Does the Ownership of a Hedge Fund predict its Longevity?

A Look into the Hazard Rates of

Funds Owned by Large Financial Institutions

George Simmons

An honors thesis submitted in partial fulfillment

of the requirements for the degree of

Bachelor of Science

Undergraduate College

Leonard N. Stern School of Business

New York University

May 2013

Professor Ingo Walter — Thesis Advisor

Professor Stephen Brown — Co-Thesis Advisor

Professor Marti G. Subrahmanyam

Faculty Advisor

Abstract

This paper answers the question whether hedge funds that are part of large financial institutions survive longer than hedge funds run as stand-alone operations. I also seek to validate past experiments on other predictors of hedge fund longevity. The results of this study show that hedge funds owned by large financial institutions have statistically significantly lower hazard rates (i.e., longer average lives) than stand-alone hedge funds. I also delve into how the Dodd-Frank Act and specifically the Volker Rule will affect hedge funds – both the stand-alone funds as well as the large financial institution-owned funds. These findings go directly against the logic of the Volker Rule, which intends to force large financial institutions to divest hedge fund and proprietary operations, except for small "skin in the game" stakes.

Acknowledgements

First and foremost, I'd like to thank my faculty advisor Professor Ingo Walter who helped me refine the myriad of ideas I had coming into this program into a well-crafted and thorough research paper. I'd also like to thank Professor Stephen Brown, who fell into the role of my faculty co-advisor because of his wealth of knowledge in the hedge fund industry; I would not have been able to write this paper without his previous work and knowledge in the field. I'd also like to thank Professor Marti Subrahmanyam, the faculty advisor, and Jessie Rosenzweig, the program advisor, for their dedication to running the honors program. Lastly, I'd like to thank my family and friends for the amazing support they showed me throughout the entire program.

Contents

I. Thesis and Importance of the Issue

I.I Introduction

As hedge funds have increased in popularity over the past 50 years, so has research on the hedge fund industry. Due to its potential for immense risk and immense returns, the hedge fund industry has become one of the most talked about, reported on, celebrated, and vilified areas of the entire financial industry. When one examines the other most scrutinized area of finance, the world of Large, Complex Financial Institutions (hereafter, LCFIs) an interesting cross section can be found. Beginning in the early 90's, many investment banks began to diversify into owning hedge funds in-house (Connor and Woo, 2004). After the repeal of the Glass-Stegall act in 1999, commercial banks began to enter the arena, along with other diversified asset managers, insurance companies, and other financial firms (Sanati, 2009).

Enter the financial crisis of 2007. In the aftermath of the second worst financial panic in history, regulators, lawmakers, and "Main Street" looked for those responsible to place the blame on. Some of the heaviest blame has fallen on these LCFIs, specifically on their hedge fund and proprietary trading operations. This is the focus of the Volker-Rule, a new law that limits proprietary trading activities in commercial and investment banks and restricts these institutions' ownership of hedge funds (Bick, 2010). The question this paper seeks to answer is: can these funds controlled by LCFIs be empirically shown to have excess risk over stand-alone hedge funds?[1] The answer to this question can provide additional insight into how the Dodd-Frank Wall Street Reform and Consumer Protection Act might be most effective and can provide a critique on the Volker-Rule and its implementation.

[1] Stand-alone hedge funds will face additional reporting requirements to the SEC but will not face much additional oversight from the Dodd-Frank Act (Bick, 2010).

I.II History of the Hedge Fund Industry

To accurately study the world of hedge funds, one must be familiar with what a hedge fund is, how the industry has evolved, and how the hedge fund industry has interacted with large, complex financial institutions. The definition of a hedge fund is simple, but it is largely misunderstood. As Miller (2013) points out, a hedge fund can't be defined by investment style (as many hedge fund investment styles are mutually exclusive), by use of leverage (as many hedge funds do not use leverage), or by implementation of hedging techniques. The name "hedge fund" was actually coined in a 1966 Fortune article by Carol Loomis when she was describing Alfred Winslow Jones' private investment fund. Jones' fund employed leverage and hedged market risk by taking both long and short positions (Loomis, 1966). However, as more investors formed limited partnerships ("LPs") for investment vehicles, the styles they used to invest their funds began to vary widely. Many funds stopped using leverage and hedging techniques entirely (Miller, 2013).[2]

Another popular, but still limited, definition of hedge funds is one based on compensation. Unlike mutual funds, whose managers are required to be symmetrically compensated for performance under an amendment to the Investment Company Act of 1940,[3] hedge fund managers can be compensated asymmetrically (Miller, 2013). Hedge fund managers are usually compensated under a "two-and-twenty" structure, whereby they receive 2% of the fund's assets under management for operational expenses and 20% of any profits the fund made after hitting a "high water mark" or historical peak in valuation (Loomis, 1966). The main

[2] The most popular form of non-hedged and non-leveraged fund is the "unlevered long-only" fund, which only buys common stocks it believes are undervalued.
[3] This means a mutual fund's manager will receive a certain percent of profits in up years but will owe the fund the same percentage of losses in down years (15 USC, 1940).

problem with this definition that Miller (2013) points out is the wide range of fee structures, which range from no performance fees to fees in excess of 60% of profits.

The best definition of a hedge fund is one based on the fact that they are specifically designed to avoid regulation. The one thing that is common to all funds, from Jones' funds in the 1950's to the most famous hedge funds today is the way they are structured as private investment companies and incorporated as limited partnerships to avoid registration with the SEC. The regulation that allows hedge funds to do this is subchapters 3C1 and 3C7 of the Investment Company Act of 1940, which were originally designed to give family offices an advantage over larger financial institutions (Miller, 2013). One provision hedge funds must adhere to is a limit on their investors to 100 "accredited investors" (15 USC, 1940).[4] Because hedge funds meet these safe harbor provisions, they are not required to register with the SEC, do not have to report holdings or performance, and are not regulated on their investment style or use of leverage (Connor and Woo, 2004).[5] My concise definition of hedge funds is: private investment companies organized as limited partnerships and designed to avoid regulation under the Investment Company Act of 1940's subchapters 3C1 and 3C7, which commonly use leverage and hedging techniques to increase returns and reduce market risk.

Since its inception in the 1940's, the hedge fund industry has grown tremendously. From Jones' first fund in 1949, the industry grew to 140 active funds in 1968 to over 7,000 live funds reporting to the TASS database today (Connor and Woo, 2004). However, the growth has not been evenly dispersed. During the bear market of the 1970's, many funds went out of business, and as a result, only sixty-eight live funds were reporting in 1984 (Connor and Woo, 2004). In

[4] Accredited investors include "registered investment companies," wealthy individuals, charitable trusts of certain size, and other similarly endowed entities ("Accredited Investors, 2012).

[5] Under the Dodd-Frank Act, hedge funds with over $150mm in AUM will be required to register with the SEC and report certain information. However, holdings, investment strategy, and use of leverage will still be up to the discretion of the portfolio manager (Bick, 2010).

the second half of the eighty's, however, new investment styles – such as the "global macro" style pioneered by Julian Robertson's now-famous Tiger fund – came into vogue. Although these global macro funds made the news with spectacular profits for much of the eighty's and nineties, the run of good returns ended with Long Term Capital Management's (LTCM) spectacular collapse in 1998. LTCM was highly levered and could not sustain the huge losses its previously-successful global fixed income arbitrage strategy produced in the wake of the Russian debt crisis.[6] This fund's failure is particularly interesting, as it was considered to be systemically important enough to warrant a private-public bailout orchestrated by the Federal Reserve Bank of New York and fourteen other large financial institutions (Aragon and Strahan, 2012). There have not previously been any other hedge fund bailouts.[7] Yet the hedge fund industry as a whole continued to grow and became more scrutinized each year.[8]

As the hedge fund industry has grown in size and diversity, it has also become more interconnected with the rest of the financial system. What began with one family office is now a multi-trillion dollar industry with funds ranging from individual managers, to specialized asset management companies, to large commercial and investment banks with proprietary trading desks. One of the greatest contributions to this heightened interconnectedness was the Gramm-Leach-Bliley Act (also known as the Financial Services Modernization Act of 1999) which repealed the Glass-Steagall provisions of the Banking Act of 1933 and tore down the wall that separated commercial and investment banks. This also set up these same institutions to become involved in the hedge fund industry, both for their own profit and as additional product offerings to clients (Sanati, 2009). The additional deregulation also contributed to the explosion in AUM

[6] LTCM had $120 billion of positions with only $4.8 billion of capital, a leverage ratio of over 25:1 (Connor and Woo, 2004).
[7] Although Bear Stearns did bail out its failing hedge funds, which led the investment bank to collapse and receive a bailout on March 14, 2008 (Kelly, 2009).
[8] Total AUM for the hedge fund industry was $1.799 trillion in 2012, down from an all-time high of 2.137 trillion in 2007 (Hedge fund industry, 2012).

the hedge fund industry experienced in the decade following the Gramm-Leach-Bliley Act's enactment (see Appendix VII.I). It is not surprising when one considers the nature of how the hedge fund industry developed in the shadows of financial regulation. The question still persists, however, whether additional regulation is required for hedge funds and, more specifically, whether hedge funds owned by LCFIs should be treated differently from stand-alone funds.

I.III Hypothesis

My hypothesis is that hedge funds operated by LCFIs should have a higher hazard rate than funds operated on a stand-alone basis. [9] There are several reasons for this hypothesis. First, the very existence of the Volker-Rule within the Dodd-Frank Act supposes a common understanding that hedge funds and proprietary trading platforms within banks are systemically risky. If stand-alone funds are not (for the most part) considered systemically risky, then an LCFI-owned hedge fund must be riskier than the average hedge fund.

Second, as the J.P. Morgan "London Whale Trade" has shown,[10] LCFIs are – just as their name implies – too large and complex to have sufficient risk management platforms in place to oversee each trade. This means LCFI-owned funds should have higher standard deviations in their returns and fail more frequently. Third, the most famous and well-compensated hedge fund managers are those at stand-alone funds. Therefore, the best and brightest managers must be attracted to stand-alone funds, where they have the most discretion over trades, risk levels, and compensation.

[9] The "hazard rate" of a fund is synonymous with its mortality rate. We are, in essence, looking at the life expectancy of a hedge fund and how this relates to its association with a large financial institution.
[10] The "London Whale Trade" was a large position in the Credit Default Swaps market performed by J.P. Morgan's Chief Investment Office in London. The trade lost the company over $6 billion, and was caused by failed operational controls (Protess and Silver-Greenberg, 2013).

I.IV Importance of the Issue

Regulation of the financial industry is an extremely topical issue in the United States today. Newspapers, television channels, and politicians can be seen speaking for or against the financial industry on an almost daily-basis. The "Occupy Wall Street" protests which sprouted up in New York City and other major cities in 2012 were largely prompted by excesses the protestors felt could be curbed with regulation (Who we are, 2011). Within the financial industry, the two areas that seem to get the most press are hedge funds and these large, global banks (Nayar, 2009). It is obvious that a great deal of change will be taking place in the financial industry. But we must ask ourselves if these new regulations and changes are for the greater good or merely for change's sake.

The main importance of this paper is to examine the risks inherent in an LCFI-owned hedge fund when compared to the stand-alone funds. Although it is accepted that many LCFIs could pose systemic risks, the more specific question I seek to answer is whether their in-house hedge funds are a riskier cohort than their stand-alone hedge fund competitors. While proprietary trading funds inside large banks are being outlawed completely and ownership in hedge funds run by the banks is being curtailed, stand-alone hedge funds face minimal new reporting requirements (Bick, 2010). Unregulated hedge funds have not (except for LTCM) seemed to pose a threat to the global financial system in the past, except for instances of counterparty risk in times of extreme stress (Brown, Lynch, and Petajisto, 2010); although Aragon and Strahan (2012) argue that hedge funds provide liquidity during times of stress and actually make the financial system more robust. If we accept the argument that the stand-alone hedge funds are not systemically risky, then hedge funds owned by large financial institutions must be proven to be more inherently risky to warrant the additional regulation.

Hopefully, insight gleaned from this research and other surveys in the future will help guide the policy of the global financial system. The goal of any regulatory system should be to maintain the freest and fairest system possible. This can only be done with empirical insights into how regulatory changes may affect the industries, and should not be formed based on emotion, self-serving argumentation, or anecdotal information.

II. Survey of Previous Literature

II.I Existing Literature

A large body of work around hedge funds and their survivability has come about in the past fifteen years. Research into hedge funds seems to have come into popularity after research into other financial products, such as mutual funds, pension funds, and other institutionally managed accounts, were already widely surveyed. This may be due to the fact that hedge funds came about as an alternative investment much later than most other institutionally managed asset pools. Also, the secretive nature of the business means data on hedge funds was not reliably available for a number of years.

One of the earliest studies of hedge fund survival and performance was Brown, Goetzmann, and Ibbotson's (1999) survey of off-shore hedge funds. This paper sought to categorize the returns these funds experienced from 1989 to 1995 as well as the hazard rates suffered by these funds. This research focused more on the predictability of a fund's performance going forward, so explanatory variables for the causes of fund failures were not included. Brown et al. (1999) concluded that offshore hedge funds do produce positive alpha compared to stock market indices, but that the high attrition rates complicate the calculations. [11] This study helped to set up an entire discipline of financial research devoted to analyzing the hedge fund industry.

The next leap in hedge fund survivability research was Liang's (2000) survey of the survivorship bias in hedge fund returns. Liang (2000) focused on the problem faced by Brown et al. (1999) and chose to analyze how much the survivorship bias affects reported returns of living funds. The Liang (2000) study was crucial because previous studies reported a wide range of

[11] Attrition rates were estimated by Brown et al. (1999) to be about 20% per year.

survivorship bias of hedge funds between .016% and 3% per year.[12] Liang (2000) reconciled data between two of the most comprehensive databases of the time to get an accurate picture of the level of survivorship bias, [13] which he estimates at just over 2%. He also briefly touches on possible causes of hedge fund attrition, again keying-up future research in the area.

Brown, Goetzmann, and Park (2001) revisited the topic of hedge fund survival in their survey of competition and risk in the hedge fund and CTA industry. [14] This paper sought to explain why fund managers disappeared and whether falling below the high water mark made some managers act more recklessly than consistent outperformers. The high water mark is a performance metric that allows performance based compensation only if the fund's value is higher than its previous maximum value. Brown et al. (2001) took an empirical look at the causes that would effect fund managers to liquidate their funds and found that the largest factors included past performance (because poor performance might mean an unlikely chance to ever break the high-water mark), volatility in returns (because high volatility may cause a fund's to see a large drop in asset value), and seasoning (because a manager with a longer track record is less concerned with termination). This paper was the first explicitly focused on the cause of fund failure, although it was focused on the governance implications of the funds rather than predicting their survivability.

Gregoriou (2002) performed the first exhaustive look at the survival times and half-life of hedge funds. Gregoriou (2002) used the Zurich Capital Markets database to analyze hedge funds from 1990 to 2001 with a number of survival models. This paper found that the most predictive

[12] Ackermann, McEnally, and Revenscraft (1999) reported a survivorship bias of .013% per month, while Brown, Goetzmann, and Ibbotson (1999) reported a survivorship bias of 3% for offshore funds.
[13] The TASS Management Limited Database and the Hedge Fund Research, Inc. database
[14] Commodity Trading Advisor. This is the advisor that oversees managed futures accounts and, in certain cases, hedge funds, mutual funds, or exchange traded funds.

factors in hedge fund survivability were mean monthly return, average AUM,[15] leverage used, and minimum purchase amount. The study also compared the different types of hedge fund strategies to determine that funds of hedge funds have the longest half-life, while global international hedge funds have the shortest half-life.[16] The paper concludes with a recommendation of investing in large, low-leverage, and seasoned funds of hedge funds for maximum survivability.

Baquero, ter Horst, and Verbeek (2005) sought to continue Brown, Goetzmann, and Ross' (1995) and Liang's (2008) work on the impact of look-ahead bias.[17] This is important because one can only back-test survival data, and it is imperative not to allow any information outside of the trial period to alter the results. Baquero et al. (2005) do this by using a proprietary model to study the liquidation of hedge funds based on previous returns, fund size, fund age, fund risk, and an indicator of whether the fund is above or below its high-water mark. This is an important contribution because look-ahead bias is much more severe for hedge funds than it is for mutual funds as a result of the volatility in hedge fund performance. Baquero et al. (2005) conclude by noting that fund performance can be overestimated by as much as 3.8% when not correcting for look-ahead bias.

Baba and Goko (2009) expanded the field of research on hedge fund survival by controlling for additional variables. Their study focused specifically on non-normality of hedge fund returns and assets under management, short-term capital outflows, and liquidity constraints associated with hedge fund redemption policy. The authors used the TASS database, and performed regressions using both the Cox proportional hazards model and the Panel Logit model

[15] AUM means "assets under management," or how much money the fund manages.
[16] Gregoriou (2002) found that the half-life for funds of hedge fund was 7.50 years, while the half-life for global international hedge funds was 3.09 years.
[17] Look-ahead bias is the term Baquero et al. coined to expand the word "survival analysis" to encompass all biases that result from looking at past returns.

to identify causes of hedge fund failure. This paper found that funds with lower skewness of returns and AUM has significantly higher liquidation probabilities, funds experiencing short term capital outflows had significantly higher liquidation probabilities, and funds with stricter redemption policies had higher survivability probabilities. This paper continued to refine the existing knowledge on hedge fund survival probabilities.

Liang and Park (2010) continued to build on the general hazard rate research by reexamining more explanatory variables as well as redefining the distinctions between liquidation, failure, and attrition rates. The most important contributions Liang and Park (2010) made to the study of hedge fund survival were to examine additional downside risk measures that could be used in place of the standard deviation of past returns. Some of these features are: semideviation, value-at-risk, expected shortfall, and tail risk. The authors found that when taken together, these measures – especially expected shortfall and tail risk – are a significantly better indicator than standard deviation alone, which tends to underestimate left-tail risk. Another contribution they made is to estimate that while the attrition rate of hedge funds during their study period was 8.7% annually, [18] real fund failures were only 3.1% per year. This distinction was between voluntary liquidations by fund managers who can't reach their high-water mark and funds that were forced to close due to poor performance or other outside factors.

II.II Summary of Literature

Up to this point, much has been discovered about the life-span of hedge funds. We know that hedge funds do seem to generate positive alpha, but have a high likelihood of dropping out of a sample (Brown et al, 1999). We also know that results of hedge fund survivability must include those funds that have dropped out, because studies of only live funds overstate the

[18] Liang and Park (2001) studied funds in the TASS database from 1995 to 2004.

returns by upwards of 2% (Liang, 2000). Brown et al. (2001) showed that possible causes for these hedge fund "deaths" include past performance, volatility in returns, and seasoning of the fund. Gregoriou (2002) confirmed these factors and included the average AUM and liquidity lock-ups as additional predictive factors. Baquero et al. (2005) expanded the field of survivability-bias to include other factors (naming it "look-ahead bias") and showed that these factors may overstate returns by almost 4%. Lastly, studies by Baba and Goko (2009) and Liang and Park (2010) added factors like skewness of returns and additional downside risk measures, respectively, to predict hedge fund survivability. Thus, we can conclude that although hedge funds have high mortality rates, funds with high AUM, high past returns, low volatility in past returns, several years of experience, and medium to severe redemption and lock-up agreements should have significantly longer lives than funds without these characteristics.

II.III New Addition to Literature

The wealth of information on hedge fund failures continues to be increased each year. What started with a paper analyzing the returns of off-shore hedge funds has grown into a field of research that has covered an abundance of variables to predict the likelihood of hedge fund survivability. As the research continues to be expanded, opportunities to increase the knowledge may seem to becoming more limited. However, no papers to the author's knowledge have studied the ownership of hedge funds and whether the entity controlling the hedge fund has an impact on its likelihood to survive. The focus of this paper is less on finding variables that impact a fund's survivability and more on examining the relationship between a parent institution and its hedge fund subsidiaries.

The literature on hedge fund failures has shown that hedge fund survivability can be predicted by a number of variables, including past returns, AUM, downside risk (as measured by standard deviation or some other measure), age, and style. This paper seeks to expand the literature and combine the field with research on large, complex financial institutions to determine whether a fund controlled by a large financial parent is more or less risky than a stand-alone hedge fund. The conclusions in this paper have implications for corporate governance, regulation, and systemic risk, perhaps more than they do for hedge fund survivability, but the results also increase the knowledge of the hedge fund world as LCFI-owned hedge funds make up a significant portion of the TASS Database.[19] It is the author's hope that future studies will be able to expand upon this work to reach further conclusions for regulating and governing hedge funds in the broader financial system and shadow banking system.

[19] By the author's calculations, LCFI-owned funds comprised 18.0% of the TASS live fund universe and 10.7% of the TASS graveyard universe.

III. Data and Methodology

III.I TASS Database

To begin examining hedge fund failure rates, a comprehensive database has to be selected. The Lipper TASS database (here in "TASS") was selected because is one of the largest and most extensive independent hedge fund databases.[20] Lipper is a subsidiary of Thompson Reuters that specializes in hedge fund and mutual fund information and analytics. This database contains two universes of hedge funds, a "live" universe, which lists all hedge fund currently reporting to the TASS service, and a "graveyard" database, which lists all hedge funds that have stopped reporting to the TASS service. Although all information reported to the TASS database is self-reported, most funds do so as a marketing technique.[21] Although there is a disincentive to market an underperforming fund, the database requires any managers wishing to re-join to undergo a thorough examination and reporting process; this discourages "submarine" funds who stop reporting at the first sign of bad results but resurface when times are good. Also, one advantage to using the TASS database is that it contains information on why a fund has stopped reporting. Since some funds may become closed to new investors and no longer wish to provide marketing materials, it is important to distinguish between legitimate liquidations and ancillary reporting stoppages.

For this study, funds that have liquidated or merged into another entity were used, because a merger between hedge fund units is more likely when an LCFI-affiliated fund fails as compared to a stand-alone fund. This added information cuts down on survivorship bias because

[20] The Lipper database contains detailed information on over 7,000 live funds and 11,000 graveyard funds (Lipper Brochure).
[21] It should also be noted that misreported performance is grounds for being removed from the TASS database, so funds have an incentive to provide correct data if they choose to report to the TASS database.

one can be sure the "graveyard" funds in the sample have actually liquidated or had an otherwise significant change in business.

The TASS database was selected for this research project for two reasons. First, the TASS database is one of the most comprehensive hedge fund databases and provides all necessary information to analyze a hazard rate regression and categorized why a fund has entered the graveyard universe. Second, because this paper wishes to expand upon previous literature concerning the hazard rates of different types of hedge funds, this database is a logical choice because it has been used extensively in the past literature.[22] The combination of these factors results in the TASS database being an excellent starting point for the purposes of this paper.

III.II LCFI Variable

Although the TASS database contains each of the data-points previously mentioned, the focus of this paper has not been implemented in the TASS research process. To get an accurate picture of whether the funds in the database were part of an LCFI or not, a manual survey of each fund was required. To determine if a fund was part of an LCFI or not, its name was compared to a list of all well-known LCFIs. If the fund's name was not recognized, the website of the fund was surveyed to determine a connection to a parent company. If both of these tests failed, the fund was considered independent. A fully owned subsidiary of an LCFI or a joint venture between two LCFIs was considered an LCFI-owned fund for the purposes of this research. Although some funds owned by LCFIs may disguise their names and websites, the majority of LCFIs are included in the list and the author believes these tests are reasonably exhaustive. A table of all LCFI-owned hedge funds can be found in Appendix 1.

[22] Previous studies to use the TASS database include Liang (2000), Brown et al. (2001), Baquero et al. (2005), Baba and Goko (2009), and Liang and Park (2010).

When determining which institutions qualify for the distinction of an LCFI, thresholds had to be set for each type of parent company. For the purposes of this project, LCFIs may include commercial and money center banks, large insurance companies, investment banks, and diversified asset managers. However, these business models are very different from each other; therefore a different measure of size was used for each group of LCFIs to determine an appropriate threshold. Diversified asset management firms were sorted by their latest-reported assets under management, with a threshold of $100B. Commercial and money center banks were determined to be LCFIs if their last reported total asset value was above a $300B threshold. Insurance companies were judged by annual premium flow, with a threshold of $5B. Lastly, Investment banks were judged by firm capital, with a threshold of $10B.

Table 1: LCFI Cut-off Points

Institution Type	Cut-off Measure	Threshold
Asset Manager	Assets Under Management	$100B
Commercial Bank	Total Assets	$300B
Insurance Company	Premium Flow	$5B
Investment Bank	Firm Capital	$10B

III.III Cox Proportional Hazards Model

Of the many hazards models available to researchers today, the Cox proportional hazards Model was selected for this project for several reasons. First, like the TASS database, the Cox proportional hazards model has been used extensively in the past to study hedge fund failures,[23] and it was selected to keep results consistent and comparable. Second, as Guo (2009) describes in an overview of survival models, the Cox model is a distribution-free model, which means it

[23] Some studies that have used the Cox hazards model to study hedge fund survivability include Brown et al. (2001), Gregoriou (2002), Baba and Goko (2009), and Liang and Park (2010).

does not require knowledge of the nature of the survival distribution being studied. The lifespan of hedge funds has not been proven to conform to a specific distribution, and as such requires a distribution-free model (or many assumptions on the form of distribution). Third, another advantage Guo (2009) points out is the Cox model's estimation based on partial likelihood. This means that hazard estimates rely only on the ranks of event times and will not be affected by monotonic transformations. Last, the Cox model allows the incorporation of time-varying covariates, which allows one to see how the variables in the model change over time (Guo, 2009).

In its mathematical form, the Cox proportional hazard model can be expressed as

where

$\boldsymbol{h_i(t)}$ is the dependent variable,

$\boldsymbol{x_1}$ to $\boldsymbol{x_k}$ are $\boldsymbol{k}$ independent variables,

and $\boldsymbol{\beta_1}$ to $\boldsymbol{\beta_k}$ are the regression coefficients;

$\boldsymbol{h_0(t)}$ is a baseline hazard function and is left unspecified (Guo, 2009).

Although complicated mathematically, one can think of the Cox model as determining how sensitive a survival function is to changes in different variables. The survival function [$h_0(t)$], in-turn, be thought of as the likelihood someone is to die (i.e., the hazard rate) for a given amount of time (for a person, it could be between now and the next fifty years; for this

experiment, it was the timespan between 1 January, 2000 and 1 September, 2007).[24] Next, the regression coefficients [β_1 to β_k] can be thought of as changes in lifestyle that affect someone's longevity (again, in real life this can be thought of as controls for smoking, drinking, or being overweight, while this experiment used variables for ownership, size, past returns, and the like).

The most effective variables used in the past have been the funds' size (in log of assets), the funds' vintage (in years of existence prior to the start of the study), the funds' volatility (in log of standard deviation of annual returns prior to the start of the study), and the funds' previous returns (in average annual returns prior to the start of the study). The new variable in this study is the classification of whether a fund belongs to a large financial institution or is independently run, as discussed earlier.

III.IV Results

Results from this finding confirm the previous studies on this topic in the four areas previously studied (hedge fund size, seniority, average return, and volatility of return).

Table 2: Cox Proportional Hazards Model Results

Variable	Coefficient	T-Value
LCFI-Owned	-0.0781	-2.1856
Log(sigma)	0.0168	0.9644
Average Return	-22.2488	-11.7900
Log(Assets)	0.0003	13.6924
Log(Seniority)	-0.1322	-7.4918

[24] These dates were selected because the TASS database's most reliable data starts on 1 January, 2000, and the most recent financial crisis started on 1 September, 2007.

The most significant predictor of a fund's survivability is average past returns. This may be due to the fact that a fund on the brink of failure most likely experienced poor performance in its previous life. The next most significant variable, the standard deviation of a fund's previous returns, is also not surprising. If a fund has had wildly fluctuating past returns, its future returns will also most likely be volatile, and one large negative return could cause the fund to fail. Another expected outcome is the variable for seniority. The older a hedge fund is at the start of the analysis means the fund has a track record, a reputation, and a strategy that has worked for several years in the past; this is similar to the fact that the life expectancy for a 60 year-old is higher than for an infant. The only surprising finding in this project was the fact that size seems to be positively correlated with extinction. One possible cause for this is that the larger a fund becomes the harder it becomes to find profitable investments. Therefore the fund must search for more risky investments and, as a result, becomes more risky itself.

The new variable introduced for this project was found to also be statistically significant with a t-value of -2.1856. This means that a fund owned by a large financial institution was less likely to liquidate over the survey period.

IV. Analysis

IV.I Disproval of Thesis

The results from the Cox proportional hazards model on the TASS dataset clearly shows that funds owned by LCFIs have longer average lives than stand-alone funds when controlling for other variables. Although this disproves my thesis that LCFI-owned funds would have shorter average lives due to a number of potential conflicts inherent in the relationship between the parent and the subsidiary, this discovery can easily be explained by a number of potential advantages these funds possess. A number of qualitative arguments can be made for or against my hypothesis, so having hard data to rely on is a necessity. Possible reasons for the statistically significant difference in life expectancies include: easier access to the capital markets, operational controls and risk management tools being firmly established, economies of scale to lower cost bases, and a large pool of talent to hire from internally.

IV.II Access to Capital Markets

One of the most significant advantages LCFIs have over stand-alone hedge funds is the ability to market funds to clients. Under the Investment Company act of 1940, an investment company (whether it is a hedge fund, private equity fund, or other private investment vehicle) cannot market itself directly to investors (15 USC, 1940). This marketing restriction, along with the restrictions on qualified investors, is aimed at increasing investor protection (Ahmed and Roose, 2012). However, although hedge funds cannot advertise publicly, there are third-party capital raising specialists that will market various firms to qualified investors (Mallon, 2008). Because an LCFI will usually have both a private wealth management division and an asset management division that manages hedge funds, the firm has a large investor base it can

introduce to its funds for almost no additional cost.[25] This can provide a very significant advantage to the LCFIs because one of the strongest indicators of hedge fund survivability is the size of the fund[26].

Another advantage that LCFIs enjoy is the fact that there are no laws regulating their relationship with the bank's capital markets teams. Trading can be executed on a favorable basis for in-house hedge funds, at the expense of any third party customers. Although ERISA regulates LCFI-owned pension funds from self-dealing, the unregulated nature of hedge funds allows them to take advantage of this significant benefit. Even more helpful for these bank-owned hedge funds is the potential for improved allocations in any popular IPOs the bank may be handling. Although this paper does not try to study this relationship in-depth, it could make for a very compelling look at the relationship between an LCFI-owned hedge fund and its in-house prime broker.

IV.III Operational Controls & Risk Management Tools

Operational risk constitutes one of the most significant risks to hedge funds. The Basel Committee's 2001 definition of operational risk is refined by Brown (2001) as "the risk of direct or indirect loss resulting from inadequate or failed internal processes, people or systems, or from external events excluding market or reputational risk." Having robust operational controls in place is very expensive, especially for smaller funds (Dodd-Frank Bill, 2011). It makes sense, therefore, that large institutions which must have these kinds of controls in place for other transactions can easily adapt them for use in overseeing hedge funds. The marginal cost for something like audited financial statements – which Brown (2011) cite as one of the most

[25] There is the potential for a conflict of interest in this market activity, so a firm must show it marketed a fund that fit the client's needs as well or better than any others it may offer (Butowski and Gibbons, 2003).
[26] See Figure 2.

important operational controls for hedge funds to enact – is much lower for a large institution than it is for a stand-alone fund. The increasing complexity of financial disclosure regulations is trying to level the playing field by forcing all funds to improve their operational risk management practices, however the implementation is unlikely to be uniform and the additional costs will impact smaller, stand-alone funds much greater than LCFI-owned funds (Dodd-Frank Bill, 2011).

One example of risk management hurdles in hedge funds is the setting of the various risk measures and limits. Take an LCFI-owned fund, whose portfolio manager has most, but not full, control over the portfolio. He must still report to his boss, who might be the Chief Risk Officer or the head of asset management. There will be limits on the amount of market risk he is able to take on, the use of leverage, and possibly trading frequencies or size (Groenfelft, 2013). Also, these restrictions will come from the portfolio manager's boss and he will have very little say in setting or raising them. Now, take a stand-alone hedge fund whose portfolio manager runs the entire operation. The only risk-management controls that are placed on this manager will be ones he chooses or ones his risk manager (a direct-report) places on him. Although the portfolio manager does have an incentive not to take on too much risk and maintain a good reputation, at the end of the day he can choose to replace his risk manager if he feels the current manager is too restrictive. Other (very limited) forms of risk controls can come from his investors and the due diligence they perform on his fund and the control the advisory board can exert (Prowse, 1998).[27] This increase in control over the funds' managers means they have a more stringent oversight process as well as less room to hide any wrongdoing in relation to the controls imposed.

[27] This is quite difficult without the aid of externally audited statements (Brown, 2011).

IV.IV Economies of Scale

Funds within large banks also have much higher economies of scale for most operational procedures than stand-alone hedge funds – in addition to the lower costs LCFI-owned funds enjoy in capital raising and risk management. One of the largest economies of scale large banks enjoy is attributable to the technology platform and systems that are required to run a hedge fund. While these systems can cost millions of dollars, even for a small trading operation, the large financial institutions already have the most advanced systems available in place for other trading and derivatives activities (Pelz, 2012). This technology is so critical to hedge funds – which rely on an informational or technological advantage to produce returns – that most funds cannot afford to be without the latest technology, even if it is their largest single expense (Pelz, 2012).

Another source of economies of scale for LCFIs is that their middle-office and back-office staff is specialized well-trained, and already in place. Compare this to a small hedge fund, which relies on a bare-bones staff of administrators and operators each performing multiple duties (Hall, 2012). The many facets this in-house support staff can provide to an LCFI-owned hedge fund include: research analysis, trading execution, capital markets access, information technology, administrative assistance, bookkeeping, marketing, and more. All of these services must be outsourced in a stand-alone hedge fund, with many of the services being provided by (and billed by) the fund's prime broker. The other services may be done in house,[28] contracted out on a case-by-case basis,[29] or contracted out on a multi-year basis.[30]

[28] Some legal work and most clerical and financial work are done in-house for most hedge funds.
[29] Trades are usually contracted out to firms on a case-by-case basis for outstanding research or close relationships (Hall, 2012).
[30] Information technology is usually contracted out, on yearly or multi-year contracts (Pelz, 2012).

IV.V Large Pools of Talent

The fourth reason an LCFI-owned fund may have a lower hazard rate than a stand-alone fund is the hiring and compensation of portfolio managers, traders, and analysts. Although empirical data for hedge fund hiring practices is scarce, a hypothetical example will suffice. Take a large bank, like J.P. Morgan, which wants to create a new hedge fund. J.P. Morgan already has a list of all-star traders from its equities and fixed income divisions it can choose to place in the role of portfolio manager. This new portfolio manager will have access to other portfolio managers within the bank who will share advice and knowledge about their roles with him. Trader and analyst roles can also be quickly and easily filled with junior members of the bank's divisions. A stand-alone fund will most-likely be started by its portfolio manager. He will not only have to worry about the fund-raising, but will also have to hire new junior people or entice more experienced professionals from their current jobs. All of this involves costs, both in the expenses of signing new people to the team and in opportunity costs while the portfolio manager spends time doing things other than managing the portfolio.

Additionally, most stand-alone hedge funds have higher average compensation than their LCFI-owned peers. This can be seen empirically in Table 3, where every one of the best-compensated hedge fund managers of 2012 was heads of stand-alone funds. Although data on compensation for positions below portfolio manager – such as analysts and traders – is not readily available, it would be tough to argue that LCFI-owned funds have higher compensation from this data. While one could argue that this heightened compensation is "fair" because these managers have produced outsize returns, it does not account for the fact that stand-alone hedge funds have higher hazard rates. This could be explained by stand-alone portfolio managers trying

to maximize compensation beyond a reasonable point, while LCFI-owned portfolio managers are forced to adhere to their company's more reasonable compensation plan.

Table 3: Top 10 Highest-Compensated Hedge Fund Managers for 2012

Name	Hedge Fund	2012 Compensation
David Tepper	Appaloosa Management	$2,200M
Raymond Dalio	Bridgewater Associates	$1,700M
Steven Cohen	SAC Capital Advisors	$1,400M
James Simons	Renaissance Technologies	$1,100M
Kenneth Griffin	Citadel	$900M
Edward Lampert	ESL Investments	$750M
Stephen Mandel Jr.	Lone Pine Capital	$580M
Leon Cooperman	Omega Advisors	$560M
David Shaw	D.E. Shaw Group	$530M
Daniel Loeb	Third Point	$380M

Source: Creswell (2013); http://dealbook.nytimes.com/2013/04/15/pay-stretching-to-10-figures/

V. Research Conclusions & Policy Implications

V.I Policy Implications

With the knowledge that hedge funds owned by large banks are not more risky than stand-alone hedge funds – they are, in fact, statistically significantly less risky when adjusting for outside factors – we can now take a look into whether the current and planned policy changes make sense for the financial system. The most important piece of legislation concerning hedge funds is the Dodd Frank Act, and specific to hedge funds within large banks is the Volker Rule.

The Dodd Frank Act, as it relates to hedge funds within and outside of large banks, mainly deals with the topic of registration and additional reporting requirements. Many hedge funds that relied on exemptions from the Investment Company Act of 1940 will no longer be able to escape registration with the SEC,[31] and although the rule applies uniformly to bank- and non-bank-owned funds, there may be a dichotomy in fund size in the future (Bick, 2010). The arbitrary $150 million mark may cause some small funds to limit investments at this point or cause funds just over the threshold to return some capital to investors. On the other side of the spectrum, the new requirements may encourage larger funds to quickly grow to a size that supports the additional costs. This may lead to funds taking on too much capital for their managers to effectively manage, and could lead to an increase in overall risk.

Additional changes for hedge funds prescribed by the Dodd-Frank Act are more minimal, with the second largest impact coming from a change in the definition of accredited investor to having investable assets, excluding the primary residence, of $1 million (Bick, 2010). I do not believe this will have a major impact on most hedge funds or their investors, as many funds

[31] Hedge funds managing less than $150 can still be exempted from registration (Bick, 2010).

require minimum investments much above this threshold and a majority of today's hedge fund investors are large institutions with large pools of money (Connor and Woo, 2004).

The Volker Rule has a much larger impact for hedge funds owned by LCFIs than any other part of the Dodd-Frank Act. This rule will force any "banking entity" to completely divest any proprietary trading entities; [32] the banking entities will also have to sell 100% of their ownership in any hedge funds they manage (Bick, 2010). This means that banks will no longer be able to invest in hedge funds with their own capital,[33] or sponsor any hedge funds as a general partner. In effect, this rule should destroy all hedge funds owned and operated by large banks – or at least cause them to be spun out into stand-alone funds. This seems to contradict the logic of the results of this study; if an LCFI-owned fund fails less often than its stand-alone peers, it does not make sense to force these funds to become stand-alone entities. This could have adverse implications on the hedge fund industry as a whole, because if these newly created stand-alone funds have hazard rates similar to the general population, the entire industry could experience an increase in volatility, hedge fund failures, and investor skepticism. The Volker Rule may have been based on studies that showed contradictory results to this one, or it may be based on different motives altogether, but this study is in clear opposition to the logic of this Act.

V.II Conclusion

This paper continues to refine what we know about hedge funds and how various factors affect their ability to survive. Although I focused on a seemingly narrow predictor – whether a hedge fund is owned by an LCFI or not – the results show this is, in fact, a statistically significant predictor of hedge fund longevity. Furthermore, the implications of this research go

[32] This term includes all "banks, thrifts, bank holding companies, savings and loan holding companies, and their affiliates" (Tarbert, 2013).
[33] This means they cannot invest in a fund as a limited partner, which is very close to proprietary trading.

much further than merely selection of hedge funds by investors. The results of this paper can and should be used by international regulators to determine the effects of the legislation they are currently implementing. Future surveys of this nature can extend the literature even further, examining, for instance, which LCFIs have had the best performing (or longest surviving, perhaps) hedge funds, or look into which types of financial institutions seem to have the best track record. Another interesting study will be the survey of hedge funds previously owned by LCFIs in the years following the implementation of the Volker Rule.

It is my opinion that the Volker Rule is merely a mechanism to place blame on the LCFIs and not a rule which makes economic sense. I will agree that the systemic risk of the LCFIs pose possible hazards to the stability of the financial system, but I do not believe forcing these large financial institutions to spin-out their hedge funds and proprietary trading operations will reduce systemic risk measurably. In fact, I believe that causing these funds to become separate entities will increase volatility and hazard rates in the hedge fund industry as these funds lose their competitive cost advantages and experience hazard rates in line with the broader stand-alone hedge fund universe.

References

Accredited investors. (2012, July 16). Securities and Exchange Commission. Retrieved May 27, 2013, from http://www.sec.gov/answers/accred.htm

Aragon, G. O., & Strahan, P. E. (2012). Hedge funds as liquidity providers: Evidence from the Lehman bankruptcy. Journal of Financial Economics, 103(3), 570-587. doi: http://dx.doi.org/10.1016/j.jfineco.2011.10.004

Baba, N., & Goko, H. (2009). Hedge fund survival: Non-normal returns, capital outflows, and liquidity. Journal of Financial Research, 32(1), 71-93. doi: 10.1111/j.1475-6803.2008.01243.x

Baquero, G., Ter Horst, J., & Verbeek, M. (2005). Survival, look-ahead bias, and persistence in hedge fund performance. Journal of Financial and Quantitative Analysis, 40(03), 493. doi: 10.1017/S0022109000001848

Bick, J. A. (2010, September 16). Impact of the Dodd-Frank Act on private equity funds, hedge funds and their investment advisers. Private Equity Newsletter, 1-8. Retrieved May 28, 2013, from www.davispolk.com

Brown, S. J., Goetzmann, W. N., & Ibbotson, R. G. (1999). Offshore hedge funds: Survival and performance, 1989–95. The Journal of Business, 72(1), 91-117. doi: 10.1086/209603

Brown, S. J., Goetzmann, W. N., & Park, J. (2001). Careers and survival: Competition and risk in the hedge fund and CTA industry. The Journal of Finance, 56(5), 1869-1886. doi: 10.1111/0022-1082.00392

Brown, S., Lynch, A., & Petajisto, A. (2010, July 19). Hedge funds after Dodd-Frank [Web log post]. Retrieved May 26, 2013, from

http://w4.stern.nyu.edu/blogs/regulatingwallstreet/2010/07/hedge-funds-after-doddfrank.html

Butowsky, M. R., & Gibbons, M. L. (2003). Hedge fund marketing by broker-dealers questions and comments in response to recent developments. Journal of Investment Compliance, 4(3), 7-12. doi: 10.1108/15285810310813158

Connor, G., & Woo, M. (2004). An introduction to hedge funds (pp. 1-39, Discussion Paper). London, UK: Financial Markets Group, London School of Economics.

Creswell, J. (2013, April 15). Hedge fund titans' pay stretching to 10 figures. New York Times DealBook. Retrieved May 1, 2013, from http://dealbook.nytimes.com/2013/04/15/pay-stretching-to-10-figures/

Dodd-Frank bill: A year and a half later - Views from the hedge fund industry (pp. 1-28, Thought Leadership Paper). (2012). Hempstead, NY: Hofstra University.

15 USC, § 80a et seq. (1940).

Gregoriou, G. N. (2002). Hedge fund survival lifetimes. Journal of Asset Management, 3(3), 237-252. doi: 10.1057/palgrave.jam.2240078

Groenfeldt, T. (2013, January 09). Hedge Funds Do Risk, And Now Risk Management Too. Forbes. doi: http://www.forbes.com/sites/tomgroenfeldt/2013/01/09/hedge-funds-do-risk-and-now-risk-management-to/

Guo, S. (2009). The Cox proportional hazards model. In Survival analysis. doi: 10.1093/acprof:oso/9780195337518.003.0004

Hall, J. (2012, August 17). Exit interview [Personal interview].

Hedge fund industry - assets under management [Chart]. (2012). In BarclayHedge. Retrieved May 20, 2013, from http://www.barclayhedge.com/research/indices/ghs/mum/Hedge_Fund.html

Kelly, K. (2009, May 9). Inside the fall of Bear Stearns: In 72 nail-biting hours, an investment bank turned from healthy to nearly insolvent. The Wall Street Journal. Retrieved May 27, 2013, from http://online.wsj.com/article/SB124182740622102431.html

Liang, B., & Park, H. (2010). Predicting hedge fund failure: A comparison of risk measures. Journal of Financial and Quantitative Analysis, 45(01), 199. doi: 10.1017/S0022109009990482

Liang, B. (2000). Hedge funds: The living and the dead. Journal of Financial and Quantitative Analysis, 35(3), 309-326. Retrieved May 3, 2013, from http://depts.washington.edu/jfqa/

Loomis, C. J. (1966, April). The Jones nobody keeps up with. Forbes, 237-247. Retrieved May 26, 2013, from http://www.awjones.com/images/Fortune_-_The_Jones_Nobody_Keeps_Up_With.pdf

Mallon, B. (2008, October 22). Hedge fund capital - How to raise assets for a hedge fund. Hedge Fund Law Blog. Retrieved May 28, 2013, from http://www.hedgefundlawblog.com/hedge-fund-capital-—-how-to-raise-assets-for-a-hedge-fund.html

Miller, J. I. (2013). Inventing hedge funds: A comparative study of institutional and individual entrepreneurship in ambiguously regulated environments (Unpublished doctoral dissertation). New York University Stern School of Business.

Nayar, S. (2009, October 11). Hedge funds face investor backlash. Financial Times. Retrieved May 25, 2013, from http://www.ft.com/intl/cms/s/0/017b81b2-b4fb-11de-8b17-00144feab49a.html

Pelz, M. (2012, May 5). Inside the machine: A journey into the world of high-frequency trading. Institutional Investor. Retrieved March 30, 2013, from http://www.institutionalinvestor.com/Popups/PrintArticle.aspx?ArticleID=2593339

Protess, B., & Silver-Greenberg, J. (2013, March 05). Senate report said to fault J.P. Morgan on loss. New York Times Dealbook. Retrieved May 1, 2013, from http://query.nytimes.com/gst/fullpage.html?res=9F0DE0DE1639F936A35750C0A9659D8B63

Prowse, S. D. (1998). The economics of the private equity market. Economic and Financial Policy Review, (Q III), 21-34. doi: http://econpapers.repec.org/RePEc:fip:fedder:y:1998:i:qiii:p:21-34

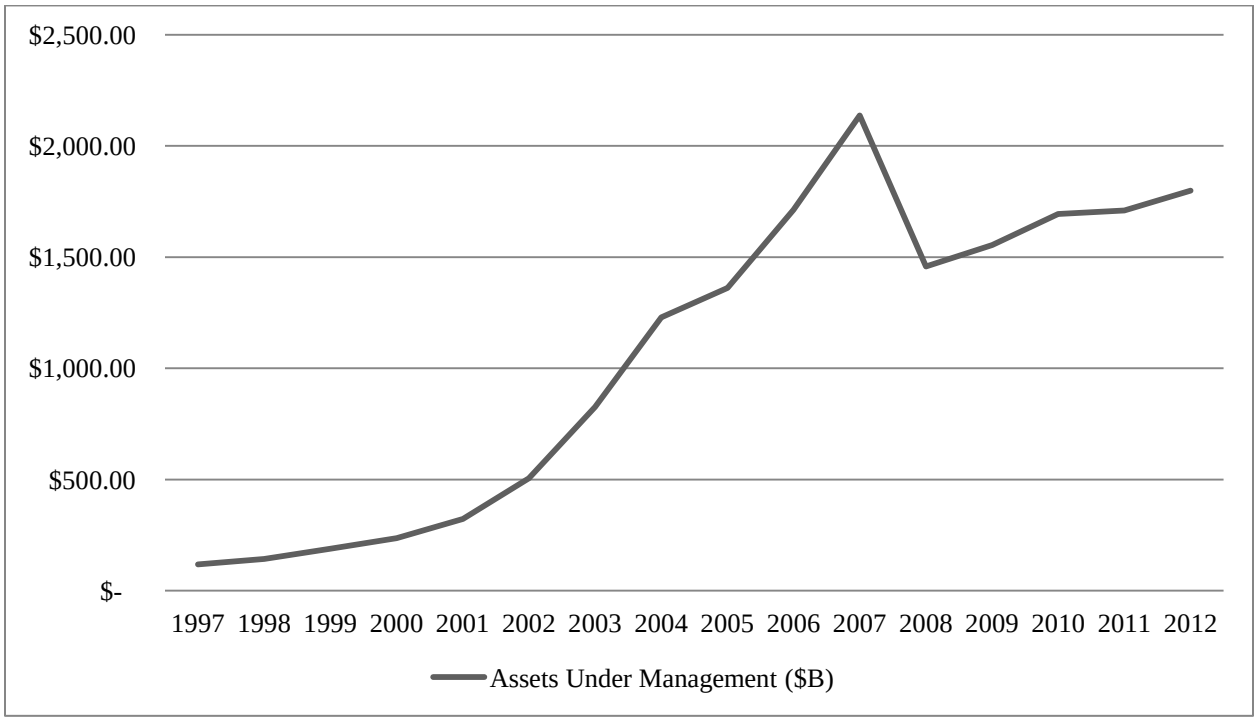
Sanati, C. (2009, November 12). 10 years later, looking at repeal of Glass-Steagall. DealBook 10 Years Later Looking at Repeal of GlassSteagall Comments. Retrieved May 23, 2013, from http://dealbook.nytimes.com/2009/11/12/10-years-later-looking-at-repeal-of-glass-steagall/

Tarbert, H. (2013). Volcker Rule (§ 619). Financial Regulatory Reform Center Weil RSS. doi: http://financial-reform.weil.com/banking-industry/volcker-rule-619/#axzz2SFwkEGDd

Who we are [Web log post]. (2011, July 16). Retrieved May 27, 2013, from http://occupywallst.org/article/who_we_are/

VII. Appendices

VII.I Chart of Total Assets Under Management in the Hedge Fund Industry



Source: BarclayHedge; http://www.barclayhedge.com/research/indices/ghs/mum/AUM_HF.xls

VII.II Table of All LCFI-Owned Hedge Funds in TASS Database

Company Name	Number of Live Funds	Number of Dead Funds	Total Funds in TASS Universe	Type of Institution	Size	Units
ABN Amro Group	0	31	31	Commercial Bank	$531B	(TA)
AIG	3	13	16	Insurance Company	$9.37B	(PF)
AllianceBernstein	0	8	8	Asset Manager	$437B	(AUM)
Allianz SE	0	5	5	Asset Manager	$2.39T	(AUM)
AmEx Asset Management	0	1	1	Asset Manager	$153B	(AUM)
Amundi	9	25	34	Asset Manager	$953.7B	(AUM)
AXA Group	3	22	25	Insurance Company	$5.57B	(PF)
Banco Bradesco	49	4	53	Commercial Bank	$439B	(TA)
Banco Itaú	48	2	50	Commercial Bank	$500B	(TA)
Banco Santander SA	0	11	11	Commercial Bank	$1.66T	(TA)
Bank of New York Mellon Corporation	24	40	64	Asset Manager	$1.4T	(AUM)
Barclays PLC	0	11	11	Investment Bank	$87.13B	(FC)
BAREP Investments Ltd.	0	19	19	Asset Manager	$1.6B	(AUM)
BBVA	3	2	5	Commercial Bank	$725B	(TA)
Bear Sterns Companies, Inc.	0	19	19	Investment Bank	$11.79B	(FC)
BlackRock, Inc.	10	40	50	Asset Manager	$3.79T	(AUM)
BlackStone Group, LP	0	8	8	Asset Manager	$218B	(AUM)
BNP Paribas CIB	20	15	35	Commercial Bank	$2.50T	(TA)
CaixaBank	6	0	6	Commercial Bank	$465B	(TA)
Canadian Imperial Bank of Commerce	0	1	1	Commercial Bank	$376.7B	(TA)
Citibank	1	0	1	Commercial Bank	$1.86T	(TA)
CITIC Group	1	0	1	Asset Manager	$7.20B	(AUM)
Claritas Capital	23	0	23	Asset Manager	$364B	(AUM)
Credit Agricole CIB	1	21	22	Commercial Bank	$2.04T	(TA)
Credit Suisse Group AG	91	44	135	Investment Bank	$37.94B	(FC)
Danske Bank Group	6	0	6	Commercial Bank	$596B	(TA)
Deutsche Bank AG	0	19	19	Investment Bank	$70.84B	(FC)
Dexia Group	23	20	43	Commercial Bank	$742B	(TA)

Edmond de Rothschild Group	69	1	70	Asset Manager	$160B	(AUM)
Fidelity International Limited	0	4	4	Asset Manager	$1.7T	(AUM)
Franklin Templeton Investments	2	10	12	Asset Manager	$824B	(AUM)
Goldman Sachs Group, Inc.	10	5	15	Investment Bank	$75.72B	(FC)
Guggenheim Partners	0	2	2	Asset Manager	$180B	(AUM)
HSBC Holdings, PLC	58	48	106	Commercial Bank	$2.69T	(TA)
ING Group	1	8	9	Commercial Bank	$1.3T	(TA)
Invesco Ltd.	1	5	6	Asset Manager	$712B	(AUM)
J.P. Morgan	33	132	165	Commercial Bank	$2.36T	(TA)
Julius Baer Group	3	8	11	Asset Manager	$181.7B	(AUM)
Key Asset Management	8	12	20	Asset Manager	$193B	(AUM)
Lazard Ltd.	12	29	41	Asset Manager	$152B	(AUM)
Legg Mason, Inc.	7	1	8	Asset Manager	$665B	(AUM)
Lehman Brothers Holdings, Inc.	0	3	3	Investment Bank	$22.49B	(FC)
Lyxor Assets Management SA	43	28	71	Asset Manager	$100B	(AUM)
Macquarie Group Limited	10	4	14	Investment Bank	$11.22B	(FC)
Merril Lynch & Co.	0	11	11	Investment Bank	$31.93B	(FC)
Morgan Stanley	8	19	27	Investment Bank	$62.11B	(FC)
NATIXIS	3	4	7	Commercial Bank	$601B	(TA)
Nomura Group	1	2	3	Commercial Bank	$370B	(TA)
Old Mutual PLC	10	44	54	Asset Manager	$407B	(AUM)
Pictet & Cie	55	6	61	Asset Manager	$377B	(AUM)
PIMCO, LLC	0	4	4	Asset Manager	$2.04T	(AUM)
Pioneer Investments	60	40	100	Asset Manager	$312B	(AUM)
PNC Financial Services Group, Inc.	0	7	7	Commercial Bank	$301B	(TA)
Royal Bank of Canada	1	0	1	Commercial Bank	818B	(TA)
Schroders PLC	6	10	16	Asset Manager	$345B	(AUM)
SEB AB	13	13	26	Commercial Bank	$363B	(TA)
Skandia	4	0	4	Asset Manager	$100B	(AUM)
SMBC Group	1	4	5	Commercial Bank	$1.17T	(TA)

Smith Barney & Co.	0	4	4	Asset Manager	$1.7T	(AUM)
Societe Generale SA	7	39	46	Commercial Bank	$1.55T	(TA)
Standard Chartered PLC	0	13	13	Commercial Bank	$600B	(TA)
TD Bank Group	3	0	3	Commercial Bank	$805B	(TA)
Thalia SA	0	2	2	Asset Manager	$1.9B	(AUM)
UBS AG	15	33	48	Investment Bank	$49.04B	(FC)
Wells Fargo & Co.	0	4	4	Commercial Bank	$1.44T	(TA)
Total	**765**	**940**	**1705**			

Source: TASS Database

Note: Institutions are broken down into four categories: Asset Managers, Commercial Banks, Insurance Companies, and Investment Banks. The units used to determine size differed for each type of institution. Asset management firms were sorted based on assets under management (AUM), commercial banks were sorted based on total asset size (TA), insurance companies were sorted by premium flow (PF), and investment banks were sorted based on firm capital (FC).