Risk management:
A Canadian case study

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Executive summary:
The theory of risk has been eloquently discussed in numerous texts throughout the ages. Yet, most institutional, investment practitioners seem only to have been sensitized to risk and its ill effects, since the perfect pension storm in 2009: increasing liabilities (due to falling interest rates); combined with decreasing asset valuations. However, the theory and practice of risk management are seldom seen in concert, along with its implementation. For this reason, good risk management, case studies can be a major boon to fellow investors! It is my intention to outline such a risk management case study herein. The fact that the main subject of this paper is a long time, Russell Investments Canada Limited's client and a well-known Canadian pension plan, which substantially reduced risk within the plan in 2015, makes it even more relevant!

A brief history of investment risk management:
As I intimated above, the evolution of risk management has been a long and often painful experience for many investment plan sponsors. It’s been trial by fire and learning important lessons the hard way, generally from past mistakes. Sure, the basic theory has been around for years, but its actual practice and effective implementation are now only gradually being adopted and better utilized in the investment world.

When it comes to risk management there are 3 noticeable periods:
1. Pre 2000: Acceptance, where risk was largely ignored;
2. From 2000 to 2008: Acknowledgement, where plan sponsors discovered the real meaning of risk; and
Before the year 2000, Modern Portfolio Theory (MPT), which was developed in the 1950’s and 1960’s was firmly entrenched in orthodox theory. But it had its limitations (simplifying assumptions etc.), which were not well understood by practitioners, whose focus was largely on optimizing return and peer comparisons. Perhaps no one made this point better than Benoît Mandelbrot (see insert), a Yale mathematician who used statistics to poke legitimate holes in modern financial theory. For example, in his “Ten Heresies of Finance,” Mandelbrot challenged the notions that market prices are normally distributed and that they move continuously, assumptions that form the foundation of then conventional risk models. He asserted that markets are much riskier than most people realize, and that current models are used not because they work well, but because the simplicity of the mathematical assumptions behind them is not disputed.

Benoît Mandelbrot, mathematician
November 1924- October 2010

Over nearly seven decades, working with dozens of scientists, Dr. Mandelbrot contributed to the fields of geology, medicine, cosmology and engineering. He used the geometry of fractals to explain how wheat prices change over time, how galaxies cluster and how mammalian brains fold as they grow, among other phenomena. Fractal geometry, his leading edge concept, is now being used in work with marine organisms, vegetative ecosystems, earthquake data, the behaviour of density-dependent populations, percolation and aggregation in oil research, and in the formation of lightning.

Dr. Mandelbrot received more than 15 honorary doctorates and served on the board of many scientific journals, as well as winning the prestigious, Wolf Prize for Physics and the Japan Prize for Science and Technology for his seminal work on fractals.

Although often heralded as one of the most celebrated mathematicians of the last 50 years, he was generally derided by his more conventional peers in the field of finance and investments. His insightful works on the uncertainty of risk were unfortunately, largely ignored, until they were proved prophetic, just a few years before his death!

The tools within the investment industry were somewhat basic when MPT was first developed, as the personal computer was just coming into vogue, while standard deviation and correlation were the key measures of risk. Yes, most funds later used asset-liability modeling and some Monte Carlo theory in conducting their annual or tri-annual asset allocation exercises. That said, the focus by sponsors was clearly on their assets (not the liabilities), with the spotlight centering on the average forecasted return and perhaps anticipating a one or at most a two standard deviation event. Tail events were largely ignored, with most additional effort concentrated on adding value, through active management and monitoring tracking error. Capital markets were nevertheless favourable and equities well rewarded throughout this timeframe, with only brief periodic setbacks. As such you often saw articles like “Why not 100% Equities?” Diversification meant simply expanding the portfolio beyond domestic markets into foreign securities, without a true understanding of factor risk. In short, the crux of the problem was the inequitable amount of time and resources that investors spent on return over risk (a return orientation)!

The wake-up call came in the subsequent period (2000 to 2008), when returns moved back towards their historical average (mean reversion) and all investment funds shuddered under the weight of three consecutive disasters within a decade: The Tech Wreck, the Global Financial Crisis and the European Debt Crisis. As equities fell by about 50 percent and most assets with any credit exposure were negatively impacted, there were very few places for investors to hide or to avoid the market downdraft, other than government bonds and gold. Standard deviation and correlation were fully exposed as unstable and of limited value in a
stressed environment. In fairness some funds, after the first calamity, tried to diversify into alternatives (hedge funds, private equity etc.), but usually forgot about three deadly portfolio sins: leverage, illiquidity and the lack of transparency. There were only a few mega funds that escaped the onslaught by successfully recognizing their real risk and lengthening or increasing their fixed income investments, to more closely match their liabilities. It was then, as our economic system teetered on the brink, when the majority of investors realized the true meaning of proper diversification and the benefits of risk management became apparent. In short, investors saw the magnitude of the equity market roller coaster and most wanted off that raucous ride! What they started to comprehend was that the global economy is a complex, non-linear system that is turbulent and near impossible to predict. They quickly understood that market risk was not stable over time and that investors’ risk tolerances were subject to dramatic change, which exacerbated their predicament. So trying to solve the risk riddle with a simple, two dimensional (mean / variance) optimization tool designed for normal markets (Modern Portfolio Theory), just wouldn’t work. There was a need to make risk / return tradeoffs and to evaluate the multi-dimensionality of risk and for that, better tools and insights would be necessary. Luckily computer capabilities had advanced tremendously and investors were also willing to admit their own investment foibles, while acknowledging the limitations of the human mind.

Since 2008 and the perfect investment storm there has been a plethora of books on risk management, detailing the lessons learned and a wide variety of new and interesting investment solutions have been generated (risk parity, dynamic asset allocation, defensive equity, liability responsive asset allocation, goal oriented investing etc.) and more reliable tools utilized (conditional value at risk, multi-factor analysis, liquidity analysis, stress testing, scenario analysis etc.). However, the dominant theme demonstrated in most of the literature is that good risk management policies and effective fund governance are intricately intertwined and that risk is a multi-dimensional process requiring various diagnostics. So changing peoples’ views and existing, outdated practices are a large part of the solution, which means behavioural science is an important prescriptive element! Deficiencies in risk management and distorted incentive systems clearly pointed to poor board oversight. As such, the regulators have entered the fray and they definitely see Risk Policy as the primary duty of the board in any organization. In short, investment funds and most companies have seen the light and a risk management revolution has begun!

In conclusion, fiduciaries need to adopt better, more prudent, risk management processes (a risk orientation) and to consider the impact of human behaviour on investment decision-making. However this requires an entirely new approach to risk management, combined with the proper tools, resources and a governance focus on goal attainment. We’re not talking about structural tweaks, but the hard work of building a better risk management framework and culture. In uncertain markets, the limitations of models and mathematics are all too often revealed by history. This is why we are seeing a total transformation in our industry as a more comprehensive and systematic approach to risk management (see figure 1, The Risk Management Process) take hold, including enterprise risk management (ERM). The mega funds are already committed to this risk managed approach, with often upwards of 20 professional, specialists devoted to risk management alone. Those with fewer staff and resources need to improve their governance process, make the important risk decisions (risk tolerance, asset allocation, guidelines etc.) and then outsource to providers with the necessary expertise, experience, risk tools and economies of scale to implement effectively, as noted in the case study below.
A Canadian case study

Background on the plans & the Fund

These multiple union plans, are best average earnings, contributory, Canadian, defined benefit pensions, with a common employer. The commingled, total fund is of significant size, with assets over C$8.0 billion. However, three of the five plans within the common fund are deeply underfunded on a going concern basis, with the largest plan (about C$5 billion) only about 60% funded for the calendar year ending 2014. With a limited, one person investment team, the fund has been using Russell Investments Canada Limited in a full retainer consulting capacity for over 20 years. The consulting services entail the full gamut of advice from governance, to asset allocation, manager search and reporting etc.

In 2004, an asset liability study had been conducted, wherein the funded status of the largest plan within the fund was about 46% on a going concern basis, with the smaller plans even less well funded. The recommendation at that time, was that unless large contributions were to be made by the employer in short order (which did not appear likely), the only possible way to make up the funding gap was an aggressive return-seeking asset allocation, with additional added value through successful active management. Although various asset class scenarios were analyzed, including alternatives, the client felt most comfortable with a conventional asset mix of 70% equities (of which 57% were global and 43% were domestic), 25% domestic universe bonds and 5% domestic real estate. This asset mix was reviewed and validated by the Investment Committee on numerous occasions thereafter, but remained largely the same throughout. Over time the direct real estate component never quite achieved policy weight, but was within range and the additional monies were usually invested in equities. In short, to meet their objective of full funding over the long term, the employer felt compelled to accept higher equity risk (a return orientation with a higher equity risk tolerance).

Over the next ten years, the total fund performed well, as the funding gap was indeed reduced, as noted for the largest plan above and was better than the 52% median, ten year forecast from the asset liability study of 2004. The actual ten year, compound, asset rate of return was 7.74%. This was first quartile peer performance, about 0.6% above median. But more importantly it was about 1.0% above their liability discount rate. That 1% excess return was largely the result of good active management. Given the timeframe (2005 to 2014) these results also came with considerable volatility, as the fund peer performance vacillated between 1st and 4th quartile on a quarterly basis, depending on how well equities performed. But the Investment Committee and Board were rightly resolute and kept largely to the prescribed asset mix throughout that ten year timeframe.
With these favourable results in hand, a further asset mix review was conducted in 2014, which recommended increased asset mix diversification, including the use of more alternatives. Also after a 5 year bull market and interest rates at record lows, the consultant suggested that the employers consider borrowing to increase contributions and take some risk off the table. However, consultants don’t always know what’s happening behind the scenes, and in this case various individuals and organizations were hard at work, determining a different outcome!

**The crossroads**

In January 2015, the employees and employer of the largest plan (hereinafter called Plan A), negotiated and announced a watershed decision, wherein the employer would pay several billion dollars, amortized over 30 years, to address the funded liabilities. In return, the unions agreed to plan changes and contribution increases. The agreement was contingent upon implementing joint trusteeship, meaning that both employer and unions would be responsible for the sustainability of the plan into the future and share equally in surpluses and deficits. This was indeed a defining moment for Plan A and its Fiduciaries!

First and foremost, Plan A had to be segregated, but would it still be required to take the same measure of risk to attain full funding? Liquidity would not be an issue for the foreseeable future, with regular monthly contributions from the employer. However, it also meant that Plan A would shortly be in a totally different situation than the other plans (B, C & D), if the common fund were maintained. When most plans in the fund are vastly underfunded and not receiving employer contributions, a common aggressive asset mix might be viable for all. But now, Plan A would have a novel governance structure, additional contributions and perhaps a different objective and risk tolerance. Finally the segregation of the largest plan’s assets (Fund A) and its new governance structure, meant a heck of a lot of work in a very short time frame for staff and the consultant!

Beyond a complex custodial transfer, which was expected to happen upon incorporation at the end of April (just 3 months after the new organizational structure was announced), was the necessity of completing all new service agreements for the largest plan’s agents. Yes, staff had to have all of their managers (13) and other service providers sign separate agreements for the newly segregated organization. A huge undertaking, particularly since this had to be reviewed by the internal Legal Department and many of the existing contracts were outdated! A new joint (employer / employee) Board and Investment Committee also needed to be appointed to make on-going decisions and effectively manage Fund A.

One of the first orders of business, after all the documentation and assets were segregated, was to set a date to conduct a one and a half day, education session with the new Fiduciaries to assist them in their decision-making. The rest of that second day session would be allocated to actually making the key strategic decisions (risk tolerance, policy asset mix etc.) based on their current, better funded position. With little time to lose, a date was agreed to in early June. The task of assembling the most appropriate educational tools was assigned to the consultant, with guidance from staff.

The consulting team immediately recognized that a new board needed the essential facts and research, about their plan and insight on the investment finance basics, to make effective decisions, but that the presentation shouldn’t be overly technical. Preparing a 200 page presentation on Investment Management, which discussed everything from good governance to appropriate oversight, along with providing investment insights, while keeping the fiduciaries engaged, was not considered lightly by the consulting team. The common, underlying theme, throughout the first day’s presentation would therefore be good governance and prudent risk management. In addition, the session would be interactive to have the new fiduciaries fully involved and participating throughout. The second morning would focus on the specifics of Plan A’s current circumstance and try to apply the broader concepts from the first day’s more general education session. For this, an asset liability study (Monte Carlo analysis with 5000 paths forecasted over 10 and 20 year time horizons etc.) and a detailed risk analysis (including historical simulations, stress tests, factor analysis etc.) with a focus on downside protection, needed to be completed in short order, so that the essential elements, results and recommendations could be considered by the new Board and Investment Committee in the afternoon of day two. Luckily, as previously noted above, given the magnitude and consistent monthly contributions, liquidity was not an issue. However time was of the essence to meet the June deadline for the two day meeting!
The strategy decisions (June 2015) & challenges

Although various solutions were considered the Board and Investment Committee for Fund A ratified that their primary objective was to ensure the projected assets would continue to meet the liabilities (a focus on surplus management as opposed to asset management). Now that the fund was near funded on a discounted basis, due to the guaranteed employer contributions, the new Fiduciaries did not wish to see the plan returned to deficit. To be cur, they wished to ensure the projected surplus would be less exposed to market whims and poor equity performance by limiting downside risk. In summary their risk tolerance had changed significantly! As such, they wanted to:

1. Immediately de-risk the fund by reducing equity exposure by 20% and correspondingly increase fixed income, which better matched the forecasted liabilities and cash flows;
2. Refresh the return seeking portfolio to improve diversification and provide a more stable cash flow:
   a) Allocate up to 10% over time to direct alternative investments (e.g. Infrastructure);
   b) Shift some public equity exposure (10% of equities) to defensive equity;
3. Increase their allocation to risk reducing assets (fixed income now 40%), diversify into core plus bonds 20% (opportunistically adding foreign bonds, mostly hedged, to a core domestic bond portfolio) and global credit 5% (foreign corporate bonds), leaving pure domestic bonds at only 15%;
4. Refine their existing domestic, fixed income manager structure, including decreasing the number of managers for their reduced allocation.

In short, Fund A would need to shift 25% of its assets out of equities into fixed income and alternatives, to further diversify and reduce the risk profile. Naturally, the Statement of Investment Policies & Goals needed to be appropriately redesigned to incorporate these changes (history, risk tolerance, objective, policy asset mix, guidelines etc.). However, a number of implementation issues were apparent, which included:

Challenge 1: Efficiently shifting the asset allocation

The fund’s policy portfolio was changing almost immediately, however, there were a number of governance and operational steps that needed to be completed before the physical assets could reach the new policy targets. Firstly, there were manager searches to conduct and specific manager allocations to be determined. This process takes time and any delay represented significant risk relative to the policy portfolio;

Challenge 2: Creating an interim exposure to infrastructure

The fund had a goal of 5% allocation to private infrastructure investments, but the funding of this asset class, would take years to complete. In the meantime, an interim exposure strategy for infrastructure assets was needed to mitigate opportunity costs, relative to the policy portfolio;

Challenge 3: Minimize the transaction costs and manage the operational burden

With over 25% of the plan turning over, the transactional costs needed to be managed in order to help minimize the performance impact on the fund. A definitive strategy was imperative to limit execution costs and minimize the effect of the restructuring.

Upon recommendation from the consultant, the staff agreed to commence an independent, formal search for an implementation manager, with transition and overlay capabilities, to provide the required trading expertise and limit the burden on staff. A short list of 3 capable agents was identified and staff issued a formal request for proposal (RFP) in June with responses to be received by mid-July. The selected implementation manager immediately evaluated the asset allocation needs of the fund. It was clear to them that an overlay program could provide immense value by immediately aligning the asset classes with the policy portfolio targets. The overlay program would use derivatives to adjust the asset allocation of the fund to policy without the need to trade physical assets. The overlay strategy would instantaneously shift the asset allocation and mitigate some opportunity costs. In effect, this
approach provided a cost effective and efficient solution to Challenge 1 and assisted in Challenge 3.

The allocation to private infrastructure (Challenge 2) would take years to complete and the fund needed an interim allocation with similar infrastructure investments, which could be quickly acquired and slowly liquidated, as the private infrastructure, capital calls were received. The consultant and implementation manager reviewed a number of different strategies which included active, passive and exchange traded fund (ETF) solutions. After reviewing these potential options, staff determined that an active, public markets commingled, multi-manager, infrastructure solution would be best for their situation, as they had previously favourably vetted such a manager, who could perform proper oversight on their behalf. Although the passive strategies had lower management fees, they were deemed inferior, as the index components could be heavily skewed by liquidity demands, sometimes significantly pushing prices away from fair value. The global listed infrastructure manager was chosen forthwith and funding (5% allocation) occurred by the end of September 2015. Additional monies (2.5%) were later provided to this same global listed infrastructure multi-manager in the New Year, to top up Fund A’s real asset component to policy, until their domestic real estate manager would require the funds (probably the distant future).

An effective transition by the implementation manager would also address Challenge 3, by minimizing trading costs, including brokerage, spread and impact costs, while mitigating opportunity costs. A complete evaluation of the restructuring cost was therefore undertaken, to understand its primary components and how best to minimize each. Further, the fund used this restructuring as an opportunity to reallocate its percentage asset allocations to target, between existing and new managers within fixed income and equity. A total of 15 managers were involved in the restructuring, which required close co-ordination between the implementation manager, staff, the custodian and the managers.

In the interim, the consultant and staff identified suitable manager search candidates for the new traditional asset mandates and what refinements would be necessary to the existing manager lineup. The defensive manager search was conducted in the late third quarter of 2015 and funded immediately, while the bond manager searches (2 separate mandates, 3 managers in total) were completed in January 2016.

Figure 2. Timeline of events

The end result (see Figure 2)

Within 11 months (see timeline) of its formation, Plan A, with close coordination between staff and consultant, was completely transformed from a return seeking fund (asset oriented with a high risk tolerance, dominated by equities) to a more diversified, risk oriented plan (focused on surplus management). A new organization, governance structure and strategy were embraced, which had all the fiduciaries working on the same game plan, with a common
playbook. The SIP&G and policy asset mix had been successfully transitioned from 72.5% global equity / 25.0% domestic fixed income / 2.5% domestic real estate to 50% global equity with a defensive bias / 40% diversified fixed income / 10% alternatives (including 7.5% global listed infrastructure and 2.5% domestic private real estate). In short, the plan’s assets were successfully de-risked and further diversified in a timely manner, through the use of education, research, various tools, products and experts. Despite staff limitations, the Fund effectually utilized the services of various, outsourced, service providers (consultant, implementation manager and multi-manager) to efficiently and effectively realize their policy. The one person staff had considerably enhanced capability by outsourcing!

De-risking was accomplished, largely through the overlay strategy, which was put in place at the end of September 2015, shortly after the relevant implementation documentation was signed. It remained in effect for 6 months, until the traditional managers had been selected. The overlay was removed at the end of March 2016, when all the active, individual, physical managers received their mandated policy cash flows and allocations.

That’s all fine and good, you may ask, but are there any measures to qualify that this implementation was a success? I believe there are several:

1) First and foremost the plan, as agreed by all fiduciaries, successfully reduced risk by:
   a. Substantially modifying their risk profile rapidly, through overlays;
   b. Setting and achieving their new target Strategic Asset Allocation within 9 months;
   c. Lowering tracking error to policy throughout the implementation process;

2) During the 6 month overlay period, Fund A’s total assets with the overlay, outperformed Fund A’s total assets without the overlay by $8.0 million (net);

3) The physical transition yielded a cost savings of $.9 million or 19 bps (gross); and

4) The added value through active management from the global listed infrastructure multi-manager structure was $2.8 million gross (while the returns from both real assets and bonds, outperformed equities) over the 6 month period.

In short, the new Fiduciaries at Plan A made many good decisions in their first year together, with limited staff, augmented by several outsourcing agents. As an update, the remaining Other Plans (B, C and D) are still invested aggressively in the original commingled fund, but are believed to be contemplating similar change.

Were there any lessons to be learned or could this case have been handled better? Perhaps, but no major deficiencies standout in this consultant’s mind! That said, there were several key takeaways, consistent with best practice:

a. The importance of accountable governance and good risk management practices should be an imperative for every fund;

b. That said, effective implementation should never be underestimated;

c. To make timely decisions, efficient use of the skills, tools, research and resources available (be they internal staff or outside providers) is paramount!

d. Having a good game plan (strategy), which all fiduciaries understand (education) and a specific common objective known to all, is essential (teamwork counts).

e. Good quantitative tools should assist in the risk management process, backed by a sensible qualitative review. But there is no substitute for commonsense in any risk management exercise!

Case study provided for discussion purposes only. Individual client results will vary based on individual circumstances and market events. There is no guarantee that all clients will experience the same positive results.
Conclusion

I believe Benoit Mandelbrot, would have been proud of the effort put forth by all participants in this case study! Surely, there were lots of other quantitative risk tools that could have been utilized. But at the end of the day, striking the right balance of education with the level of fiduciary understanding is just as important and often lends itself to a sensible result. Risk management is not about precise accuracy, but rather being directionally correct and recognizing a catalyst for change. At any rate, it’s not the number of risk tools that count, but rather the insight provided. Having a sound rationale and timely implementation often win the day! Ultimately, good, old fashioned, commonsense should prevail, as it did in this decision by Plan A to de-risk and further diversify. The staff, in particular, should be congratulated for their exemplary efforts in bringing this planned metamorphosis to fruition, under such tight time constraints!

Certainly every risk case is different, but hopefully this particular study and the key principles applied can also be useful to others.

Related Reading
