Do Bank-Related Hedge Funds Benefit from Bailouts?

ABSTRACT

We examine whether bank-related hedge funds benefited from bailout programs initiated in seven countries during the 2007-2009 global financial crisis. Reduced fund liquidation probabilities followed bailouts of financial firms offering prime brokerage and custodial services to hedge funds in the short term. However, for institutions with minimal participation in bailouts, related hedge fund liquidation probabilities increased. Bailouts did not lead to improved capital levels in bank-related hedge funds. Collectively, our evidence suggests that bailouts helped stem the propagation of contagion through information channels rather than directly through counterparty funding.

JEL classification: G10, G21, G23, G28

Keywords: Financial crisis, Hedge funds; Bank bailouts; Financial contagion; Capital adequacy

During times of financial turmoil, hedge funds' extensive and economically significant ties to banking institutions spur fears of systemic risk among regulators and investors. Considerable resources were expended by governments worldwide on maintaining the economic viability of financial institutions to stave off the effects of the financial crisis of 2007 to 2009. As reflected in the following headlines from the popular press, some market participants take the view that hedge funds benefit from bailout plans, while others think coverage for hedge funds under such plans is inevitable:

A.I.G. Bailout May Aid Hedge Funds

(*New York Times*, 18 March 2009)

Hedge Funds Tapped Rescue Program

(*Wall Street Journal*, 1 December 2010)

Ackermann Says Bailout Risk Lurks for Hedge Funds

(*BusinessWeek*, 28 January 2011)[1]

Is there substance to the claim that hedge funds are direct beneficiaries of bailing out financial institutions to which they have links? In this paper we answer this question in the context of bailout programs announced in seven countries during the financial crisis period 2007-2009. Hedge funds are of broader concern to our paper than just the populist sentiment, since during financial crises rapidly increasing counterparty risk is one of the most feared potential consequences of the crisis. As such, financial economists, regulators and the investing and taxpaying public are vitally interested in whether the bailouts reduced counterparty risk in the hedge fund industry. Indeed, Federal Reserve Chairman Bernanke's justification of bank bailouts by the United States government reflects concerns about counterparty risk: "As more firms lost access to funding, the vicious circle of forced selling, increased volatility, and higher haircuts and margin calls that was already well advanced at

[1] Josef Ackermann is Deutsche Bank AG's Chief Executive Officer.

the time would likely have intensified. The broader economy could hardly have remained immune from such severe financial disruptions."[2]

The hedge fund industry presents an insightful environment in which to examine whether the supposed benefits of bank bailouts extend beyond the targeted institutions and flow into the wider financial market. The basic intuition backing this claim comes from several observations. First, hedge funds, through prime brokerage and other arrangements primarily involving banks, constitute a distinct and significant clientele group with extensive dependence on the financial health of financial institutions. For example, prime brokerage banks provide hedge funds with financing, lend them securities for short-selling purposes, and often combine these services with settlement and custodial facilities.

Second, during the global financial crisis, hedge fund investors and portfolio managers became increasingly concerned about the creditworthiness of prime brokers and their parent organizations. Third, regulators and financial markets expected that rescue packages would help reduce counterparty risk and, thus, avoid massive asset fire sales in the hedge fund industry that would exacerbate the crisis by adversely affecting hedge funds' creditors. Finally, the crisis period is particularly suited for our study since during times of stress hedge funds' ability to raise and retain capital is severely constrained (Kambhu, Schermann and Stiroh 2007). While Gupta and Liang (2005) show that 89 percent of funds that liquidated in the 1977-2003 period covered in their study were adequately capitalized, a considerable amount of anecdotal evidence shows during the recent financial crisis, that hedge funds faced major difficulties in their ability to maintain capital funding and to meet redemptions.[3] Empirically, Cao, Chen, Liang and Lo (2013) and Ben-David, Franzoni and

[2] See Federal Reserve Chairman Ben S. Bernanke's speech entitled "Reducing Systemic Risk" at the Federal Reserve Bank of Kansas City's Annual Economic Symposium, Jackson Hole, Wyoming, August 22, 2008).
[3] See, for example, "Hedge fund blues are just beginning - When even a profitable fund closes, that's a sign there's trouble ahead", *Fortune*, 2 October 2008.

Moussawi (2012) show that during times of liquidity crisis, hedge funds dramatically reduce their market exposure, corroborating regulators' concern with the hedge fund induced risk of asset fire sales.

The theoretical link between bailouts and hedge fund contagion is provided by Boyson, Stahel and Stulz (2010) who, based on Brunnermeir and Pedersen's (2009) model of the interaction of asset and funding liquidity, propose that the financial health of prime brokers can be expected to adversely affect the funding liquidity of hedge funds. Our empirical tests build on this framework by investigating hedge fund stability in the immediate aftermath of the bailout of institutions with which the funds share significant financial ties.

What is the mechanism through which bailouts affect contagion in the hedge fund industry? The contagion literature (see Helwege (2009), and Jorion and Zhang (2009)) identifies two main channels through which resolving financial distress in one financial market sector (banking in our context) can benefit another sector (the hedge fund industry). First, bailouts can help ameliorate *information contagion* – i.e., news that a banker to hedge fund companies has been rescued, results in improved operating conditions and market confidence for the bank-related investment managers. In turn, lower redemption requests by investors lead to reduced fund liquidation probabilities and improved capital adequacy in such funds. Second, if bailouts help address *counterparty contagion*, the rescue of a financial institution leads directly to improved financial health in hedge funds linked to the institution, again as manifested through improved survival probabilities and increased capital. In this case hedge funds linked to weak banks that needed bailing out now have recapitalized counterparties to look to for credit support in the event of a surge in redemption requests, for example.

Despite the extensive links which hedge funds have with financial institutions, there is scant large sample evidence that examines the prevalence of these relationships, much less their economic significance. This lack of knowledge is not surprising, given the limited disclosure requirements placed on hedge funds. In particular, we know little about the details of hedge fund-bank credit and securities lending transactions. To overcome these data limitations, we investigate post-bailout terminations and capital adequacy of hedge funds (rather than trying to identify post bailout financial transactions between banks and hedge funds).

We hypothesize that bank bailouts successfully served the purpose for which they were designed – to facilitate continuity in banking relationships and to secure the stability of the financial system. Accordingly, if hedge funds benefited from having closely affiliated financial institutions bailed out, we should see (1) a reduced number of hedge fund closures and (2) improved hedge fund capital adequacy in the aftermath of the financial rescues. These two measures of hedge fund health have been successfully modeled in the literature (as we outline in the methods section below). The first part of the analysis investigates the determinants of fund terminations in the immediate aftermath of the bailout of financial institutions linked to the hedge funds using difference-in-differences techniques. The dependent variable in the second part of our analysis is the Gupta and Liang (2005) time-varying measure of a hedge fund's Value-at-Risk (VaR) capital adequacy based on Extreme Value Theory. Specifically, the capital adequacy measure is obtained by comparing the equity required to cover hedge fund losses, based on the maximum amount a hedge fund is liable to lose over a specified period with a specified probability, to the actual equity carried by the fund.

Our empirical approach allows us to identify the likely route for the transmission of beneficial effects of bailouts to the hedge fund industry. If bailout monies were used to

directly fund hedge funds connected to banks, we should observe reduced hedge fund liquidations accompanied by a positive relationship between the incidence of the financial rescues and the capital of hedge funds related to institutions. We would interpret such a finding as evidence that the likely channel was through reducing the risk of counterparty contagion through the funding channel. Alternatively, finding reduced fund terminations and either no link or a negative relation between bailouts and hedge fund capital would support the information contagion hypothesis.

To address our designated hypotheses, we utilize a large sample of hedge funds whose relationships with financial institutions are identified in the Lipper TASS database. Identities of hedge funds' counterparties are not found in any other hedge fund database, and indeed, to our knowledge, there is no published work that uses such information to date.[4] We match our sample of hedge funds domiciled in 57 countries to 33 financial institutions, mostly banks that were bailed out by the governments of Belgium, France, Germany, Ireland, Sweden, Switzerland, the United Kingdom, and the United States during the 2007-2009 financial crisis.[5] In all, our sample consists of approximately 9500 bank-hedge fund relationships.

Our findings can be neatly summarized as follows. We find that, without controlling for the extent of institutions' reliance on bailout monies, hedge funds that are connected to prime broker and custodian banks are less likely to be liquidated. In contrast, funds that are connected to investment adviser banks are more likely to be liquidated. When we concentrate our analysis on strong banks – those accessing bailout funds only once – we find hedge funds connected to prime brokers and investment advisers are more likely to be liquidated while there is no effect on those connected to custodians. While most US banks were able to apply

[4] Apart from Aragon and Strahan (2012) referred to above, after commencing this study, we became aware of a recent working paper by Klaus and Rzepkowski (2009) that utilizes the identities contained in the Lipper TASS database to analyse the relationship between prime broker distress and hedge fund performance. Their study also covers part of the crisis period.

[5] Luxembourg and the Netherlands also co-financed two bailouts with Belgium and France, but are not considered separately to avoid double counting.

for TARP funding following the initial disbursement in October 2008, our findings suggest that strong banks' related hedge funds failed at higher rates during the financial crisis.

Finally, we do not find any evidence of bailouts explaining hedge fund's capital adequacy ratio through funds' connection with prime broker, custodian and investment adviser banks that accessed the funding. This result confirms our initial evidence that the effectiveness of bank bailouts was through information channels rather than directly through counterparty funding. While we find that bailouts worked in reducing hedge fund failure risk, the channel through which this outcome was achieved was not the direct application of public monies to shore up hedge funds. Rather, the probable explanation is that bailouts improved the general operating environment of hedge funds, allowing liquidation decisions to be avoided. Relating this explanation to the terminology of the financial contagion literature, our findings suggest that bank bailouts ameliorated information contagion rather than counterparty contagion in the hedge fund industry.

Our paper is related to a number of strands of the literature. There is a substantial body of research on public bailouts of financial institutions. In the theoretical literature, the role of government bailouts in resolving liquidity shortages is defended and criticized by Gorton and Huang (2004) and Diamond and Rajan (2002), respectively. Gorton and Huang find a role for government bailouts on the basis of the (*ex-post* bailout) opportunity cost to private providers of capital to distressed institutions. Diamond and Rajan argue that ill-designed bailouts can encourage inertia among firms that are not bailed out, risking a greater probability of total system collapse than would be the case if a few of the weakest constituents had been left to fail instead.

Empirically, Slovin, Sushka and Polonchek (1993) explore the reaction of borrowing firms' stock prices to the announcement of a bailout of the lending bank. Giannetti and

Simonov (2013) extend this study to a large sample of Japanese bank bailouts, examining the reaction of lending levels as well. Faccio, Masulis and McConnell (2006) investigate the influence of political connections on the selection of recipients of bailout funds. Our study makes a contribution to this literature by focusing on financial institutions (hedge funds) as counterparties to bailout recipients (rather than focusing on corporate creditors).

Our paper is also related to the broader literature on counterparty risk during the recent financial crises, for example, Brunetti, di Filippo and Harris (2011) (on central bank liquidity intervention and interbank counterparty risk), and Jorion and Zhang (2009) (bankruptcy announcements and credit contagion in the corporate sector). Finally, the paper augments a nascent strand of hedge fund literature concerned with the relationship between hedge funds' institutional links and performance. Aragon and Strahan (2012) provide evidence that those hedge funds which employed Lehman Brothers as a prime broker, experienced failure rates two-fold larger than other similar funds, causing declines in the liquidity of stocks traded by Lehman related funds after the firm's bankruptcy on 15 September 2008. Klaus and Rzepkowski (2009) provide evidence of a negative relationship between prime broker distress and hedge fund performance. These two papers illustrate the economic significance of the relationship between banks and hedge funds. Our paper's added contribution is to show the effectiveness of government intervention, in the form of bailouts – our evidence documents that bailouts do favorably affect the key institutional links that hedge funds have with financial services firms during a period of financial turmoil.[6]

The remainder of the paper is crafted as follows. Section 1 explains the primary motivations for investigating the link between bailouts and hedge fund stability. In Section 2

[6] Research which investigates the determinants of fund liquidations is also relevant to our study (for example, Brown, Goetzmann and Park (2001), Baquero, ter Host and Verbeek (2005) and ter Horst and Verbeek (2007)), as are papers on hedge fund liquidity risk (e.g. Gupta and Liang (2005)). A growing literature also focuses on the contribution (or lack thereof) of hedge funds to systemic risk (see Boyson, Stahel and Stulz (2010), including a summary of the related research).

we describe the data and empirical design. Section 3 presents and discusses the results and Section 4 concludes.

1. Institutional Background and Motivation

The hedge fund industry is well-suited for addressing the questions raised in our study for several reasons. First, hedge funds critically depend on the financial health of financial institutions ravaged by the financial crisis. In this paper, the specific relations between hedge funds and financial institutions that we are particularly concerned with are prime brokerage, custodial and investment advisory arrangements. These links are the ones most likely to be associated with financial exposures between financial institutions and hedge funds. Prime brokers provide financial, administrative and operational services to hedge funds. Such services broadly include securities clearing, handling hedge funds' collateral, and providing finance. Custodians are institutions that traditionally provide the infrastructure and back office support for hedge funds. Custodians can also control the flow of capital to meet margin calls. In recent years, custodians have been encroaching into prime brokerage and vice versa, and operating hybrid "prime custodial" services, where one institution provides financing and lending for short positions and holds and services long assets, is now a common feature of the market.[7] In providing investment advisory services to hedge funds, financial institutions act as principals to trades, and lend reputational and financial capital to the ongoing operations of the funds.

Second, the ties hedge funds have with financial institutions translate into significant exposures that market participants did become more concerned about during the financial crisis. A practitioner's comments encapsulate this notion: "The sub-prime crisis, Bear Stearns

[7] See, for example, "Settling the fight for hedge funds", *Financial Times Mandate*, pp. 50-51, 1 June 2009.

and Lehman all chipped away at the idea of undifferentiated risk, so for the first time in a decade asset managers have prioritized liability duration, quality and counterparty quality in their prime broker arrangements."[8] Such market expectations suggest that contagion was expected to flow from financial institutions to hedge funds. Aragon and Strahan (2012) provide empirical evidence of contagion flowing from Lehman Brothers' 2008 bankruptcy, ranging from hedge fund terminations through to restrictions on the liquidity of securities held by the affected hedge funds.

However, to some extent a reverse causality might be true – instability in hedge funds could have disrupted financial institutions to which they were connected. The anecdotal evidence from the crisis period contradicts this conjecture. Virtually no hedge fund failures were reported to have caused bank liquidations during the crisis. Although hedge funds constituted a large part of Lehman Brothers' business before its September 2008 bankruptcy, the largest creditors were not hedge funds. Even when cascading counterparty risk is considered in this case, the largest exposure Lehman posed to an active participant in the hedge fund industry was to Citibank, which, according to Helwege (2009), was $1.75 billion, representing only a small proportion of Citibank's portfolio.

Third, regulators and financial markets shared a belief that bailouts would help reduce the effects of the crisis on hedge funds. For example, an article in *The Economist* in October 2008 stated that "JPMorgan Chase, now the owner of Bear, has seen a 25% rise in prime-brokerage assets over the past few weeks… Now that Morgan Stanley and Goldman Sachs have received the blessing of the American government, thanks to the capital injections announced this month, worries about counterparty risk have clearly diminished."[9] Our analysis covers both healthy and troubled bailout candidates. In the US, the Treasury

[8] Comments of Barry Bausano, co-head of global prime finance at Deutsche Bank, in "Prime brokers – Differentiated risk entices prime brokers post-crisis", *Financial Times Mandate*, 1 July 2009.
[9] See, "Prime brokers: Do the brokey-cokey", *The Economist*, 25 October 2008, p. 14.

Department's Capital Purchase Program that kick-started bailouts in October 2008, which was voluntary, was touted by Treasury officials as being not a bailout for the banks, but rather a plan to help `healthy` institutions continue lending. Bailed out institutions also try to convince the market of their fundamental health, although investors are not easily convinced (Helwege (2009)). In any event, only a handful of bailout recipients had voluntarily returned the public funds by June 2009, suggesting that the bailouts in many cases met genuine funding needs.

Fourth, hedge funds' exposures can extend beyond prime brokers due to 'rehypothecation'. The practice allows the collateral posted by a hedge fund to their prime broker to be reused as collateral by the prime broker for its own purposes, compounding the fund's exposure. Although in the US the law restricts such an exposure to (a still considerable) 140 percent of what is owed to the financial institution by a hedge fund, in countries such as the UK there are no corresponding limits (Singh and Aitken (2010)). Moreover, in the US, despite explicit protections to banks' hedge fund clients, tracking rehypothecated assets passed on by the original holders of this form of collateral proved difficult for many institutions during the financial crisis.

Given the hedge funds' deep links to financial institutions described above, we have a natural setting to exploit in investigating the efficacy of public bailouts. We are able to address the effects of bailouts on the stability of an important segment of the financial system. Studies in this area typically focus on the corporate sector. As noted by Jorion and Zhang (2009), the magnitude of exposures between financial institutions are very low due to regulatory and prudential constraints, as well as the relative balance sheet sizes of financial firms. In Jorion and Zhang's sample, the exposure between financial institutions averages 0.16 percent of creditors' equity. In contrast, among industrial firms trade credit typically amounts to 20 percent of the debtors' assets, and 0.32 percent of the creditors' equity. To

illustrate the sensitivity of hedge funds to the financial health of prime brokers, consider the case of Lehman Brothers' failure. On declaring bankruptcy, $65 billion of assets owned by 3500 of Lehman's prime brokerage clients were immediately frozen, effectively turning the hedge funds into unsecured creditors.[10] Consider also the fact that the typical hedge fund has only one prime broker, certainly prior to the onset of the crisis. Even hedge funds that utilize several prime brokers have exposure to a very concentrated market where the top ten dealers service 84 percent of hedge fund assets under management (King and Maier 2009).

2. Sample Construction and Empirical Design

2.1 Data

This paper is served by two main datasets – (1) bailouts of hedge fund-related financial institutions and (2) hedge fund characteristics. We collect US bank bailout data from the *New York Times* website.[11] In the US, bailouts were made under the Troubled Asset Relief Program (TARP), which commenced in October 2008. The *New York Times* list comprises 655 institutions that received approximately $400 billion in federal bailout capital. To identify recipients of bailout funds sourced from European governments, we augment the list compiled by Goddard, Molyneux and Wilson (2009) with searches of news articles in the Factiva database. This process yields an additional 24 institutions domiciled in Belgium, France, Germany, Ireland, Sweden, Switzerland and the United Kingdom.[12]

Our source of hedge fund data is the Lipper TASS database, one of the most frequently used databases in hedge fund research. While a number of previous studies strive

[10] See "Don't sell hedge funds short," *Wall Street Journal*, 21 October 2008.
[11] Available online at: http://projects.nytimes.com/creditcrisis/recipients/table. The list was compiled by reporters Matthew Ericson, Elaine He and Amy Schoenfeld from sources such as the US Treasury, Bloomberg, Dow Jones, Stifel, Nicolaus & Company (Texas ratio), and the affected companies.
[12] Luxembourg and the Netherlands co-financed two bailouts with France and Belgium. In our analysis we count only Belgium for these two cases as it hosts the headquarters of the bailout candidates (Dexia and Fortis).

for a more complete representation of the hedge fund industry by combining up to four databases (see for example, Kosowski, Naik and Teo 2007), we confine our scope to the Lipper TASS database for the primary reason that it is the only source from which we could obtain the identities and roles of hedge-fund linked firms (an issue we discuss further below). For our purposes, Lipper TASS provides a representative sample of hedge funds that are linked to rescued institutions. Our study also follows in the tradition of non-performance oriented studies that have found the Lipper TASS database to be reliable (see, for example, Gupta and Liang (2005), on hedge fund capital adequacy, and Aragon (2007), a study of the share restrictions).

Nevertheless, the drawbacks of hedge fund databases such as survivorship and backfill biases are well known and, thus, readers should apply due care when interpreting our findings. We take two primary steps to ameliorate such biases. First, in our analysis of fund liquidations, we begin with the most unrestricted definition of liquidations including all funds that stopped reporting to Lipper TASS. We then perform a robustness check by restricting the analysis to only those funds clearly identified as having been liquidated, in this way excluding discretionary withdrawals from the sample. Since our findings are qualitatively unchanged we only tabulate those based on the fuller definition. Second, the empirical design that we employ for our second set of analyses (of hedge fund capital adequacy during the financial crisis) naturally converges to a sub-sample of funds-of-hedge-funds. This attribute of the analysis delivers the benefit identified by Fung and Hsieh (2000) and Fung et al. (2008) who argue that fund-of-fund performance data are a more reliable representation of the returns earned by hedge fund investors than are individual fund data.[13] This logic also applies to our paper since returns are a key input in computing fund capital adequacy proxies,

[13] Fung and Hsieh (2000) and Fung et al. (2008) point to the greater propensity of an individual hedge fund to stop reporting performance ahead of actual fund closure compared to a fund-of-funds whose reporting is not affected by isolated distress at one of its portfolio funds.

our dependent variable in the second set of tests. An additional benefit of restricting the analysis of hedge fund liquidity to funds-of-funds is that this fund category largely has homogenous share restrictions (averaging six months). It is reasonable to expect that capital adequacy for funds with short share restriction periods are regarded differently by investors compared to funds with longer waiting periods to redemption.

Lipper TASS reports performance and profile data on 12,935 hedge funds domiciled in 57 countries (including 13 tax havens) as at 30 June 2009. Specifically, this study utilizes returns, NAVs, age (calculated from inception and liquidation dates), fund objectives, management fees, incentive fees, indicators of portfolio manager's own capital and whether a fund is leveraged. Lipper TASS supplied us with the identities of the key institutions related to each hedge fund – administrator, auditor, bank, custodian, investment advisor, legal counsel, management firm, prime broker, registrar/transfer agent, sub advisor, underwriter/sponsor. After carefully checking the questionnaire that Lipper TASS uses to collect data from hedge fund managers, for the purposes of our study, we collapse the roles into four categories: (1) prime brokers; (2) custodians (comprising the original bank and custodian roles); (3) investment advisors (investment advisor and management firm); and (4) other roles (all the remaining roles). The rationale for our new classification is that we are interested in the first three roles since they represent important financial links between the hedge funds and institutions.[14]

We match the bailouts and hedge fund data by hand. First, we identify all cases where bailed-out institutions are linked to hedge funds using company names and verifying close matches through electronic sources such as company websites, news articles and SEC lodgments. We are also interested in subsidiaries of bailed out institutions which makes the matching process more difficult when names are not closely related. Prime brokers, in

[14] We exclude the non-financial roles of administrator, auditor, legal counsel and registrar/transfer agent.

particular, often operate under names that are completely unrelated to their parent organizations (for example, Pershing LLC operated by Bank of New York Mellon and Fimat, part of Société Générale Group). To resolve this problem we obtain the universe of 46 prime brokerage firms from the 2008 FINalternatives Prime Broker Directory. We then check the ownership of each firm and in this way identify those prime brokers related to bailed-out banks.

Table 1 lists the 33 hedge-fund related institutions that received bailouts from US and European governments.[15] These institutions are prime brokers to 4,305 funds (33 percent of the Lipper TASS database) and custodians to 4,915 funds (38 percent) in our sample. Almost 700 funds use units operated by the bailed out institutions as investment managers. Banks bailed out in the US account for 9,493 or 70 percent of the total 13,584 bank-hedge fund partnerships in this study. Belgium and Switzerland yield more than 1,000 observations each.

The sample period for this study commences in July 2005 and ends in June 2009. The crisis period is taken to commence in August 2007, in line with generally accepted market and regulator interpretations (see, for example, Bhansali, Gingrich and Longstaff 2008 and Shin 2009). Table 2 reports summary statistics for the main fund-specific variables, chosen from those described extensively in studies utilizing similar data to ours. It is of interest to assess whether there are noticeable changes in some of the statistics in our sample period given that it incorporates the global financial crisis. A few observations are worthy of note in this regard. First, the mean proportion of funds located in tax havens (Offshore) is 69 percent compared to the 59 percent reported by ter Horst and Verbeek (2007). Second, incentive fees (mean 12.67 percent), management fees (1.46 percent) and fund size are generally lower than those previously reported although the magnitude of the differences is not large. Third,

[15] Note that some high profile bailouts may not appear in this list due to the fact that the institutions concerned did not have links to hedge funds of the nature we study in this paper.

turning to fund categories, 26 percent are Long/Short Equity funds, while each of the other categories represented in our study account for between three and six percent of the sample. Fourth, on average in 17 percent of the fund sample, portfolio managers have invested their own capital (Personal Capital) and 46 percent of these funds use leverage.

2.2 Methods

2.2.1 Modeling Determinants of Hedge Fund Liquidations – Core Design

To explore the effects of bank bailouts on related hedge funds, the basic framework of our empirical design is to analyze the determinants of our key variables over the chosen sample period (January 2005 to June 2009), with independent variables motivated from the existing literature. Within this basic framework, our main tests rely on difference-in-differences and log-logistic regression techniques, two state of the art methods used in this line of research. Using difference-in-differences estimates, we compare the probability of hedge fund liquidations during the crisis period for a sample of hedge funds whose related banks were bailed out with that of hedge fund clients of banks that were not bailed out. We utilize probit regression estimates of the determinants of fund liquidations.

The majority of the explanatory variables are derived from prior studies such as Brown, Goetzmann and Park (2001) and ter Horst and Verbeek (2007). Among these variables are lagged returns, fund size (*ln(NAV)*), fund risk (*StDev*, proxied by the standard deviation of the previous twelve months' returns), and fund age (in years). We also employ eight binary indicators of fund investment style, following Baquero, ter Horst and Verbeek (2005) and ter Horst and Verbeek (2007), excluding those classifications with little representation in our dataset (for example, convertible arbitrage). The style groups

accommodated are: emerging markets; equity market neutral; event driven; fixed income arbitrage; global macro; long/short equity; managed futures and offshore. *Management Fees* (measured as a percentage of assets under management) and *Incentive Fees* (hedge fund managers' participation in fund returns over agreed thresholds) represent managers' incentives. *Underwater* is a dummy variable indicating whether a fund has a negative cumulative return over the past 12 months. We also introduce two new variables not previously utilized in the hedge fund liquidations literature – a dummy variable denoting whether there is any manager's personal capital invested in the fund (*Personal Capital*) and a second indicating whether the use of leverage is permitted in the fund (*Leverage*). These two variables are incorporated in Brown, Goetzmann, Liang and Schwarz's (2008) analysis of hedge fund operational risk. We hypothesize that *Personal Capital* (*Leverage*) will be positively (negatively) associated with fund survival.

The application of difference-in-differences techniques within our probit framework is similar to Giannetti and Simonov (2013).[16] We incorporate time dummy variables denoting the three or six months that follow the critical events of the bailout of hedge fund related banks (our event dummies). To specifically investigate whether bailouts reduced the probability of hedge fund liquidations, we identify the subsample of hedge funds related to bailed out institutions with a dummy variable (*Connected Fund*) and interact the dummy variable with the event dummy (*Post Bailout*). The interpretation of a statistically significant coefficient for this interaction term is that liquidation probabilities are indeed different for the subsample of hedge funds related to bailed out institutions as identified by the dummy variable.

[16] Although Giannetti and Simonov (2013) use an OLS approach, Puhani (2012) builds on Ai and Norton (2003) to show that it is appropriate to focus on the coefficient of the interaction term when the difference-in-differences identification strategy is applied to nonlinear models like probit, logit or tobit.

We include time fixed effects to control for time-varying market wide changes in the hedge fund industry as well as a dummy variable marking the entire crisis period (commencing August 2007). We also construct a dummy variable for each country involved in our sample of bailouts to control for differences in the structure of bailout packages across various countries. This control is also necessary to account for country specific approaches to managing the financial crisis. For example, at different points in time over the crisis period, some governments announced financial rescue packages such as blanket bank guarantees to run parallel to bailouts. The inclusion of these additional control variables and the post-event window indicators improves the model fit by approximately 30 percent. We cluster standard errors across quarters as well as across hedge funds to correct for cross-sectional dependence in fund liquidations.

2.2.2 Determinants of Hedge Fund Liquidations – Robustness Techniques

Several dimensions of robustness are explored. As a robustness check on our analysis of the determinants of hedge fund liquidations, first we examine hedge fund survival using a log-logistic model following Calomiris and Mason (2003) and Richardson and Troost (2009). In this analysis, we concentrate exclusively on how bailouts affected hedge fund terminations during the crisis period. Our sample period for this purpose therefore includes fund liquidations that took place after July 2007. We adopt this cut-off point to ensure that our analysis includes the liquidations which occurred in August 2007, the month marking the commencement of the crisis. The main advantage of using this survival model is that it allows us to examine the same explanatory variables as employed in our probit models (since the model is flexible enough to permit the inclusion of data sampled and aggregated at different points in time and levels). The dependent variable in the log-logistic specification is

the natural logarithm of the number days until liquidation, counting post 31 July 2007.[17] The critical response variable is the interaction between the bank-related funds dummy variable and the post-bailout time dummy. For comparative purposes, we present the results of the log-logistic regressions alongside our probit results.

As a second element of robustness, we use a Cox proportional hazards regression approach to analyze the probability of hedge fund survival conditional on the fund being bailout bank related:

$$log h_i(t|X_{t-1}) = \lambda_t + \beta X_{t-1} \quad (1)$$

where $h_i(t|X_{t-1})$ is the so-called hazard rate, i.e. the probability that fund *i* exits at time *t*, given it survived until time *t-1*. The vector X_{t-1} contains a set of variables hypothesised to influence the probability of survival.[18] We use the same independent variables across three regression approaches for ease of interpretation.

2.2.3 Modeling Hedge Fund Capital Adequacy

In our analysis of the effects of bank bailouts on related hedge funds' capital adequacy, we use OLS regressions. The dependent variable is the capitalization ratio (*CAPRATIO*) of a fund based on its value at risk (VaR) as proposed by Jorion (2000) and Gupta and Liang (2005). A fund's capitalization ratio is calculated as follows:

$$CAPRATIO = \frac{E_{Actual} - E_{Required}}{E_{Required}}, \quad (2)$$

[17] We use days as our time measurement unit so that liquidations which took place in August 2007 are not denied an effective role in our analysis. If we use months in line with the probit models, durations of one month would fall away upon log transformation.

[18] For a detailed description of Cox proportional hazard regressions see Greene (2003, Chap. 4.7.3) and in the context of firm survival, see the methodological appendix in Mata and Portugal (2002).

where a fund's required equity ($E_{Required}$) is three times its VaR estimate and the actual equity (E_{Actual}) is the fund's observed total net assets (TNA).[19] A hedge fund's VaR is measured as follows:

$$VaR = (0 - R_{99\%}) \times TNA, \tag{3}$$

where VaR is the 99% one-month VaR, $R_{99\%}$ is the cutoff return at the 99% confidence level estimated using Extreme Value Theory (EVT), and TNA is the total net assets or equity of a fund. We use monthly return data to estimate an empirical distribution of returns for each hedge fund separately. To interpret the capitalization ratio, a value less than zero indicates that the fund's capital is insufficient to cover its portfolio risk as measured by VaR.

EVT and its application to hedge fund VaR measurement is explained comprehensively in Gupta and Liang (2005). Briefly summarized, EVT is the theory of modeling and measuring events which occur with very small probability, that is, fitting only the tail of the distribution. This implies its usefulness in risk modeling, as 'extreme' risk events tend to happen with low probability. Two main alternative distributional assumptions are possible in EVT models. First, the generalized extreme value (GEV) describes the limiting behavior of normalized maxima of iid distributed random variables. Second, the generalized Pareto distribution (GPD) describes the tail of a distribution above a given high threshold. This approach focuses on the realizations which exceed some specified threshold, the so-called peak over threshold (POT) method and is preferred for its efficient usage of limited data.

Before pursuing the formal analysis, we depict how our dependent variables behave over the crisis period. Figure 1 graphs quarterly counts of fund liquidations. Relative to

[19] In unreported results, we also consider alternative VaR multiples of 4 and 5 to estimate required fund capital. Using these alternative multiples, our main findings are qualitatively unchanged. Details are available from the authors upon request.

trends from 2005, substantially more funds were terminated starting in the first half of 2007. However the most significant increase in fund closures is seen from around Q2-2008 culminating in a peak just before the end of 2008. Thereafter, liquidations drop sharply towards figures seen at the beginning of the sample period. Figure 2 shows quarterly averages of our capital adequacy proxies. From the beginning of our sample period to approximately the first quarter of 2008, the trend had been for hedge funds to reduce their CAPRATIOs. Thereafter, there is a sharp rise that roughly coincides with run-up to the peak of liquidations seen in Figure 1. It would appear hedge fund companies reacted to the peak of the financial crisis by raising their funds' capital levels. Taken together, anecdotally, these observations describe market conditions that broadly reflect market worries about the potential chaos playing out in financial markets, thereby potentially justifying government interventions such as the bailouts.

3. Results

3.1 Results of Probit Regressions

Prior to presenting our main findings, in Table 3 we report the results of our preliminary models of fund liquidation (i) to facilitate a comparison with other studies of hedge fund attrition (such as Brown, Goetzmann and Park 2001 and ter Horst and Verbeek 2007) and (ii) to shed light on the incremental value of the new variables that we introduce. In Table 3 the distinction between the two models (a) and (b) is that model (b) incorporates the *Crisis Dummy* (taking the value of unity in the period August 2007 to June 2009 and zero otherwise), in addition to the determinants of fund liquidations included in Model (a). In Model (b) the *Crisis Dummy* is statistically significant and positively related to the probability of fund liquidation. This finding is intuitively appealing, particularly in light of

the pattern displayed in Figure 1 which demonstrates a spike in the number of fund closures over the crisis period. The fact that this result holds up strongly after controlling for the other variables in the model, underscores its importance. Of particular note among the potential determinants of fund attrition, is the role of our "new" variables. Regardless of whether the crisis period is taken into account, *Personal Capital* is negatively related to the demise of hedge funds. Interestingly, being leveraged does not seem to differentiate funds that liquidate from those that survive.

The remaining explanatory variables are broadly in line with expectations, given our incorporation of the crisis period, and/or consistent with previous findings. Past performance, particularly going back two to three months is negatively related to fund survival. Of the style classifications whose coefficients are statistically significant (at some conventional level), only the *Managed Futures* style shows strong resilience against the propensity of hedge funds to close. *Age* is non-linearly associated with terminations – the linear term is positive while the associated quadratic term is negative, suggesting an asymmetric *Age* effect. Finally, high incentive fees seem to encourage liquidations which, combined with the positive sign on the variable *Underwater*, suggests that fund managers who paid themselves higher incentive fees were quicker to shut down, probably due to crisis-induced poor performance.

In Table 4 we extend the base models to our full sample of bank related hedge funds by incorporating the interaction between (a) a time dummy variable marking the immediate aftermath of the bailout (either of prime brokers in Panel A, of custodians in Panel B, or of investment advisors in Panel C) and (b) a dummy variable denoting associated bank-related hedge funds. Specifically, the columns labeled "x months" (where x = 3, 6, 9 or 12) includes the interaction term based on a period of x months counting from the bailout month. The interaction term relating to the immediate aftermath of the bailout of hedge funds': (a) prime brokers is labeled "Post_BO_PB"; (b) custodians is labeled "Post_BO_CUS"; and (c)

investment advisors is labeled “Post_BO_IA”. Often news of bailouts is leaked a few days before the disbursement of the funds, hence, our incorporation of the bailout month into the analysis.

Panel A of Table 4 presents the prime broker results. Most notably, irrespective of which post-event window is used, it appears the bailing out of prime brokers had the effect of reducing the probability of fund liquidation. That is, in all cases the estimated coefficient on the key interaction term is negative and significant at the 1% level. Notably, the crisis dummy loses its statistical significance, suggesting that hedge fund terminations slowed down only for the sub-sample of funds related to bailed out banks. Panel B of Table 4 presents the custodian results and the results mimic Panel A – irrespective of which post-event window is used, based on the probit modeling the bail out of custodians reduced the probability of fund liquidation. However, as shown in Panel C, regardless of the horizon, investment advisory linkages to banks were associated with an increased probability fund closure post-bailout.

Table 5 repeats the analysis in Table 4 on a restricted sample of banks that we define as “strong” banks, i.e. those that tapped into bailout funds no more than once. According to this characterization, “weak” institutions include A.I.G., which accessed TARP funding twice, and Bank of America and Citigroup, both extended access three times. In Panels A and C, our probit model findings based on the strong banks sub-sample show that hedge funds with prime brokerage links or investment advisory links to such banks, respectively, were more likely to be liquidated in the immediate aftermath of the bailout. This result suggests that accessing bailout funds more than once signaled financial strength for bank related funds. However, in Panel B of Table 5 which focuses custodial bailouts in the strong banks sample, no such effect is observed – the relevant interaction term is insignificant across all horizons.

3.2 Results of Log-Logistic and Hazard Regressions

Table 6 reports the results of the base version of the log-logistic and Cox proportional hazard specifications of the determinants of fund terminations are reported. For the log-logistic regression results, to interpret the coefficients note that our interest is in how each explanatory variable is associated with hedge fund liquidation rates rising above the baseline during the sample period. A coefficient that is negatively related to the dependent variable indicates the explanatory variable is associated with liquidations rising above baseline. The results show that most of the coefficients that correspond to statistically significant parameters in the earlier baseline probit models are also significant and of opposite sign to the probit regressions. The Cox proportional hazards model yields results that mostly confirm the log-logistic robustness check. These results confirm our earlier findings on the base model of determinants of fund liquidations.

Tables 7 to 10 present the outcome of estimating the log-logistic and Cox proportional hazard methods for the extended model specification that includes the interaction term that separates post bailout effects linked to prime brokers (Panel A), custodians (Panel B) and investment advisors (Panel C). Specifically, Table 7 (Table 8) displays log-logistic (hazard) model results for the all banks sample, while Table 9 (Table 10) is the counterpart for the strong banks sample.

In Tables 7 and 8, for the all banks analysis, the estimated coefficients from the log-logistic and proportional hazard specifications for the post bailout period are statistically significant, across all horizons. Specifically, for the log-logistic estimation both the prime broker and custodian cases deliver a positive coefficient, whereas the investment advisor interaction term produces a negative coefficient. As expected, in Table 8, the estimated signs

are reversed for the counterpart hazard model estimations. Tables 9 and 10, for the strong banks analysis, produce quite mixed results that defy a clear interpretation.

Collectively, our findings suggest that bailouts reduced the probability of fund liquidations, particularly for prime broker and custodian banks. Our evidence lends support to the idea that improved liquidity in key hedge fund banking partners encouraged survival. However, we need to consider these findings alongside the analysis of determinants of capital adequacy during the crisis period in order to definitively identify the channel through which bailouts ameliorated contagion in the hedge fund industry.

3.3 Bailouts and Hedge Fund Capital

In this section we report findings based on regressions of hedge funds' capital adequacy proxies on a number of fund characteristics.[20] In the model we exclude fund performance which is highly correlated with TNA, a key part of the computation of fund capital adequacy proxies. Also, since the sample for this analysis is only comprised of funds-of-funds, all style classifications used in the empirical analysis to this stage are not part of the current tests.

Our results reported in Table 11 show that post-bailout capital has no relation with hedge funds capital adequacy in any type of relationship, regardless of the horizon. This finding suggests that, likely due to political considerations, banks did not directly channel bailout funds to their hedge fund customers. Moreover, the finding is consistent with anecdotal evidence that US banks that received bailout funds in fact reduced lending.[21]

[20] Since the construction of our dependent variable results in a truncation of the hedge fund illiquidity proxy at an *upper* limit of zero, we cannot apply Tobit regressions since they apply to cases which involve a non-negative dependent variable.

[21] See, for example, "Lending Drops at Big US Banks - Top Beneficiaries of Federal Cash Saw Outstanding Loans Decline 1.4% Last Quarter" *Wall Street Journal,* 26 January 2009.

Taken together with our findings on hedge fund liquidations, these results serve to indirectly confirm the channel of the efficacy of bank bailouts, at least in the context of the hedge fund industry. Specifically, it appears that the effectiveness of bailouts was through fostering the improvement of the industry's operating environment and market confidence in general, and not via a monotonic injection of bailout funds into banks' hedge fund clients. Relatively little reliance on bailout funds was 'mistaken' for a sign of financial weakness as we find it was accompanied by increased liquidations. Thus, we conclude that bailouts had positive effects in general and stopped the propagation of contagion through the information channel rather than directly via counterparty funding.

4. Summary and Conclusions

This study is, to the best of our knowledge, the first to provide evidence on the impact of bank bailouts on the hedge fund industry. Hedge funds have close ties to financial institutions which provide prime brokerage, custodial and investment advisory services. For hedge funds these ties result in economically significant exposures to counterparty risk – the risk that if the related financial institutions fail, hedge fund funding would dry up. It is this vital link which we target in our study and we show that in the aftermath of bailouts, the probability of fund liquidation was substantially reduced. Specifically, we find that, without controlling for the extent of institutions' reliance on bailout monies, hedge funds that are connected to prime broker and custodian banks are less likely to be liquidated. In contrast, funds that are connected to investment adviser banks are more likely to be liquidated. When we concentrate our analysis on strong banks – those accessing bailout funds only once - we find hedge funds connected to prime brokers and investment advisers are more likely to be liquidated while there is no effect on those connected to custodians. While most US banks

were able to apply for TARP funding following the initial disbursement in October 2008, our findings suggest that strong banks' related hedge funds failed at higher rates during the financial crisis.

Finally, we do not find any evidence of bailouts explaining hedge fund capital adequacy ratios through funds' connection with prime broker, custodian and investment adviser banks that accessed the funding. This result confirms our initial evidence that the effectiveness of bank bailouts was through information channels rather than directly through counterparty funding.

Our findings have two main policy implications. First, bailouts seem to have the very desirable effect of forestalling wholesale fund liquidations with the probable result of slowing down asset fire sales, one of the most feared consequences of the recent global financial crisis. Second, governments will note from these findings that having a relationship with a bailed out institution does not mechanically lead to the transfer of financial rescue funds by banks to hedge fund clients.

With regard to future research, the findings we have presented herein suggest that there is scope in at least two directions. First, is to target the heterogeneity of financial rescue programs to include initiatives such as bank guarantees and the Primary Dealer Credit Facility to inform the debate on what types of government intervention worked more effectively to reduce the risk of contagion in the hedge fund industry. Second, is to consider in greater detail the process and mechanics by which hedge funds returned to normal business as the crisis dissipated. Hedge funds' intricate links with the banking system are particularly relevant to new research avenues.

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Table 1

Bailouts of hedge fund related financial institutions

This table provides a list of the banks that were bailed out in the US and Europe during the 2007-2009 financial crisis. The types of relationships with hedge funds are summarized in the right hand panel and country totals in the lower panel.

				Bailed Company – Fund Relationships			
Bailed Company	Bailout Date	Bailout Country	Total	Prime Broker	Custodian	Investment Advisor	Other
A.I.G.	16-Sep-08	US	124	13	22	48	36
Allied Irish Banks (AIB)	11-Feb-09	Ireland	77	1	25	4	47
American Express	9-Jan-09	US	26	-	5	16	5
Bank of America	28-Oct-08	US	851	481	342	17	10
Bank of Ireland	11-Feb-09	Ireland	117	11	69	3	34
Bank of New York Mellon	28-Oct-08	US	624	44	232	74	268
BNP Paribas	20-Oct-08	France	419	36	230	28	119
Boston Private Financial	21-Nov-08	US	4	-	4	-	-
Capital One Financial	14-Nov-08	US	2	-	2	-	-
Citigroup	28-Oct-08	US	982	226	225	18	507
City National	21-Nov-08	US	2	-	2	-	-
Comerica	14-Nov-08	US	99	7	92	-	-
Commerce National Bank	9-Jan-09	US	2	-	2	-	-
Commerzbank AB	1-Nov-08	Germany	37	10	22	1	3
Credit Agricole	20-Oct-08	France	309	9	69	142	73
Dexia	30-Sep-08	Belgium	297	19	117	66	88
Fortis	29-Sep-08	Belgium	1173	78	480	54	559
Goldman Sachs Group	28-Oct-08	US	2025	1052	731	9	229
JPMorgan Chase	28-Oct-08	US	1691	680	747	61	197
Lloyds TSB	13-Oct-08	UK	3	-	3	-	-
Mercantile Bank	15-May-09	US	1	-	1	-	-
Morgan Stanley	28-Oct-08	US	1938	1130	764	6	37
Northern Trust	14-Nov-08	US	350	34	112	-	204
PNC Financial Services Group	31-Dec-08	US	458	8	119	6	321
Royal Bank of Scotland	13-Oct-08	UK	65	3	-	9	-
Société Générale	20-Oct-08	France	500	-	30	9	25
State Street	28-Oct-08	US	262	15	122	20	104
SunTrust Banks	14-Nov-08	US	8	-	8	-	-
Swedbank	4-Nov-08	Sweden	15	1	8	4	2
US Bancorp	14-Nov-08	US	9	1	8	-	-
UBS	16-Oct-08	Switzerland	1075	443	298	92	215
Wells Fargo	28-Oct-08	US	35	3	24	4	-
WestLB	1-Jan-08	Germany	4	-	-	4	-
Country Totals		Belgium	1470	97	597	120	647
		France	809	9	99	151	98
		Germany	41	10	22	5	3
		Ireland	194	12	94	7	81
		Sweden	15	1	8	4	2
		Switzerland	1075	443	298	92	215
		UK	68	3	3	9	0
		US	9493	3694	3564	279	1918
Grand Total			13584	4305	4915	695	3083

Table 2

Summary statistics of fund specific variables

This table reports descriptive statistics for the main fund specific variables based on 10,820 hedge funds in the period 2005-2009. The variable ln(NAV) is the natural logarithm of hedge fund net asset value. Fund Age (Age) is computed from the date of inception to the reporting date. Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore are fund style classification dummy variables. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator for funds that report a negative cumulative return over the previous 12 months. Personal Capital indicates funds whose managers have invested their own money in the funds. Leveraged is a binary indicator for funds allowed to employ leverage. CAPRATIO3, the capitalization ratio, represents the degree of undercapitalization relative to the required equity that is three times the 99% one month VaR of the fund as described in the text.

Variable	Mean	Std Dev	Minimum	Maximum
ln(NAV)	5.69	1.73	-13.82	29.86
ln(Age)	1.07	1.05	-5.89	3.67
ln(Age)2	2.26	2.13	0.00	34.65
Emerging Markets	0.05	0.21	0.00	1.00
Equity Market Neutral	0.04	0.20	0.00	1.00
Event Driven	0.06	0.23	0.00	1.00
Fixed Income Arbitrage	0.03	0.18	0.00	1.00
Global Macro	0.04	0.19	0.00	1.00
Long/Short Equity	0.26	0.44	0.00	1.00
Managed Futures	0.05	0.22	0.00	1.00
Offshore	0.69	0.46	0.00	1.00
Management Fees	1.46	0.65	0.00	21.00
Incentive Fees	12.67	8.67	0.00	200.00
Underwater	0.27	0.45	0.00	1.00
Personal Capital	0.17	0.37	0.00	1.00
Leveraged	0.46	0.50	0.00	1.00
CAPRATIO3	7.56	8.07	-0.99	49.99

Table 3

Determinants of hedge fund liquidation 2005-2007: Probit estimation results

This table reports the results of probit models. The dependent variable is a binary indicator that takes a value of unity if a hedge fund liquidates in a given month and zero otherwise. Past returns are denoted r(-1) through r(-6). The variable ln(NAV) is the natural logarithm of hedge fund net asset value. StDev is fund risk proxied by the standard deviation of the previous twelve months' returns. Fund Age (Age) is computed from the date of inception to the reporting date. Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore are fund style classification dummy variables. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator of funds that report a negative cumulative return over the previous 12 months. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. The Crisis Dummy denotes the period August 2007-June 2009.

Parameters	Model (a) Estimate	Model (b) Estimate
Intercept	-1.293***	-1.390***
	(0.077)	(0.078)
r(-1)	-0.009***	-0.009***
	(0.002)	(0.002)
r(-2)	-0.005***	-0.004***
	(0.002)	(0.002)
r(-3)	-0.005***	-0.004**
	(0.002)	(0.002)
r(-4)	-0.000	-0.000
	(0.002)	(0.002)
r(-5)	-0.002	-0.002
	(0.002)	(0.002)
r(-6)	-0.004**	-0.003*
	(0.002)	(0.002)
ln(NAV)	-0.073***	-0.074***
	(0.004)	(0.004)
StDev	0.005*	0.003
	(0.003)	(0.003)
ln(Age)	0.207***	0.191***
	(0.050)	(0.050)
$\ln(Age)^2$	-0.055***	-0.052***
	(0.017)	(0.017)
Emerging Markets	-0.078*	-0.072
	(0.044)	(0.044)
Equity Market Neutral	0.080**	0.086**
	(0.040)	(0.040)
Event Driven	0.043	0.045
	(0.037)	(0.037)
Fixed Income Arbitrage	0.163***	0.165***
	(0.044)	(0.044)
Global Macro	0.081*	0.082*
	(0.046)	(0.046)
Long/Short Equity	0.024	0.029
	(0.023)	(0.023)
Managed Futures	-0.178***	-0.163***
	(0.046)	(0.046)
Offshore	0.028	0.025
	(0.018)	(0.018)
Management Fees	-0.023	-0.027*
	(0.014)	(0.014)
Incentive Fees	0.004***	0.005***
	(0.001)	(0.001)
Underwater	0.326***	0.252***
	(0.020)	(0.021)
Personal Capital	-0.061***	-0.048**
	(0.023)	(0.023)
Leveraged	-0.016	-0.013
	-0.018	(0.018)
Crisis Dummy		0.218***
		(0.022)
No. of Observations	162,979	162,979
Log Likelihood	-11341	-11,289
Pseudo R^2	0.0531	0.0575

Table 4

Hedge fund liquidation post bank bailouts: Probit estimation results – all banks sample

This table reports the results of probit regressions of hedge fund liquidations during the period 2007-2009. This analysis focuses on the all banks sample. The dependent variable is a binary indicator that takes a value of unity if a hedge fund liquidates in a given month and zero otherwise. The variable ln(NAV) is the natural logarithm of hedge fund net asset value. StDev is fund risk proxied by the standard deviation of the previous twelve months' returns. Fund Age (Age) is computed from the date of inception to the reporting date. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator of funds that report a negative cumulative return over the previous 12 months. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. The Crisis Dummy denotes the period August 2007-June 2009. Post Bailout (Post_BO) is a binary indicator of the months counting from the bailout month indicated in each model's label (i.e. 3, 6, 9 or 12 months) for prime brokers (PB); custodians (CUS); or investment advisors (IA). Connected Fund is a dummy variable indicating a bailed out bank offers prime brokerage services to the fund. Variables included in the estimated models but not reported to conserve space: past returns from lag 1 to lag 6; and dummy variables representing fund style classifications - Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore. BO Country Fixed Effects are indicators of the countries issuing bailouts. Standard errors in the probit models are clustered at the investment management firm level.

Model	Panel A: Prime broker bailouts				Panel B: Custodian bailouts				Panel C: Investment advisor bailouts			
Post-Event Window	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months
Parameters	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	-1.581***	-1.585***	-1.539***	-1.538***	-1.576***	-1.575***	-1.528***	-1.526***	-1.569***	-1.571***	-1.576***	-1.577***
	(0.111)	(0.111)	(0.111)	(0.111)	(0.111)	(0.111)	(0.112)	(0.112)	(0.111)	(0.111)	(0.111)	(0.111)
ln(NAV)	-0.075***	-0.075***	-0.075***	-0.075***	-0.075***	-0.075***	-0.075***	-0.075***	-0.075***	-0.075***	-0.075***	-0.075***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
StDev	0.007**	0.007**	0.007***	0.007***	0.007**	0.007**	0.007**	0.007**	0.007**	0.007**	0.007**	0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
ln(Age)	0.187***	0.187***	0.187***	0.187***	0.185***	0.184***	0.183***	0.183***	0.187***	0.187***	0.186***	0.186***
	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
$\ln(Age)^2$	-0.049***	-0.049***	-0.049***	-0.049***	-0.048***	-0.048***	-0.047***	-0.047***	-0.049***	-0.049***	-0.048***	-0.048***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Management Fees	-0.031**	-0.031**	-0.032**	-0.032**	-0.031**	-0.031**	-0.031**	-0.031**	-0.029**	-0.029**	-0.029**	-0.029**
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Incentive Fees	0.005***	0.005***	0.006***	0.006***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Underwater	0.282***	0.281***	0.280***	0.280***	0.284***	0.284***	0.284***	0.284***	0.285***	0.285***	0.285***	0.285***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Personal Capital	-0.039*	-0.039*	-0.038	-0.038	-0.040*	-0.039*	-0.039*	-0.039*	-0.040*	-0.040*	-0.040*	-0.040*
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Leveraged	-0.015	-0.014	-0.013	-0.013	-0.016	-0.016	-0.016	-0.016	-0.018	-0.018	-0.018	-0.018
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Crisis Dummy	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056
	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)	(0.064)
Connected Fund	-0.391**	-0.392**	-0.392**	-0.392**	-0.388**	-0.386**	-0.384**	-0.384**	-0.391**	-0.391**	-0.391**	-0.391**
	(0.192)	(0.192)	(0.192)	(0.192)	(0.191)	(0.191)	(0.191)	(0.191)	(0.190)	(0.190)	(0.190)	(0.190)
Post_BO_(PB or CUS or IA)	-0.199***	-0.162***	-0.190***	-0.190***	-0.151***	-0.140***	-0.172***	-0.174***	0.152**	0.129**	0.135**	0.134**
	(0.053)	(0.042)	(0.040)	(0.040)	(0.049)	(0.040)	(0.038)	(0.038)	(0.060)	(0.055)	(0.053)	(0.053)
BO Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	143,396	143,396	143,396	143,396	143,396	143,396	143,396	143,396	143,396	143,396	143,396	143,396
Log Likelihood	-10998	-10998	-10994	-10994	-11001	-11000	-10996	-10995	-11003	-11003	-11003	-11003
Pseudo R^2	0.0586	0.0587	0.0590	0.0590	0.0584	0.0585	0.0589	0.0589	0.0583	0.0582	0.0583	0.0583

Table 5

Hedge fund liquidation post bank bailouts: Probit estimation results – strong banks sample

This table reports the results of probit regressions of hedge fund liquidations during the period 2007-2009. This analysis focuses on that subset designated "strong" banks - namely, those accessing bailout funds only once. The dependent variable is a binary indicator that takes a value of unity if a hedge fund liquidates in a given month and zero otherwise. The variable ln(NAV) is the natural logarithm of hedge fund net asset value. StDev is fund risk proxied by the standard deviation of the previous twelve months' returns. Fund Age (Age) is computed from the date of inception to the reporting date. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator of funds that report a negative cumulative return over the previous 12 months. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. The Crisis Dummy denotes the period August 2007-June 2009. Post Bailout (Post_BO) is a binary indicator of the months counting from the bailout month indicated in each model's label (i.e. 3, 6, 9 or 12 months) for prime brokers (PB); custodians (CUS); or investment advisors (IA). Connected Fund is a dummy variable indicating a bailed out bank offers prime brokerage services to the fund. Variables included in the estimated models but not reported to conserve space: past returns from lag 1 to lag 6; and dummy variables representing fund style classifications - Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore. BO Country Fixed Effects are indicators of the countries issuing bailouts. Standard errors in the probit models are clustered at the investment management firm level.

Model	Panel A: Prime broker bailouts				Panel B: Custodian bailouts				Panel C: Investment advisor bailouts			
Post-Event Window	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months
Parameters	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	-2.323***	-2.326***	-3.075***	-3.075***	-2.510***	-2.511***	-2.523***	-2.517***	1.590*	1.507*	0.864	0.896
	(0.336)	(0.339)	(0.448)	(0.448)	(0.307)	(0.308)	(0.310)	(0.311)	(0.867)	(0.869)	(0.892)	(0.892)
ln(NAV)	-0.074***	-0.074***	-0.074***	-0.074***	-0.081***	-0.081***	-0.081***	-0.081***	-0.153***	-0.152***	-0.154***	-0.154***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.007)	(0.007)	(0.007)	(0.007)	(0.022)	(0.022)	(0.022)	(0.022)
StDev	0.011	0.011	0.012	0.012	0.005	0.005	0.005	0.005	-0.037	-0.037	-0.036	-0.036
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.023)	(0.024)	(0.023)	(0.024)
ln(Age)	0.400***	0.402***	0.399***	0.399***	0.358***	0.357***	0.358***	0.358***	0.822**	0.839**	0.839**	0.839**
	(0.103)	(0.103)	(0.103)	(0.103)	(0.096)	(0.096)	(0.096)	(0.096)	(0.389)	(0.390)	(0.391)	(0.391)
$\ln(Age)^2$	-0.130***	-0.130***	-0.129***	-0.129***	-0.120***	-0.119***	-0.120***	-0.120***	-0.372**	-0.379**	-0.374**	-0.373**
	(0.034)	(0.034)	(0.034)	(0.034)	(0.033)	(0.033)	(0.033)	(0.033)	(0.167)	(0.167)	(0.167)	(0.166)
Management Fees	-0.003	-0.001	-0.001	-0.001	0.009	0.009	0.010	0.010	-0.115	-0.111	-0.114	-0.117
	(0.042)	(0.042)	(0.042)	(0.042)	(0.030)	(0.030)	(0.030)	(0.030)	(0.079)	(0.079)	(0.079)	(0.079)
Incentive Fees	0.017***	0.017***	0.017***	0.017***	0.013***	0.013***	0.013***	0.013***	0.018***	0.018***	0.018***	0.018***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)	(0.006)
Underwater	0.280***	0.281***	0.280***	0.280***	0.280***	0.280***	0.281***	0.281***	-0.288**	-0.288**	-0.272*	-0.266*
	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)	(0.143)	(0.142)	(0.143)	(0.142)
Personal Capital	-0.038	-0.039	-0.039	-0.039	0.004	0.005	0.004	0.004	0.028	0.046	0.028	0.033
	(0.037)	(0.037)	(0.037)	(0.037)	(0.042)	(0.042)	(0.042)	(0.042)	(0.383)	(0.384)	(0.382)	(0.381)
Leveraged	0.035	0.036	0.035	0.035	-0.009	-0.009	-0.010	-0.010	0.069	0.073	0.065	0.069
	(0.036)	(0.036)	(0.036)	(0.036)	(0.034)	(0.034)	(0.034)	(0.034)	(0.112)	(0.111)	(0.112)	(0.112)
Crisis Dummy	-0.034	-0.034	-0.034	-0.034	0.016	0.016	0.016	0.016	-0.152	-0.154	-0.154	-0.154
	(0.104)	(0.104)	(0.104)	(0.104)	(0.112)	(0.112)	(0.112)	(0.112)	(0.285)	(0.285)	(0.285)	(0.285)
Post_BO_(PB or CUS or IA)	0.484**	0.252	0.824**	0.824**	-0.050	-0.057	0.024	0.016	0.726***	0.539***	0.752***	0.706***
	(0.210)	(0.348)	(0.328)	(0.328)	(0.094)	(0.094)	(0.107)	(0.108)	(0.160)	(0.171)	(0.186)	(0.181)
BO Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	41,469	41,469	41,469	41,469	43,362	43,362	43,362	43,362	4,481	4,481	4,481	4,481
Log Likelihood	-3016	-3018	-3016	-3016	-3091	-3090	-3091	-3091	-394.6	-396.8	-394.9	-395.4
Pseudo R^2	0.0672	0.0668	0.0674	0.0674	0.0670	0.0670	0.0669	0.0669	0.208	0.203	0.207	0.206

Table 6

Determinants of hedge fund survival 2005-2007: Log-logistic and Hazard model estimation results

This table reports the results of log-logistic and Cox proportional hazards regressions of hedge fund survival. The dependent variable in the former model is the natural logarithm of the number of days until liquidation (restricted to the period after 31 July 2007). The latter model estimates is the hazard rate, i.e. the probability that fund i exits at time t, given it survived until time t-1. The variable ln(NAV) is the natural logarithm of hedge fund net asset value. StDev is fund risk proxied by the standard deviation of the previous twelve months' returns. Fund Age (Age) is computed from the date of inception to the reporting date. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator of funds that report a negative cumulative return over the previous 12 months. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. Variables included in the estimated models but not reported to conserve space: past returns from lag 1 to lag 6; and dummy variables representing fund style classifications - Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore.

	Log-logistic model	Hazard model
Parameters	Estimate	Estimate
Intercept	2.614***	
	(0.131)	
ln(NAV)	0.110***	-0.150***
	(0.008)	(0.011)
StDev	-0.013**	0.010
	(0.006)	(0.006)
ln(Age)	-0.288***	0.449***
	(0.069)	(0.124)
$\ln(Age)^2$	0.074***	-0.130***
	(0.022)	(0.043)
Management Fees	0.029	-0.079**
	(0.021)	(0.033)
Incentive Fees	-0.009***	0.013***
	(0.002)	(0.003)
Underwater	-0.201***	0.741***
	(0.038)	(0.061)
Personal Capital	0.040	-0.084
	(0.034)	(0.058)
Leveraged	0.012	-0.039
	(0.028)	(0.043)
No. of Observations	162,979	162,979
Log Likelihood	-2891	-18,500
Pseudo R^2	-	-

Table 7

Hedge fund survival post bank bailouts: Log-logistic estimation results – all banks sample

This table reports the results of log-logistic regressions of hedge fund survival during the period 2007-2009. This analysis focuses on the all banks sample. The dependent variable is the natural logarithm of the number of days until liquidation (restricted to the period after 31 July 2007). The variable ln(NAV) is the natural logarithm of hedge fund net asset value. StDev is fund risk proxied by the standard deviation of the previous twelve months' returns. Fund Age (Age) is computed from the date of inception to the reporting date. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator of funds that report a negative cumulative return over the previous 12 months. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. The Crisis Dummy denotes the period August 2007-June 2009. Post Bailout (Post_BO) is a binary indicator of the months counting from the bailout month indicated in each model's label (i.e. 3, 6, 9 or 12 months) for prime brokers (PB); custodians (CUS); or investment advisors (IA). Connected Fund is a dummy variable indicating a bailed out bank offers prime brokerage services to the fund. Variables included in the estimated models but not reported to conserve space: past returns from lag 1 to lag 6; and dummy variables representing fund style classifications - Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore. BO Country Fixed Effects are indicators of the countries issuing bailouts.

Model	Panel A: Prime broker bailouts				Panel B: Custodian bailouts				Panel C: Investment advisor bailouts			
Post-Event Window	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months
Parameters	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	3.977***	3.981***	3.977***	3.977***	3.977***	3.980***	3.976***	3.975***	3.978***	3.978***	3.979***	3.979***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
ln(NAV)	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
StDev	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln(Age)	-0.014***	-0.015***	-0.015***	-0.015***	-0.013***	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$\ln(Age)^2$	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Management Fees	0.002**	0.002**	0.003**	0.003**	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Incentive Fees	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Underwater	-0.019***	-0.020***	-0.020***	-0.020***	-0.019***	-0.021***	-0.021***	-0.021***	-0.020***	-0.020***	-0.020***	-0.020***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Personal Capital	0.003	0.003	0.003	0.003	0.003*	0.003	0.003	0.003	0.003*	0.003	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Leveraged	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Crisis Dummy	0.054***	0.054***	0.054***	0.054***	0.054***	0.054***	0.054***	0.054***	0.054***	0.054***	0.054***	0.054***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Connected Fund	0.030**	0.033**	0.033**	0.033**	0.030**	0.032**	0.032**	0.032**	0.032**	0.032**	0.032**	0.032**
	(0.015)	(0.016)	(0.016)	(0.016)	(0.015)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)
Post_BO_(PB or CUS or IA)	0.014***	0.013***	0.015***	0.015***	0.009***	0.010***	0.013***	0.014***	-0.025***	-0.021***	-0.020***	-0.020***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
BO Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979
Log Likelihood	-2188	-2250	-2246	-2246	-2192	-2252	-2247	-2247	-2244	-2246	-2246	-2246

Table 8

Hedge fund survival post bank bailouts: Hazard model estimation results – all banks sample

This table reports the results of Cox proportional hazards regressions of hedge fund survival during the period 2007-2009. This analysis focuses on the all banks sample. The dependent variable is the hazard rate, i.e. the probability that fund i exits at time t, given it survived until time t-1. The variable ln(NAV) is the natural logarithm of hedge fund net asset value. StDev is fund risk proxied by the standard deviation of the previous twelve months' returns. Fund Age (Age) is computed from the date of inception to the reporting date. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator of funds that report a negative cumulative return over the previous 12 months. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. The Crisis Dummy denotes the period August 2007-June 2009. Post Bailout (Post_BO) is a binary indicator of the months counting from the bailout month indicated in each model's label (i.e. 3, 6, 9 or 12 months) for prime brokers (PB); custodians (CUS); or investment advisors (IA). Connected Fund is a dummy variable indicating a bailed out bank offers prime brokerage services to the fund. Variables included in the estimated models but not reported to conserve space: past returns from lag 1 to lag 6; and dummy variables representing fund style classifications - Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore. BO Country Fixed Effects are indicators of the countries issuing bailouts.

Model	Panel A: Prime broker bailouts				Panel B: Custodian bailouts				Panel C: Investment advisor bailouts			
Post-Event Window	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months
Parameters	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
ln(NAV)	-0.149***	-0.150***	-0.149***	-0.149***	-0.150***	-0.150***	-0.149***	-0.149***	-0.151***	-0.151***	-0.151***	-0.151***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
StDev	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.010	0.010
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
ln(Age)	0.443***	0.444***	0.444***	0.444***	0.441***	0.439***	0.435***	0.434***	0.445***	0.444***	0.444***	0.444***
	(0.123)	(0.123)	(0.123)	(0.123)	(0.123)	(0.123)	(0.123)	(0.123)	(0.124)	(0.124)	(0.124)	(0.124)
$ln(Age)^2$	-0.129***	-0.129***	-0.129***	-0.129***	-0.128***	-0.127***	-0.125***	-0.125***	-0.129***	-0.128***	-0.128***	-0.128***
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)
Management Fees	-0.082**	-0.082**	-0.084**	-0.084**	-0.080**	-0.081**	-0.082**	-0.082**	-0.078**	-0.078**	-0.078**	-0.078**
	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)
Incentive Fees	0.014***	0.014***	0.015***	0.015***	0.014***	0.014***	0.014***	0.014***	0.013***	0.013***	0.013***	0.013***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Underwater	0.735***	0.733***	0.731***	0.731***	0.740***	0.741***	0.741***	0.741***	0.742***	0.742***	0.742***	0.742***
	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.060)
Personal Capital	-0.080	-0.078	-0.076	-0.076	-0.082	-0.081	-0.080	-0.080	-0.084	-0.083	-0.083	-0.083
	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)
Leveraged	-0.032	-0.030	-0.028	-0.028	-0.035	-0.034	-0.033	-0.033	-0.038	-0.038	-0.038	-0.038
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.044)	(0.044)	(0.044)	(0.043)	(0.043)	(0.043)	(0.043)
Connected Fund	0.004	0.013	0.027	0.027	0.005	0.020	0.039	0.040	-0.045	-0.046	-0.048	-0.048
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.044)	(0.044)	(0.044)	(0.042)	(0.043)	(0.043)	(0.043)
Post_BO_(PB or CUS or IA)	-0.389***	-0.325***	-0.391***	-0.392***	-0.317***	-0.299***	-0.374***	-0.380***	0.363**	0.320**	0.329***	0.326***
	(0.120)	(0.097)	(0.093)	(0.093)	(0.111)	(0.092)	(0.090)	(0.090)	(0.142)	(0.129)	(0.125)	(0.125)
BO Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979	162,979
Log Likelihood	-18494	-18494	-18491	-18491	-18496	-18495	-18491	-18491	-18497	-18497	-18496	-18497
Pseudo R^2	0.0206	0.0206	0.0208	0.0208	0.0205	0.0206	0.0208	0.0208	0.0205	0.0204	0.0205	0.0205

Table 9

Hedge fund survival post bank bailouts: Log-logistic estimation results – strong banks sample

This table reports the results of log-logistic regressions of hedge fund survival during the period 2007-2009. This analysis focuses on that subset designated "strong" banks - namely, those accessing bailout funds only once. The dependent variable is the natural logarithm of the number of days until liquidation (restricted to the period after 31 July 2007). The variable ln(NAV) is the natural logarithm of hedge fund net asset value. StDev is fund risk proxied by the standard deviation of the previous twelve months' returns. Fund Age (Age) is computed from the date of inception to the reporting date. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator of funds that report a negative cumulative return over the previous 12 months. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. The Crisis Dummy denotes the period August 2007-June 2009. Post Bailout (Post_BO) is a binary indicator of the months counting from the bailout month indicated in each model's label (i.e. 3, 6, 9 or 12 months) for prime brokers (PB); custodians (CUS); or investment advisors (IA). Connected Fund is a dummy variable indicating a bailed out bank offers prime brokerage services to the fund. Variables included in the estimated models but not reported to conserve space: past returns from lag 1 to lag 6; and dummy variables representing fund style classifications - Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore. BO Country Fixed Effects are indicators of the countries issuing bailouts.

Model	Panel A: Prime broker bailouts				Panel B: Custodian bailouts				Panel C: Investment advisor bailouts			
Post-Event Window	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months
Parameters	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	4.042***	4.043***	5.554	4.085***	4.059***	4.060***	4.048***	4.046***	2.316	3.847***	3.861***	3.886***
	(0.028)	(0.028)	(0.000)	(0.040)	(0.026)	(0.026)	(0.026)	(0.026)	(0.000)	(0.031)	(0.033)	(0.020)
ln(NAV)	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.005***	0.005***	0.005***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
StDev	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ln(Age)	-0.033***	-0.033***	-0.035***	-0.033***	-0.029***	-0.029***	-0.029***	-0.029***	-0.029**	-0.023*	-0.032**	-0.020**
	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.014)	(0.013)	(0.015)	(0.009)
$\ln(Age)^2$	0.011***	0.011***	0.011***	0.011***	0.010***	0.010***	0.010***	0.010***	0.014**	0.012**	0.015**	0.009***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.005)	(0.006)	(0.004)
Management Fees	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	0.004	0.004	0.004	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)
Incentive Fees	-0.001***	-0.001***	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Underwater	-0.021***	-0.021***	-0.022***	-0.021***	-0.020***	-0.019***	-0.019***	-0.019***	0.010*	0.008*	0.010*	0.006*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.003)
Personal Capital	0.003	0.003	0.003	0.003	-0.001	-0.001	-0.001	-0.001	-0.005	-0.005	-0.006	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)	(0.013)	(0.014)	(0.009)
Leveraged	-0.003	-0.003	-0.003	-0.003	0.001	0.001	0.001	0.000	-0.002	-0.001	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.002)
Crisis Dummy	0.053***	0.053***	0.053***	0.053***	0.049***	0.049***	0.049***	0.049***	0.058***	0.060***	0.058***	0.059***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.006)
Post_BO_(PB or CUS or IA)	-0.040*	-0.015	-1.514***	-0.046	0.011	0.014**	0.014*	0.015*	-0.023**	-0.010	-0.019*	-0.008
	(0.021)	(0.026)	(0.029)	(0.031)	(0.007)	(0.007)	(0.008)	(0.008)	(0.010)	(0.009)	(0.011)	(0.008)
BO Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	48,464	48,464	48,464	48,464	49,602	49,602	49,602	49,602	5,254	5,254	5,254	5,254
Log Likelihood	-648.2	-649.7	-658.4	-648.6	-661.9	-661.2	-661.7	-661.4	39.36	60.47	34.09	71.86

Table 10

Hedge fund survival post bank bailouts: Hazard model estimation results – strong banks sample

This table reports the results of Cox proportional hazards regressions of hedge fund survival during the period 2007-2009. This analysis focuses on that subset designated "strong" banks - namely, those accessing bailout funds only once. The dependent variable is the hazard rate, i.e. the probability that fund i exits at time t, given it survived until time t-1. The variable ln(NAV) is the natural logarithm of hedge fund net asset value. StDev is fund risk proxied by the standard deviation of the previous twelve months' returns. Fund Age (Age) is computed from the date of inception to the reporting date. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Underwater is a binary indicator of funds that report a negative cumulative return over the previous 12 months. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. The Crisis Dummy denotes the period August 2007-June 2009. Post Bailout (Post_BO) is a binary indicator of the months counting from the bailout month indicated in each model's label (i.e. 3, 6, 9 or 12 months) for prime brokers (PB); custodians (CUS); or investment advisors (IA). Connected Fund is a dummy variable indicating a bailed out bank offers prime brokerage services to the fund. Variables included in the estimated models but not reported to conserve space: past returns from lag 1 to lag 6; and dummy variables representing fund style classifications - Emerging Markets, Equity Market Neutral, Event Driven, Fixed Income Arbitrage, Global Macro, Long/Short Equity, Managed Futures and Offshore. BO Country Fixed Effects are indicators of the countries issuing bailouts.

Model	Panel A: Prime broker bailouts				Panel B: Custodian bailouts				Panel C: Investment advisor bailouts			
Post-Event Window	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months
Parameters	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
ln(NAV)	-0.161***	-0.161***	-0.161***	-0.161***	-0.172***	-0.172***	-0.172***	-0.172***	-0.267***	-0.267***	-0.268***	-0.269***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.020)	(0.020)	(0.020)	(0.020)	(0.040)	(0.040)	(0.040)	(0.040)
StDev	0.030	0.030	0.030	0.031	0.009	0.009	0.009	0.009	-0.026	-0.028	-0.028	-0.028
	(0.021)	(0.021)	(0.021)	(0.021)	(0.020)	(0.020)	(0.020)	(0.020)	(0.044)	(0.047)	(0.046)	(0.046)
ln(Age)	0.988***	0.988***	0.986***	0.986***	0.838***	0.838***	0.839***	0.839***	2.209***	2.259***	2.305***	2.304***
	(0.255)	(0.255)	(0.255)	(0.255)	(0.238)	(0.238)	(0.238)	(0.238)	(0.801)	(0.797)	(0.805)	(0.807)
$\ln(Age)^2$	-0.328***	-0.328***	-0.327***	-0.327***	-0.295***	-0.295***	-0.295***	-0.295***	-0.991***	-1.009***	-1.024***	-1.022***
	(0.085)	(0.085)	(0.085)	(0.085)	(0.082)	(0.082)	(0.082)	(0.082)	(0.327)	(0.326)	(0.328)	(0.328)
Management Fees	-0.009	-0.007	-0.007	-0.007	0.009	0.009	0.010	0.010	-0.193	-0.188	-0.184	-0.188
	(0.101)	(0.101)	(0.101)	(0.101)	(0.071)	(0.071)	(0.071)	(0.071)	(0.163)	(0.167)	(0.167)	(0.167)
Incentive Fees	0.048***	0.047***	0.047***	0.047***	0.029***	0.029***	0.029***	0.029***	0.038***	0.037***	0.037***	0.036***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.007)	(0.007)	(0.007)	(0.007)	(0.011)	(0.011)	(0.011)	(0.011)
Underwater	0.710***	0.711***	0.710***	0.710***	0.740***	0.741***	0.742***	0.741***	-0.580*	-0.570*	-0.564*	-0.554*
	(0.111)	(0.111)	(0.111)	(0.111)	(0.108)	(0.107)	(0.107)	(0.107)	(0.306)	(0.301)	(0.304)	(0.303)
Personal Capital	-0.072	-0.073	-0.073	-0.073	0.014	0.014	0.013	0.013	0.714	0.736	0.739	0.739
	(0.090)	(0.090)	(0.090)	(0.090)	(0.102)	(0.102)	(0.102)	(0.102)	(0.608)	(0.612)	(0.612)	(0.611)
Leveraged	0.082	0.082	0.083	0.083	-0.017	-0.018	-0.019	-0.019	0.197	0.222	0.219	0.222
	(0.086)	(0.086)	(0.086)	(0.086)	(0.082)	(0.082)	(0.082)	(0.082)	(0.211)	(0.213)	(0.212)	(0.212)
Post_BO_(PB or CUS or IA)	1.047**	0.707	1.236***	1.232**	-0.048	-0.013	0.154	0.132	1.492***	0.787*	1.052**	0.985**
	(0.418)	(0.687)	(0.478)	(0.481)	(0.222)	(0.221)	(0.244)	(0.246)	(0.436)	(0.420)	(0.431)	(0.445)
BO Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	48,464	48,464	48,464	48,464	49,602	49,602	49,602	49,602	5,254	5,254	5,254	5,254
Log Likelihood	-4227	-4228	-4227	-4227	-4361	-4361	-4361	-4361	-480.9	-483.0	-482.8	-483.0
Pseudo R^2	0.0326	0.0323	0.0326	0.0326	0.0304	0.0304	0.0304	0.0304	0.106	0.102	0.103	0.102

Table 11

Effects of related bank bailouts on hedge fund capital adequacy

This table reports results for OLS regressions of the Gupta and Liang (2005) measure of hedge fund value at risk described in the text. The dependent variable is the natural logarithm of CAPRATIO. Fund Age (Age) is computed from the date of inception to the reporting date. Management Fees are a percentage of assets under management. Incentive Fees are a percentage of achieved returns. Personal Capital is a binary variable indicating funds whose managers have invested their own capital in the funds. Leveraged denoted funds allowed to employ leverage. The Lockup Period is measured in months. The Crisis Dummy denotes the period August 2007 – June 2009. Post Bailout (Post_BO) is a binary indicator of the months counting from the bailout month indicated in each model's label (i.e. 3, 6, 9 or 12 months) for prime brokers (PB); custodians (CUS); or investment advisors (IA). Connected Fund is a dummy variable indicating a bailed out bank offers prime brokerage, custodial and investment management services to the fund. BO Country Fixed Effects are indicators of the countries issuing bailouts. Time Fixed Effects are dummy variables for each quarter. N= 35096. Standard errors are in parentheses.

Model	Panel A: Prime broker bailouts				Panel B: Custodian bailouts				Panel C: Investment advisor bailouts			
Post-Event Window	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months	3 months	6 months	9 months	12 months
Parameters	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	18.914***	18.916***	18.918***	18.917***	18.906***	18.911***	18.913***	18.920***	18.913***	18.918***	18.924***	18.925***
	(2.125)	(2.126)	(2.127)	(2.127)	(2.126)	(2.127)	(2.128)	(2.129)	(2.125)	(2.125)	(2.126)	(2.126)
ln(TNA)	-0.356***	-0.357***	-0.357***	-0.357***	-0.356***	-0.356***	-0.356***	-0.356***	-0.356***	-0.356***	-0.356***	-0.356***
	(0.094)	(0.095)	(0.095)	(0.095)	(0.094)	(0.094)	(0.095)	(0.095)	(0.094)	(0.094)	(0.094)	(0.094)
StDev	-1.607***	-1.607***	-1.606***	-1.606***	-1.608***	-1.608***	-1.608***	-1.608***	-1.608***	-1.609***	-1.610***	-1.610***
	(0.281)	(0.281)	(0.281)	(0.281)	(0.281)	(0.281)	(0.281)	(0.281)	(0.281)	(0.281)	(0.282)	(0.282)
ln(Age)	0.392	0.390	0.387	0.387	0.393	0.393	0.393	0.393	0.393	0.390	0.386	0.386
	(1.136)	(1.136)	(1.136)	(1.136)	(1.136)	(1.136)	(1.136)	(1.136)	(1.136)	(1.136)	(1.136)	(1.136)
$\ln(Age)^2$	-0.273	-0.272	-0.271	-0.271	-0.273	-0.274	-0.274	-0.274	-0.274	-0.273	-0.272	-0.272
	(0.339)	(0.339)	(0.339)	(0.339)	(0.339)	(0.339)	(0.339)	(0.339)	(0.339)	(0.339)	(0.339)	(0.339)
Management Fees	-0.508*	-0.507*	-0.507*	-0.507*	-0.508*	-0.508*	-0.508*	-0.509*	-0.508*	-0.509*	-0.509*	-0.509*
	(0.304)	(0.304)	(0.304)	(0.304)	(0.304)	(0.304)	(0.304)	(0.304)	(0.303)	(0.303)	(0.303)	(0.303)
Incentive Fees	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Underwater	-1.319***	-1.319***	-1.320***	-1.320***	-1.317***	-1.317***	-1.318***	-1.318***	-1.318***	-1.319***	-1.318***	-1.318***
	(0.317)	(0.317)	(0.317)	(0.317)	(0.317)	(0.316)	(0.316)	(0.316)	(0.317)	(0.317)	(0.316)	(0.316)
Personal Capital	1.163*	1.165*	1.169*	1.169*	1.163*	1.162*	1.161*	1.160*	1.161*	1.163*	1.165*	1.165*
	(0.696)	(0.696)	(0.696)	(0.696)	(0.696)	(0.696)	(0.695)	(0.695)	(0.696)	(0.696)	(0.696)	(0.696)
Leveraged	-0.235	-0.234	-0.234	-0.234	-0.236	-0.235	-0.235	-0.235	-0.235	-0.232	-0.228	-0.228
	(0.397)	(0.397)	(0.397)	(0.397)	(0.397)	(0.397)	(0.397)	(0.397)	(0.397)	(0.397)	(0.398)	(0.398)
Lockup Period	0.433	0.432	0.431	0.431	0.433	0.433	0.433	0.434	0.433	0.433	0.433	0.433
	(0.664)	(0.664)	(0.665)	(0.665)	(0.664)	(0.664)	(0.664)	(0.664)	(0.664)	(0.663)	(0.663)	(0.663)
Crisis Dummy	0.566***	0.566***	0.565***	0.565***	0.566***	0.566***	0.566***	0.566***	0.566***	0.567***	0.567***	0.567***
	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)	(0.166)
Connected Fund	-4.459***	-4.460***	-4.459***	-4.460***	-4.463***	-4.469***	-4.469***	-4.470***	-4.471***	-4.482***	-4.489***	-4.490***
	(1.113)	(1.112)	(1.112)	(1.112)	(1.113)	(1.113)	(1.113)	(1.113)	(1.113)	(1.112)	(1.112)	(1.112)
Post_BO_(PB or CUS or IA)	-0.669	-0.760	-1.063	-1.054	-0.320	-0.030	0.002	0.071	0.071	0.537	0.825	0.847
	(0.538)	(0.645)	(0.706)	(0.717)	(0.290)	(0.331)	(0.385)	(0.400)	(0.688)	(0.677)	(0.743)	(0.742)
BO Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	32,637	32,637	32,637	32,637	32,637	32,637	32,637	32,637	32,637	32,637	32,637	32,637
Adjusted R^2	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158

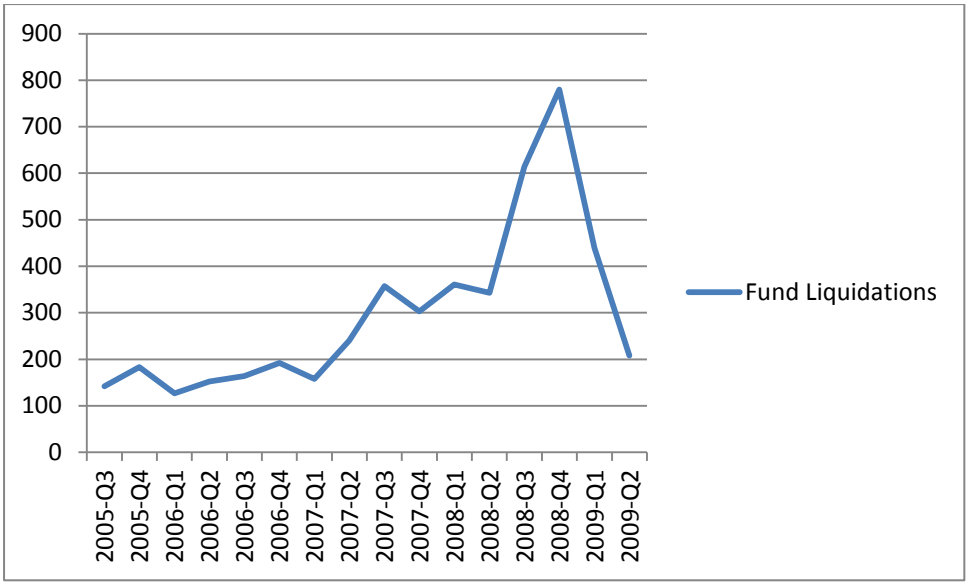

Figure 1. Quarterly hedge fund attrition over the period 2005-2009.

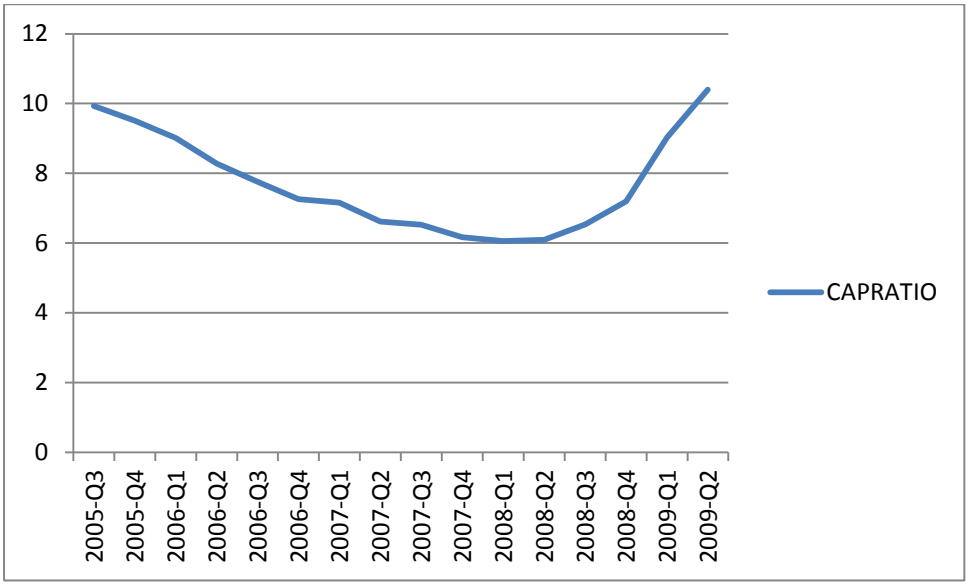

Figure 2. Quarterly hedge fund capital ratios over the period 2005-2009.