invested in highly rated securities. The structure of collateralized reinsurance is typically similar to ta side car structure, which is illustrated in Figure B1.

[28] Most ILS are issued under Rule 144A, impliying that they can be purchased only by Qualifying Institutional Buyers (QIB). There is a secondary market, although largely managed by one person – Craig Bonder at Bearch Hill Securities (Evans, 2019).

[29] Since the ceding insurer will typically wants to receive credit for the reinsurance from its regulatory body, it will need to purchase reinsurance from a regulated reinsurance entity. To provide such an institution, so-called reinsurance transformer entities are created with cells for each individual collateralized reinsurance transaction. The cell issues the reinsurance policy, receives the collateral from the investors, and returns the collateral and premiums back to the investors less the claim payments at the end of the contract period. Examples of transformer services are Solidum Re (Solidum Partners, 2019) and Aon's White Rock (2019).

Figure 1

Tax Costs for Different Portfolio Strategies
As a Function of the percentage of short term gains realized (ρ_S)

Four portfolios are considered:
(1) All fund returns are in the form of long-term capital gains ($\alpha,\beta,\kappa=0$).
(2) All fund returns are in the form of short-term capital gains ($\kappa=1$).
(3) All fund returns are in the form of interest ($\alpha=1$)
(4) All fund returns are in the form of dividends ($\beta=1$).

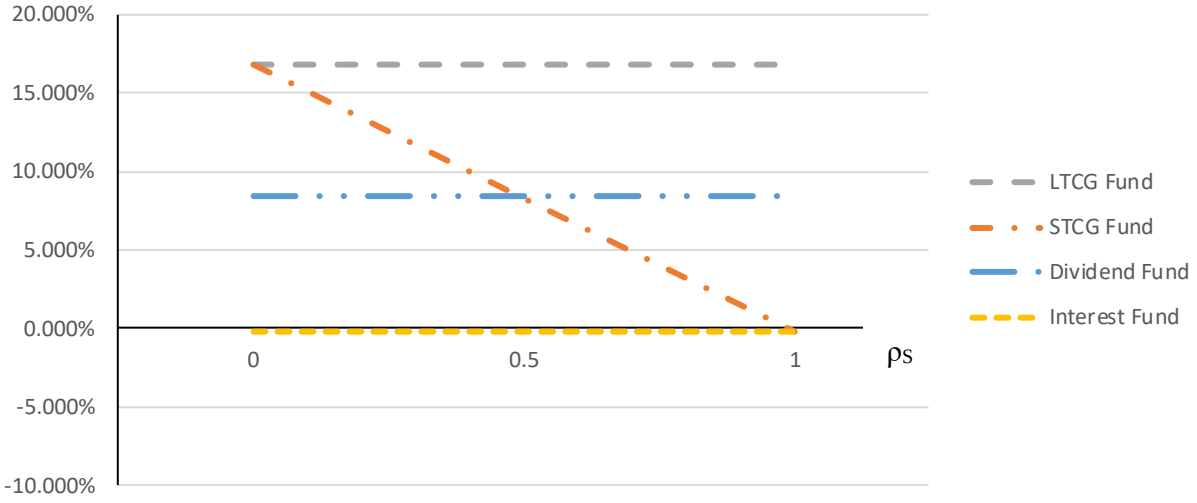


Table 1

Maximum Tax Rates Over Time

			Personal Tax Rates		
	DRD	Corporate	Ordnry income & STCG	Qualified Dividends	LTCG
1993-2002		35%	39.6%*	39.6%	20%
2003-2012	70%	35%	35.0%	15.0%	15%
2013-2017	70%	35%	39.6%	20.0%	20%
2018-	50%	21%	37.0%	20.0%	20%

- in 2001 and 2002, the maximum rate was 39.1% and 38.6%, respectively.

Table 2

Taxation of returns on a Portfolio held by a Hedge Fund investor and an Insurer Investor

		Tax Rates	
		Corporate	Personal
Interest = αR	Hedge Fund	0	τ_S
	Insurer	τ_c	τ_L
Dividends not s.t. DRD = $\beta (1-\varepsilon) R$	Hedge Fund	0	τ_L
	Insurer	τ_c	τ_L
Dividends s.t. DRD = $\varepsilon \beta R$	Hedge Fund	0	τ_L
	Insurer	0	τ_L
Realized STCG = $\kappa \rho_S R$	Hedge Fund	0	τ_S
	Insurer	τ_c	τ_L
Unrealized STCG = $\kappa (1 - \rho_S) R$	Hedge Fund	0	τ_L
	Insurer	τ_c	τ_L
Realized LTCG = $(1-\alpha-\beta-\kappa) \rho_L R$	Hedge Fund	0	τ_L
	Insurer	τ_c	τ_L
Unrealized LTCG = $(1-\alpha-\beta-\kappa)(1-\rho_L) R$	Hedge Fund	0	τ_L
	Insurer	τ_c	τ_L

Table 3

Tax Costs on Insurer Equity with Different Corporate Tax Rates

Tax costs are stated as a percentage of the total return on the asset portfolio. Prior to 2017 Tax Reform, the corporate tax rate is assumed to be 35% and the dividend received deduction (DRD) is 70%. Post-2017 Tax Reform the corporate tax rate is 21% and the DRD is 50%. Other assumptions: the return is equally divided between interest, dividends, short-term capital gains, and long-term capital gains (i.e., 25% from each), one-half of the capital gains (both short-term and long term) are realized, and one-half of all returns are paid out as a dividend. The corporate tax disadvantage is measured using the first term in equation (1) and the personal tax advantage is measured using the second term in equation (1)

	Prior to 2017 Tax Reform	Post-2017 Tax Reform
Corporate Tax Disadvantage	24.50%	14.70%
Personal Tax Advantage	7.35%	6.38%
Total Tax Costs	17.15%	8.32%

Table 4

Private and Sponsored Offshore Reinsurance Entities with Hedge Fund Connections

Private OSHFRs:

- Sandel Re, formed in 2014, assets managed by Sandell Asset Management Corp. Insurance liability to asset ratio equal to 28% in 2015 and 27% in 2016.
- Fidelis was created in 2015 with $1.5 billion from three PE firms; initially used a total return model with investments in multiple hedge funds; exited hedge fund strategy in 2017 and switched portfolio to a more traditional reinsurer portfolio with 80% of assets in fixed income and cash; now uses Goldman Sachs & JPMorgan as its investment managers.
- Pac Re. formed by Validus (John Paulson) in 2012; Leverage ratio <1% in 2012, shutdown in 2016.
- Sac Re. formed by Steven Cohen (SAC Capital) and Capital Z Partners in 2012; Leverage ratio 1.1% in '12; sold to Hamilton Re Group in 2013 after SAC Capital admitted to insider trading.
- AQR RE formed by AQR Capital Management in 2011; exited in 2015. Insurance liability to asset ratio = 15% in 2015 and 18% in 2016.

"Sponsored HFRs" by established insurers or reinsurers:

- ABR Re was formed by Chubb and Blackrock in 2015; assets managed by Blackrock; only reinsures risk from Chubb; Insurance Liability to asset ratio equal to 14% in 2016 and 32% in 2017.
- Harrington Re formed by AXIS and Blackstone in 2016; Insurance Liability to asset ratio equal to 16% in 2017 and 32.5% in 2018.
- Kayla Re formed in 2016 by Enstar (a $14 billion insurance group). A little less than half of its $620 million of capital come from Enstar and the other capital came from private equity firms: Hillhouse Capital Management (a Chinese investment firm with over $25 billion AUM) and Stone Point Capital. Assets managed by Hillhouse. In 2018, Enstar bought out the other owners.
- Kelvin Re formed by Credit Suisse Insurance Linked Strategies in 2014; insurance liability to asset ratio was 33% in 2017 and 44% in 2018.

Table B1

Largest 25 ILS Funds (September 2019)
(Source: Artemis.bm website)

Name	Location (HQ / domicile)	AUM ($m)	Launch
Nephila Capital	Bermuda	11,500	1997
Credit Suisse Ins Linked Strategies Ltd.	Zurich, Switzerland	8,000	2003
LGT ILS Partners Ltd.	Pfaeffikon, Switzerland	7,100	2001
Markel CATCo Investment Management	Bermuda	6,800	2010
Fermat Capital Management, LLC	Westport, Connecticut U.S.A.	6,300	2001
Stone Ridge Asset Management	New York	5,930	2012
Securis Investment Partners LLP	London	5,900	2005
Leadenhall Capital Partners LLP	London	5,500	2008
RenaissanceRe Holdings Ltd.	Bermuda	4,900	1993
AlphaCat Managers	Bermuda	4,100	2008
Aeolus Capital Management Ltd	Hamilton, Bermuda	4,000	2006
Elementum Advisors, LLC	Chicago, IL	4,000	2009
Twelve Capital AG	Zurich, Switzerland	4,000	2010
Schroder Investment Management	London	3,000	2008
Amundi Pioneer	Boston, MA	2,300	1928
Arch Underwriters Ltd.	Bermuda	1,700	2006
Hudson Structured Capital Management Ltd.	Stamford / Bermuda	1,700	2016
Hiscox Re Insurance Linked Strategies Ltd.	Bermuda	1,600	2014
SCOR Investment Partners	Paris, France	1,359	2011
AXA Investment Managers Paris	Paris, France	1,231	2007
AXIS Re Ventures	Bermuda	1,150	2013
Neuberger Berman ILS	New York and Bermuda	1,100	2009
Mt. Logan Re Ltd.	Bermuda	1,046	2013
Pillar Capital Management Limited	Bermuda	1,032	2008

Figure B1
Illustration of a Simplifed Structure of a Reinsurance Sidecar

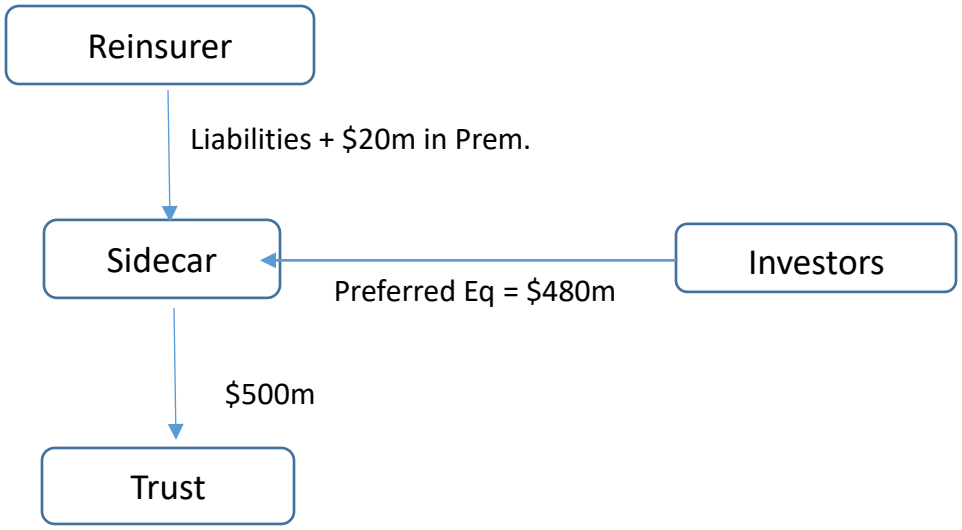
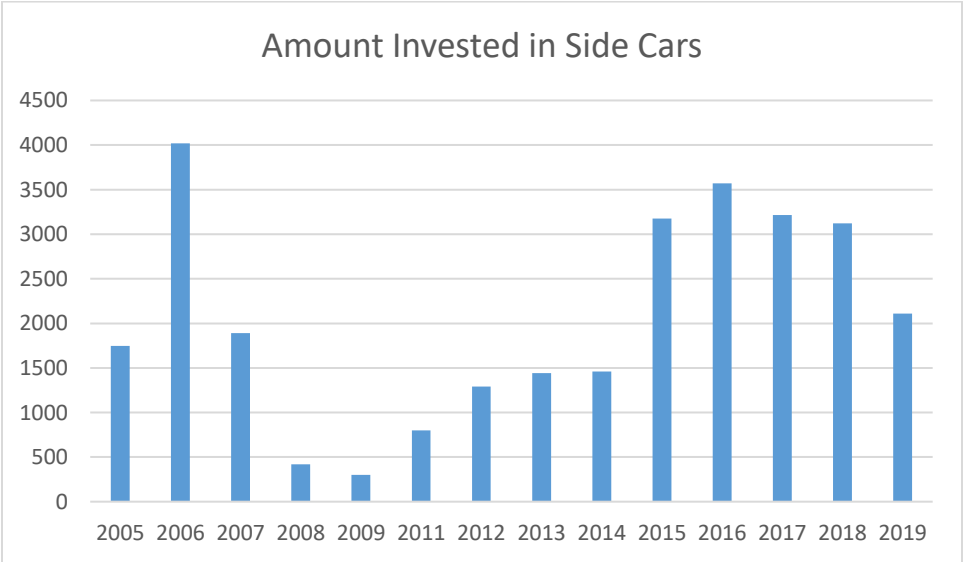
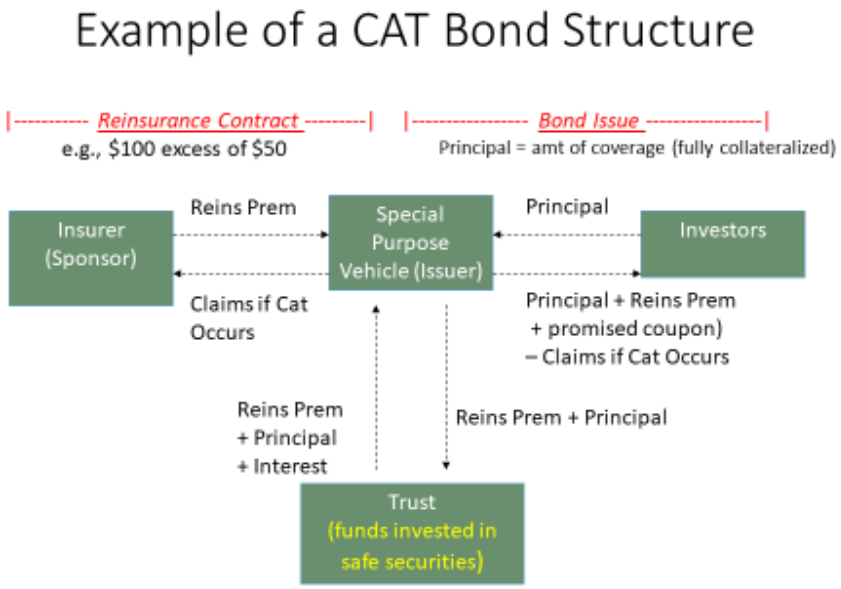


Figure B2



Source: Data are from the Artemis.bm website

Figure B3


Example of a CAT Bond Structure
Reinsurance Contract
e.g., $100 excess of $50
Bond Issue
Principal = amt of coverage (fully collateralized)
Insurer (Sponsor)
Reins Prem
Claims if Cat Occurs
Special Purpose Vehicle (Issuer)
Principal
Investors
Principal + Reins Prem + promised coupon) – Claims if Cat Occurs
Reins Prem + Principal + Interest
Reins Prem + Principal
Trust (funds invested in safe securities)