Operational Plus Commercial Due Diligence: Strengthen the Shield Against Fraud

Jinzhu Chen, *CAIA*
Anbang International

When Professor Eugene Fama developed the Efficient Market Hypothesis ("EMH") in 1970 (Fama 1970), the investment community was largely organized around public markets, which also demarcated the frontiers of empirical application of classical pricing models such as CAPM and factor models despite their extensive theoretical coverage. The past half century has witnessed, on the one hand, the EMH pushing to the limits of its semi-strong form in public markets evidenced by the growing market share of passive management, and on the other hand, expansion of the institutionalized investment universe into a variety of alternative investments.

A causal relationship may be established between these two observations. By definition, as a market improves in efficiency, the cost of "mining" information not yet captured by price becomes exorbitant, which drives investors seeking abnormal profits to other markets. The private and asymmetric nature of information in alternative investment markets implies access to alpha for diligent market players, which partially explains their increasing popularity with the investment community.

Due diligence ("DD") is in essence the search for information that has yet to be reflected in price, which in turn represents an opportunity to materialize into excess returns. The umbrella term due diligence encompasses all such efforts in any segment of the capital market. Indeed, it first came into common use by broker-dealers in the 1930s to refer to their investigations of public stock offerings, and it was only over time that its original meaning was assigned to research analysis, presumably to signify the tilt from the diligence exercised on information gathering to analysis of available information. The term due diligence itself now largely denotes investigations on investments with a private element, be it mergers and acquisitions ("M&A") or subscription to a hedge fund.

Is it the end of the story and will the prevailing nomenclature persist? Very unlikely. While difficult to deduce precisely how it will evolve, as long as the pursuit of higher investment returns persists, which it will, novel DD approaches with recognizable value-add would quickly diffuse in the investment community, making them routine and common. Interestingly but unfortunately, DD practices as an intangible good demonstrate the properties of both unpatented intellectual property and negative externality, which means that once "invented", they would soon be "copied" at minimal marginal cost with new findings factored into equilibrium price (i.e. the market becomes more efficient), congesting out any excess returns that could have been earned on informational edge.

What happened in public markets is repeating itself with alternative investments, however slowly, and the chase after abnormal profits eventually eliminates them. Nevertheless, our job as professionals is to iteratively aim at a moving target called superior returns by relentlessly recalibrating the DD weapon, until the mission becomes so formidable that new fronts must be opened. Doomed as it may sound, huge gaps remain to be filled and profits to be gleaned along the trudge toward a fully efficient market, mirroring John Maynard Keynes' famous "in the long run we are all dead" quote from a bright angle.

Use Operational Due Diligence to Detect Lurking Hazards

A comprehensive review of prevailing DD practices across alternative investment sectors is beyond the scope of this article. Rather, it will try to shed some light on the theme of continuously upgrading the DD toolkit to keep effectiveness, by focusing on the relatively mature and organized domain of buyout private equity ("PE") deals.

For such transactions, the DD process is to a great extent normalized around three pillars – financial, legal, and commercial. Amongst the three, financial and legal due diligence largely examines standardized documents provided by the seller or the target, aiming material issues with the health of the business. On the other hand, commercial due diligence ("CDD") is conducted on a broader collection of non-standard information from various sources, trying to gauge a target's commercial attractiveness against the full context of internal and external settings.

This systemic approach is by now well embraced by the PE investment community and has become basic know-how for the buy-side and the sell-side alike. However, as we have taken great pains to explain, its success also preludes diminishing effectiveness. What used to be an unnoticeable gap between the three pillars now stands out as prominent, namely finding issues with the target's health with non-standard information.

To borrow a concept from the CAIA curriculum book on fund operational due diligence, all such risks can be categorized under meta risk, which is used as a "miscellaneous, intangible catchall" for qualitative risks not captured by specific, measurable risks (Kaplan Schweser 2018). In fact, they are more precisely termed as uncertainties rather than risks because neither their probabilities of occurrence nor the magnitude of associated losses can be scientifically measured in advance. They are extremely difficult, if not impossible, to be discerned by conventional DD methods (and what is conventional now only became common practice in the last thirty to forty years), but they can be latent for a prolonged period with substantial tail losses, aggravated by the information asymmetry and low liquidity of PE investments.

One way to tackle this is to introduce an element of operational due diligence ("ODD") into CDD, usually conducted by the investor itself and sometimes assisted by investment banks. This is because operational risks are in general qualitative in nature, diverse across industries, and incompatible in documentation format. They are not enclosed in the specialty areas of external advisors, hence have to be picked up by the investor itself who is ultimately accountable for investment outcomes. This of course comes with a cost, explicit or implicit, but it may also come with higher marginal benefits than the same amount spent on financial due diligence ("FDD") and legal due diligence ("LDD"), which already command millions of dollars. It also infuses new value into CDD, which often reduces to looking for evidence to corroborate a business case established long before the DD stage.

Besides cost, another constraint is the tight timeline imposed by the seller. To find deficiencies that the seller fails to find or pretends not to have found within a short time window, the buyer's DD has to go with the deal flow and make the best use of each step:

- Deal screening: include a reference list on potential points of concern with the target's operations in preliminary business analysis. Since very few deals proceed to the DD stage, it may be worthwhile to methodically develop and continuously enrich a list for the investor's specialized sectors in the course of investment activities.
- Before bidding: consult sector experts, internal or external, on industry-specific pitfalls to beware. This complements the generalized advice from investment banks, law firms, and accounting firms, and is particularly vital for cross-border investments.
- Bidding to signing: kick off ODD as soon as practicable. Leverage on initial findings from FDD and LDD and probe deeper. Raise DD requests on questionable practices, go ahead to learn more about the business if met with cooperation, otherwise make it a case for protective SPA clauses against future mishaps.
- Signing to closing: take full advantage of the conveniences at this transitional phase to thoroughly inspect the business. This will be discussed in detail later.

To convert operational uncertainty to operational risk, an ODD takes profound insights to see right through abnormal practices when the buyer is still an outsider to the business. This may sound like using a microscope with frosted lens to find the one marked cell on a whole sample, but isn't it what investment is all about?

Tong Yang Life Insurance Meat Loan Fraud[1]

As the old Chinese saying goes, "A fall into the pit, a gain in your wit," the idea of this article originated from a tragedy.

In 2015, Anbang Insurance Group acquired a controlling stake of 63.01 percent in Tong Yang Life Insurance Co. Ltd. ("TYL"), the then 8th largest life insurer in Korea, from Seoul-based private equity fund Vogo Investment Group ("VIG") and other minority shareholders for a combined consideration of KRW1.13 trillion (about US$1 billion). The deal was first announced in February and closed in September 2015, which marked the first Chinese investment in Korea's financial industry and also the biggest investment ever from China.

About one year after the acquisition, a colossal credit fraud on meat loans burst in the Korean insurance industry. As background information, meat loans are loans extended to distributors secured by imported frozen meat. Borrowers and creditors are connected by specialized agents who may also provide valuation and pooling services. Despite higher risks due to the lack of a centralized collateral registry and valuation system, this type of loans gained traction in a low-interest environment with Korean financial institutions, notably insurance companies, savings banks, and investment funds.

Police investigation and independent audit on cold storage warehouses found serious "double dipping" by Korean meat distributors in taking out multiple loans against the same collateral, and only less than 20 percent of the documented meat consignments turned out to exist. Around twenty creditors were involved with an estimated sum at stake of over KRW600 billion (about US$550 million), among which TYL alone accounted for KRW380 billion (all booked as non-performing loans later), or 21.3 percent of its net equity as of December 31, 2016. Concurrent rights to the same collateral also invoked conflicts among creditors.

By January 2017, TYL claimed that meat distributors had failed to pay back KRW283.7 billion in loans. TYL reserved KRW266.2 billion for non-performing meat loans by the end of 2016, which directly contributed to the 78.2 percent YoY drop in its net profit to KRW3.44 billion, despite a 58.1 percent YoY growth in revenue to KRW7.43 trillion.

In June 2017, Anbang filed a KRW698 billion (about US$612 million) compensation claim with the International Chamber of Commerce's arbitration court in Hong Kong ("ICC") against former TYL shareholders for failing to disclose risks of meat loans during due diligence for the acquisition.

This is a classic case of major tail risk materializing from a merger and acquisition deal, causing the investor humongous losses in several aspects:

- **Direct financial loss:** according to an industry veteran with over 20 years of experience, the TYL meat loan fraud was the most catastrophic financial incident he had ever observed. Statistics provided by Financial Supervisory Service ("FSS") also suggest it to be the largest financial incident in terms of total worth of damages over the five-year period of 2012-2016, with loss suffered by TYL only second to the cumulative damages of KRW453.1 billion to KB Kookmin Bank over 40 plus incidents.
- **Regulatory enforcement:** the Korean Financial Services Commission ("FSC") conducted a special audit on the TYL meat loan case from December 2016 to January 2017 and February to March 2017. The Prior Notice of Contemplated Measures issued in April 2018 indicated partial suspension of TYL's business or operation and sanction measures on certain managerial staff for improper loan management practices. The FSC however resolved in May 2018 on milder measures as institutional warning to TYL and caution to staff with supervisory responsibilities. In addition, several former employees in various managerial roles were prosecuted and convicted of fraud and malfeasance offences.
- **Business disruption:** although difficult to measure, it has the most extensive and long-term impact. In an industry founded on trust, even if business suspension ended up not being imposed, clients with no lack of choices in the saturated Korean insurance market still walk away, not to mention repercussions such as uncertainties around operations, damage on staff morale, shackles on business decision making, lost development opportunities in shortage of solvency buffer, and resources dedicated to compliance and risk management to meet increased regulatory scrutiny.
- **Loss in market value:** an integrated indicator of all impacts above. TYL's stock price dropped by 12.2 percent in the week following its announcement on the potential meat loan loss, which magnified to 30 percent in two months, along with downgrade and reduction in target price by all security houses covering TYL. Although TYL was also experiencing other major difficulties, notably turmoil around the controlling shareholder, the meat loan fraud apparently accounts for a large portion of the plummeting stock price immediately following the breaking news.

Overall, business losses are front-loaded with unlimited downside, whereas recoupment of any indemnity has to follow years of legal proceedings and is capped by the lower of the claim filed and financial strength of the counterparty. In the TYL case, Anbang even had to provide KRW528.3 billion of emergency capital injection to stave off regulatory insolvency (Shim 2017). It is not inconceivable for the insurer to go on a fire sale or even cease operations long before an arbitration award, had the parent company been less deep-pocketed.

Practical Lessons from the Fraud Case

The TYL meat loan case provides a very interesting subject to enlighten on fraud avoidance in mergers and acquisitions. TYL is a publicly listed company, which subjects it to dual supervision by both insurance and securities regulators and extensive disclosure requirements. The scrutiny it is under in the normal course of business may not fall short of a standard DD, yet failed to prevent an ostentatious fraud for years. This points to the need of more probing measures for a DD to be effective.

From hindsight, bursting of the Ponzi scheme seems inevitable, and the primary point of dispute between Anbang and VIG is whether the latter willfully concealed the risks. While resolution on this is pending adjudication by the arbitration tribunal, it is time to extract preliminary lessons that may help future acquirers avoid similar pitfalls, or at least gain a better position should disputes arise.

To do this, we will conduct a series of what if exercises and try to generalize insights obtained to broader settings. For each exercise, follow-up actions are grouped into prevention – to cure or quit before closing, and insurance measures against future controversies or even litigations. As conventional wisdom suggests, prevention is the better cure. This is especially true in the TYL case, as the acquirer was under pressure to improve performance by adopting an aggressive business model, which makes it harder to distinguish between calculated and blind risk taking.

What if Comparitive Study was Made on Average Asset Allocation of the Korean Insurance Industry vs. TYL?

TYL had around KRW2 trillion other loans on its books at closing, which accounted for 20 percent of other loans of all Korean life insurance companies and exceeded the total sum of the three largest players. While insurance companies may diverge in definition of asset classes, the fact that meat loans as one subclass of other loans took up around 10 percent of all TYL loans would have been significant enough to sound the alarm.

Why can't we count on FDD by accounting firms to detect such anomalies? Because FDD, like financial audits, is to a large extent standardized across economic sectors. For example, loans are typically classed by term, size and whether secured or not, with samples mostly drawn from unsecured sizeable loans. Only in-depth industry knowledge may direct DD performers to where business-specific risk lies, in this case tens of thousands of meat-secured loans with each insignificant in amount. Moreover, even if samples from this loan class were drawn by FDD, investigation of paper documents from a financial rather than operational perspective would have difficulty finding anything.

Follow-up Actions:

Prevention: the next *what if* exercise.

Insurance: the sales and purchase agreement ("SPA") typically requires prior consent from the buyer for any material decisions made on or by the target before closing. In view of risk concentration around meat loans, it would have been worthwhile to negotiate for a broader set of scenarios and looser thresholds for such consent to be sought, including renewal of or increase in aggregate credit line to a group of concerted parties, uplifting a loan class's pro rata proportion to total invested asset portfolio, etc. Purpose of such measures is twofold: detect anomalies if consent is sought too often, and establish breach of contract if consent is not adequately sought or obtained.

Lesson learned: success of an insurance business not only rests with the liability side, which often draws most of the fire of a CDD, but also stands on the other leg as asset allocation. It is advisable for potential acquirers to closely examine the soundness of investments made against premium income, otherwise any projected business growth would be a skyscraper built on shaky ground.

Extension of the lesson to other sectors may include management of the FF&E reserve of the hospitality industry, timber stock of the furniture industry, crude oil inventory of refineries, etc.

It is probable that such investigation does not detect any material risk. In the TYL case, the other loans class comprised over KRW1 trillion asset-backed loans, which also included fish-secured loans, project financing, and loans secured by other assets in addition to meat loans. Examination on these high-risk high-return loans would have served as an insurance against risk that does not materialize, not unlike most other DD efforts.

What if Due Diligence was Conducted on how TYL Handled Meat Loans?

A review of media reports on the incident suggests at least the following deficiencies in TYL's meat loan management:

- Delegation of collateral evaluation to agent: TYL had Profit International, its exclusive meat loan solicitor since 2007 and nominal borrower for a number of meat distributors, prepare the 'Valuation of the Meat', posing apparent conflict of interest.
- Absence of on-site collateral inspection: TYL is believed to have extended loans solely based on 'Valuation of the Meat' prepared by Profit International without on-site checking of collateral, nor did it require Profit International to conduct physical inspection.
- Failure to identify affiliation between borrowers: as of 31 December 2015, TYL had extended a total credit of KRW114.3 billion to 11 borrowers, which all turned out to be affiliated with Warner Company through cross-shareholding and executive double hatting. All these loans became non-performing loans. The actual amount could be even higher as these companies gained access to additional credit through Profit International as nominal borrower, which well exceeds the credit limit for a group of affiliates.

Had ODD been conducted on TYL's meat loan management, those deficiencies would have had a good chance of being detected. This may seem like a needle in a haystack, but totally feasible if the first what if exercise was performed.

Ideally, any fault with the business can be detected before signing the SPA, yet we do recognize the pressing timeline and confidentiality concerns of sellers in practice. A good time to conduct an investigative ODD is the period from SPA signing to deal closing, in TYL's case February to September 2015. A designated transaction team of the buyer is generally stationed at the target's premises during this period, furnished with full and timely access to its business and documents. An affluence of information and knowledge about the business can be

gained if such access is effectively utilized, not only for hazard screening, but also conducive to post-investment integration and development.

Follow-up Actions:

Prevention: provided that the representations and warranties and covenant clauses in the SPA are tactically negotiated, material faults detected before closing should be corrected and the purchase price adjusted accordingly. In the most extreme case, the buyer may walk away cost-free.

Insurance: this is the second line of defense if preventive measures prove impracticable or inadequate. Depending on relative bargaining power of the two sides of transaction, the buyer may ask the seller to provide insurance, implicit or explicit, against future losses thereon for a certain period, or purchase insurance, in its literal sense, from third parties at own cost.

Lesson learned: although not totally clear from public information, it is implausible that the 8th largest Korean insurer did not have a full set of operational guidelines on loan management, rather failed to be observed in practice.

This case is special in that the fraud developed around the time of transfer of a controlling stake, but it is by no means unique in its cause. Operational failure looms large over most of the recent financial frauds, in the same vein as reckless driving being the most common cause of road accidents. In fact, similar meat loan fraud emerged in Korea as recently as 2013, where distributors also "received loans from different non-banking institutions against the same meat in warehouse" (Condon 2017).

Some may argue that it is already mission improbable to discover frauds in the normal course of business (echoed by VIG in its defense), how could we expect an investor-to-be to succeed from outside? To this, our answer is that a robust CDD, like an internal audit but free from preconception and intra-organizational affiliations, is in a better position to overhaul the target's business because it is not accustomed to the long-standing operational anomalies. For example, the special relationships between TYL borrowers could have been uncovered simply by reviewing their publicly accessible company registries.

What if a Request was made to the Seller for Onsite Audit of Collateral?

Up to this point, only hypotheses can be derived from the series of desktop research, but conclusions can only be drawn from an onsite audit. Indeed, TYL is said to have discovered the fraud while examining imported meat held as collateral in cold storage (Condon 2017).

Whether or not risks identified by CDD warrants an onsite audit and on how large a sample is a judgment call, nevertheless simply raising the request may benefit the buyer by testing out the seller's willingness to cooperate.

Follow-up Actions:

Prevention: if the seller is cooperative, the buyer may well proceed with the audit and decide on the scale by analyzing the cost of engaging professional parties on this job against potential benefits. Preventive measures would ensue on findings from the inspection.

Insurance: if, however, the seller rejects, extra caution must be taken, and the seller's story scrutinized. The buyer will then decide whether to insist, to demand firmer guarantee from the seller on the loan portfolio, or to carefully document correspondence with the seller in case fraud is identified after closing and disputes over whether seller had prior knowledge arise. The second and third moves are not mutually exclusive, and both serve as insurance against risks.

Lesson learned: while existence of fraud is a fait accompli, assignment of responsibility is more critical to parties of the transaction. If the first best outcome of nipping risks in the bud cannot be achieved, then the next best is to prepare in advance for a rainy day. With DD findings pointing to tangible and specific threats to the business, it could be a sure-fire to request for taking the investigation one step further. Even a flat denial by the seller may, to say the least, save millions of dollars in litigation later.

What if an ODD was Conducted on VIG as the Lead Seller?

For institutional investors screening PE funds for investment, ODD has become the norm, which helps investors gain "an understanding of how a private equity fund operates from a process and procedures perspective" and of "how the fund works across the risk areas" (Kaplan Schweser 2018). In contrary, M&A DD focuses on the portfolio company as the target rather than the fund per se as the seller.

This makes good sense as the buyer and the seller ideally have fulfilled all contractual obligations upon ownership transfer of the target, especially as PE funds, unlike an ordinary parent company, have few business relationships with portfolio companies that may carry over. This apparently holds if nothing happens thereafter. However, representations and warranties clauses that exhaust the alphabet in a typical SPA indicate that closing only marks the beginning of certain obligations, which makes a case for the buyer to know the seller better.

The TYL arbitration case centers on whether VIG was aware of risks of the meat loans but chose to conceal them from Anbang. An executive of VIG claimed that "Even TYL employees became aware of the meat loan issue late. There was no way for the shareholder at the time to be aware of the issue in advance" (Shim 2017).

An ODD on VIG, which by no means needs to be full-scale, could have done the buyer some good. On the one hand, it can locate weak links in the fund's post-investment operational processes and make them focus areas for DD on the target as well as shed light on key terms of transaction documents. On the other hand,

documentation of the fund's participation in target's operations may lend more support to the buyer's claim than indirectly relying on expert witness's testimony about common industry practices.

> **Lesson learned:** as little public information is available on the ongoing arbitration, we will refrain from making specific suggestions on actions that could have been taken, but rather leave it as an invitation to the investment community to start thinking about whether and how fund ODD techniques can be applied to acquisition deals with the seller being a PE fund. While we do recognize the complexities and particularities of fund ODD that consume extra time and cost, extra care is also needed when dealing with funds. Just to name a few reasons:
>
> - They are in general well-versed in deal processes, negotiation tactics, and contract laws.
> - They are less likely to be actively involved in portfolio companies' daily operations, which lends weight to their claim of innocence.
> - Their buy-and-sell model dictates a rather short holding period, over which representations and warranties are in general applied.
> - They have a limited window to distribute sale proceeds to investors and/or pay down leverage, hampering their ability to indemnify future contingencies.
> - They are oftentimes incorporated offshore, posing difficulty for efficient enforcement of judgment cost- and time-wise.

Conclusion

This article discusses operational risk investigation on acquisition targets by adding elements of ODD into CDD, and makes practical recommendations by examining the recent TYL meat loan fraud case. Like a physical examination, even the most sophisticated DD measures cannot be exhaustive, but the improvement in chances of early detection could be worth all one's life – had the owner of TYL still been VIG at the time the fraud was exposed, it would likely have gone bankrupt as no Korean PE fund management company has an equity in the hundreds of billions of won, according to market observers.

Also similar to physical examination, in the wake of technology advancement and digitization of information, standardized and quantitative analysis has become much more convenient, with the help of state-of-the-art medical device or well-trained professional advisors. Powerful as such instruments may be, if due diligence is all about reading paper documents furnished by the seller and reports prepared by external advisors, then we investment professionals set ourselves too simple a task. The ultimate due diligence liability that rests with the investor should command more profound scrutiny, which in turn calls for non-standard measures derived from hard-earned insight and expertise.

Some may argue that the cost of what is ideal may not be justified by its expected gains. While cost is always a crucial factor, classic principal-agent theory suggests that the cost-benefit analysis of investment professionals as the executor and that of the investing entity as the shareholder may not agree, and the former often prevails. Benefit to the investment team is typically twofold – a hefty bonus immediately upon completion of a deal, and the more intangible but lasting returns from an impressive deal list on resume. The personal cost is however rather limited and contingent, with accountability difficult to assign internally ex post. On the other hand, a meticulous DD consumes efforts and resources, returning either minor findings that take further efforts to correct before the deal can move ahead, or major defects that can bring down the whole deal, but its savings on potential losses that never realize seldom get recognized by the company or the wider investment community.

Operational risk is a risk without reward, which makes efforts that forestall such risks all the more worthy of a reward. While investment companies can achieve this with better aligned incentive mechanisms, high turnover of this profession demands that the whole investment community be mobilized to promote a risk-aware culture and do its members justice for deals dropped for a reason, rather than simply attributing credits by the counts of done's.

This echoes the dilemma depicted at the beginning of this article. Innovative DD techniques are rapidly picked up by peers and sellers alike, reversing their own effectiveness. This appears to be a zero-sum game, or worse, since total worth to all parties is fixed at the target's intrinsic value, whereas extra resources are consumed on additional DD activities. However, if we cast our eyes beyond individual deals to the general investment environment, this is in a large part offset by positive spillover effects, manifest as greater information efficiency in both the investment market and the talent market.

Endnotes

1. All narrative and analysis on Tong Yang Life Insurance Co. Ltd. and the meat loan fraud case are based on public information, including media reports. As information on the ongoing meat loan arbitration case is classified, some representations in this article may not have been verified by an official source.

References

Condon, Jon. 2017. "Imported Meat Finance Fraud Case Unsettles Korean Market." *Beef Central,* January 19, 2017. https://www.beefcentral.com/trade/imported-meat-finance-fraud-case-unsettles-korean-market.

Fama, Eugene F. 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work." *The Journal of Finance* 25, no. 2 (May): 383-417.

Kaplan Schweser. 2018. "Private Equity Operational Due Diligence." *In CAIA Level II Curriculum (Book 1: Ethics, Current & Integrated Topics, Asset Allocation, and Private Equity)*, 377-93. Florida: Kaplan, Inc.

Shim, Sae Rom. 2017. "700 Billion Won Meat-Secured Loan Lawsuit between Korea and China." *JoongAng Ilbo,* June 28, 2017. http://news.joins.com/article/21706394.

Author Bio

Jinxhu Chen, *PhD, CAIA, CFA, FRM*
Anbang Insurance Group Co.

Dr. Jinzhu Chen joined Anbang Insurance Group Co. Limited in 2015 as the Deputy General Manager of its International Business Department. She has assumed a variety of positions within the group and is currently the Head of Hong Kong Office and the Sole Director of Anbang Asset Management (Hong Kong) Co. Limited. In this role, she oversees a full spectrum of functions spanning the front, middle and back offices of Hong Kong Office as the support center for the group's international business, centered around acquisitive activities in targeted industries and post-investment integration and management. Prior to joining Anbang, she worked as a Director of the international business unit at China Minsheng Investment Group, responsible for its overseas M&A transactions. Jinzhu received her Doctoral Degree in Economics from Harvard University, and received her bachelor's degree in Economics and Management with First Class Honours from the University of Oxford. Jinzhu is a Chartered Financial Analyst and is a CAIA and FRM charterholder.