The Synergies of Hedge Funds and Reinsurance

Eric Andersen

May 13th, 2013

Advisor: Dwight Jaffee

Department of Economics

University of California, Berkeley

Acknowledgements

I would like to convey my sincerest gratitude to Dr. Dwight Jaffee, my advisor, whose support and assistance were crucial to this project's development and execution. I also want to thank Angus Hildreth for providing critical feedback and insightful input on my statistical methods and analyses. Credit goes to my Deutsche Bank colleagues for introducing me to and stoking my curiosity in a truly fascinating, but infrequently studied, field. Lastly, I am thankful to the UC Berkeley Department of Economics for providing me the opportunity to engage this project.

Abstract

Bermuda-based alternative asset focused reinsurance has grown in popularity over the last decade as a joint venture for hedge funds and insurers to pursue superior returns coupled with insignificant increases in systematic risk. Seeking to provide permanent capital to hedge funds and superlative investment returns to insurers, alternative asset focused reinsurers claim to outpace traditional reinsurers by providing exceptional yields with little to no correlation risk. Data examining stock price and asset returns of 33 reinsurers from 2000 through 2012 lends little credence to support such claims. Rather, analyses show that, despite a positive relationship between firms' gross returns and alternative asset management domiciled in Bermuda, exposure to alternative investments not only fails to mitigate market risk, but also may actually eliminate any exceptional returns asset managers would have otherwise produced by maintaining a traditional investment strategy.

Table of Contents

Section I: Introduction

Traditional insurance industry pitches to institutional and retail investors frequently focus on the low correlation of insurance returns with market returns. Over the last decade, Bermuda-based reinsurance companies have trended toward partnering with alternative asset managers. The relationship between the two is symbiotic: the reinsurance company gets access to top-tier, high-yielding asset management and the hedge funds receive access to a permanent base of capital. The interaction of hedge funds and reinsurers produces alternative asset focused reinsurers, which provide their insurance operations as a stable platform that asset managers can leverage to achieve large returns in non-traditional investments. Some investors protest that alternative asset focused reinsurers provide returns less stable than those of insurers primarily exposed to traditional stocks and bonds. To placate investor concerns, alternative asset focused firms pitch that outsourcing the management of their investment portfolios to hedge fund managers enable them to achieve high yield returns with limited correlation with the market. However, the veracity of such claims is uncertain. Pitches reliant on scant data and generalist language to support the logic of a “low beta, high alpha” investment thesis risk the trust, goodwill, and support of institutional and retail investors. Until the conceptual foundation of their investment theses can be backed by robust statistical analysis, alternative asset focused reinsurers operating from any locality, Bermuda or otherwise, are effectively convincing investors to trust hundreds of millions of dollars to that which amounts to untested hypotheses.

In this paper, I investigated those hypotheses as their authors present them and under their authors’ framework of assumptions. Specifically, I aimed to test three hypotheses. The first claim is that operating in Bermuda and investing in alternative assets are positively related to reinsurers’ returns. Stated explicitly, hypothesis one is as follows:

Hypothesis 1: Ceteris paribus, reinsurers' gross returns are the function of a positive relationship with Bermuda incorporation, a positive relationship with exposure to alternative asset investments, and a positive relationship with an interaction term.

The second claim posits that reinsurers that invest in alternative assets produce returns with less market correlation risk[1] than reinsurers that invest in stocks and bonds. The second hypothesis is stated explicitly as follows:

Hypothesis 2: Ceteris paribus, reinsurers' betas are negatively related to exposure to alternative asset investments.

The third claim I investigated argues that reinsurers exposed to alternative asset investments produce exceptional returns[2] superior to those produced by reinsurers focused on traditional equities and fixed income securities. I explicitly state the final hypothesis as the following:

Hypothesis 3: Ceteris paribus, reinsurers' alphas are positively related to exposure to alternative asset investments.

Using publicly-available equity prices and financial statements data to conduct a battery of regression analyses on each hypothesis, I found mixed results. The data support hypothesis 1 by showing alternative asset exposure in Bermuda may benefit firms' returns. However, after adjusting returns for risk, data show that alternative asset exposure aggravates returns' market correlation risk and hinders asset managers from producing alpha.

Before explaining my research methodology, I provide background on the financial institutions examined in this paper. With a comprehensive understanding of the forces that shape insurers and hedge fund managers, the motivations behind their venturing jointly into the

[1] Correlation risk is measured by beta of the Black-Jensen (1972) Capital Asset Pricing Model (CAPM).
[2] Exceptionality is measured by the Black-Jensen CAPM's alpha coefficient.

alternative asset focused reinsurance space are apparent, and my analyses' results can more logically inform the implications of a potentially-faulty investment thesis.

Section II: Industry Milieu

Insurance

The insurance and reinsurance[3] industry's capital structure is unique compared to those of other financial institutions. Specifically, insurance companies have two sources of leverage to fund their operations and boost the returns of their investment portfolios: debt and float. Although debt, typically acquired by issuing corporate bonds or by opening a revolving line of credit, does not distinguish insurance financing from that of other industries, float is a feature available only to insurers. Insurers operate on a collect-now, pay-later model: policy holders pay insurers a set amount (i.e., a premium) at the beginning of the insurance contract period in expectation that the insurers will cover policy holders' unexpected losses and expenses as they occur. During the period after insurance premiums are collected and before claims are paid, the premium revenue an insurer holds is called "float" (Nissim, 2010). Insurers pay no interest to policy holders in return for holding the float during this interim period. Any administrative costs incurred holding the float are minimal. Insurers can, and do, add float to their investment portfolios[4], investing the float as they wish. By supplementing the assets that an insurer invests while simultaneously remaining a liability to be paid out later, float acts like leverage. However, float remains distinct from debt in that the former does not oblige the holder to pay interest to the provider. In this respect, float is effectively, as Warren Buffet calls it, "free money," leveraging an investment portfolio without incurring any interest expense while it is used.

[3] For the purposes of this paper, I grouped the insurance and reinsurance industries together and use the terms "insurance" and "reinsurance" interchangeably. Although analyzing each industry would be interesting, such an analysis lies outside the scope of this paper and is left open for future research endeavors.

[4] The American insurance industry is regulated at the statewide level. Regulations on capital adequacy and capital requirement vary state by state. Depending on locality, the amount of float an insurer must hold in reserve changes.

Hedge Funds

"Hedge fund"[5] is a broadly defined term of varying meaning and no statutory definition. Academic, regulatory, and industry literature provide more than a dozen different interpretations on hedge fund structure, investment strategy, and regulatory schema.[6] Agreed upon by most sources, the term "hedge fund" describes an investment vehicle with set of common characteristics. First, hedge funds are private investment partnerships that are generally not available to retail investors. Hedge funds predominantly draw high net worth individuals, pension funds, funds of hedge funds, and other institutional investors (Mirsky & Cowell, The evolution of an industry: 2012 KPMG/AIMA Global Hedge Fund Survey, 2012). Most hedge funds allow their investors to redeem their investments periodically while typically limiting investors to a pre-determined number of redemptions per year (Ackermann, McEnally, & Ravenscraft, 1999). Second, hedge funds are actively managed and compensate investment managers predominantly on the basis of performance rather than solely as a fixed percentage of assets under management (AUM). Third, hedge funds are secretive by nature and rely on light regulatory burdens to avoid disclosing investment strategies. Fourth, hedge funds typically supplement their traditional investment portfolios of stocks and fixed income maturities with assets in non-traditional (i.e., alternative) investment classes (e.g., derivatives, credit swaps, private equity, and others). In summary, hedge funds are performance fee based, actively managed investment partnerships that are available to only sophisticated, exclusive investors who maintain control over the deployment of their invested assets; take significant positions in

[5] The term "hedge fund" and "alternative asset manager" are used interchangeably throughout this paper.
[6] See (Ang, Gorovyy, & van Inwegen, 2011), (Mirsky & Cowell, The value of the hedge fund industry to investors, markets, and the broader economy, 2012), (Lo, Risk Management for Hedge Funds: Introduction and Overview, 2001), and (Vaughan, 2003).

alternative asset investments; and face little regulatory pressures that force them to reveal their proprietary investment models.

A characteristic particular to hedge funds is the tendency to invest in alternative assets as well as traditional assets. "Alternative asset investments" is a catch-all concept that includes all types of assets and investments that do not fall under the scope of traditional assets and investments. Traditional assets conventionally include those in publicly-listed equity securities (i.e., stocks, ETFs, mutual funds, and index funds) and fixed income securities. Traditional assets share a set of common characteristics that distinguish them from alternative assets. First, traditional assets are liquid; they can be easily converted to cash at any time (Tobin, 1958). Second, they are transparent, and investors can easily perform due diligence at minimal cost and effort (Robert W. Baird & Co, 2010). In other words, accurately assessing the values and risk of traditional assets is simple and inexpensive. Third, they are not derivatives and do not derive their values from the value of underlying assets (United States Treasury, 2013). Lastly, investment opportunities in traditional assets are typically open to all classes of investors: institutional, accredited, and non-accredited (Lerner, Schoar, & Wang, 2008).

In contrast, alternative assets include[7] derivatives, such as options, futures, and credit swaps; commodities; precious metals; real estate; and distressed debt as well as investments in private equity, hedge funds, and venture capital. Compared to traditional assets, alternative assets are typically less liquid than traditional investments. They require more time or are more costly to liquidate, particularly under market conditions of economic stress (Robert W. Baird & Co, 2010). Many alternative investment opportunities are exclusive, open only to a small class of investors like major institutional investors and high net worth accredited investors. A popular

[7] See (Robert W. Baird & Co, 2010), (Skidmore, 2010), (Collimore, 2013), (Lerner, Schoar, & Wang, 2008), and (Lo, 2001).

outlet for portfolio diversification, alternative investments typically feature low correlation risk; however, they also vary considerably in performance, according to Lerner (2008). While many hedge fund managers are particularly adept at dealing with the benefits and costs of alternative assets, all hedge fund managers face the risk of operating under an extraordinarily volatile business model.

Although hedge funds are attractive investment vehicles that can take profitable advantage of investment opportunities otherwise unavailable to the public at large, their business model is fundamentally unstable, at risk of "blowing up" in any given market downturn. More specifically, hedge fund instability is a function of the interacting effects of investor confidence and redemption/liquidation risk (Taussig, 2010). When a given hedge fund produces low or lower-than-expected returns, its investors feel compelled to redeem their investments. While investor confidence poses comparatively little risk to traditional asset managers investing in highly liquid traditional asset classes on behalf of a large base of non-accredited, accredited, and institutional investors, investor redemptions create a burdensome cost for hedge fund managers investing in illiquid alternative asset classes (Agarwal, Daniel, & Naik, 2009).[8] At the onset of the financial crisis in the latter half of 2008, a mass trend of investors redeeming their investments cost global hedge fund industry to lose 25%[9] of total AUM in less than six months. High liquidation costs diminish hedge fund returns and, in turn, trigger a domino effect of further redemptions, additional transaction costs, and continually shrinking returns. Overall, while the hedge fund business model does well during periods of positive market conditions when hedge funds can generate high returns, it is particularly susceptible to failure during market downturns

[8] The OECD estimates hedge funds face transactions costs approximate to 25% of total investment return (Kelly, 2013).
[9] The 25% reduction amounted to roughly $500 billion (Kelly, 2013).

when the low returns hedge funds produce are compounded by the high costs of liquidating assets at the behest of investor redemptions.

To surmount the instability of the traditional hedge fund structure, alternative asset managers pursue permanent capital bases which grow and shrink at predictable intervals which investment managers can accommodate far easier than sudden investor flights. Most typical consumer, financial, industrial, or technology companies that need access to permanent capital can satisfy their capital needs by issuing equity on the stock market or acquire leverage, but neither option provides an effective solution for hedge fund managers. In regard to the former, while initial public offerings are a very effective way to access a broad base of permanent capital, most stock exchanges and securities regulation authorities necessitate that publicly-listed corporations adhered to strict financial disclosure requirements as well as a level of financial transparency to which most alternative asset managers are averse (Taussig, 2010). In other words, equity capital is incompatible with the secretive nature of the hedge fund industry which relies maintaining proprietary investment strategies in order to edge out competitors. In regard to the latter source of permanent capital, credit lines do not have strict public disclosure requirements, magnify gains and losses, and are compatible with the needs of hedge funds. Although debt leverage has been and continues to a be popular funding avenue for hedge fund managers, the most recent financial crisis highlighted the risk management issues hedge funds face in regard to deleveraging costs, particularly those incurred involuntarily (Dai & Sundaresan, 2012).[10] Expected hedge fund performance heavily depends not only on the success of asset management strategies but also on managers successfully handling credit line closures in the

[10] Prime brokers contract to provide funding under the condition a hedge fund does not fall below a specified trigger, typically connected to AUM or net asset value. If the trigger conditions are met, whether by fund underperformance or mass investor redemptions, then the broker can terminate funding by closing the hedge fund's line of credit.

event of underperformance or in the instance of mass redemptions. Involuntary deleveraging costs, like investor redemptions, exacerbate the instability of the hedge fund business model.

Alternative Asset Focused Reinsurance

Fortunately, there exists a viable, stable base of permanent capital that suits hedge funds' needs nearly perfectly: float. First, float is reliable. Policy holders are contractually obligated to pay premiums at specified intervals or risk losing coverage, a prospect that compels policy holders to pay premiums regardless of macroeconomic conditions. Second, changes in float are predictable and can be hedged. Assuming the insurance team can accurately monitor the average rate at which they are generating premiums and the average rate at which they pay claims and expenses, then the asset management team can accurately gauge the rate at which they should expect AUM to increase or decrease and can take hedging positions to protect the fund's performance. Third, float requires minimal disclosure. Compared to other public investment vehicles, reinsurers, both traditional and alternative asset focused, are required to disclose very little in terms of how they invest their assets. Even more, if a reinsurer contracts its asset management to a hedge fund, the hedge fund is required to disclose no more information than it would if it were investing solely the funds of high net worth individuals.

Both alternative asset managers and reinsurers are keenly aware of the opportunities the other offers. Simply, the relationship between alternative asset managers and reinsurers is symbiotic: alternative asset managers seek from reinsurers a safe, disclosure-minimizing permanent base of capital, and reinsurers seek from hedge funds high returns with low correlation risk (Davidoff, 2012). The relationship's logical conclusion is alternative asset focused reinsurers: firms that unite insurance and hedge fund teams to yield investment returns superior to those of traditional reinsurers and less prone to collapse than traditional hedge funds.

Although the alternative asset focused reinsurance industry has grown more popular over the past decade,[11] it is not a new concept (The Insurance Insider, 2005). Berkshire Hathaway has been perhaps the market's most charismatic hedge fund-reinsurance hybrid since Warren Buffet acquired control of it in 1964 (Taussig, 2010). Today's alternative asset focused reinsurers flock to Bermuda. In Bermuda, reinsurers are lightly regulated: they face low capital and capital adequacy requirements; they are required to disclose next to nothing regarding their investment activities; and, since Bermuda has a 0% corporate income tax rate, their earnings are not taxed (KPMG International, 2013).

[11] Of the 33 firms in my sample, seventeen of them are less than ten years old.

Section III: Methodology

Data Sources

The data in the paper focuses on quarterly and annual returns from the first quarter of 2000 through the fourth quarter of 2012 as well as asset allocations and firms' countries of incorporation. The primary data sources were Compustat,[12] Morningstar, company 10K's, and the Federal Reserve Bank of St. Louis. Compustat provided total asset, net income, and stock price data for the companies and index in my model. Morningstar provided asset allocation figures for corporations that were active as of April 2013, but not on those that were acquired or dissolved before Q4 of 2012.[13] I collected asset allocation data on the remaining firms from their most recent 10K reports. The Federal Reserve Bank of St. Louis provided the interest rates on 90 day Treasury Bonds, which I used as a proxy for the risk-free rate.

I composed my sample of 33 firms from a wide variety of publicly listed insurers.[14] I originally wanted to include private companies in my analysis since many private insurers in Bermuda are closely involved with American hedge funds. However, given the secretive nature of the private firms and lax reporting requirements, I decided to restrict my sample to public companies after I found that collecting data on private firms was costly and inefficient and frequently provided only unaudited financial data. While my sample is smaller than I prefer, I hope that the data being publicly-available and transparent makes the data set both reliable and independently verifiable.

[12] Compustat access furnished by Wharton Research Data Services

[13] Firms no longer operating under an active ticker symbol at the end of the last quarter included FSR, IPCR, ORH, and TRH

[14] A full list of ticker symbols and associated summary statistics are in Appendices A and B.

To measure returns, I analyzed two metrics: stock market price returns (ROR) and return on assets (ROA).[15] Although the former is the standard metric used in capital asset pricing model analyses, I found the latter also interesting since it gauges a firm's performance invariant to its leverage. Throughout my paper, I will provide two sets of results: one calculated using ROR and the other calculated using ROA.

Models

At its onset, analyzing the returns of Bermuda-based alternative asset focused reinsurers faced many obstacles. The primary difficulty was separating the portion of each firm's return that was generated by alternative asset investments from the portion of return that was generated by traditional investments. Publicly-available financial statements did not provide these data for all 33 firms in my sample. Fortunately, percent exposure to alternative asset investments, calculated as the percent of total assets invested in alternative asset investments, was available via Morningstar as well as via each firm's most recent 10K report. Rather than directly evaluating firms based on the percent of total income generated by either investment class, I used percent exposure[16] as a proxy to evaluate the level to which a firm was "alternative asset focused." Using this process, I conducted two sets of linear regression tests.

The first set of analyses models each firm's return as a function of Bermuda-based operations,[17] exposure to alternative asset investments, and an interaction term. This relationship is tested as a cross-section across all the insurers. Formatted as an equation, Model 1 is as follows:

$$E(r_i) = \rho_i + \omega_i(Bermuda_i) + \tau_i(Exposure_i) + \theta_i(Bermuda_i) * (Exposure_i) \quad (1)$$

[15] ROA equals net income divided by total assets.
[16] I used percent exposure as calculated in each firm's most recent 10K.
[17] I assumed country of operation is the incorporation jurisdiction on the cover page of each firm's most recent 10K.

In (1), r_i is the average return for each insurer averaged from the year 2000 through 2012; $Bermuda$ is a dummy variable that takes the value 1 for firms incorporated in Bermuda and 0 for those operating elsewhere, and $Exposure$ is the percent of total assets invested in alternative investments. To ascertain the total effect of Bermuda in Model 1, I took the discrete difference of (1) with respect to $Bermuda$[18] in the following:

$$\frac{\Delta E(r_i)}{\Delta Bermuda_i} = \omega_i + \theta_i(Exposure_i) \tag{1a}$$

Also, to be thorough, I created two additional models, Model 2 and Model 3, which measured the effect of Bermuda incorporation and exposure separately. They are as follows:

$$E(r_i) = \omega_{0i} + \omega_{1i}(Bermuda_i) \tag{2}$$

$$E(r_i) = \tau_{0i} + \tau_{1i}(Exposure_i) \tag{3}$$

Worth noting is that Models 1, 2, and 3 measure reinsurers' *gross* returns. Since the returns of Models 1, 2, and 3 are not adjusted for market correlation risk, they must be considered with regard to the second set of analyses.

The second set of analyses evaluated how insurers' returns vary in risk and exceptionality as a function of exposure to alternative assets. I tested risk and exceptionality separately as a two part analysis. In the first step, I adopted the Black-Jensen capital asset pricing model (CAPM) to measure beta and alpha of each firm. An adaptation of the original Sharpe-Lintner[19] CAPM, the Black-Fisher CAPM shows the expected return on the security *i* is a function of the expected return the market portfolio *M*, the expected risk-free rate,[20] and a constant:

---

[18] I would like to note that taking the partial derivative with respect to a dummy variable like $Bermuda$ is unorthodox since $Bermuda$ is not a continuous variable. The derivation in equation (1a) measures marginal effect on the dependent variable for a discrete change in the dummy variable from 0 to 1. To distinguish this differentiation from a traditional partial derivative, I denoted equation (1a) with Δ rather than the canon ∂.
[19] The traditional CAPM was proposed separately by Sharpe (1964) and Lintner (1965)
[20] As a proxy for the return of the market portfolio, I used the return of the Standard and Poor's 500 Composite Index; for the risk-free rate, the return on 90 Day United States Treasury Bills.

$$E(r_i) = \alpha_i + E(r_f) + \beta_i(E(r_M) - E(r_f)) \tag{4}$$

To evaluate systematic risk of the security *i* with the market portfolio, I rearranged equation (4):

$$E(r_i) - E(r_f) = \alpha_i + \beta_i(E(r_M) - E(r_f)) \tag{5}$$

I estimated the alpha and beta coefficients for each of the 33 insurers based on time series regressions over the full sample from the year 2000 through the year 2012. The original Sharpe-Lintner CAPM equation assumes the strong-form efficient markets hypothesis which, by assuming securities are fairly priced, effectively denies asset managers the ability to generate alpha (i.e., alpha strictly assumed to be zero) (Fama, 1970). Jensen (1968) proposes and Black, Jensen, & Scholes (1972) confirm that relaxing Fama's efficient markets assumption, inherent in the Sharpe-Lintner CAPM, more accurately models risk adjusted returns for both individual firms and multi-security portfolios. By relaxing this assumption and permitting for a non-zero alpha, Lo (2004) posits that CAPM more accurately evaluates the performance of alternative asset managers. Considering that alternative investments, by definition, execute in market conditions fundamentally dissimilar to those of the fixed income and equity markets (e.g., limited liquidity, costly investor due diligence, and/or exclusive investor bases), assuming the strong-form efficient markets hypothesis makes the Sharpe-Lintner CAPM ill-suited to evaluate hypothesis 3. The Black-Jensen CAPM does not require the assumption that all investors are rational and acknowledges the potential for exceptional returns beyond those predicted by a given level of risk. In effect, using the Black-Jensen CAPM lets my analysis consider insurers' returns after accepting alternative asset managers' claims to produce exceptional returns as given.[21]

[21] In Appendix E, I also provide the results for hypothesis 2 assuming the efficient markets hypothesis. Comparing to Appendix E to Table 2, the Sharpe-Lintner results effectively mirror the Black-Jensen results.

In a second stage regression analysis, I separately regressed each firm's betas and each firm's alpha, which were estimated in the time series regression (5), against the firm's percent exposure to alternative asset investments:

$$\beta_i = \gamma_{0i} + \gamma_{1i}(Exposure) \quad (6)$$

$$\alpha_i = \varphi_{0i} + \varphi_{1i}(Exposure) \quad (7)$$

With these final two equations, I evaluated hypotheses 2 and 3.

Section IV: Results

Hypothesis 1

Table 1[22]

		Model 1							Model 2			Model 3		
Return Type		ω	p-value	τ	p-value	θ	p-value	R^2	ω_1	p-value	R^2	τ_1	p-value	R^2
ROR	Month	-0.003	0.820	0.023	0.337	-0.025	0.606	0.092	-0.010	0.162	0.062	0.024	0.223	0.047
ROR	Quarter	-0.034	0.671	0.088	0.548	-0.100	0.731	0.075	-0.063	0.160	0.063	0.110	0.359	0.027
ROR	Annual	-0.203	0.612	0.375	0.609	1.748	0.235	0.102	0.081	0.729	0.004	0.668	0.270	0.039
ROA	Quarter	0.002	0.515	-0.006	0.175	0.008	0.362	0.254	0.004	0.009	0.202	-0.007	0.084	0.093
ROA	Annual	-0.002	0.855	-0.027	0.129	0.056	0.111	0.226	0.012	0.035	0.135	-0.021	0.163	0.062

Table 1 provides the regression estimates and matching notation for equations (1), (2), and (3) under Models 1, 2, and 3, respectively. Analyzing each firm's returns averaged over the years 2000 through 2012, I considered monthly (N = 156), quarterly (N = 52), and annual (N = 13) ROR data. Unfortunately, monthly ROA data was not available, so I analyzed only quarterly and annual ROA.

At first glance, ROR data appears mostly insignificant; however, by interpreting the results of ROA data, I hope to offer insight that suggests there may be more to the price return data than meets the eye. In Table 1, we observe for Model 1 (i.e., equation (1)) that annual ROA is higher (θ = 0.056, p = 0.111[23]) for Bermuda-based reinsurers exposed to alternative assets than for traditional, non-Bermudan reinsurers. In equation (1a), by taking the discrete difference of Model 1 with respect to $Bermuda$ we observe the cumulative effect of operating in Bermuda is positive for any firm with greater than zero percent exposure to alternatives (ω = -0.002, θ = 0.056).

Considering Model 2 (i.e., equation (2)) in Table 1, we recognize that operating in Bermuda exhibits a positive relationship with both annual (ω_1= 0.012, p = 0.035) and quarterly

[22] P-values less than 0.20 and greater than 0.10 (i.e., $0.10 < p < 0.20$) are highlighted yellow, those less than 0.10 and greater than 0.05 (i.e., $0.05 < p < 0.10$) are highlighted orange, and those less than 0.05 (i.e., $p < 0.05$) are highlighted red.
[23] ω = -0.002, p = 0.855; τ = -0.027, p = 0.129

(ω_1= 0.004, p = 0.009) ROA; however, the results of Model 1 show Model 2's relationship is overstated. The regression coefficient on $Bermuda$ in Model 2 disappears in Model 1, which demonstrates that Model 2 fails to account for the correlation between $Bermuda$ and $Exposure$. In short, the results suggest for firms seeking higher ROA that while operating from Bermuda is beneficial, operating in Bermuda *and* investing in alternative assets is even more productive. In Model 3 on both an annual (τ_1= -0.021, p = 0.163) and a quarterly (τ_1= -0.007, p = 0.084) basis, we observe a negative relationship between $Exposure$ and ROA, which, considered with regard to Model 1, suggests that firms seeking alternative asset exposure are rewarded only when doing so from a base of operations in Bermuda.

After considering the observed relationships in ROA data, we realize that the ROR regression estimates in Table 1 may offer a more compelling story regarding the relationship between ROR and the independent variables in Models 1, 2, and 3 than their respective p-values suggest. Unfortunately, the small sample size (N = 33) provides to the price returns regressions insufficient statistical power to yield significant results. Avoiding the urge to assume for ROR the relationships we observed for ROA, we consider in Table 1 only the ROR regression estimates with statistically significant p-values. Equation 2 (i.e., Model 2 in Table 1) hints at a negative relationship between $Bermuda$ and ROR on a monthly (ω_1= -0.010, p = 0.162) and a quarterly (ω_1= -0.063, p = 0.160) basis; but the data's collinear nature, which I inferred from the ROA analyses, robs Model 1 of sufficient statistical power to observe any interaction effect of $Bermuda$ and $Exposure$. As a result, despite the temptation to infer the interaction effect on ROR from the observed effect on ROA, the ROR analyses provide unsatisfying results that only show a tendency for investors to dislike reinsurers operating in Bermuda, regardless of alternative asset exposure.

In regard to hypothesis 1, the cross-section analyses tell two stories: one about firms' performance and one about how investors receive that performance. The first story, drawn from the ROA analyses, confirms hypothesis 1: reinsurers generate higher gross returns while operating in Bermuda with alternative asset exposure. Although firms operating in Bermuda generally observe higher net incomes, a fact potentially the result of Bermuda's non-existent corporate tax rate, those also exposed to alternative assets see net incomes even greater. However, the second story shows that equity investors are not impressed: although Bermudan insurers can achieve higher ROA with more exposure to alternative assets, their stock trades at a discount relative to the stock of insurers based elsewhere. Explanation for the observed relationships estimated in Table 1 may be offered in Table 2, to which we now turn, and the ensuing analyses of hypotheses 2 and 3.

Hypotheses 2 and 3

Table 2[24]

Significance Level			All p-values					p-value < 0.05				
Return Type		DV	γ_1	p-value	γ_0	p-value	R^2	γ_1	p-value	γ_0	p-value	R^2
ROR	Annual	β	0.618	0.763	1.189	0.071	0.003	0.373	0.426	0.753	0.000	0.054
ROR	Quarter	β	1.463	0.538	0.875	0.243	0.012	0.925	0.021	0.650	0.000	0.211
ROA	Annual	β	-1.174	0.147	1.422	0.000	0.067	-0.625	0.153	1.304	0.000	0.150
ROA	Quarter	β	-0.966	0.366	1.082	0.003	0.026	-0.226	0.613	1.121	0.000	0.019
Return Type		DV	ϕ_1	p-value	ϕ_0	p-value	R^2	ϕ_1	p-value	ϕ_0	p-value	R^2
ROR	Annual	α	0.755	0.209	0.028	0.881	0.050	-*	-	-	-	-
ROR	Quarter	α	0.115	0.348	0.019	0.614	0.028	-	-	-	-	-
ROA	Annual	α	-0.021	0.223	0.009	0.099	0.048	-0.029	0.277	0.011	0.320	0.117
ROA	Quarter	α	-0.006	0.268	0.004	0.016	0.039	-0.016	0.149	0.006	0.068	0.142

*[25]

[24] *P*-values less than 0.20 and greater than 0.10 (i.e., $0.10 < p < 0.20$) are highlighted yellow, those less than 0.10 and greater than 0.05 (i.e., $0.05 < p < 0.10$) are highlighted orange, and those less than 0.05 (i.e., $p < 0.05$) are highlighted red.

[25] As significance requirements increase, sample size decreases. Empty boxes indicate a sample size too small to compute regression coefficients. Since statistically significant regression estimates for alpha were too few in

Table 2 provides the regression estimates and matching notation for equations (6) and (7). My regression analyzed the determinants of each firm's betas and alphas[26] in terms of alternative asset exposure. The regression of equation (6) estimated the relationship between beta and alternative asset exposure, and the regression of equation (7) estimated the relationship between alpha and alternative asset exposure.

Table 2 presents the regression results of the Black-Jensen CAPM coefficients according to increasing sampling frequency (i.e., by year and by quarter). In other words, the "annual" rows contain the observed relationship between a CAPM coefficient (i.e., either beta or alpha), calculated using annual returns, and alternative asset exposure. The "quarter" rows contain the observed relationship between a CAPM coefficient (i.e., either beta or alpha), calculated using annual returns, and alternative asset exposure.

In stark contrast to hypothesis 2, alternative asset exposure does not mitigate the riskiness of stock price returns; rather, increasing exposure to alternative assets increases a reinsurance stock's market correlation risk. Considering only ROR betas with p-values less than 0.05, there is a significant, positive relationship (γ_1= 0.925, p = 0.021, N = 25) between quarterly ROR market correlation risk and exposure to alternative assets. Although the relationship falls in significance when I expand the sample to include betas of all p-values (N = 33), its magnitude grows. In short, alternative asset exposure increases the riskiness of a firm's stock price returns, a fact which makes the regression results of Model 1 (i.e., equation (1)) much less impressive.

ROA data tells a different, but equally disappointing story. First, there is no evidence of alternative asset exposure mitigating ROA risk on a quarterly level, and there is only a vestige of

---

number to analyze, I decided to avoid speculating on their relationship with exposure and did not discuss them in this paper.

[26] See Appendix C for a full list of each firm's Black-Jensen CAPM coefficients estimated by equation (5).

risk mitigation effect on annual betas. Both when restricting the sample to only annual betas with p-values less than 0.05 (γ_1= -0.625, p = 0.021, R^2 = 0.150, N = 15) and when considering the entire sample of 33 firms (γ_1= -1.174, p = 0.174, R^2 = 0.067), alternative asset exposure exhibits only a marginally significant, negative relationship that explains only a small portion of the variation observed in beta.[27] Second, the data suggest that any alpha a reinsurer may be able to generate is quickly eliminated as insurers increase their exposure to alternative assets. Restricting the sample to only quarterly alphas significant at the 0.05 level, we observe a negative relationship (φ_1= -0.016, p = 0.149; φ_0= 0.006, p = 0.068; N = 16). We observe the same relationship (φ_1= -0.006, p = 0.268; φ_0= 0.004, p = 0.016), albeit with lesser statistical significance, when we consider all alphas. Tackling both hypotheses 2 and 3 together, the ROA data explain that alternative asset exposure not only has little to no effect on mitigating riskiness, but also eliminates any exceptional returns that asset managers produce.

[27] The regression results in Appendix E used the estimated Sharpe-Lintner CAPM regression coefficients, listed for each firm in Appendix D, and show that the observed Black-Jensen CAPM relationships in equation (6), both for price return and ROA, hold when we assume the efficient markets hypothesis inherent in the Sharpe-Lintner CAPM.

Section V: Conclusion

In short, given the data, alternative asset focused reinsurers' claims to generate superior returns with little additional correlation risk have yet to be realized. Although there may be some truth to producing greater ROA by investing in alternatives and operating out of Bermuda, adjusting those returns for correlation risk highlights that those greater returns are neither exceptional beyond those produced by traditional reinsurers nor worth the additional risk they incur. Equity returns are also disappointing: Bermudan reinsurers are penalized for their country of operation, and their returns grow more risky as alternative asset exposure increases. Stopping short of labeling alternative asset reinsurers' claims as disproven, I propose that there is insufficient data to support their hypotheses. In fact, I wish to clarify further on why my analysis is not the death knell of Bermuda-based alternative asset focused reinsurance.

Although the data analyses do not speak well of non-traditional reinsurers, they focus on a relatively immature industry over an extraordinarily difficult period of time. The insurance industry was particularly hard hit during the 2008 financial crisis which witnessed giants, like AIG, previously considered too-big-to-fail nearing collapse. Apart from causing uncharacteristically large swings in equity prices and net income figures reflected in my data set, the numerous financial crises[28] throughout my time period instigated unprecedented changes in the benchmark and risk-free rates that played key roles in my analyses. In other words, the alternative asset focused reinsurance space warrants reexamination in the future within the scope of a longer sampling period, when the major effects of one-time events will wield less undue influence on the sample. Ideally, this future data set will yield results of greater statistical power that can either corroborate or refute my findings from the current data set.

[28] Crises include the dot-com bust, the Great Recession, and the ongoing European debt crisis.

There exist additional, very interesting factors that can supplement future research efforts but were not analyzed in the course of my paper. First, differentiating between property and casualty (i.e., P&C) insurance and catastrophe (i.e., CAT) insurance would provide insight on the role business lines play with generating float and the resulting effect on the efficacy of alternative asset management. P&C insurance pays less expensive claims on a more frequent basis to a larger base of policyholders relative to CAT insurance. In effect, P&C float has a shorter lifespan than CAT float but is generated at a faster rate and may be substantially more dependable and stable. Studying the implications for alternative asset managers would yield informative results. Second, future research should examine how the effects of alternative asset exposure vary across the reinsurance and insurance industries. Although I grouped the industries together for the sake of simplicity, splitting and analyzing the data between the less risk-prone reinsurance and more risk-prone insurance industries may yield a more satisfying data set. Lastly, including private reinsurers in the sample would provide additional statistical power to ROA data. Unfortunately, collecting data on private firms, both those based in Bermuda and those based elsewhere, is an elusive goal[29] which requires to achieve more sources than I have currently have at my disposal. With these considerations, I eagerly await further contributions to such an exciting field of research.

[29] Also, private data should be considered with caution as it may be less reliable if it has not been thoroughly audited and verified by an independent source.

Section VI: Appendices

Appendix A

Return Type	Price Returns (ROR)					
Frequency	Annual			Quarterly		
Firm	Mean	Std Deviation	N	Mean	Std Deviation	N
R_f	0.020	0.019	52*	0.004	0.004	52
R_M	0.035	0.191	13	0.008	0.089	52
ACE	0.069	0.186	12	0.033	0.129	51
ACGL	0.143	0.307	12	0.034	0.143	51
AGII	0.067	0.254	12	0.023	0.160	51
AHL	0.035	0.115	9	0.011	0.098	35
AIG	1.462	5.261	12	0.676	5.196	51
ALL	0.018	0.232	12	0.021	0.149	51
ALTE	0.104	0.370	11	0.022	0.120	45
AWH	0.116	0.172	6	0.033	0.108	25
AXS	0.030	0.159	9	0.014	0.108	37
BRK.B	-0.031	0.338	12	-0.002	0.164	51
ENH	0.488	1.450	10	0.018	0.104	39
ESGR	3.263	7.912	6	0.016	0.136	23
FSR	-0.092	0.264	4	-0.013	0.130	21
GLRE	0.087	0.448	5	0.014	0.154	22
HCC	0.036	0.150	12	0.027	0.122	51
IPCR	0.070	0.230	8	0.031	0.117	38
MET	0.022	0.226	12	0.022	0.155	50
MHLD	0.394	0.630	4	0.040	0.207	18
MRH	0.006	0.227	10	0.001	0.113	40
ORH	0.181	0.210	7	0.061	0.164	32
PRE	0.031	0.131	12	0.021	0.112	51
PRU	0.113	0.337	11	0.036	0.221	43
PTP	0.068	0.153	10	0.018	0.089	40
RE	0.054	0.209	12	0.032	0.137	51
RGA	0.048	0.179	12	0.024	0.127	51
RNR	0.041	0.249	12	0.027	0.146	51
SSREY	-0.020	0.212	12	0.022	0.228	51
TKOMY	0.001	0.369	12	0.002	0.158	51
TRH	-0.032	0.228	11	0.001	0.122	48
UVE	1.619	4.684	12	0.378	2.090	51
VR	0.060	0.055	5	0.023	0.113	21
WTM	0.075	0.262	12	0.040	0.169	51
XL	0.244	1.207	12	0.021	0.258	51

*Note: For illustrative purposes, I averaged the annualized return for 90 day Treasury Bills quoted on a quarterly basis. However, regressions were calculated using listwise elimination, so only the annualized return quoted on an annual basis was factored into the regression.

Appendix B

Return Type	Return on Assets (ROA)					
Frequency	Annual			Quarterly		
Firm	Mean	Std Deviation	N	Mean	Std Deviation	N
R_f	0.020	0.019	52*	0.004	0.004	52
R_M	0.022	0.008	12	0.005	0.002	48
ACE	0.022	0.013	13	0.006	0.005	51
ACGL	0.032	0.023	13	0.009	0.011	51
AGII	0.007	0.027	13	0.002	0.010	51
AHL	0.030	0.034	10	0.008	0.016	38
AIG	0.005	0.039	13	0.001	0.013	52
ALL	0.014	0.012	13	0.004	0.004	51
ALTE	0.017	0.020	13	0.005	0.008	47
AWH	0.038	0.030	8	0.012	0.008	30
AXS	0.051	0.034	10	0.011	0.014	38
BRK.B	0.032	0.012	13	0.008	0.005	51
ENH	0.038	0.040	11	0.010	0.015	41
ESGR	0.034	0.016	8	0.010	0.013	28
FSR	0.020	0.093	7	0.004	0.029	24
GLRE	0.038	0.085	7	0.010	0.036	25
HCC	0.032	0.011	13	0.008	0.004	51
IPCR	0.055	0.118	9	0.013	0.057	38
MET	0.006	0.004	13	0.001	0.002	51
MHLD	0.013	0.010	5	0.004	0.008	20
MRH	0.039	0.100	11	0.012	0.039	44
ORH	0.031	0.025	10	0.008	0.009	36
PRE	0.025	0.028	13	0.007	0.013	51
PRU	0.004	0.003	13	0.001	0.001	46
PTP	0.002	0.095	13	0.007	0.019	42
RE	0.025	0.021	13	0.007	0.009	51
RGA	0.014	0.004	13	0.004	0.002	51
RNR	0.064	0.051	13	0.016	0.020	51
SSREY	0.009	0.008	13	0.002	0.004	36
TKOMY	0.010	0.009	12	0.004	0.007	30
TRH	0.023	0.013	11	0.005	0.006	48
UVE	0.018	0.053	13	0.005	0.022	51
VR	0.058	0.054	7	0.017	0.021	25
WTM	0.029	0.038	13	0.007	0.021	51
XL	0.001	0.024	13	0.001	0.011	51

*Note: For illustrative purposes, I averaged the annualized return for 90 day Treasury Bills quoted on a quarterly basis. However, regressions were calculated using listwise elimination, so only the annualized return quoted on an annual basis was factored into the regression.

Appendix C[30]

Return Type		Price Returns (ROR)						Return on Assets (ROA)					
Frequency		Annual			Quarterly			Annual			Quarterly		
Firm	Coefficient	Value	p-value	R^2	Value	p-value	R^2	Value	p-value	R^2	Value	p-value	R^2
ACE	β_i	0.690	0.010	0.504	0.863	0.000	0.367	1.196	0.000	0.788	1.197	0.000	0.581
	α_i	0.047	0.257		0.029	0.047		-0.001	0.699		0.000	0.812	
ACGL	β_i	-0.078	0.880	0.002	0.486	0.029	0.093	1.650	0.002	0.623	1.652	0.000	0.268
	α_i	0.129	0.189		0.030	0.126		0.008	0.265		0.003	0.130	
AGII	β_i	0.505	0.210	0.152	0.849	0.000	0.228	1.273	0.032	0.384	1.263	0.002	0.188
	α_i	0.047	0.511		0.019	0.329		-0.016	0.086		-0.004	0.024	
AHL	β_i	0.485	0.025	0.534	0.612	0.001	0.279	1.020	0.195	0.200	0.919	0.196	0.052
	α_i	0.005	0.874		0.003	0.833		0.008	0.545		0.003	0.397	
AIG	β_i	11.996	0.161	0.187	15.306	0.061	0.070	0.853	0.198	0.159	0.835	0.068	0.071
	α_i	1.327	0.378		0.689	0.336		-0.020	0.078		-0.005	0.014	
ALL	β_i	0.683	0.056	0.318	0.890	0.000	0.290	0.661	0.003	0.611	0.652	0.000	0.331
	α_i	-0.004	0.948		0.018	0.315		-0.007	0.022		-0.002	0.003	
ALT	β_i	1.427	0.010	0.543	0.960	0.000	0.499	1.140	0.007	0.539	1.052	0.001	0.229
	α_i	0.054	0.518		0.012	0.371		-0.005	0.363		-0.001	0.484	
AWH	β_i	0.697	0.020	0.777	0.501	0.022	0.209	1.516	0.061	0.470	0.912	0.013	0.232
	α_i	0.097	0.059		0.028	0.166		0.011	0.404		0.006	0.001	
AXS	β_i	0.534	0.086	0.362	0.893	0.000	0.490	0.515	0.515	0.055	0.382	0.539	0.012
	α_i	-0.001	0.980		0.002	0.869		0.032	0.038		0.007	0.015	
BRK.B	β_i	0.257	0.649	0.022	0.317	0.222	0.030	0.919	0.001	0.678	0.916	0.000	0.364
	α_i	-0.049	0.636		-0.006	0.807		0.010	0.013		0.003	0.001	
ENH	β_i	3.861	0.164	0.227	0.852	0.000	0.480	1.024	0.247	0.145	0.890	0.190	0.049
	α_i	0.275	0.557		0.003	0.813		0.017	0.247		0.005	0.080	
ESGR	β_i	0.807	0.967	0.000	0.837	0.001	0.397	0.492	0.060	0.470	-0.523	0.437	0.028
	α_i	3.243	0.422		0.011	0.633		0.013	0.014		0.009	0.009	
FSR	β_i	0.728	0.253	0.558	0.653	0.012	0.289	-1.007	0.611	0.056	-2.547	0.187	0.090
	α_i	-0.088	0.498		-0.015	0.541		0.010	0.797		0.011	0.241	
GLRE	β_i	1.446	0.117	0.614	0.804	0.009	0.295	0.059	0.974	0.000	-0.186	0.933	0.000
	α_i	0.055	0.727		0.011	0.689		0.021	0.573		0.008	0.450	
HCC	β_i	0.481	0.043	0.348	0.293	0.127	0.047	1.085	0.001	0.681	1.059	0.000	0.542
	α_i	0.016	0.675		0.023	0.167		0.009	0.040		0.003	0.000	
IPCR	β_i	0.032	0.948	0.001	0.410	0.052	0.101	4.495	0.257	0.179	4.984	0.121	0.065
	α_i	0.049	0.618		0.030	0.109		0.052	0.273		0.012	0.229	
MET	β_i	0.883	0.004	0.588	1.169	0.000	0.469	0.892	0.000	0.790	0.884	0.000	0.732
	α_i	-0.002	0.956		0.018	0.269		-0.016	0.000		-0.004	0.000	
MHLD	β_i	4.859	0.260	0.547	0.967	0.026	0.272	0.958	0.169	0.520	0.205	0.834	0.003
	α_i	-0.205	0.702		0.028	0.526		-0.008	0.500		0.003	0.594	
MRH	β_i	0.500	0.283	0.142	0.562	0.008	0.170	2.628	0.219	0.162	2.288	0.170	0.049
	α_i	-0.035	0.661		-0.010	0.567		0.009	0.780		0.005	0.494	
ORH	β_i	-0.030	0.947	0.001	0.629	0.053	0.119	2.211	0.039	0.478	1.796	0.002	0.259
	α_i	0.157	0.135		0.056	0.051		0.016	0.164		0.004	0.018	

(Continued)

[30] *P*-values less than 0.20 and greater than 0.10 (i.e., $0.10 < p < 0.20$) are highlighted yellow, those less than 0.10 and greater than 0.05 (i.e., $0.05 < p < 0.10$) are highlighted orange, and those less than 0.05 (i.e., $p < 0.05$) are highlighted red.

Appendix C[31]
(Continued)

Return Type		Price Returns (ROR)						Return on Assets (ROA)					
Frequency		Annual			Quarterly			Annual			Quarterly		
Firm	Coefficient	Value	p-value	R^2	Value	p-value	R^2	Value	p-value	R^2	Value	p-value	R^2
PRE	β_i	0.439	0.024	0.415	0.602	0.000	0.236	0.986	0.091	0.259	1.099	0.029	0.100
	α_i	0.012	0.705		0.018	0.199		0.001	0.897		0.001	0.732	
PRU	β_i	1.452	0.001	0.702	1.732	0.000	0.496	0.999	0.000	0.891	0.967	0.000	0.843
	α_i	0.063	0.310		0.023	0.345		-0.018	0.000		-0.004	0.000	
PTP	β_i	0.285	0.362	0.105	0.518	0.001	0.238	2.165	0.245	0.132	1.045	0.181	0.048
	α_i	0.038	0.493		0.008	0.535		-0.027	0.379		0.001	0.778	
RE	β_i	0.875	0.002	0.621	0.645	0.002	0.179	0.943	0.039	0.362	0.920	0.006	0.153
	α_i	0.030	0.458		0.029	0.107		0.002	0.785		0.001	0.530	
RGA	β_i	0.770	0.001	0.676	0.793	0.000	0.315	1.078	0.000	0.898	1.078	0.000	0.815
	α_i	0.025	0.428		0.021	0.171		-0.008	0.001		-0.002	0.000	
RNR	β_i	0.769	0.044	0.346	0.462	0.044	0.081	1.084	0.307	0.104	0.986	0.199	0.036
	α_i	0.018	0.774		0.023	0.240		0.041	0.036		0.011	0.001	
SSREY	β_i	0.853	0.004	0.586	1.493	0.000	0.346	0.878	0.000	0.918	0.862	0.000	0.505
	α_i	-0.044	0.315		0.020	0.450		-0.013	0.000		-0.003	0.000	
TKOMY	β_i	0.864	0.154	0.192	0.459	0.065	0.068	0.791	0.017	0.452	0.118	0.750	0.004
	α_i	-0.022	0.830		-0.002	0.930		-0.012	0.029		0.001	0.661	
TRH	β_i	0.948	0.003	0.652	0.840	0.000	0.400	1.196	0.001	0.717	0.795	0.001	0.220
	α_i	-0.047	0.302		-0.002	0.868		0.002	0.645		0.000	0.966	
UVE	β_i	1.751	0.826	0.005	1.302	0.697	0.003	1.835	0.094	0.255	1.602	0.055	0.078
	α_i	1.586	0.288		0.375	0.210		-0.007	0.685		-0.001	0.779	
VR	β_i	0.121	0.350	0.289	0.453	0.053	0.183	0.683	0.600	0.059	-1.279	0.350	0.046
	α_i	0.056	0.101		0.022	0.354		0.037	0.188		0.021	0.006	
WTM	β_i	0.997	0.009	0.511	0.983	0.000	0.275	0.444	0.481	0.051	0.347	0.652	0.004
	α_i	0.050	0.397		0.037	0.073		0.006	0.588		0.002	0.549	
XL	β_i	3.406	0.074	0.284	1.672	0.000	0.337	0.682	0.112	0.233	0.658	0.096	0.059
	α_i	0.194	0.545		0.019	0.525		-0.020	0.013		-0.005	0.005	

[31] 31 *P*-values less than 0.20 and greater than 0.10 (i.e., $0.10 < p < 0.20$) are highlighted yellow, those less than 0.10 and greater than 0.05 (i.e., $0.05 < p < 0.10$) are highlighted orange, and those less than 0.05 (i.e., $p < 0.05$) are highlighted red.

Appendix D[32]

Return Type		Price Returns (ROR)						Return on Assets (ROA)					
Frequency		Annual			Quarterly			Annual			Quarterly		
Firm	Coefficient	Value	p-value	R^2	Value	p-value	R^2	Value	p-value	R^2	Value	p-value	R^2
ACE	β_i	0.704	0.009	0.482	0.859	0.000	0.346	1.184	0.000	0.786	1.191	0.000	0.586
ACGL	β_i	-0.039	0.942	0.001	0.482	0.033	0.088	1.729	0.001	0.621	1.758	0.000	0.289
AGII	β_i	0.519	0.185	0.154	0.846	0.000	0.224	1.113	0.072	0.264	1.108	0.008	0.141
AHL	β_i	0.490	0.015	0.546	0.615	0.001	0.281	1.173	0.107	0.263	1.132	0.090	0.085
AIG	β_i	12.394	0.143	0.185	15.204	0.063	0.068	0.652	0.362	0.076	0.640	0.176	0.039
ALL	β_i	0.682	0.045	0.318	0.888	0.000	0.284	0.587	0.016	0.424	0.578	0.000	0.248
ALT	β_i	1.465	0.006	0.549	0.971	0.000	0.502	1.087	0.007	0.500	0.994	0.001	0.221
AWH	β_i	0.746	0.041	0.598	0.519	0.020	0.207	1.707	0.027	0.525	1.513	0.000	0.397
AXS	β_i	0.533	0.063	0.368	0.896	0.000	0.495	1.149	0.230	0.155	0.906	0.157	0.060
BRK.B	β_i	0.243	0.654	0.019	0.318	0.216	0.030	1.018	0.002	0.584	1.027	0.000	0.365
ENH	β_i	4.307	0.098	0.275	0.858	0.000	0.489	1.328	0.132	0.212	1.337	0.043	0.109
ESGR	β_i	2.445	0.896	0.004	0.842	0.001	0.398	0.727	0.058	0.424	0.586	0.347	0.038
FSR	β_i	0.739	0.186	0.494	0.649	0.011	0.282	-0.833	0.622	0.043	-0.894	0.493	0.024
GLRE	β_i	1.471	0.065	0.613	0.807	0.007	0.295	0.421	0.795	0.012	0.942	0.561	0.016
HCC	β_i	0.486	0.033	0.349	0.289	0.135	0.044	1.176	0.001	0.624	1.170	0.000	0.509
IPCR	β_i	-0.027	0.952	0.001	0.370	0.082	0.080	2.732	0.446	0.074	3.901	0.207	0.043
MET	β_i	0.882	0.002	0.588	1.168	0.000	0.462	0.734	0.040	0.330	0.723	0.000	0.316
MHLD	β_i	3.714	0.089	0.673	0.995	0.020	0.281	0.626	0.097	0.539	0.680	0.105	0.166
MRH	β_i	0.443	0.294	0.121	0.545	0.009	0.164	2.799	0.153	0.193	2.675	0.088	0.073
ORH	β_i	-0.154	0.770	0.015	0.625	0.065	0.105	1.657	0.092	0.314	1.634	0.006	0.199
PRE	β_i	0.442	0.017	0.415	0.599	0.000	0.229	0.998	0.069	0.269	1.128	0.022	0.107
PRU	β_i	1.497	0.001	0.692	1.748	0.000	0.496	0.823	0.032	0.355	0.669	0.000	0.278
PTP	β_i	0.347	0.239	0.150	0.531	0.001	0.249	1.898	0.292	0.100	1.115	0.128	0.060
RE	β_i	0.884	0.002	0.613	0.641	0.002	0.170	0.962	0.026	0.375	0.955	0.004	0.166
RGA	β_i	0.777	0.001	0.666	0.790	0.000	0.305	0.994	0.000	0.723	1.002	0.000	0.691
RNR	β_i	0.774	0.034	0.348	0.458	0.046	0.077	1.486	0.238	0.124	1.432	0.090	0.060
SSREY	β_i	0.840	0.004	0.553	1.490	0.000	0.342	0.745	0.013	0.441	0.565	0.003	0.248
TKOMY	β_i	0.857	0.137	0.189	0.459	0.063	0.068	0.675	0.068	0.272	0.199	0.529	0.015
TRH	β_i	0.950	0.002	0.624	0.841	0.000	0.400	1.198	0.001	0.713	0.797	0.001	0.226
UVE	β_i	2.227	0.782	0.007	1.247	0.711	0.003	1.766	0.087	0.243	1.563	0.055	0.076
VR	β_i	0.146	0.411	0.174	0.456	0.050	0.179	1.325	0.336	0.154	1.755	0.122	0.115
WTM	β_i	1.012	0.007	0.500	0.977	0.000	0.260	0.500	0.406	0.064	0.427	0.572	0.007
XL	β_i	3.464	0.061	0.284	1.669	0.000	0.335	0.486	0.362	0.076	0.463	0.267	0.026

[32] [32] *P*-values less than 0.20 and greater than 0.10 (i.e., $0.10 < p < 0.20$) are highlighted yellow, those less than 0.10 and greater than 0.05 (i.e., $0.05 < p < 0.10$) are highlighted orange, and those less than 0.05 (i.e., $p < 0.05$) are highlighted red.

Appendix E[33]

Significance Level			All p-values					p-value < 0.05				
Return	Frequency	DV	γ_1	p-value	γ_0	p-value	R^2	γ_1	p-value	γ_0	p-value	R^2
ROR	Annual	β	1.081	0.605	1.134	0.089	0.009	0.366	0.435	0.758	0.000	0.048
ROR	Quarterly	β	1.442	0.542	0.875	0.240	0.012	0.916	0.023	0.654	0.000	0.205
ROA	Annual	β	-1.068	0.080	1.374	0.000	0.096	-0.605	0.259	1.223	0.000	0.114
ROA	Quarterly	β	-1.229	0.084	1.385	0.000	0.093	-0.819	0.103	1.253	0.000	0.167

[33] 33 *P*-values less than 0.20 and greater than 0.10 (i.e., $0.10 < p < 0.20$) are highlighted yellow, those less than 0.10 and greater than 0.05 (i.e., $0.05 < p < 0.10$) are highlighted orange, and those less than 0.05 (i.e., $p < 0.05$) are highlighted red.

Section VII: Bibliography

Ackermann, C., McEnally, R., & Ravenscraft, D. (1999, June). The Performance of Hedge Funds: Risk, Return, and Incentives. *The Journal of Finance, 54*(3), 833-874.

Agarwal, V., Daniel, N. D., & Naik, N. Y. (2009, October). Role of Managerial Incentives and Discretion in Hedge Fund Performance. *The Journal of Finance*, *64*(5), 2221-2256.

Ang, A., Gorovyy, S., & van Inwegen, G. B. (2011, February 6). Hedge fund Leverage. *Journal of Financial Economics*, *102*(1), 102-126.

Black, F., Jensen, M. C., & Scholes, M. (1972). *The Capital Asset Pricing Model: Some Empirical Tests.* Westport: Praeger Publishers Inc.

Collimore, T. (2013). *Alternative Investments for Individual Investors: A Starting Point for Discussions with Your Financial Advisor.* New York: CFA Institue. Retrieved from CFA Institute.

Dai, J., & Sundaresan, S. (2012, March 21). Risk Management Framework for Hedge Funds: Role of Funding and Redemption Options on Leverage. *Working Paper Series*, 1-38.

Davidoff, S. M. (2012, September 4). *With Lax Regulation, a Risky Industry Flourishes Offshore.* Retrieved from The New York Times: Dealbook: http://dealbook.nytimes.com/2012/09/04/with-lax-regulation-a-risky-industry-flourishes-offshore/

Fama, E. F. (1970, May). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance, 25*(2), 383-417.

Federal Reserve Bank of St. Louis. (2013, May 2). *3-Month Treasury Bill: Secondary Market Rate*. Retrieved from Economic Research: Federal Reserve Bank of St. Louis: http://research.stlouisfed.org/fred2/series/TB3MS/downloaddata?cid=116

Jensen, M. C. (1968). The Performance of Mutual Funds in the Period 1945-1964. *The Journal of Finance, 23*(2), 389-416.

Kelly, D. (2013). *Private Equity, Hedge Funds & Investment Vehicles in the US.* Los Angeles: IBISWorld Inc.

KPMG International. (2013, May 8). *Corporate tax rates table*. Retrieved from KPMG: http://www.kpmg.com/global/en/services/tax/tax-tools-and-resources/pages/corporate-tax-rates-table.aspx

Lerner, J., Schoar, A., & Wang, J. (2008, September). Secrets of the Academy: The Drivers of University Endowment Success. *National Bureau of Economic Research*.

Lintner, J. (1965, February). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics, 47*(1), 13-57.

Lo, A. W. (2001). Risk Management for Hedge Funds: Introduction and Overview. *Financial Analysts Journal*, 16-33.

Lo, A. W. (2004). The Adaptive Markets Hypothesis: Market Efficiency from an Evolutionary Perspective. *Journal of Portfolio Management*.

Mirsky, R., & Cowell, A. (2012). *The evolution of an industry: 2012 KPMG/AIMA Global Hedge Fund Survey.* London: KPMG International.

Mirsky, R., & Cowell, A. (2012). *The value of the hedge fund industry to investors, markets, and the broader economy.* Imperial College, Centre for Hedge Fund Research. London: KPMG International.

Nissim, D. (2010). *Analysis and Valuation of Insurance Companies.* Columbia Business School, Center for Excellence in Accounting and Security Analysis. New York: Columbia University in the City of New York.

Robert W. Baird & Co. (2010). *Demystifying the Role of Alternative Investments in a Diversified Investment Portfolio.* Milwaukee: Robert W. Baird & Co. Incorporated.

Sharpe, W. F. (1964, September). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *The Journal of Finance, 19*(3), 425-422.

Skidmore, G. H. (2010). *Alternative Asset Classes: An Introduction.* Greenwich: Belray Asset Management.

Taussig, J. K. (2010). *A Tale of Two Capital Structures.* Zürich, Switzerland: Taussig Capital AG.

The Insurance Insider. (2005, January 10). Hedge funds strengthen reinsurance roots. *Insider Quarterly,* pp. 20-21.

Tobin, J. (1958). Liquidity Preference as Behavior Towards Risk. *Review of Economic Studies*, 65-86.

United States Treasury. (2013, May 7). *Derivatives.* Retrieved from Office of the Comptroller of the Currency: http://www.occ.gov/topics/capital-markets/financial-markets/trading/derivatives/index-derivatives.html

Vaughan, D. A. (2003). Selected Definitions of "Hedge Fund". *Roundtable on Hedge Funds* (p. 3). Washington, DC: U.S. Securities and Exchange Commission.