

Advanced Risk Management: Commonfund's Differentiated Approach

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About Commonfund

Commonfund is an independent investment firm with a 40-year history of meeting the investment needs of institutional institutions across all asset classes and strategies. Headquartered in Wilton, Connecticut with investment offices in Beijing and London and client service offices in San Francisco, Commonfund manages \$25 billion on behalf of nearly 1400 endowments and foundations, healthcare organizations, pension funds and other institutional investors. We were among the first investment firms to offer a fully outsourced-CIO capability for multi-asset discretionary mandates and we also manage specific investor needs in equities, fixed income, private equity, venture capital, natural resources, hedge funds and commodities.

Advanced Risk Management: Commonfund's Differentiated Approach

For institutional investors, risk is the fuel that generates portfolio returns. At Commonfund, risk management is the process of harnessing that risk fuel in the pursuit of better returns for our investors.

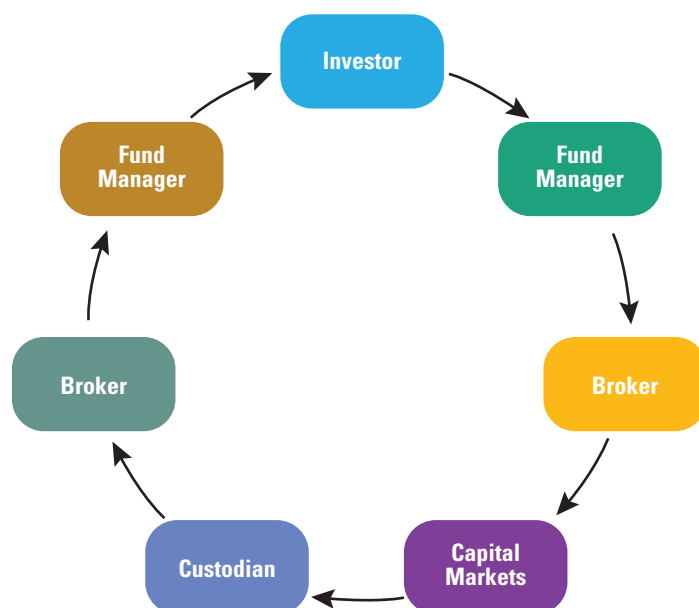
As *Figure 1* indicates, to capture those returns, investors' money must go on a round-trip into the capital markets and back. This involves passing through financial intermediaries, custodians and asset managers and into economic assets that will produce returns. At Commonfund, our enterprise-wide risk framework

is built on mitigating the *uncompensated risks* in this process—including counterparty, operational, legal, compliance and regulatory risk—while harnessing the compensated investment risks.

To understand Commonfund's approach to risk management, it may help to remember the number sequence "4-3-3." These numbers refer to four risk disciplines, three lines of defense, and three differentiating features of the risk management framework at Commonfund.

FIGURE 1

The Investment Virtual Roundtrip



For institutional investors, risk is the fuel that generates portfolio returns. To capture those returns, investors' money must go on a round-trip into the capital markets and back.

The Four Risk Disciplines

Our enterprise-wide risk framework for controlling risk is built on four disciplines, or pillars. These are:

Risk Identification and Clear Ownership

This discipline seeks to ensure that no risk falls through the cracks or fails to be identified and, thus, results in surprises.

Risk Measurement and Monitoring of Exposures

This discipline seeks to estimate exposures to various risks. Here it is important to recognize that some risks are, in fact, not measurable. Nonetheless, these risks can be monitored qualitatively even if they cannot be measured with precision.

Organizational Checks and Balances

This relates to our internal controls. Checks and balances are particularly effective at controlling operational risks.

Centralized Risk Management

This approach brings specialized, complementary skills into the firm, aggregates risk information across our portfolios, analyzes it, brings that analysis to bear on investment decisions and escalates issues, if needed.

The Three Key Lines of Defense

In implementing this framework, there are also three key lines of defense, or allies, that work together.

The first line is our managers.

Our due diligence processes strive to ensure that the managers we select are disciplined in their risk taking and have the requisite risk management capabilities to safely invest our clients' funds.

The second line is our portfolio managers at Commonfund.

There are dedicated portfolio managers for every Commonfund fund. They determine the overall portfolio construction and then monitor markets and the risk of positions of our underlying fund managers. They frequently exchange views with the underlying managers, decide when to adjust allocations, and when to put on risk mitigating overlay strategies.

The third line is Commonfund's risk management, operations, legal and compliance teams.

These teams aggregate information, monitor our exposures, provide independent risk analysis to decision-makers and the board act as control points in our risk-taking processes, and play the role of challenging the status quo.

The Three Differentiating Features of Our Risk Management Framework

There are three aspects of our approach to risk management that we believe differentiate us.

Governance

Our governance model enables us to focus on protecting our clients. We have an independent board of directors appointed by our investors. The board's focus is on guiding Commonfund in its continuing mission to bring the benefits of sophisticated asset management to nonprofit endowments and foundations. The Chief Risk Officer reports to the board and our CEO. He or she has the duty, authority and independence to protect our clients' interests. They *do not* represent the interests of shareholders, *as we have none*. And *do not* represent the interests of our portfolio managers, as their compensation does not depend on their short-term performance. This independence manifests itself in their authority to raise issues with respect to any investment and to escalate issues to our board. Risk management team members engage directly with portfolio managers and attend all investment committee meetings.

Sophistication

We have invested in risk staff and risk systems that we believe are equal to those of much larger asset management firms. This commitment shows itself in the experience of our people and the investment we make in risk analytics. Aside from myself, we have a managing director from University of Chicago, focusing on credit risks; a director from Goldman Sachs and a PhD in physics, focusing on investment risks; and an associate director from UBS with a master's degree in financial mathematics from the University of Chicago, building our analytics and backing us all up. We invest over \$1 million per year in our position-level risk systems; these include RiskMetrics, Barra, Hedge Platform and Blackrock Solutions. Our scale enables us to hire the best people and to invest in the best techniques for risk management.

Perspective

Our risk management work is aligned with the longer-term, active management risks our clients face. Commonfund creates investment solutions for strategic investors and we believe in the long-term value of active management. This means we manage money for our clients for the long term and have a core competency in picking the best active managers. Our core endowment and foundation clients target five- and 10-year returns, not monthly or annual returns. This is a fundamentally different risk management challenge in that traditional tools for risk management, such as the short-term, volatility-based measures like value at risk, start to lose their usefulness when managing longer-term risks. Fundamental economic trends, maximum drawdowns, upside and downside participation rates, capturing liquidity premiums, capturing market inefficiencies, and the effectiveness of diversification strategies in tail risk events are much more important to our clients' long-term returns. Consequently, scenario analysis is much more of a focus in our risk management approach, although we also look at shorter-term volatility-based risk measures as well.

To deliver the value active management can create, we must always seek to discern between average managers and the best managers, daunting as this task may be. These managers must not only pass our investment due diligence, but also our operational due diligence. Managers often fail due to operational, compliance or risk management errors rather than to poor performance. Our initial and ongoing manager due diligence processes repeatedly evaluate and monitor these idiosyncratic risks of every manager. One of the things that makes us different is the fact that we have a number of non-investment staff members with practical experience running operational, compliance and risk functions in asset management firms, and who participate in manager due diligence interviews. They not only have deep due diligence experience, they have actually performed the work for which they are evaluating the manager. *Each of them* has the authority to question and in certain cases veto a proposed investment in a manager if they feel its operations, compliance or risk management capabilities are inadequate relative to its strategy.

Risk Management in Action

Having set the framework, let us turn to some examples of Commonfund risk management in action.

Government Shutdown/Debt Ceiling Imbroglio

In all likelihood, you remember the federal government shutdown and debt ceiling fight in fall 2013. It ended relatively well, but there were many worse outcomes possible and these may still come to pass in 2014.

Scenario Analysis – The debt ceiling debate had been on our Systemic Risk Monitor (*Figure II*) since 2011. We use this tool monthly to qualitatively track emerging systemic events. It's a discipline that keeps us vigilant and sets our agenda for developing stress and scenario analyses. We have also focused on the debt ceiling debate for several months in the Monthly Risk Assessment that is written for senior management. In this analysis, we scan the markets for macroeconomic risks, political risks, asset bubbles, correlation shifts, major changes in

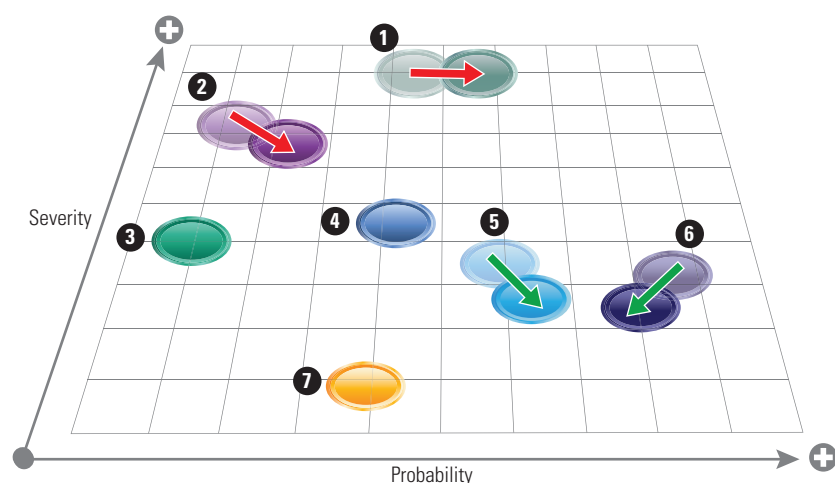
asset flows across countries or asset classes, and changes in risks being signaled in the derivatives markets via their price movements.

Using scenario analysis, we had been evaluating our clients' portfolio exposures to the debt ceiling and fiscal cliff events for over two years and discussing it along with many other scenarios at our monthly Systemic Risk Committee meeting. We had also been discussing it at our quarterly board meetings and in our investment team meetings. These exchanges allowed us to identify and critique some of the more significant deviations from the policy benchmarks our active management approach creates.

We had developed our debt ceiling scenario with Michael Strauss, Commonfund's Chief Economist and Chief Investment Strategist, and updated it with each successive round of political stalemate. The most recent version was based around the 2011 debt ceiling event, in which the S&P 500 Index fell 16 percent.

FIGURE II

Systemic Risk Ranking



Since 2011, the federal debt ceiling debate has been among those risks on Commonfund's Systemic Risk Monitor. Commonfund's risk management team uses this tool monthly to qualitatively track emerging systemic events.

Scenario	This Month	Previous Month	Comment
1 Japan loss of confidence	↑ Increase	↑ Increase	Foreign investor inflows have been significant and are decelerating as fiscal sustainability concerns increase.
2 Bond bubble	↑ Increase	No Change	Funds are outflowing from fixed income at a controlled pace, decreasing the severity but government bond yields remain too low. Eventual end of QE is increasingly likely and is likely to shock yields and prices.
3 China credit crunch	No Change	No Change	Shibor spiked again in late October but moderated. The PBOC marginally reduced funding in the system.
4 Oil price shock	No Change	↑ Increase	The Syrian conflict appears to be broadening as regional players increase support for both sides.
5 Debt ceiling	↓ Decrease	↑ Increase	Deferred to Early 2014. Market reaction to repeated bouts of political bluffing is reducing with each iteration
6 EU depression	↓ Decrease	No Change	ECB guidance more accommodative, forecasted to exit recession in 2H13
7 Counterparty risks: Bank failure	No Change	No Change	Record regulatory fines have not eroded bank creditworthiness, just reduced investor equity so far.

FIGURE III

Systemic Risk and Turbulence Map

Commonfund's Systemic Risk and Turbulence Map is another quantitative tool that attempts to indicate how fragile markets are by tracking the magnitude of common factors influencing returns and common sources of volatility.



Source: SSGA and Commonfund

Our risk metrics system was used to evaluate potential exposures under this scenario at the position, manager, country, portfolio, asset class and client level. This is a new risk system we implemented in 2012 to improve the timeliness of the risk analysis we do and the detail with which we can drill down into manager positions. It also enables us to safely undertake our portfolio overlay activity, which can be used to hedge or tactically take exposures with the potential to add value for our clients. It also helps in our regulatory reporting.

Using our position-level risk system, in which we model in near real time the positions our managers hold, we evaluated how well diversified our portfolios were relative to this extreme event. We used a relative stress test to identify how much we might outperform or underperform our benchmarks or policy portfolios. We then drilled into our holdings to identify the managers and manager positions that were contributing the most to that variability in performance. We evaluated low cost hedging options and the effectiveness of our overlay portfolios in mitigating this potential underperformance.

We continued to modify the scenario as markets evolved and, in particular, we saw that its investment impact would be less than the debate of 2011 because

markets appeared more resilient. Our Systemic Risk and Turbulence Map (*Figure III*) is another quantitative tool that attempts to indicate how fragile markets are by tracking the magnitude of common factors influencing returns and common sources of volatility, showed that markets were more robust than in 2011. Our mean reversion monitor showed that few asset prices were more than two standard deviations above or below their long-term historical means and potentially overpriced or prone to a large correction that could be triggered by the events in Washington. Lastly, indicators of equity and interest rate market uncertainty—like the Chicago Board Options Exchange Market Volatility Index (VIX) and the Merrill Lynch Option Volatility Estimate Index (MOVE)—did not show that the market anticipated a large flight to quality as implied volatility remained lower than it had been historically. The primary difference was that we did not have simultaneous crises in Europe and the U.S. like we did in 2011. We thought the market might dip but would bounce back relatively quickly. To ride through it, we needed to be able to stay invested in our positions and have available liquidity to take advantage of any mispricing that might occur.

We did recognize, however, that liquidity could be an issue. We knew that due to Dodd-Frank (formally, the Dodd-Frank Wall Street Reform and Consumer Protection Act, enacted in July 2010), liquidity in the fixed income market was changing and, in some sectors, getting materially worse. As *Figure IV* shows, we could see that declining liquidity in fixed income markets was increasing the tracking error between some index ETFs and their underlying indices. We knew that the market was anticipating a rate increase eventually, making Treasuries less attractive longer term but also the asset likely to benefit from a flight to quality. We also knew payment of short-dated Treasuries coming due might be delayed and that there was a remote chance that foreign investors might start to sell Treasuries—an event that could set off a landslide of selling.

We wanted to be able to ride through any volatility the shutdown might create—but what if short-dated Treasuries became illiquid and ineligible for use as collateral in derivative transactions? If this happened, everyone in the market would need to come up with more cash or eligible securities to use as collateral. Not only could this trigger a sell-off as investors

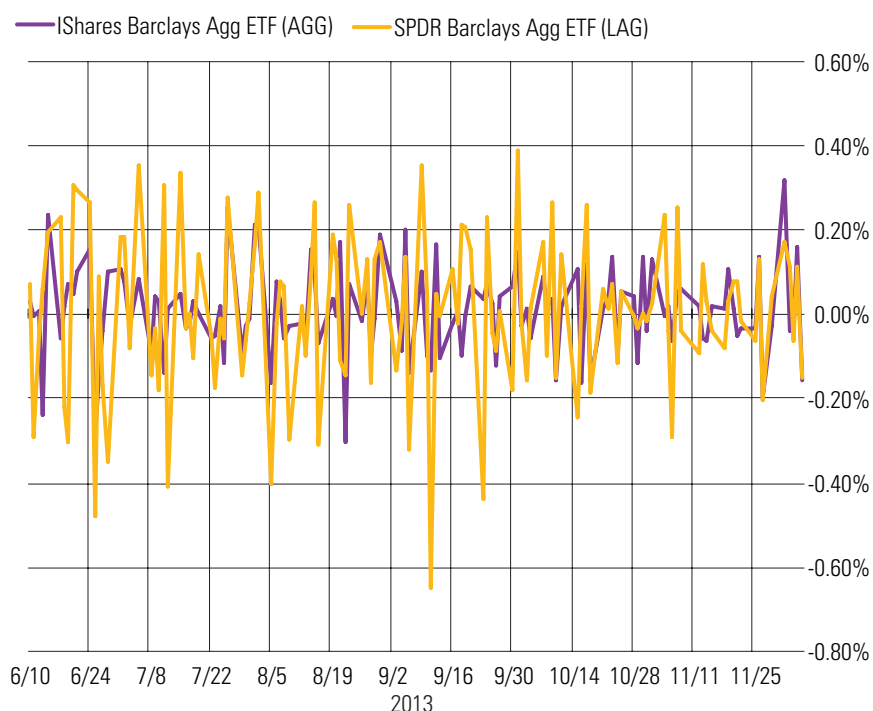
liquidated positions to come up with the cash, but it could also potentially cause problems again in the interbank funding markets. This, in turn, could create counterparty risks.

We looked at all the holdings of all of our active managers to see the extent to which they held short-dated Treasuries and whether they had significant amounts of cash and other securities eligible to be used as collateral. In short, we were concerned about funding liquidity risk. We talked to our money market managers to get the pulse of what was going on in the money markets and whether they were potentially exposed. They reported that they and most other managers were increasing the maturity of the U.S. Treasuries they held in order to not hold short-dated Treasuries and prudently increasing their cash holdings. This pattern was true for all of our managers, but most pronounced among our money market managers. We were satisfied that our manager selection and manager due diligence processes had led us to be invested in top quality managers who were not only good investors but good risk managers, too.

FIGURE IV

Barclays Aggregate ETFs Premium and Discount

As the debt ceiling/default debate raged in Washington, liquidity in the fixed income market was changing and, in some sectors, getting materially worse. As liquidity in fixed income markets was declining, the tracking error between some index ETFs and their underlying indices was rising. Commonfund knew that the market was anticipating a rate increase eventually, making Treasuries less attractive longer term but also the asset likely to benefit from a flight to quality.



Source: Bloomberg

Meanwhile, we'd ominously heard that the Hong Kong Exchange was increasing its haircuts on U.S. Treasury collateral, requiring more collateral to be posted in order to stay invested in positions on the exchange. We'd also heard that banks were effectively increasing the haircuts on short-dated Treasuries by reducing the amount they would loan in cash to anyone pledging a short-dated Treasury as collateral. This reduction in funding via repo loans could create funding problems for some counterparties and potentially increase counterparty risk.

Counterparty Risk

To manage counterparty risk, we continue to employ the counterparty risk management techniques that enabled us to detect the deterioration in Lehman Brothers in 2008 and avoid any exposure or losses due to the firm's eventual default. Our counterparty default model attempts to predict counterparty defaults based on real-time movements in counterparty equity, bond and credit default swap prices. We did not see major changes in these market variables indicating increasing default risk. The market did not think our counterparties would run out of funding. Nonetheless, we made sure we were not holding any unnecessary cash at our brokers and that it was safely kept at our banks.

The primary improvement we have made in our counterparty risk management has been to move from calculating our exposure on a mark-to-market basis to estimating the potential worst case exposure assuming markets move in our favor and our counterparties end up owing us significant amounts when they default. We checked to make sure that these potential exposures were at the most creditworthy banks.

We also looked at Commonfund's reserves to ensure that we, too, would have sufficient liquidity in the event short-dated Treasuries were not paid on time.

As the stalemate dragged on and the first payment date approached, we started to see some anomalies and more signs of stress. We saw the LIBOR – OIS (overnight indexed swap) spread, a traditional indicator of interbank funding stress, cross; it was not, however, due to LIBOR increasing over the risk-free rate. *It was due to the short-term risk-free rate itself going above LIBOR, implying the market thought the U.S. government was more risky than the banks.* We also tracked U.S. credit default swap spreads and were concerned to

see the market pricing in an implied probability of default by the U.S. at a surprisingly high 7 percent. When the budget deal was announced, these anomalies disappeared and the markets calmed as it was clear the U.S. would pay its debt on time. Now that the event has passed, at least until 2014, we continue to see evidence of how serious it was.

Best Execution

One of the mundane but important risk management activities we undertake is monitoring the efficiency with which our managers trade. We call this best execution monitoring. Every month, we receive data on our managers' executed trades. We get this by security and by counterparty and for a peer set of managers in which we are not invested. We look to see that managers are not paying off-market prices to buy or sell securities, as these higher trading costs erode our clients' returns over time just as a high management fee would. At worst, it can indicate fraud at a manager firm that may be directing off-market trades to a specific broker, inflating broker profits and getting a kickback. In effect, this is a way of stealing client assets.

When we've looked at the data from the September-January 2014 period, we do see an increase in the transaction costs of all market participants as liquidity was at a premium during this period, but are comforted to see that our specific managers actually did not get poorer terms compared with their peers and, in some cases, got better execution.

Current Focus

Now, as the 2nd quarter of 2014 progresses, we are tracking Japan and the implications of a lack of market confidence in Abenomics' ability to create a Japanese economic recovery. Prime Minister Shinzo Abe's aim is to revive the sluggish Japanese economy with "three arrows." These are a massive fiscal stimulus, more aggressive monetary easing from the Bank of Japan and structural reforms to boost Japan's competitiveness. Optimism has led to a 40 percent increase in the Nikkei year-to-date 2013, with foreigners buying \$130 billion of Japanese stocks.

The risk team's concern is that this optimism dissipates. Each of the three arrows has to pass through the political process in Japan and have the intended effect in order for Abenomics to work. Even if you assume

that each arrow has a 70 percent chance of being implemented and being effective, the odds of all three working together as intended, however, is just 34 percent. And that ignores unintended consequences.

To alert us to a potential change in sentiment, we have constructed the Japan Monitor (Table A). It shows the highs and lows of various Japanese market factors. We pay close attention to the implied volatility levels in the foreign exchange, equity and bond derivatives markets. We think this is the area where we would start to see sophisticated investors begin to hedge their bets and pay up for protection if their confidence starts to wane. If we see an uptick in implied volatility, we would consider it to be a warning signal that the odds of a market collapse are increasing. So far, the signals remain benign.

We have also been running a Japan “loss of confidence scenario” on all of our funds since the beginning of 2013 to estimate our exposure to this event, should it happen. Our position-level risk system produces a fund-level relative risk report, or dashboard, that we use weekly to evaluate potential losses, monitor tracking error, detect risk concentrations and monitor position liquidity. Overall, it helps us ensure that our managers and funds are delivering the exposures our investors expect. Among the many types of risk information it provides, the report showed that one particular fund could be expected to outperform its benchmark by 53.7 basis points under our Japan loss of confidence scenario.

Prospective Hindsight

Testing potential events discussed in the financial community is one way to stress test our portfolios, but it is not the only method we use. What if we are not being imaginative enough in thinking about what can go wrong? After all, few financial experts saw the 2008 crisis coming. For this reason, we have adopted a process called “prospective hindsight,” or reverse stress testing, to probe our blind spots. We do this in our monthly Systemic Risk Committee, where we postulate that one of our funds has lost a significant amount and then work backwards to imagine scenarios that could have caused a loss of this magnitude. We find that it helps us to question our assumptions, jolts us out of our habitual ways of thinking about the market and forces us to use our imaginations.

Summary

In summary, our objective with this paper has been to communicate the principles of Commonfund’s risk framework and how we bring various risk management capabilities to bear on risks in the marketplace. We hope readers will use the mnemonic device of “4-3-3” to recall the three differentiating features of Commonfund’s enterprise-wide framework for controlling risk:

The four risk disciplines:

- 1) Risk identification and clear ownership;
- 2) risk measurement and monitoring of exposures;
- 3) organizational checks and balances; and
- 4) centralized risk management.

The three lines of defense:

- 5) The managers who pass our **robust** due diligence process;
- 6) our portfolio managers at Commonfund; and
- 7) the risk management, operations, legal and compliance teams at Commonfund.

The three differentiating features of our risk management framework:

- 1) *Governance*—our governance model enables independent focus on protecting our clients;
- 2) *Sophistication*—we have invested in risk staff and risk systems equal to those of much larger asset management firms; and
- 3) *Perspective*—our risk management work is aligned with the longer-term, active management risks our clients face.

TABLE A

Japan Monitor

The blue highlighted figures represent a decline in quality of 10-20 percent versus the 30-day high and low. The red highlighted figures represent a decline in quality of over 20 percent versus the 30-day high and low.

	Prior EOD	5/22/2013 (snapshot) - 1 Year Nikkei Peak		6/13/2013 (snapshot) levels		30 day high		30 day low	
	12/6/13	5/22/13	% Change (Current/ May22)	6/13/13	% Change (Current/ June 13)	Value	% Change (Current/ 30D High)	Value	% Change (Current/ 30D Low)
Equities¹									
Nikkei 225	15299.86	15627.26	-2%	12445.38	23%	15794.15	-3%	14026.17	9%
Nikkei Vol Index	25.68	27.61	-7%	46.19	-44%	27.01	-5%	20.07	28%
JGB Yields²									
JGB 5Y Yield	0.20	0.41	-50%	0.34	-39%	0.21	-3%	0.19	10%
JGB 10Y Yield	0.67	0.89	-25%	0.86	-22%	0.67	0%	0.59	14%
JGB 30Y Yield	1.69	1.89	-11%	1.80	-6%	1.69	0%	1.61	5%
BANK CDS³									
Mizuho	86.84	92.21	-6%	116.66	-26%	92.86	-6%	86.54	0%
Nomura	88.53	153.12	-42%	159.47	-44%	113.68	-22%	88.53	0%
Sumitomo	77.89	86.82	-10%	105.67	-26%	85.17	-9%	77.20	1%
Bank of Tokyo	77.91	79.85	-2%	103.00	-24%	82.85	-6%	76.50	2%
FX⁴									
USDJPY Spot	102.91	103.16	0%	95.37	8%	103.39	0%	97.62	5%
USDJPY 1M ATM Vol	9.39	12.00	-22%	16.75	-44%	10.69	-12%	8.32	13%
USDJPY 3M ATM Vol	10.04	11.81	-15%	15.28	-34%	10.50	-4%	8.84	14%
USDJPY 1M 10D Put Vol	10.83	12.35	-12%	19.55	-45%	12.68	-15%	8.59	26%
USDJPY 3M 10D Put Vol	11.43	12.42	-8%	18.42	-38%	12.08	-5%	9.36	22%
Sov Credit Spread⁴									
JGB 5Y CDS Spread	47.3	64.68	-27%	84.78	-44%	57.40	-18%	44.63	6%
IR Vol⁴									
JPY 1M10Y Swaption ATM Vol (bp)	34.0	68.27	-50%	72.04	-53%	42.81	-21%	33.81	1%
JPY 3M10Y Swaption ATM Vol (bp)	40.7	53.85	-24%	62.28	-35%	48.70	-16%	39.76	2%
JPY 6M10Y Swaption ATM Vol (bp)	40.3	48.78	-17%	55.41	-27%	48.85	-18%	40.06	1%

¹Nikkei down 10% or more versus snapshot levels: >20% down (red), 10-20% down (blue); Nikkei Vol Index up 10% or more versus snapshot levels: >20% Up (red), 10-20% Up (blue)

²JGB Yields rise more than 20% in yield from snapshot value: >20% Up (red), 10-20% Up (blue)

³Credit Spreads of Japanese Banks and Insurers widen more than 20% from current spreads: >20% Up (red), 10-20% Up (blue)

⁴All Other metrics: >20% Up (red), 10-20% Up (blue)

Source: Bloomberg, Commonfund

About the Author



David Belmont, CFA, is the Chief Risk Officer of Commonfund. In this capacity, he has firm-wide oversight and responsibility for all aspects of risk management at Commonfund. Prior to joining Commonfund in 2011, he was Global Head of Hedge Fund Credit for UBS Investment

Bank, a position in which he led a global team of 45 risk managers and analysts responsible for the risk management of hedge funds and of fund exposures in the Investment Bank globally. Prior to UBS, he spent 10 years in Asia, six of which were in Singapore with Temasek Holdings, Singapore's \$100 billion sovereign wealth fund, most recently as Chief Risk Officer from 2004 to 2007. In addition, he was a Director of Anderson LLP and founded the firm's Asia Financial and Commodity Risk Consulting practice in Singapore, managing a team of 17 professionals across Asia. Mr. Belmont is a Chartered Financial Analyst and the author of *Managing Hedge Fund Risk and Financing* (2011) and of *Value Added Risk Management in Financial Institutions* (2004), both published by John Wiley and Sons. He is a cum laude graduate of Bowdoin College and earned M.B.A. and M.S. degrees from Yale University.

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