

Data Sufficiency for Financial Institutions

Dan diBartolomeo
Webinar June 2021

Data Insufficiency

- Numerous “loss events” over the last twenty years trace to financial institutions simply having insufficient data about what their holdings actually are and what risks to which they are exposed.
- During the failures of Lehman Brothers and AIG that triggered the GFC, some firms took months to realize how much exposure they had.
 - Often, they had exposure information only at the portfolio or trading desk level but no ability to aggregate information across divisions.
 - This inability to observe total position concentration made things look more diversified and lower in risk.
- *Institutions are universally ignorant of risk concentration across asset classes*
 - *Imagine you hold Bank of America equity shares, Merrill Lynch bonds, rent space in your real estate to BofA, and they are your derivatives counterparty*
 - In our systems it all adds up if the required information is available.

Our Proposed Cure

- More than twenty years ago Northfield suggested a vision of financial portfolio risk management that had never been previously attempted, our so-called “Everything, Everywhere” model.
 - After more than two decades of analytical development we are closing the final gaps in EE with coverage additions of frontier markets, crypto assets, unrated bonds, and retail banking assets (e.g. personal, auto, small business loans).
- Over the same interval, we have observed numerous serious failures in the risk management of financial institutions.
 - The Global Financial Crisis
 - The Madoff and lesser known but similar events (e.g. MBTARS in Boston)
 - Major institutional losses in volatility trading during the pandemic
 - Failure of various hedge funds associated with “meme” stocks short squeezes
 - The \$10 Billion in margin lending losses related to Archegos by five leading investment banks.

The Second Common Thread of Failure

- Institutional management priorities that were biased in favor of short-term operating profits while willfully “looking the other way” on exposure to potential rare but extreme losses.
 - For an entertaining and technically sophisticated insight into the excessive risk taking in the GFC, I recommend Iceberg Risk by Kent Osband, <https://www.amazon.com/Iceberg-Risk-Adventure-Portfolio-Theory/dp/1587990687>
- In January 2019, I wrote a brief analysis on the likely disasters which would arise from institutions trying to cut expenses by cutting corners on risk management through consolidation of systems.
 - The actual cases described a global firm that saved **\$30 Million** annually. It’s one two firms that has admitted to *multiple billion dollar losses in the Archegos lending mess.*

The Third Common Thread of Failure

- The analytical methods used to assess risk were *conceptually inadequate* such that risk assessments were just wrong.
 - Use of VaR with highly non-linear derivatives tail risk dictated the use of another measure like CVaR.
 - VaR is an incoherent measure. There are situations where it will report zero risk where a lot of risk exists.
 - Unjustified reliance of assumed sufficient diversification under the Central Limit Theorem.
 - The Gaussian Copula and the GFC, [368.pdf \(northinfo.com\)](#)
 - Duration Times Spread, [Dissecting Duration Times Spread \(northinfo.com\)](#)
 - Many illiquid assets are marked to market only once a year by GPs with obvious conflicts of interest in determining valuations.
 - *Institutions do not know the risk of illiquid assets*
 - *They don't even know their portfolio asset weights correctly.*

Our First Real Estate Paper

- Almost twenty years ago, we wrote our first analytical paper on more advanced methods of assessing risk in “brick and mortar” real estate.
 - One of the early clients was a multi-asset class fund
- After a detailed assessment of the fund’s risk exposures I informed the CIO of very large active exposure to the US tech sector.
 - He replied that our analysis was clearly wrong because their equity portfolio was “sector neutral” to US Tech
 - I informed him that the fund owned sixty very large chunks of commercial real estate, the five largest of which were all shopping malls in Silicon Valley.
 - **When I asked the CIO “Who do you think is shopping at the luxury shops in your malls?”, he understood the problem.**
- The response was an immediate conference call with the heads of each asset class team asking “Don’t you guys talk to each other?”
 - The answer was “No”

A Happier Story

- In 2019, I got an email from one of the largest sovereign wealth funds in the world.
 - They wanted to celebrate an important milestone for their risk team.
 - Despite having more than 100,000 separate assets (global, public and private) they had managed to list them all out and found a way of *representing 100% of what they owned in the Northfield EE model* at a level of granularity with which they were comfortable.
 - The achievement was recognized by me giving a lecture on risk concepts to about 40 members of senior management.
- *What terrified me was that if this mega-organization would formally celebrate over having a decent estimate of their total risk, what sort of shape were our other clients in?*

Data Sufficiency Defined in Two Rules

- For a financial institution to own a particular asset, the first rule should be that you know that you own it, and you know enough about it to assess the risks involved.
- The second rule is that you have to know enough about the asset and your portfolio that you can assess the contribution of each position to the risk of the aggregate portfolio.
- *The obvious corollary is that if you don't know what you have or don't have enough knowledge of the asset to judge the risk of the asset or how it contributes to the risk of the total portfolio, **don't own it.***
- The second rule requires accurate assessment of portfolio weights and correlations which requires special attention when illiquid assets are valued infrequently, or positions are so large as to be unable to be liquidated promptly.

The Asset Master

- The first and most important aspect of investment data is actually having a complete list of all positions that can be accessed in a timely manner.
 - Most financial institutions would refer to this as having an “asset master” as distinct from “books of record” or the general ledger of a portfolio accounting system.
 - The asset master is a database where there are many, fields so that all the relevant attributes of each position can be kept updated
- Asset masters should have ability to point to subsidiary portfolios as descriptors of an asset
 - Mutual funds, ETFs, index futures
 - Replication proxy portfolios for illiquid assets
 - Track common properties across positions (e.g. derivative counterparties)
- Most asset owners that rely on external managers do not have an asset master.

At Least Two Levels of Detail

- Many institutions hold positions in collective investment funds, “fund of funds”, “hedge funds”, and “partnership” that represent ownership of some set of liquid or illiquid assets.
- For any collective investment structure, you want to know:
 - Any contractual terms involving cash flow capital calls into a private equity or real estate fund.
 - Any limitations on liquidating units (“lock in”) of a hedge fund or other vehicle with purported liquid underlying positions (see Ang and Bollen 2010)
- What’s the nature of the *underlying private asset portfolio*?
 - If it’s a real estate fund you need to know where the properties are, what sort of real estate, any tenant concentration
 - For PE, VC etc. you should know the underlying portfolio companies at least by country, sector and size
 - This kind of information is now available from a variety of vendors, most of whom we deal with.

The Secret Sauce Hedge Fund

- Some prominent hedge funds do not offer their client transparency into the underlying portfolio.
- In this circumstance there are two levels of recourse:
 - There is an industry standard known as OPERA that provides a list of basic fund portfolio characteristics that a hedge fund should provide in order to keep their investors informed.
 - OPERA stands for Open Protocol Enabling Risk Aggregation
- In our view the OPERA standards are the bare minimum needed to do some amount of hedge fund risk assessment.
 - A method that addresses hedge funds without transparency was developed by Northfield some years ago
 - [Portfolio Analysis of Investment Funds with Undisclosed Holdings \(northinfo.com\)](http://northinfo.com)
 - It requires the OPERA data as inputs plus a return history.

Uncertainty in Portfolio Weights

- All traditional portfolio risk calculations assume that portfolio weights are known.
 - In the real world, we often do not know actual portfolio weights because positions are intrinsically illiquid and do not get market to market.
 - Real Estate, Private Equity, Infrastructure
- We also don't know "net portfolio weights" because our positions are large and in the event of needing to liquidate positions into cash, the prices we would actually get aren't the posted market prices.
 - This is the concept underlying "swing pricing" in mutual funds.
- We almost always have differences in return expectations across assets so if we rebalance portfolios on finite intervals, the expectation of the weight vector on average is not the current portfolio weights.
 - See Shah ([Risk under Uncertainty and Price Movement by Anish Shah :: SSRN](#))

Fixing the Portfolio Weight Problem

- Most portfolio weight problems arise because asset values are not updated in a timely fashion.
 - This means that most “total portfolio” performance reporting is just wrong.
- Northfield provides “replication portfolios” of liquid assets that we assert will provide the same returns over time as a particular illiquid asset
 - We maintain our GERARD database of over 6000 global commercial real estate properties for which returns can be estimated on a monthly basis as a proxy for an investor’s actual property.
 - We can create bespoke replication portfolios on request.
- There are numerous papers that illustrate how public market returns can provide useful estimates about private asset values and returns.
 - Kritzman, Turkington and Czonis (2019)

Hanging on Street Corners

- Some years ago I was in lower Manhattan at the intersection of Wall Street and Water Street when I heard somebody yell out “Hey Dan!”
 - The individual in question was the head of risk for a \$150 Billion (then) public pension fund.
- What he wanted was risk analysis of their private asset portfolio but very simply said “I can write you a pretty big check, but we have no internal staff available to collect the data”.
- Not long after I had a related conversation with head of risk for a large pension plan in the Netherlands
 - “Since we own all our real estate outright, we definitely have all the data you might need, but I don’t know where in the building it is, or if it is computerized in any form”.

The Data Sufficiency Solution

- Over the past several years, Northfield has been slowly moving more and more client activity to an online platform internally hosted by Northfield.
 - This is a modular system that includes interactive analytics for analysts and PMs, large scale batch processes for wealth management, and fully automated processes for compliance and regulatory reporting.
 - You'll see the "client login" facility opening on the Northfield website in the next couple weeks.
 - Since portfolio analytics are processed on our servers, we can observe and address any data discrepancies as they arise.
- In order to address the "data sufficiency" problem in a way that clients would be comfortable with we searched for the best data management partner so clients could make best use of EE across all asset classes

And the Winner Is!

- After a lot of review and hands-on experience we've chosen to implement multiple services from Digital Financial.
 - *They provide the OFX Open Finance Network that allows for data interchange among over 100 custodians, fund administrators, accounting systems, and market data vendors.*
 - *A full "asset master" facility with its own user interface providing asset owners and other institutions with a "virtual back office".*
 - Their field structure is being augmented to fit the detailed needs of Northfield models.
 - Their systems natively provide the hierarchical structures needed for proper risk analysis of investments with underlying portfolios.
 - Data collection and enrichment shared with Northfield
 - **SOC-2 data security certified**
 - Clients and prospective clients are welcome to start "kicking tires"

Conclusions

- We believe that the Northfield analytical approaches to risk assessment are superior for a broad range of financial institutions.
 - To carry out risk assessments to the degree of accuracy that Northfield wants to provide, every asset and exposure must be accounted for with sufficient granularity.
 - We have found that only a small minority of institutions have their position data sufficiently complete and enriched to allow for best use of our sophisticated modeling.
 - To address this problem, we are offering to move Northfield clients to our online platform and to offer additional data services in partnership with Digital Financial.
- The combined service package will ensure that excessive risks for our institutional clients will not arise simply because the required data was not at hand in a timely fashion.