

HEDGE FUND SCANDALS & HOW SMART CONTRACTS COULD HELP PREVENT THEM

PART 1 — PONZI SCHEMES

In a world defined by its interconnectedness, any mistakes or malevolent activity taking place in the trillion dollar asset management industry will cause ripples of consequence across continents and societies. In the last 30 years, there have been several high profile hedge fund scandals that made it into the mainstream media. Billions of dollars in value has been lost or misappropriated, and the effects are often still being felt many years after the scandals conclusion.

Through the two case studies below we intend to dissect the motivations, actions and fallout from these scandals. We'll also investigate how in most cases, smart contract based asset management protocols like Melon, running on top of blockchain technologies like Ethereum, could have greatly mitigated the damage caused, or even prevented the underlying issues from arising in the first place.

Without further ado, let's start at the top...

Ponzi Schemes

The largest Ponzi scheme of all time, and possibly the largest financial fraud in history is estimated to have cost investors up to \$65bn, with over 4800 clients affected. What happened? For decades, Bernie Madoff took investments in his fund, and reported strong returns without ever making any actual investments... He simply posted "made up" returns, and spent the capital he was supposed to be investing with on yachts, jets and homes all over the world. As long as he was taking in more investors money than he had to pay back, the ruse could continue.

"F—k my victims. I carried them for twenty years, and now I'm doing 150 years."

—Madoff to an inmate who expressed concern for the defrauded investors

How did he get away with it for so long?



Photographers waiting outside the entrance to the apartment block where Bernie Madoff was under house arrest.

It is estimated that Madoff got away with taking investments and posting returns for as long as 30 years whilst the Ponzi scheme was in operation. There were never any real trades in the portfolio, but since Madoff also owned a broker dealer, he could generate "fake trade tickets" on request. In over 30 years, no authority (eg. the SEC) decided to check whether the trades Madoff said he was completing really matched the assets his fund supposedly held. When asked to be audited by independent auditors, Madoff always said that only his brother was allowed to audit the fund's performance in case his secret strategy leaked out to the world. When anyone asked for information about his returns, his answers were always vague and mysterious.

"It's a proprietary strategy. I can't go into it in great detail"
-Bernie Madoff

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People bought this false illusion for years and ignored a warning letter issued to the SEC by Harry Markopolos in 2005, which detailed every single red flag. An Assistant Director of the SEC at the time, Eric Swanson, was falling head over heels in love with and eventually got married to Madoff's niece and compliance manager. It was quite the web of intertwined lies and conflicts of interest. Three years after the scheme came crashing down and Madoff was jailed, many are still paying the price of this scandal.

ABC News via Clusterstock: At a business roundtable meeting last year, Madoff boasted of his "very close" relationship with a SEC regulator, chuckling as he said, "in fact, my niece even married one."

How could smart contracts have helped avoid this situation?

We can break up the issues into three broad buckets:

Conflict of Interest

In Madoff's Ponzi scheme, two of the most notable "conflicts of interest" that arose (amongst many others) were that Madoff refused any auditor but his brother, and that the Assistant Director of the SEC at the time had a romantic relationship with Madoff's niece and compliance manager. This must have at a minimum contributed to various parties feeling uncomfortable or reluctant to report or investigate for fear of being proven wrong. Fear! Fear of losing their job, losing their loved one or just being generally outcast in society.

By using smart contracts, we can pre-define the rules and parameters of a fund in immutable code. These rules are enforced by the underlying blockchain protocol which is in turn secured by many thousands of financially incentivised nodes across the world, all working to make sure the protocol rules remain unbroken. There is no room for fear to get in the way of standing up for what you believe may be fraud because of the element of pseudo-anonymity too.

In particular, the way that we address this in the Melon protocol is with Risk Management modules. The idea behind this is to give a set of rules to encourage sensible behaviour and limited losses in the event that the fund manager tries to act in a way which is not desired by investors. This gives the investors of a fund a level of security that until recently was next to impossible to achieve.



Everyone was fooled: BBC coverage of the Madoff scandal

Auditability and Transparency

Given how transparent and simple the accounting, auditing and checking process is on a blockchain, and since there is generally only one or two ledgers with all the information on—it would be almost impossible to say you owned something when you don't without someone being able to find out very quickly. It's relatively simple to prove whether you own assets on a blockchain or not. An inability to show ownership of tokenised blockchain assets can certainly be inferred by a lack of said proof. Investors could very easily and at any time audit the holdings of a smart contract based fund.

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I was astonished. They never even looked at my stock records. If investigators had checked with The Depository Trust Company, a central securities depository, it would've been easy for them to see. If you're looking at a Ponzi scheme, it's the first thing you do. —Bernie Madoff

It's worth noting here too that in the traditional world of hedge funds, settlement times can take 2–3 days or more, and you need several centralised parties in the middle to vouch for the fund's activity. This makes the auditing process much more complicated, cumbersome and expensive than it needs to be. Blockchain based exchanges can settle in seconds at the click of a button for just a few cents.

Disappearing Funds/Theft

If you use smart-contracts to manage your fund, you could (and we hope investors come to demand such measures) pre-define the assets that your fund is allowed to invest in within an "Asset Universe" smart contract. You could also pre-define a sensible process by which new assets are added with various approvals from fund stakeholders or from the investors themselves, this would likely take the form of a governance module. This is one of the most interesting features of the Melon protocol. The value proposition is that it attempts to put guards in place so that it is close to impossible to use the funds for anything else but what the mandate of the portfolio allows you to do. More specifically, we have devised something we refer to as a Universe module which pre-defines:

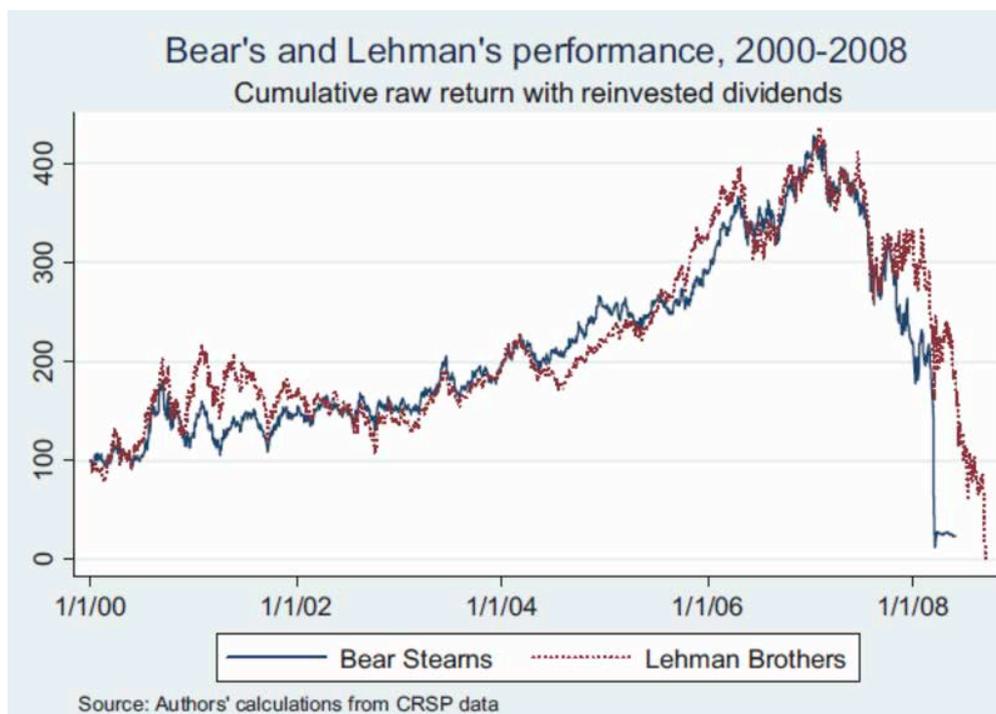
1. A set of assets that a fund / fund-manager is allowed to invest in
2. A set of price feeds linked to those assets against which performance is calculated.
3. Pre-defines a set of exchanges linked to those assets

PART 2

Leverage—The Fall of Bear Stearns and Lehman Brothers

One of the most memorable financial implosions of all time was the collapse of Bear Stearns followed shortly by Lehman Brothers. Several friends who used to work on the Lehman Brothers trading floor recall it well. All of a sudden, the usual hustle and bustle one might expect from a trading floor was interrupted, only to be replaced by cold, eerie stillness. Phones calls went unanswered, nobody dared say a word—everyone was fixated on the television screens as a CNBC Anchor announced to the world that their bank was officially... Bankrupt.

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It was excessive leverage that brought down both Bear Stearns and Lehman Brothers. Their collapse very nearly shattered the entire financial system in 2008/2009. Incentive structures in the finance industry have always been misaligned; they encourage high risk oriented behaviour that normally involves leverage (borrowing as much as possible) to magnify returns to justify the enormous management and performance fees required to capitalize asset management activities. By focusing purely on maximising profits, risk is often not properly taken into account. The consequences of this kind of behaviour are often disastrous.

So what exactly is leverage?

Leverage can be taken by a trader in several different ways:

- **Short selling**—borrowing an asset you don't own to sell it. Some people call short selling a "hedge" against their long positions. This could mean that they are confident in their long position (eg. A position of \$5mn notional of Apple stock) but they want to protect against unexpected downward moves in the market. So, what they could do is borrow \$5mn notional of S&P futures and short sell them against their Apple position. They then pay interest on this "loan" and sell it for the duration that they need to. In other words, they are betting on Apple stock outperforming the S&P index. If they are right, they will make a profit.
- **Options**—Options are a type of derivative security. Similarly to short selling, you can buy or sell an option on an asset with very little up-front capital outlay. It is only if your option position starts to go against you that you are forced to post more collateral, but it is often a good way to take a magnified bet on something without consuming up too much collateral (and in some cases raising some—eg. selling put options). Measuring risk on a portfolio taken by options positions can be very difficult.
- **Futures**—Taking a position in an asset by buying an option to pay for it at a certain fixed price in the future. In a way, this is a kind of option, and similarly requires little capital outlay. Futures are typically priced at a premium to the underlying cash position to price in the fact that you don't have to pay for the whole amount up-front (so, you are essentially borrowing in the interim).

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- **Outright loans**—backed against collateral of the fund—a short term loan at a pre-defined interest rate from the fund's prime broker in order to increase exposure. This loan is often backed by collateral including assets held in the fund.

Leverage in action

Here's an example of some of the above being used to hedge a trade:

Assumptions:

- You buy \$5mn notional Apple @ \$150/share
- You borrow \$5mn S&P futures at an annualised rate of 3%
- You short sell \$5mn S&P futures @ \$2,380
- Trade is placed at the same time and duration of the trade is 1 year

At the end of year 1:

- Apple is @ \$200/share
- S&P futures are covered @ \$2,390 and trader buys them back in the market
- Trader returns the borrowed S&P futures to the lender and pays the 3% interest on them (feel free to do the math yourself before reading the results!)

Results of the trade?

Apple position is +33% and now valued at \$6,650,000 -> profit of \$1,666,667

Cost to borrow S&P futures (3%) -> \$150,000 (loss)

Short position is valued at \$4,978,991 -> loss of \$21,009

Total profit & loss on the trade: +\$1,495,658

Note: If things would have gone wrong on both sides (Apple shares down, S&P futures up as well as the cost of borrowing)—the trader would have had to buy the futures back at a loss and may be forced to sell existing long positions if cash in their account is not sufficient. **This starts to give you an idea of how leverage can be dangerous, especially if it's used on its own and not part of a larger hedging strategy.**

It can be misleading to think that a net neutral position equates to "less risk" just because it isn't reflecting a directional view. This is far from the truth, and is especially evident in times of crisis. Often, hedge funds take a great deal of leverage, drastically increasing their gross exposure (and hence their risk) by leveraging as much as 300–400% of their AUM.

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When everything comes tumbling down...

Generally, in periods of stability or growth, lenders can get a little too comfortable. They start to lend well above industry norms on the basis that collateral is posted.

Who the fuck lends money to people who can't make the first payment?

— Steve Eisman, FrontPoint Partners

This is exactly what happened in the build up to the 2009 crisis. In 2003 and 2004, Lehman Brothers purchased BNC Mortgage and Aurora Loan Services, which specialised in Alt-A and subprime loans. These were loans made to borrowers without full documentation, and often without any down-payment or deposit required whatsoever. At the same time, Bear Stearns hedge funds were accumulating exposure to “Mortgage Backed Securities” (MBS) in their portfolios as were many others. These were portfolios of “risky” loans which paid high interest rates due to the risk profile of the borrowers. The repackaging of MBSs into “collateralised debt obligations” (CDO’s) further obfuscated the risk associated with them. Nobody ever thought the risk profile would be as high as it actually turned out to be.

Like many others, when the default rates on loans started to spike, Bear Stearns found itself un-hedged. Lenders who had provided them with leverage to buy the CDOs in the first place started posting margin calls. Unfortunately, in the case of Bear Stearns, they were unable to post enough cash as collateral, so they had no choice but to sell other assets to raise as much cash as possible.

Since multiple players in the space were also suffering from similar problems, this caused an accentuated pressure on the prices of many asset classes, and the downward spiral was the beginnings of one of the biggest financial collapses in history. Selling pressure from the need to raise enough collateral for margin calls drove asset prices even lower, forcing further margin calls, forcing more sellers to raise more collateral, and so on and so forth. A lot of assets held by Bear Stearns and others were illiquid, meaning that at times, there were simply no buyers around to bid for the assets. Bear Stearns was eventually unable to post its margin call.

Why were so many home loans made without doing enough due diligence? You may have already guessed it by now, human conflicts of interest—mortgage brokers were mainly concerned with booking their next commission. Bankers were far too concerned with locking in their next easy trade when realistically they should have been analysing what they were actually buying and focusing on managing their risk exposure.

“The Big Short” is a gripping account of what happened in detail, and is well worth a watch/read if you haven’t already.

In the trailer to the film, Mark Baum tells a stripper that she’s not going to be able to re-finance her loan. The pole dancer responds by saying she has five houses and a condo.

“How much do you make a year?” an incredulous Baum asks.

This is when the penny drops for him that there was a serious problem looming.

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Source: Business Journal NG

“The market might have learned a simple lesson: Don’t make loans to people who can’t repay them. Instead it learned a complicated one: You can keep on making these loans, just don’t keep them on your books. Make the loans, and then sell them off to the fixed income department of big Wall Street investment banks, which will in turn package them into bonds and sell them to investors.” Michael Lewis.”

How could smart-contracts have helped avoid this situation?

Well for starters, loans should always be risk managed! Okay, “we’ve tried that before” we hear you cry—but time and time again, we seem to forget this lesson and repeat mistakes made before in history. Luckily, we’re getting to the point where we simply don’t have to rely on humans any more. We have new, better technology... Why not rely on a smart contract instead?

Some very interesting, well-thought-out experimental innovations are being made in the field of leverage using smart-contracts. Lendroid is a favourite. It’s proposition is to make loans via a smart contract—it proposes to pre-define the lending terms and collateral requirements up-front using coded logic written in Solidity. The idea here is that you have three main players in this concept; borrowers, lenders and guarantors.

Borrowers—state what amount of loan they want and post some minimum amount of collateral which is then locked up into a smart contract.

Lenders—decide who they would like to lend to and make offers accordingly to the borrowers they like.

Guarantors—can choose to guarantee specific loans issued by one or more markets they believe will remain solvent by locking up LSTs (proposed native Lendroid tokens) which act as secondary collateral for a loan. In return, they get 20% of the interest lenders charge for guaranteeing a portion of the loan and keeping markets liquid and solvent. In case of default, the guarantor’s LSTs are auctioned off and go towards paying back the lenders.

This could be very interesting in the context of Melon portfolios because users of the protocol can now start to access leverage in what could be a very risk-managed way. In theory, entities or individuals behind Melon portfolios or funds could also act as guarantors and make a revenue stream out of analysing loan quality and assessing which loans to guarantee, thus creating a recurring revenue stream for doing so!

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Some other interesting work is being done by a company called StabL in futures & options. Through its trading platform Variabl (currently in alpha: <http://variabl.io>), StabL aims to match buyers and sellers of same-expiry, same-strike-price contracts with one another. You can build interesting things into these futures contracts such as automatic stop-losses triggered by smart-contract code which is linked to the amount of collateral you have posted. StabL will eventually provide hedging products built on top of this futures market.

ABOUT MONA EL ISA



Former star-trader at Goldman Sachs, promoted to Vice President by the age of 26 and made the "top 30 under 30" list in Trader Magazine in 2008 and Forbes Magazine in 2011 after profitably trading the 2008 and 2011 crashes. Moved to Geneva-based macro fund Jabre Capital in 2011, before deciding in 2014 that the future of finance lay in blockchain technology. She studied Economics & Statistics at the University College London. Today, Mona is the CEO and Co-Founder of Melonport AG, the private company building the open-source Melon protocol.

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