

# Risk management

ISSUE 32 ■ MARCH 2015



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# Risk management

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## JOINT RISK MANAGEMENT SECTION

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## ARTICLES NEEDED FOR RISK MANAGEMENT

Your help and participation is needed and  
welcomed. All articles will include a byline to  
give you full credit for your effort. If you would  
like to submit an article, please contact David  
Schraub, JRMS Staff Partner, at [dschraub@soa.org](mailto:dschraub@soa.org). The next issues of *Risk Management*  
will be published:

**PUBLICATION  
DATES**  
August 2015  
December 2015

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DEADLINES**  
May 1, 2015  
September 1, 2015

### PREFERRED FORMAT

In order to efficiently handle articles, please use  
the following format when submitting articles:

- Word document
- Article length 500-2,000 words
- Author photo (quality must be 300 DPI)
- Name, title, company, city, state and email
- One pull quote (sentence/fragment)  
for every 500 words
- Times New Roman, 10-point
- Original PowerPoint or Excel files  
for complex exhibits

If you must submit articles in another manner,  
please call Kathryn Baker, 847.706.3501, at the  
Society of Actuaries for help.

## Do you have a Risk Management question?

Ask us! Please send us your questions ([dschraub@soa.org](mailto:dschraub@soa.org)) and we will publish the questions and  
answers for everyone's benefit.

## Members Speak!

Love an article or strongly disagree with the opinion  
developed in another paper? Please share any  
comments or feedback on the JRMS newsletter with  
David Schraub at [dschraub@soa.org](mailto:dschraub@soa.org).

# Chairperson's Corner

By Lloyd Milani

**THE WORLD SEEMS TO BE GETTING RISKIER AND RISKIER ALL THE TIME.** As I write this article in early January and looking back only a few months, we have seen the very deliberate attacks in France, the collapse of oil prices, another plane falling out the sky, civil unrest in various U.S. cities, a number of cyber attacks, Ebola, and the list goes on. What will the next three months bring us?

As risk managers we are asked to deal with all types of risks. Both those which are known and those that are also unknown. We have certain tools that we use to identify, quantify and control these risks. Through these frameworks and processes we try to make sure that our respective corporate eggs are not all in one basket.

One of our objectives in the JRMS is to expand ERM educational opportunities for section members and sponsoring organizations—i.e., we hope that we can help you add to your toolbox.

One way in which we support this objective throughout the year is by conducting webinars which focus on relevant and timely risk management topics. In the upcoming year, we plan doing webinars on ORSA in the United States, ORSA Professionalism and Model Validation. Take advantage of the webinars being offered. The ORSA webinar will be well timed, as many of you will be going through the ORSA process for the first time in 2015. It is easy to register and you don't have to leave the comfort of your office to participate.

As mentioned in a previous newsletter and at the 2014 SOA Annual Meeting & Exhibit, you now have access to the EBSCO Risk Management E-Library. Simply go to the JRMS section of the SOA website and you will see a link that takes you to the SOA Access My SharePoint log in screen. In addition, there is a link to a PDF with complete instructions on how to access EBSCO. If you are looking for a resource and it is not listed, please inform us and we will see if we can add the title to the library.

As part of our section planning that took place this past October, we plan to develop the idea of a virtual town hall meeting. These meetings will be set up to facilitate discussions among risk management professionals on various topics. The agenda will be driven by the participants. We look forward to conducting our first town hall meeting later this year.

This year, the ERM Symposium will be held on June 11–12 in Washington, DC. This meeting provides excellent content as well as an opportunity to network with other risk management professionals. By the time the newsletter is published, the full agenda and registration material will be available.

As always, there is an open invitation to all members to actively participate in the activities of the JRMS. Let us know what projects you think we should be focusing on. You may want to be a speaker on future webinars or at the various SOA meetings held throughout the year. We are always looking for volunteers to lead the various initiatives. Please contact David Schraub at the SOA ([dschraub@soa.org](mailto:dschraub@soa.org)).

Finally, this newsletter is also a very good resource for risk management knowledge. I would like to thank this issue's editors, Cheryl Liu and Robert He. I would also like to thank all of the contributors of articles for all their hard work. Without you we would not have a newsletter. ■



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Save the  
Date



ENTERPRISE RISK  
MANAGEMENT SYMPOSIUM

June 11-12, 2015  
Gaylord National Resort  
& Convention Center  
Washington, DC

[www.ersymposium.org](http://www.ersymposium.org)

**SAVE THE DATE**

**Seminar on Reinsurance**

June 1, 2015 - June 2, 2015

Hyatt Regency Philadelphia  
at Penn's Landing

Philadelphia, PA

[www.casact.org/reinsurance](http://www.casact.org/reinsurance)





# Letter from the Editors

By Robert He and Baoyan Liu (Cheryl)

**AS ALWAYS, THE EDITORS OF THIS NEWSLETTER TRY TO BRING OUR READERS TIMELY AND THOUGHT-PROVOKING ARTICLES TO COVER A WIDE RANGE OF IMPORTANT TOPICS IN THE RISK MANAGEMENT AREA.** In this issue, we are happy to present five interesting articles.

“Are Low Interest Rates Here to Stay?” is a summary of the SOA-sponsored research titled “Sustained Low Interest Rate Environment: Can it Continue? Why it Matters.” In the article, Max Rudolph discusses the drivers of long-term low nominal interest rate scenarios and the impact on insurers and asset classes. While the markets are expecting higher rates, the flip side still needs to be monitored and managed.

As part of the “Insights from Wall Street” series, we worked with Deutsche Bank to present articles on two important topics in today’s world. In “VIX & Tails: Hedging with Volatility,” Rocky Fishman illustrates the volatility regime switch DB observed in the equity markets over decades. The author discusses the strategies that can be used to deal with the potential higher vol regime we are going to face. Bankim Chadha presents another interesting article focused on cross market correlation titled “Long Cycles in the Bond-Equity Correlation: Where Next?” Again, the author illustrates that it’s important to understand the regime we are in. It’s helpful for the insurance companies to analyze the long trends and cycles of the bond-equity correlation when constructing their portfolios and designing their VA hedges.

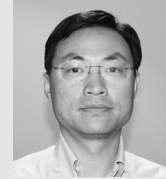
In “Model Risk Management for Insurers,” Chad Runchey and Erik Thoren share their experiences and viewpoints on model risk management with insurers. They identify key lessons learned, including specific challenges and practical solutions to those challenges that can help insurers develop their own model risk management capabilities.

In an effort to provide international flavor to the newsletter, we are glad to have a risk actuary from China to give us insights on the risk environment for the life insurers in China. Developing markets such

as China are representing significant growth opportunities for insurers. “Risk and Opportunity: the New Risk Arena for Chinese Insurers” by William Bu, discusses three major risks that insurers operating in China are facing: insurance risks, investment risks, and operational risks.

Last, as an ongoing feature in this newsletter, we provide a list of recent articles and papers that may be of interest to the members. These pieces can provide further information on a broad range of topics.

We would like to thank David Schraub, Kathryn Baker and Geoff Huang for their support in pulling together this newsletter for our readers. ■



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# Are Low Interest Rates Here to Stay?

By Max J. Rudolph

**THIS ARTICLE SUMMARIZES RESEARCH TITLED "SUSTAINED LOW INTEREST RATE ENVIRONMENT: CAN IT CONTINUE? WHY IT MATTERS"** which can be found at <https://www.soa.org/Research/Research-Projects/Risk-Management/research-2014-sustained-low-interest.aspx>.



**Max J. Rudolph** is the founder of Rudolph Financial Consulting, LLC in Omaha, Neb. He can be reached at [max.rudolph@rudolph-financial.com](mailto:max.rudolph@rudolph-financial.com).

Interest rates are at generational lows, but could they go lower? Interest rates cycle, so many assume they will go up from these levels. But that considers only

historical data from our collective working lifetimes. Periods of deflation occurred starting in 1836, 1870 and 1930. Contraction of the supply of money and credit can lead to bank insolvencies and reduced trust in the financial system. There are similarities to today's environment, and reasons why slower growth could drive deflation. It is important for anyone modeling interest rates to consider scenarios with low and even negative interest rates, recognizing that slowly rising rates often represent a best case scenario.

Rarely has there been so much discussion of low and high rates at the same time. Large budget deficits and an increasing money supply point to higher rates, while unemployment (along with underemployment) and productivity improvements put downward pressure on rates. Uncertainty reigns. Mitigating both a potential rate spike and perennially low interest rates is cost prohibitive in the marketplace. Options include mass mitigation strategies that increase price and preclude sales; making a market bet on the direction of interest rates (e.g., shortening/lengthening duration); credit risk; equity risk; or paralysis and inaction. Risk managers should make conscious decisions about these potential strategies and approaches based on an entity's unique risk profile, culture and appetite for risk.

## DRIVERS OF LONG-TERM LOW NOMINAL INTEREST RATE SCENARIOS

Few financial firms have developed models to provide

risk managers with information regarding exposures to sustained low interest rates. If they are possible, what are the drivers? The key is to recognize scenarios where nominal growth is low or could slow in the future. What follows are sign-posts of low or slowing economic growth, which drives demand for funds and interest rates.

## Velocity of money

The velocity of money (VM) measures how frequently a unit of currency is spent during a given time period (so is a measure of the economy's health). Its drivers are not well understood by economists and it currently is at historically low levels. This metric has been known to mean revert over time, and even a return to average levels would provide an inflationary push to nominal gross domestic product (GDP). Velocity is often driven by behavioral responses and trust in the "system." VM is very hard to predict, especially when interacting with expansionary federal monetary policy. When it is low, monetary tools tend to be less effective.

## Demographics

Worldwide demographic trends show an aging population for many years into the future, especially in developed countries. Each geographic region has its own pattern, with Japan the first to age and shrink in size. The United States is younger than many developed nations and may be able to learn lessons from others through observation.

## Sustainability

Human survival requires us to interact with nature in ways that endure over a long period of time. This process balances ecological elements, climate change, and resource depletion with economic growth and living conditions. A risk manager's role is to consider tail events that could occur, without placing bets on which events actually will occur. Many of these risks evolve very slowly, or happen infrequently. Historical data going back 500 years is considered limited. With so much noise in the data confusing the signal, it is hard to recognize trends but easy to manipulate the data to support nearly any conclusion. The economic downside to ignoring a climate change scenario is large.

**“Each company’s exposure to a continued low interest rate environment will be unique.”**

Solutions that correct previous environmental imbalances would position world economies for growth moving forward, but could be costly if not consistently managed. An example of this is pollution, where a buildup of toxins was not included in the existing accounting system. Delays cleaning air and water become more costly, taking money away from other projects, reducing growth and putting downward pressure on prices and interest rates.

Economic growth could also slow due to environmental changes driving structural additions such as levees, dikes and gates to manage storm surges. These structural investments add to current Gross Domestic Product but don’t expand future capacity, so they reduce demand and interest rates.

### Non-repeatable events

Professor Robert Gordon of Northwestern University views the industrial age as unique, with “headwinds” expected to slow growth. He expects nominal GDP growth to return to the 0.2 percent rate present prior to 1700. While this seems drastic, ramifications of growth rates below 3 percent should be considered.

Gordon has identified six headwinds that will impact future growth. They include:

1. Female workforce participation rates increased in the last century and were a one-time event.
2. College graduation percentages are past their peak.
3. Rising inequality, as growth in real income bifurcates between “haves” and “have-nots.”
4. Jobs move to lower-cost regions and eventually back to developed countries as machines replace humans.
5. New processes required to maintain sustainability.
6. High debt leads to higher taxes, lower services and currency devaluations.

### IMPACT ON INSURERS

Life insurance company margins are stressed in low interest rate scenarios when nominal returns on assets

are insufficient to support interest rate floors. A low interest rate scenario that extends beyond tactical business plans, meaning longer than three to five years, will have a strong negative financial impact as assets roll over and are reinvested at lower rates. Depending on asset and product mix, each company’s exposure to a continued low interest rate environment will be unique. Products with the ability to reprice regularly, like casualty, term life, and health insurance products, should be able to adjust.

Stress testing specific risk exposures and strategies realistically is the key. If interest rates spike, some insurers may become insolvent due to policyholder disintermediation, asset capital losses and ALM/liquidity issues, but a low rate scenario could systemically doom the entire life insurance industry if regulators do not provide relief from contractual rate guarantees. As the Federal Reserve considers systemic risk applicable to insurers, the implication of a low interest rate “Japan” scenario, and the regulatory role in creating it, should be considered.

Recent experience for Japanese insurers, with low interest rates for an extended period, led to changes in product mix (away from offering interest guaranteed products), cost cutting, and a willingness to consider alternative investment asset classes. Guaranteed interest rates have been lowered on existing policies, but not abolished. Testing of reserve adequacy has been weakened, with insurers now required to show liability support for ten years rather than the full run out of cash flows.

### IMPACT ON ASSET CLASSES

Many asset classes include options where the borrower can select against the lender. Prepayments of bonds or mortgages are a common feature for these asset classes. While liability options are rarely efficiently exercised, sophisticated borrowers are expected to send money back to lenders when it is financially prudent. Even home mortgages exhibit the “*USA Today* effect,” where a newspaper article triggers a run on home loan refinancings.

Market liquidity risk is rarely tested prior to a crisis. Discontinuities can occur when buyers become aware

CONTINUED ON PAGE 8



that an individual seller has cash needs, or the entire market for a specific asset or asset class can become illiquid.

Those who outsource alternative asset class investment decisions need to include a strong oversight process. Additional yield goes hand in hand with additional risk. Particular care should be taken to understand tail scenarios with little historical data. Discontinuities can be driven by changes in central bank policy or liquidity shortfalls, among others. One recent example is residential mortgage backed securities (RMBS) that combined liquidity, credit and contagion risk before blowing up in 2008.

Some think that central banks, as they implement monetary policy, inadvertently create asset bubbles through subsidies and bailouts (creating moral hazard). Low interest rates incent speculators to borrow money at low cost. Decisions are made that would differ in an environment with higher borrowing costs. The recent decision by the Swiss National Bank to allow its currency to rise against the Euro above a self-imposed cap, along with the drop in oil prices in late 2014, are examples where market forces were not allowed to balance between supply and demand. Eventually this type of mispricing corrects itself and balance is restored. Risk builds when government policy is loose, and borrowers become overextended as the policy is unwound.

## CONCLUSIONS

There are multiple reasons why interest rates may stay low. The velocity of money may remain low as individuals and businesses fear personal risk more than they distrust the financial system. Aging demographics and shrinking populations may combine to stress economic growth, and the combination of resource depletion and climate change make the environment volatile and challenging. Surprises will be everywhere for the unprepared as interactions evolve in new and unexpected ways. Long-term trends toward low interest rates might be disturbed by short-term pressures toward higher interest rates. How it will all play out is quite uncertain. Preparation and proactive risk management are the keys to survival.

Some risks are too big, timing too uncertain and options

too costly to mitigate. The events described here are not that far into the tail of possible outcomes. Initial qualitative analysis can lead to a more thorough review as the likelihood increases. The current era relies on just-in-time science to continually overcome Malthus-style forecasts of resource depletion and overpopulation. One misstep could be disastrous. Analyses with long time horizons are necessary in order to reasonably consider alternative futures. Metrics like value at risk that are designed around short time horizons and typical result distributions may lead to poor decision making.

It is vital that the insurance industry proactively look at the possibility of a continued low interest rate environment and take action now. By managing risk holistically and considering a range of potential outcomes, financial institutions will improve their resiliency as they manage through most future scenarios. It is the risk manager's job to anticipate potential problems and build resiliency within the firm. You can't anticipate every crisis, but you can build a risk culture that allows a firm to react when the inevitable poor scenario arrives. ■

SOCIETY OF ACTUARIES

# Investment SYMPOSIUM

MARCH 26-27, 2015

THE WESTIN PHILADELPHIA

PHILADELPHIA, PA



## Investment strategies for challenging times

Today's investment landscape is unlike any other in modern history. Valuations in many asset classes are stretched, macro-economic risk is high and regulatory constraints are on the rise. This, coupled with additional constraints on the investment process and a political process mired in discord, is a powerful combination. Experts at this year's symposium will help you navigate the conflicting forces and provide insight into the many nuances in investment strategy and risk analysis.

Choose from five tracks of study:

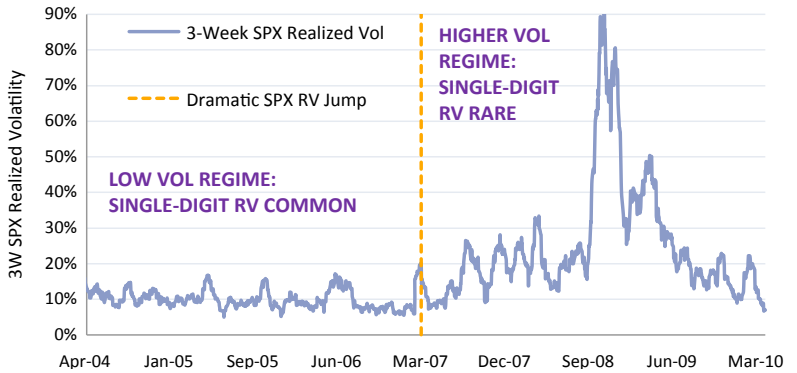
- Retirement Income Security
- Portfolio Management and Strategies
- ALM, Quantitative Risk Management and Trading
- Economics, Regulation and Governance
- Demographics, Environmental and Social Investing

Investments and asset liability management professionals can't afford to miss this annual event.

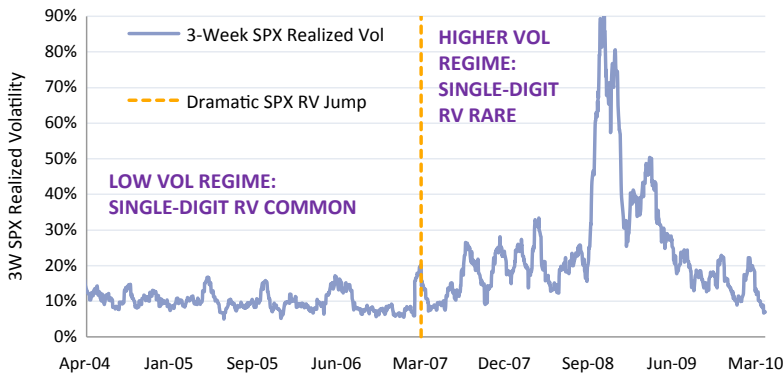
[soa.org/2015InvestmentSymposium](http://soa.org/2015InvestmentSymposium)

# VIX & Tails: Hedging With Volatility

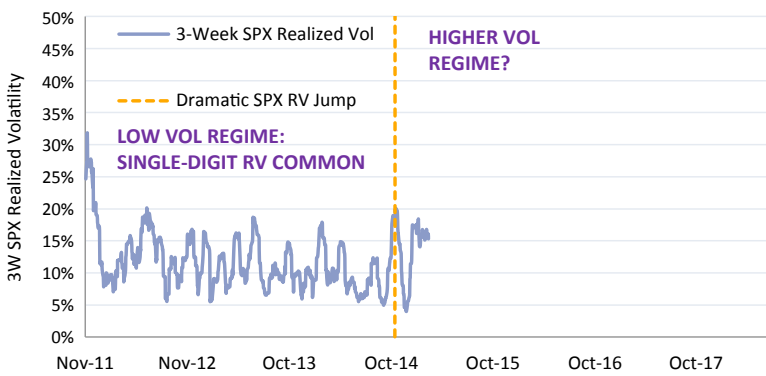
By Rocky Fishman



Source: Deutsche Bank



Source: Deutsche Bank



Source: Deutsche Bank

**EQUITY VOLATILITY—IN PARTICULAR THE VIX—HAS BEEN GAINING ATTENTION LATELY,** less for its overall level (general volatility levels have been below average the last couple of years) than for the quick changes we’ve seen in market behavior, and the impact of those changes on investors’ portfolios.

## A RARE AND OMINOUS PATTERN

The rapid changes in SPX realized volatility seen in September/October, and then again in December/January, are almost unprecedented. In the past 40 years, the only two times when the SPX transitioned from sub-7 percent three-week realized volatility to >18 percent realized vol in the three weeks immediately thereafter happened in the vicinity of major vol regime shifts—occurring just months before an extended low vol regime ended (though each included a brief return to low volatility).

What was interesting about the past few months is that this rare pattern was essentially repeated twice—accentuating the recent surge in vol-of-vol.

## A LONG-TERM TREND TOWARD HIGHER VOL SPIKES

By nature, multiple-standard deviation events do not happen very often. As “tailologists,” we have no choice but to work with limited sample sizes. To get a feel for the behavior of volatility in tail events, we have taken a look at SPX returns of the past 35 years and examined all “two-sigma in less than three months” pullbacks. We have found that the explosion of volatility—both implied and realized—accompanying such events seems to be on the rise. The image below shows changes in volatility around two-sigma SPX selloffs since 1980:

We observe:

- With the notable exception of 1987, realized volatility has been more explosive in recent tail events than in prior ones. Each of the periods around a tail event from 1998 has come with a 3-week period of 45 percent realized vol, except for 2010. The October 1987 crash was the only three-week period when the SPX saw 40 percent+ realized vol over a 35-year period ending in November 1997.



- At times prior to the late 1990's, the SPX could suffer a multi-sigma selloff with low volatility (realized vol not jumping much at all—even for a short period). Now, explosive reactions of realized volatility are common.

### VIX PRODUCTS KEY TO VOLATILITY MARKETS

The past few years have seen rapid growth in VIX derivatives, making its futures, options, and futures-linked ETNs/ETFs the largest marketplaces for short-dated implied volatility risk. The trend toward active volatility trading, and structural characteristics of the ETN/ETF products, have helped volatility itself begin to move faster in recent years. VIX markets are also a great source of information about expected volatility, and also expected volatility-of-volatility. While VIX markets dominate short-dated (<three-month) volatility trading, the active and liquid market for variance swaps is available for longer-dated trading.

### VOL-OF-VOL ON THE RISE

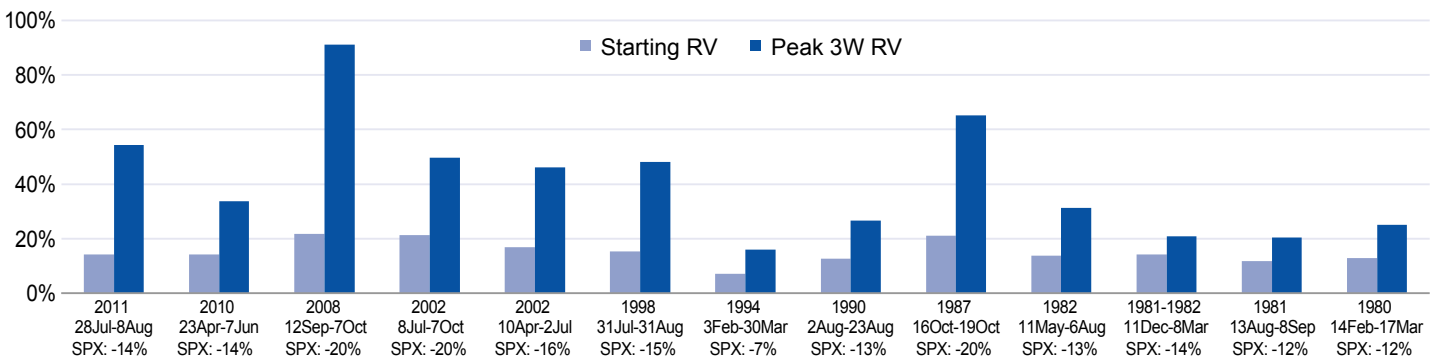
Volatility of volatility has been rising over the past few months in the U.S. equity market—resulting in a wider range of implied (expected) and realized (actual historical) volatility. Vol-of-vol can be a source of confusion because there are actually three forms of it. Each of these three forms of vol-of-vol has been on the rise:

- **Changes in SPX realized vol: 5 percent pullback, lowest vol in decades, 5 percent pullback.** Volatility of SPX realized vol was clear in Q4: November was the lowest realized vol month since 1966—yet October and December each featured >5 percent pullbacks and more than triple November's realized vol.
- **Changes in the VIX, VIX futures, and other implied volatility metrics: VIX multi-year high and low in 3M.** Implied volatility moves were highlighted by the VIX hitting multi-year lows (10.3 on 3-Jul) and highs (31 intraday on 15-Oct) in just over three months.
- **Implied volatility of VIX options: highest VVIX in years.** Implied volatility of implied volatility. The VVIX measure of expected vol-of-vol (as implied by VIX option prices) has trended higher over the past two years, hitting very high peak levels in October and December.



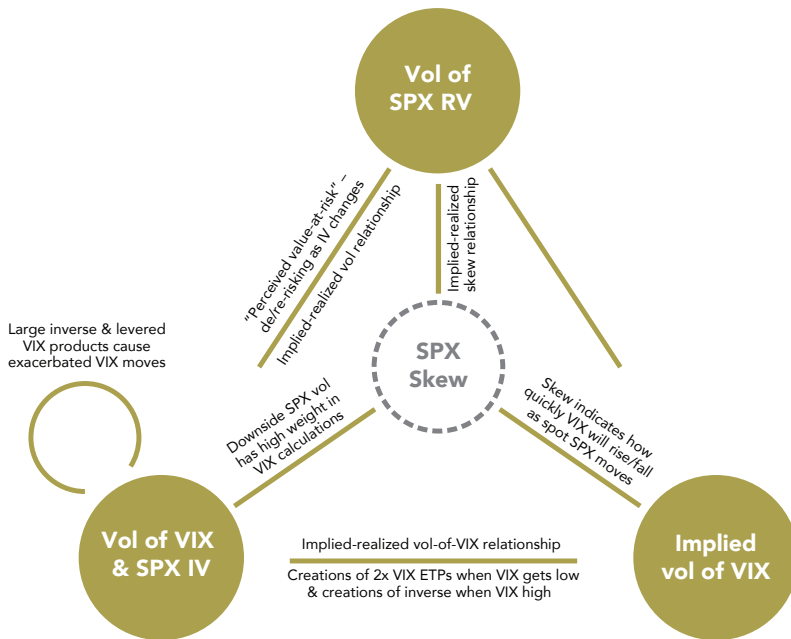
**Rocky Fishman, CFA**, is an equity derivatives strategist at Deutsche Bank in New York, N.Y. He can be reached at [rocky.fishman@db.com](mailto:rocky.fishman@db.com).

CONTINUED ON PAGE 12



PRIOR TO 1998, THE OCT 1987 CRASH WAS THE ONLY 3-WEEK, 40% RV PERIOD FOR SEVERAL DECADES

Source: Deutsche Bank



Source: Deutsche Bank

## THE VOL-OF-VOL TRIANGLE

The three types of vol-of-vol highlighted above are strongly interconnected—by fundamental factors (implied vs realized vol, skew connections), and by technical factors. These factors drive vol-of-vol in both directions: pushing both implied and realized volatility to higher highs and lower lows:

While some of these connections are self-explanatory, others require some explanation:

- **Skew as a connector.** Implied volatility skew, or the difference between implied volatility of put and call prices, is a key driver of the relationship between spot index and implied volatility movements—as well as a driver of the price of VIX options. As a result, it sits in the middle of the vol-of-vol triangle, facilitating connections between these three.
- **Perceived risk.** High implied volatility in the market increases investors' perception of risk in

their portfolios. To maintain a constant “perceived value-at-risk,” many investors will tend to de-risk as implied volatility rises, leading to higher SPX realized vol in selloffs. This is particularly relevant currently, with many hedge funds challenged after underperforming the broad equity market’s last few years’ rally.

- **VIX ETP flows.** Flows in VIX futures generated by VIX exchange-traded products (ETPs) can be a very important source of supply/demand in the volatility market. Flows from these products can result from both large investor creations and redemptions, and also structural trades by the products themselves. Like any levered or daily inverse product, the very large inverse volatility products and double-levered products buy VIX futures when they are rising, and sell VIX futures when they are falling – exacerbating volatility moves in both directions.

## HEDGING WITH VIX: BEYOND THE BACKTESTS

VIX option strategies continue to draw interest as portfolio hedges because of their deep liquidity (they’re effectively derivatives of the very deep SPX market), their convexity in selloffs, and their strong correlation with risk-off events across markets. VIX-based protection trades, while difficult to manage, have gained fundamental value in this environment. As market selloffs unfold, quick de-risking by hedge funds, lack of liquidity provided by dealers, and flows by VIX products all can drive up the pace of SPX drops and implied volatility spikes. The value of volatility-based hedges has been on the rise – but so has the cost. This has made managing volatility-based hedges important but challenging.

## VIX HEDGES: FUNDAMENTAL TRADEOFFS

Systematic VIX strategies have spawned a mini industry of backtest engineering, in which VIX strategies are tested against their short 2007-14 hypothetical performance aiming to produce the perfect strategy that will work forever. However, the ever-changing environment demands that investors approach VIX hedging with a new lens – focusing on tradeoff management

and economics rather than historical performance. The explosive performance of VIX upside in tail events has strong value – so in some form, owning that protection will come at a cost. Carefully designing VIX trades can pay that price in one of three “currencies”:

- **Currency #1: Negative carry.** The easiest (and likely most expensive) way to carry VIX upside is to suffer the negative carry of the position. Example trades: long VIX calls, long VIX futures.
- **Currency #2: Underwriting downside.** To finance VIX upside participation, take the risk of losses should VIX futures drop substantially. Example trades: Risk reversals, sell straddle to buy two calls.
- **Currency #3: Selling insurance against the “wrong” type of selloff.** Sell protection in some format against modest moves up in volatility, knowing that it’s only the severest events the protection is needed for. Example trades: sell short-dated call spreads to buy longer-dated calls, 1x2 call spreads.

Trades that minimize the use of Currency #1, and instead focus on underwriting other risks, are often called “self-funding” trades, because they aim to be zero-carry in a base case situation. Several option strategies have gained attention as VIX-based hedges. The table below maps investors’ general views on

implied volatility (VIX high or low) and implied volatility-of-volatility (VIX options expensive or cheap) to VIX option trade structures:

		Implied Vol-of-Vol View	
		Vol-of-Vol is Low	Vol-of-Vol is High
Implied Vol View	Vol is Low	Buy longer-dated VIX calls Call calendars (buy short-dated)	Buy VIX future Buy short-dated VIX call Sell straddle to buy two calls Put spread risk reversal
	Vol is High	Calendar strangle Sell short-dated call spread, buy longer-dated call	1 x 2 call spread Long call spread Call spread risk reversal

Source: Deutsche Bank

Institutional investors often alternate among these strategies in an effort to efficiently defend against spikes in volatility. ■

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# Long Cycles in the Bond-Equity Correlation: Where Next?

By Bankim (Binky) Chadha

## TWO VERY DISTINCT REGIMES OF BOND-EQUITY RETURNS CORRELATION.

We focus on bond-equity return correlations since the mid-1960s, as bond return volatility prior to that was essentially zero.<sup>1</sup> Since the mid 1960s there have been



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two very distinct regimes in the correlation (see Figure 1).

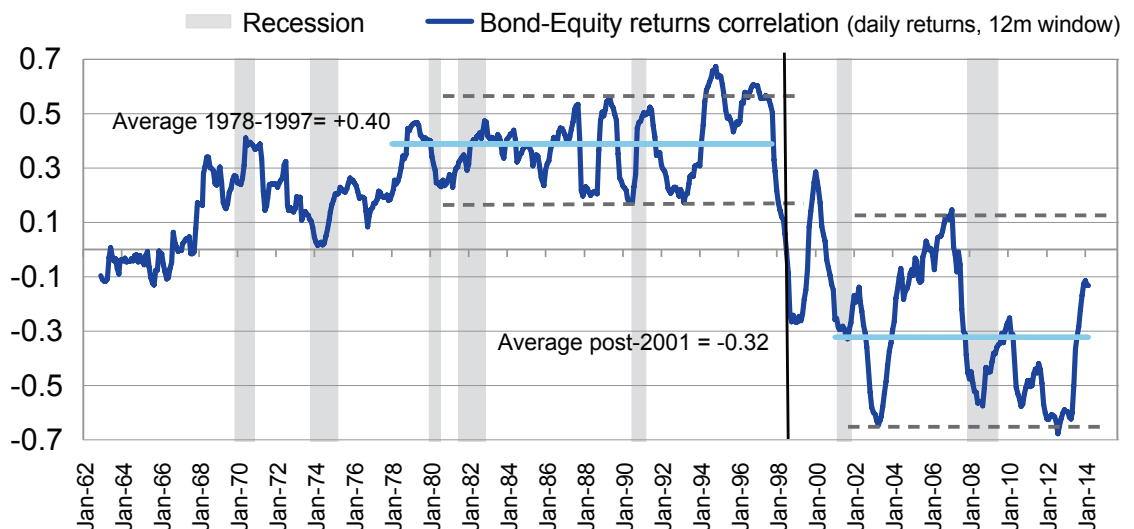
• **Regime I:** Consistently and strongly positive correlation from

1966-1997. From near zero, the correlation began to rise in the mid 1960s, but dipped back to zero for a brief period around the 1974 oil price shock and recession. It then rose into a +0.2 to +0.6 band where it stayed for 20 years. It is notable that this

consistently positive and relatively high average correlation of +0.4 endured through a number of recession and recovery cycles.

- **Regime II:** Strongly negative correlation since 1998, but also more volatile. In the late 1990s, the bond-equity correlation fell off sharply, turning negative in 1998. It has been predominantly negative since, averaging -0.3, but also varied more widely than in the first regime, ranging between -0.7 and +0.1. Negative extremes in the correlation obtained in 2003 as the post tech bubble de-rating of equities continued, deflation fears ran high and the Fed moved to keep policy rates well below its past average behavior (Taylor rule). As the Fed dropped its easing bias, the correlation began to rise, turning less and less negative, then briefly positive late in the recovery cycle in 2006 and continued to rise before falling hard again in 2007 as the recession and financial crisis began.

Figure 1: Two regimes of bond-equity returns correlation



Correlation calculated using daily US 10y bond and S&P 500 total returns over a rolling 12m window

Source: Haver, Deutsche Bank

## WHY THE BREAK: BIG MACRO-FINANCIAL MARKET CYCLES?

The two regimes in bond-equity returns correlation corresponded to two big macro-financial market cycles. This naturally suggests these cycles played a role in determining the correlation regimes. Regime I, over 1966-1997, coincided with the big long inflation cycle. The post 1998 regime has seen a long equity risk premium cycle, which continues. The break in regimes began just as the long cycle in inflation was ending and the late 1990s equity bubble was beginning. The view that the two regimes were importantly driven by macro-financial market cycles is reinforced by the read of the behavior of equity earnings and bond yields. Earnings and bond yields moved very closely together from the 1960s through the late 1990s, so they were positively correlated. Then beginning in the late 1990s, they began to move in opposite directions. The tight positive correlation

between bond yields and earnings yields in regime I and the steadiness of the bond-equity returns correlation also points to the predominance of a common driver during this period. The wide range and volatility of the correlation in regime II since the late 1990s suggests the importance of various drivers.

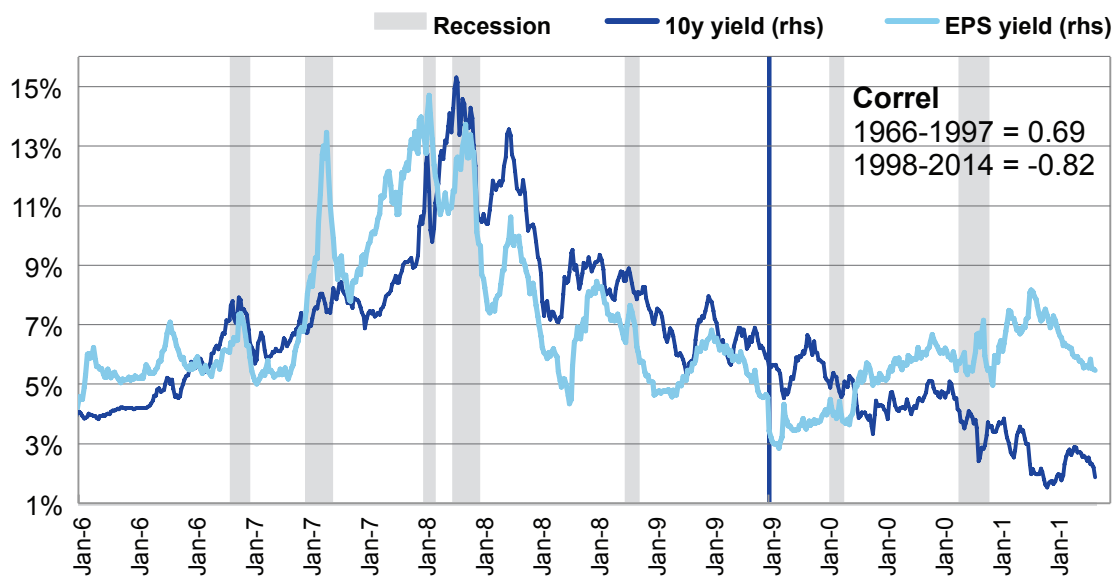
**AT A FUNDAMENTAL LEVEL, THE BOND-EQUITY CORRELATION DEPENDS ON TRENDS AND SHOCKS TO THE COMMON DRIVERS OF BOND AND EQUITY RETURNS, COMBINED WITH THEIR RESPECTIVE SENSITIVITIES TO EACH OF THEM.**

We identify four top-down drivers of the bond-equity correlation:

- **Growth concerns.** We proxy these by the gap between the unemployment rate and the natural

CONTINUED ON PAGE 16

Figure 2: Earnings and bond yields



Source: Bloomberg Finance LP, Haver, Deutsche Bank

rate. Growth concerns should be associated with lower equities and lower bond yields implying a negative returns correlation;

- **Inflation concerns.** We proxy these by the deviation of core PCE inflation from 2 percent, the Fed's target. Higher inflation concerns should be associated with higher bond yields and lower equities implying a positive returns correlation;
- **The Fed's reaction function.** We proxy this by the deviation of the Fed funds target rate from a Taylor rule. A market perceived bias to easing beyond the Fed's average historical behavior should lead for example to a bigger decline in rates on negative data surprises and a more negative correlation;
- **Equity-bond risk premium.** We proxy this by the spread between earnings and bond yields. Medium term cycles in the relative risk premium (equity love or bond love) will create a negative correlation as movements in the relative risk premiums drive relative returns.

#### POSITIVE BOND-EQUITY RETURNS CORRELATION REGIME DURING 1966-1997 PREDOMINANTLY DRIVEN BY THE INFLATION CYCLE.

The first regime of positive correlation was dominated by the long up and down cycle in inflation. Core PCE inflation rose from 2 percent in 1966 to 10 percent by 1980 then fell back to 2 percent by 1997. The equity earnings yield (correlation of 0.85) and bond yields (0.58) closely followed inflation through both the up and down phases, with bond yields lagging inflation slightly in some periods. It follows that the positive correlation between bond and equity returns was driven in part by the inflation cycle. But how important was the inflation cycle in driving the positive bond-equity returns correlation? A decomposition of the bond-equity returns correlation over the period based on relative volatilities and the betas of earnings and bond yields to inflation indicates that the bulk (70 percent) of the correlation reflected the inflation cycle. The other drivers also had an impact, but much less so (30 percent).

#### NEGATIVE CORRELATIONS SINCE 1998 REFLECT A COMBINATION OF THE FOUR FUNDAMENTAL FACTORS.

Empirically, each of the four drivers played a role in driving the level and variation in the bond-equity returns correlation.

- **Diminished but significant role of inflation.** Compared to the 1966-1997 regime inflation has been range bound between 1 percent and 2.5 percent since 1998. As the volatility of inflation has diminished, its relative importance in driving the bond-equity correlation has diminished, while the importance of the other drivers has risen. It is notable that the correlation is tightly tied to inflation in some periods but less so in others.
- **Closely tied to unemployment.** The bond-equity returns correlation has been closely tied to the unemployment gap. In the 2003-2007 recovery cycle, the peak and trough in the unemployment gap in 2003 and in 2007, respectively, marked the turning points in the bond-equity returns correlation. The bond-equity returns correlation has been closely tied to the unemployment gap (-0.63) over the period. In this cycle, though the unemployment gap peaked in late 2009 and has shrunk steadily since, the bond-equity returns correlation ratcheted down in the summers of 2010 and 2011, and stayed there until the Fed's taper communication last summer, implying other factors were at play, and suggesting in particular a role for Fed policies in driving the bond-equity returns correlation.
- **Fed reaction function added to negative correlations.** Fed policy looks to have been an important driver of the bond-equity correlation since the early 1980s. Since the Fed raised interest rates in 1982 to fight inflation, all the way through the beginning of QE1 in December 2008, the relationship between the deviation of policy rates from the Taylor rule and the bond-equity returns correlation was strong (0.6). Using the same measure of the Fed's policy bias, the Taylor rule gap, the relationship looks to have weakened (0.27) since December 2008 when QE1 was implemented. But in our view, the Fed's

“The two regimes in bond-equity returns correlation corresponded to two big macro-financial market cycles. This naturally suggests these cycles played a role in determining the correlation regimes.”

reaction function has continued to be an important driver of the bond-equity returns correlation. Since December 2008, as policy rates remained at the zero floor and the Fed adopted a number of nontraditional measures (QEs, calendar rate guidance and data-dependent forward guidance), these announcements introduced additional gyrations in the correlation over and above those captured by the Taylor rule gap. So Fed policy was a driver just not as measured by the Taylor rule gap. In the summer of 2010 for example, as the market began to anticipate QE2 the bond-equity returns correlation, which had remained tied to the Taylor rule gap, plunged below as the market priced in QE2, then as QE2 was announced and implemented, the correlation rose. So in our reading the impact of the Fed's reaction function since September 2008 has been stronger than it looks.

- **Equity-bond risk premium cycle key to persistently negative correlations since 1998.** Equity and bond yields have moved in opposite directions through most of the last 15 years as the equity risk premium cycle unfolded. The equity-bond risk premium fell to a low in the late 1990s as the equity bubble saw earnings yields fall to historic lows while 10y yields had been rising late in the economic cycle. Then the prolonged de-rating as the bubble burst, followed by the financial crisis saw equities de-rate while 10y yields fell to historic lows. The equity-bond risk premium has been normalizing since its lows in the fall of 2011, initially as equities re-rated from their lows after the U.S. debt downgrade and more recently as bond yields rose following the Fed's taper comments last summer.

#### THE FOUR DRIVERS TOGETHER EXPLAIN MUCH OF THE VARIATION IN THE EQUITY-BONDS RETURNS CORRELATION, CAPTURING THE MAJOR TRENDS AND KEY TURNING POINTS.

Each of the drivers is significant in explaining the correlation since 1998. The estimates imply a fair value for the correlation of -0.35 currently. The fitted or fair value correlation has

been trending up from its lows in August 2011, rising from -0.6 in September 2011 to -0.35 presently. This relatively steady rise reflects the continued decline in the unemployment rate (+12 pps in correlation), smaller easing Fed bias (+11 pps), a decline in the equity-bond risk premium (+9 pps), while inflation has fallen (-6 pps).

#### WHERE NEXT FOR THE BOND-EQUITY RETURNS CORRELATION?

Over the medium term, the outlook for each of the four drivers point to the bond-equities returns correlation moving higher (+30pp) and becoming less negative, close to zero but still slightly negative (-0.05) by the end of 2015. This pattern would be very similar to that observed in the last cycle.

- Unemployment should continue to fall in line with the trend of 0.7pp per year, in place since its recovery began, with recent data points suggesting the pace may in fact have quickened. Unemployment falling to its natural rate of around 5.5 percent should raise the bond-equity returns correlation by +5pp;
- Continued strength in core services inflation and an unwinding of idiosyncratic factors points to an inflation reset higher sooner rather than later. A rise in core inflation to 2 percent should raise correlation by +10pp;
- Unemployment approaching its natural rate and an inflation reset higher should increase pressure on the Fed to raise its guidance for the path of Fed rates and bring it closer to the traditional Taylor rule, pushing correlation up by +5pp;
- Finally, as the still large equity-bond risk premium continues to normalize, it will keep the returns correlation negative but less and less so as the magnitude declines. Every 1pp decline in the risk premium should see correlation +3pp higher, and a complete normalization by the end of next year would push correlation up by 10pp.

CONTINUED ON PAGE 18



### SMALL CHANGES IN THE CORRELATION CAN MAKE LARGE DIFFERENCES TO ASSET ALLOCATION.

Changes in the bond-equity returns correlation impact the vol of a portfolio and hence risk adjusted returns for all equity-bond allocations. While asset allocation does not depend only on maximum risk-reward given constraints of risk tolerance, maturity, liquidity, etc., changes in the correlation will influence the optimal bond/equity allocation at the margin. We use long run historical (1928-2013) equity and bond excess returns (relative to cash) and vol to calibrate the impact of correlation on bond/equity allocations that maximize risk adjusted returns in a stylized portfolio. The change in allocations is not linear, with the bond portfolio share falling in favor of equities slowly for correlation shifts from very negative levels to zero but very rapidly as correlation turns increasingly positive.

- From regime I to regime II. A decline in the correlation from the average 1978-1997 level of +0.4 to the post 1998 average of -0.3 would raise the allocation in favor of bonds away from equities by 25 percentage points.
- To the top of the regime II range. An increase in the correlation from -0.3 to zero would lower the share of bonds in favor of equities by 10 percentage points.
- Looking forward. The impact of changes in the correlation on desired asset allocation depends, in general, on the differential in expected risk adjusted returns. Looking forward, we expect risk adjusted returns for equities to be significantly higher than those for bonds. Median ex-recession S&P 500 returns are 17 percent historically, while bond returns should be constrained to about 1.4 percent by already low yields in a rising rates environment. Equity vol should remain close to its ex-recession average of 13 percent, while bond vol which has been kept near historic lows by various Fed policies and low inflation should rise.

### IN THE VA HEDGING SPACE, BOND-EQUITY CORRELATION IS ALSO AN IMPORTANT CONSIDERATION.

Several insurance products, especially the VA, have the exposure to joint shocks (lower interest rates and drop of equity). Therefore, bond-equity correlation is an important factor for many advanced VA writers. 2015 witnessed some VA writers put on bond-equity correlation hedges when the price was attractive. It's probably helpful for the insurance companies to analyze the long trends and cycles of the bond-equity correlation when designing the correlation hedge.

### BUY RATES-EQUITIES CORRELATION ON PULLBACK IN EQUITIES ON HIGHER RATES

Despite the upturn in U.S. growth, markets remain concerned about global growth and have focused on the dollar's sharp rise and the collapse in oil and commodity prices. Bond equity 3m returns correlations are back to a recession-like -0.6. However, an increased focus on a Fed rates reset could see the market again price in a higher/positive bond-equity correlation, i.e., pricing in an equities sell-off on higher rates, much as we saw after the taper communication. If implied bond-equity correlations rise or turn positive we recommend positioning for a reversal outright through swaps or use it to cheapen directional equity and rates views using knock-in options. ■

#### ENDNOTES

- <sup>1</sup> For other analyses of the drivers and prospects for the correlation see PIMCO (The Stock-Bond Correlation, November 2, 2013) and Lingfeng Li (Macroeconomic Factors and the Correlation of stock and Bond Returns, Yale November 2002).

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# Model Risk Management for Insurers

By Chad Runchey and Erik Thoren

## INSURANCE COMPANIES USE COMPLEX MODELS TO SUPPORT ALMOST ALL CRITICAL BUSINESS DECISIONS.

However, models can only estimate future results, and thus they will never produce answers that are 100 percent accurate. The reliability of results can also be affected by human error, including design flaws, incorrect calculations, out-of-date parameters, misunderstood or poorly communicated assumptions

and results, poor data and the inappropriate application of a model.

Financial models introduce risks at all insurance organizations and should be addressed as part of a comprehensive risk management program to protect an organization's financial strength and reputation. Much of the activity underway to man-

age model risk in the United States is in response to the joint guidance from the Office of the Comptroller of the Currency (OCC) and the Federal Reserve Board: Supervisory Guidance on Model Risk Management (SR 11-7/ OCC 2011-12).<sup>1</sup> Banks, insurers that own banks and insurers designated systemically important financial institutions (SIFIs) will be held to the standards in that guidance. These standards are also establishing leading practices for a model risk management capability for the broader insurance industry.

Additional information on model risk management and validation that directly applies to insurers comes from Solvency II in Europe, the 2012 North American CRO Council article on applying model validation principles to risk and capital models<sup>2</sup> and the SOA research project "Model Validation for Insurance Enterprise Risk and Capital Models."<sup>3</sup> Together, these sources of guidance provide a good starting point for insurers, but they focus only on capital models and do not address

a comprehensive model risk management capability.

This article discusses specific challenges in model risk management, and practical solutions to those challenges, which are critical to building a model risk management capability. Through our experience working with insurers to build a model risk management capability, we have identified four areas in need of special attention.

1. Model definition
2. Governance and policy
3. Model validation
4. Model documentation

Addressing the challenges within these areas early on can help prevent more complex problems from arising later in a model's life cycle.

## MODEL DEFINITION

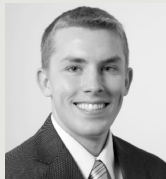
In building and maintaining an inventory of models that will be subject to a model risk management policy, the following considerations can help streamline model risk management activities once the policy is in place.

### Coverage

- Challenge: The definition of "model" may inadvertently exclude analysis tools that introduce risk to the organization.
- Our point of view: The Federal Reserve Board's Supervisory Guidance on Model Risk Management states that a model is "a quantitative method, system, or approach that applies statistical, economic, financial, or mathematic theories, techniques, and assumptions to process input data into quantitative estimates."<sup>4</sup> Most insurers have found the need to tailor that definition to their organizations. One example of relevance for insurers is that traditional reserve valuation models are often excluded from the model risk policy. This occurs for valuation models where there is limited or no judgment and the systems are well-controlled.



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## Materiality

- Challenge: The materiality of certain models may change over time.
- Our point of view: A model not deemed material today might have less rigorous oversight throughout its life cycle, even as it exposes the company to more risk tomorrow. Insurers may need to identify models whose materiality is likely to change over time. These models may need triggers in place to regularly examine their materiality and determine anew the appropriate level of oversight.

## GOVERNANCE AND POLICY

Developing a policy and establishing governance help to ensure that all other activities of model risk management are followed appropriately and consistently. Considerations for these initial activities include the following items:

### Centralized or decentralized structure

- Challenge: Many insurers are unsure of how to organize their model risk management activities.
- Our point of view: Either a centralized or decentralized structure may be appropriate. What matters is the clear definition of roles and responsibilities at each of the three lines of defense—model owners, model governance and validation, and internal audit. Regardless of structure, the organization needs clear and consistent visibility into its model risks and the ability to look at the aggregate model risk for the entire enterprise. While both structures are used, organizations with more mature model risk management programs have moved to a centralized structure. One additional point is that if the business units within a company are diverse, enterprise standards may need to be translated into guidelines and procedures at the business unit, product and model levels.

## UNIQUE SKILL SETS

- Challenge: Much of the modeling performed at insurance companies requires a specialized set of

technical skills, and validation of models requires a different mindset.

- Our point of view: Given the evolving regulatory environment, many insurance companies are looking to increase staffing to meet finance, risk and actuarial needs. They find it difficult to meet those demands and, at the same time, allocate qualified resources to model risk management activities. Subject-matter specialists who have the background to effectively govern model risk management are needed. When choosing members of the model governance committee and defining their roles, their objectivity, independence and skill sets must be considered. Finally, just hiring technically qualified professionals will not automatically result in the appropriate validation skill set. Organizations that wish to have an internal validation unit need to provide adequate training to junior resources to develop their own validation expertise. For validation activities, some organizations use a third party to access qualified, cost-effective resources.

## MODEL VALIDATION

### Management expectations

- Challenge: Senior management and the board of directors may not be aware of the scope and expectations related to the validation of a model.
- Our point of view: Risk management must establish realistic expectations among leaders and decision-makers about what model validation means, both what it is and is not, and should revisit the definition often. Models by their nature are not without forecasting error, and to test all of the calculations is extremely costly and time prohibitive. However, there is a clear benefit to validation: a model that has gone through the procedures should have a lower risk of misinterpretation and inaccurate results than a model that has not.

### Independence

- Challenge: A truly independent review of the model may be difficult to achieve.

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- Our point of view: Independent validation is the gold standard when it comes to models. Banks often have large teams of qualified professionals within independent reporting lines who perform validations. Insurance companies have not yet adopted this approach, but they do need some form of independent validation, which may vary by model depending on the risk rating established by the organization. For example, for certain models, it might be acceptable to have a qualified professional who was not involved in the development perform the validation, even if the ultimate reporting line is the same as the developer's, as long as the validator is providing a qualified and effective challenge.

#### Scope

- Challenge: Model validation may not address all areas of potential risk.
- Our point of view: The term “model validation” carries different meanings—from individual cell testing to a high-level evaluation of conceptual soundness. Insurers need to address all sources of risk, either in the validation process or in other model risk management activities. Overall risk mitigation must include detailed recalculations to validate the math used and address a model's appropriateness for its intended use, its consistency with industry practice and the quality of input data. The specific procedures for validation should be clearly articulated in the model risk management policy and provide enough guidance for a diverse set of models.

#### Ownership

- Challenge: It may be easy to over rely on the validation conclusions of third parties.
- Our point of view: Given the resource constraints of many insurers, in particular scarce actuarial skill sets, third parties are often called on to perform model validation. It is important for companies to engage with the third party, take full ownership of the conclusions of the model validation work and

interpret the third party's procedures accordingly. By owning the conclusions of model validation, the risk management function of an organization can more effectively perform its duties as the second line of defense.

#### Sustainability

- Challenge: The validity of the model changes over time.
- Our point of view: Tactics must be in place so that a validated model stays valid, particularly models that remain in use for long periods. Establishing clear processes and controls for incorporating changes, monitoring results and reviewing model use will help increase the longevity of the validation. Many companies have established formal change management policies that model owners and developers must follow.

#### New uses

- Challenge: Models may be used incorrectly.
- Our point of view: When a new analysis and model are needed, practitioners typically look for a starting point from the existing model inventory. Having been validated once, an existing model may appear valid for any purpose. However, validations are performed for a specific use of the model, and applying an existing model for a new purpose may not be appropriate. Anyone considering a new use for an existing model should understand the intended use for the model and its limitations—and the need to revalidate the model for the new use.

#### MODEL DOCUMENTATION

One of the most critical activities of model risk management is developing comprehensive and robust documentation. Comprehensive documentation provides evidence of the diligence used to create the model, captures the findings of the validation, and clarifies the intended use and limitations of the model. To help see that thorough, consistent documentation is created for all models, the challenges below should be addressed.

“One of the most critical activities of model risk management is developing comprehensive and robust documentation.”

## Standards

- Challenge: The documentation for a model is often little more than a user guide.
- Our point of view: By defining the standards for documentation and making model owners and builders aware of those standards, critical information will be captured at the earliest stages of model development. Common items include the current approach and methodology, and the limitations and uncertainties for the user of the model’s results to be aware of. An often overlooked element is the rationale for developing the model and the assumptions and trade-offs made in its creation. The documentation should also outline a consistent approach for monitoring the model’s performance.

## Templates

- Challenge: The quality of model documentation is often inconsistent from model to model.
- Our point of view: Establishing templates early in the development of model risk management capability can provide consistency and clarity in the documentation across all models. The templates must include sufficient detail to make sure each model owner interprets the requirements the same way, and model owners should be required to provide examples to clarify complicated topics.

## Third-party models

- Challenge: Many actuarial models are licensed from a third-party software developer, and much of the initial model development and history may not be known to the organization.
- Our point of view: Insurers should request that third-party developers be able to provide information needed to comply with the model risk management policy and standards. Also, companies should avoid relying on third-party documentation for open-source models where there have been modifications, and look for the same level of documentation for those changes as an in-house model. An insurer is responsible for potential risks, even

from a third-party model, and therefore should make it clear how the requirements for those models differ from those for in-house models.

## CONCLUSION

Setting up a model risk management capability is a complex undertaking that can be broken down into parts. A solid start includes establishing a framework, setting a governance cadence and selecting an initial set of models to go through a validation.

Model risk management will call on resources beyond the business units that own the models, including resources from enterprise risk management and internal audit. A program management office may need to be established to keep the implementation moving forward as other issues take priority for the people involved.

Ultimately, model risk management should add value to the enterprise as well as reduce risk. Visibility into the source of data, confidence in the reliability and applicability of the model, and ongoing model improvements all support more effective decision-making for the organization, ultimately protecting its financial position and reputation. ■

## ENDNOTES

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# Risk and Opportunity: The new risk arena for Chinese insurers

By Youjun Bu (William), Edited by Baoyan Liu (Cheryl)

**ASIA IS AMONG THE WORLD'S FASTEST DEVELOPING REGIONS.** As economic growth continues, the number of elderly people and middle class is increasing, developing markets such as China are representing significant growth opportunities for life insurers. Developments in the financial sector and the expansion

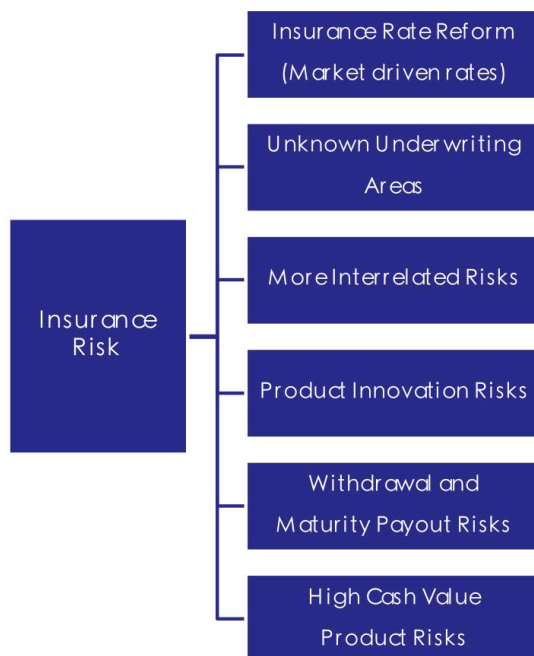
of foreign influence in the market have fueled rapid growth over the past decade. With new opportunities have come new risks and considerations, the implications of which are

still being understood. In this article, we focus on three key risks in the context of China's changing economy: insurance, investment, and operational.

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## INSURANCE RISKS:

Insurers currently face a complex risk environment. On one hand, companies are struggling with high expenses and low profit margin; on the other hand, they are looking to expand into new fields to remain competitive in the market.



- Underwriting Risk:** With pressure to remain profitable, some Chinese insurers are expanding businesses into new fields, such as catastrophe and public safety insurance. Another example is the P2P (peer to peer) lending business, where insurers provide protection to lenders against default or failure to meet borrowing rates. Lack of credible data and experience on pricing and underwriting those products introduce significant underwriting risk.
- Insurance Rate Reform of China:** The Chinese Insurance Regulatory Commission (CIRC) has begun moving towards the direction of lifting the maximum requirement on universal pricing rates, beginning with regular life plans and profit-sharing plans. In the past, the prescribed 2.5 percent rate was used to safeguard insurance companies, although it undermined the attractiveness of insurance products to customers. Deregulation on the prescribed rate allows insurers to compete with banks on yields and returns, better understanding of the implication and market reaction is necessary.
- Interrelated Risk:** The rapid growth of the Chinese insurance industry has created tighter connections with the general economy. Broadening investment requirements due to new products require partnerships with asset management firms to provide more advanced and complex investment vehicles. Some companies are partnering with local governments to invest in local infrastructure construction projects while others are investing in retirement housing for more stable, long-term cash flow matching.
- Product Innovation Risk:** While innovations allow companies to gain a competitive edge over peers, they have a risk of pushing away from the realm of traditional insurance into speculation and gambling. This can have major financial consequence, but also draw the attention of the CIRC—as well as fines. An industry saying is “no innovation is too risky for insurance, but many are too risky for compliance.”
- Withdrawal and Maturity Payout Risk:** The rapid expansion of insurance also creates a liquidity risk from two sources: early withdrawals and grouped maturity payouts.
  - Industry data show large blocks of life contracts

**“The rapid growth of the Chinese insurance industry has created tighter connections with the general economy.”**

maturing between 2013 and 2015 (mostly endowment life contracts sold from 2000 to 2005, with an average term of 10 years). This maturity pattern creates a high cash demand. To respond to the liquidity crunch, affected companies are often forced to continue to “sell to cover,” meaning they continue issuing new policies for cash to cover maturing contracts rather than for profitability or strategy.

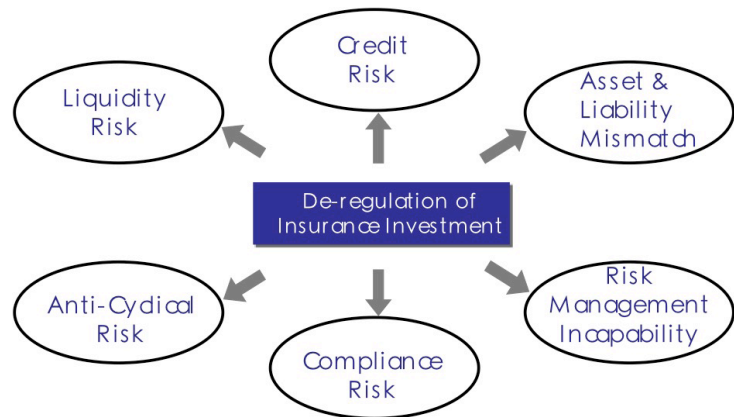
- Some companies chose to focus sales on so-called “bank insurance products” which claim to be able to compete with bank deposit rate. These products are usually short-term, high return guaranteed with no withdrawal penalty after a specific period. Consequentially, high withdrawal rates are observed immediately after the penalty period. The exposure to withdrawal behavior creates enormous cash-flow pressure on these companies, limiting their investment choices based on durations that support short-term products.
- **High Cash Value Products:** As mentioned above, insurers created “bank insurance products.” These products were designed to compete with bank deposit products, but customers were often looking for high cash value as well. This further increases sensitivity and exposure to withdrawal and liquidity risk, but has become a necessity to cover benefit payments from existing payments.

### INVESTMENT RISKS:

In the past, insurance company investments were heavily regulated. Historical data show most companies followed the same investment pattern: concentration on bank deposits and government bonds with limited public equity investment. There was no use of more complex investment vehicles or so-called “non-traditional investments,” either because they were too risky or they were not readily available. Some examples include: debt investment, project oriented investment, infrastructure project investment (bridges and highways), real estate investment, and futures contracts.

The regulation limits investment returns and reduces the competitive edge of strong investment teams. As China’s financial industry expands, the CIRC has begun to understand the necessity of broader investment options—strict regulations are hampering the

competitiveness and growth potential of insurance companies. As investment regulations relax, Chinese insurance companies are able to increase investments in areas including debt instruments, equity, and real estate, which also increase investment risk exposure.



- **Debt investment:** Most insurance companies invest in real estate or infrastructure related projects with fixed returns over certain period of time (e.g., five to 10 years). While the return and principal payments are mostly guaranteed, credit risk should be considered. Since most of the projects are owned by local governments or large state-owned companies, credit risk is relatively low though.
- **Private Equity investment:** Equity investments are primarily in private companies prior to their initial public offerings (IPO). While these investments have risen over the past two years, companies are still cautious as equity investments are much riskier than debt-based alternatives. Insurance companies are new to the market and therefore do not always have the expertise and experience as investment firms. While the return is potentially higher, conservative appetites of insurers currently still lean towards more stable options.
- **Real estate investment:** By regulation, Chinese insurance companies cannot invest directly in residential real estate; however, they are allowed to invest in commercial real estate, including retirement housing. Commercial real estate is an ideal asset for insurers, as it provides long-term, stable cash flows.

CONTINUED ON PAGE 26



However, the recent hikes in Chinese domestic property prices have pushed insurers to look overseas to find real estate investment opportunities. A recent example in the news was the purchase of the Waldorf Hotel in New York City by Chinese insurer Anbang. While commercial real estate provides opportunity for diversified investment portfolios, it is a complicated instrument with many volatile factors like property value and occupancy rates.

### OPERATIONAL RISK:

According to recent survey, nine out of 10 Chinese insurers would choose operational risk as the no. 1 risk insurance companies face today in China. Specifically, the following risks are mentioned:

- **Fraud:** Fraud is ranked as the top risk in the Chinese insurance industry. Industry estimates that 20 percent to 30 percent of insurance claims have fraud elements. While insurers have gained experience to spot and handle these fraud elements, it is a continually evolving area that requires constant vigilance.
- **Insurance Intermediary:** A large portion of Chinese insurance products are sold through third party insurance intermediaries, such as brokers/agents. Brokers and agents sometimes will lack the training or sufficient experience on understanding the long-term products feature and customer suitability. Sales driven by commissions would result in complaints and fines from regulators. Insurance companies face with high reputation risk.
- **Investment:** Operationally, some companies have yet to create a defined process to control and monitor trade/investment activities, exposing themselves to investment operational risk. Also, from a post-investment perspective, not all insurers have the processes in place to monitor performance, especially if new investments are longer duration in nature and can have substantial implications on company performance.
- **Compliance risk:** Despite recent de-regulations, the Chinese insurance industry is still heavily regulated by the CIRC. It is especially important for companies to meet compliance standards and maintain good standing with regulators.

Compliance risk is a key issue faced by insurers for some of the following reasons:

- New regulations, compliance standards, and requirements are issued/changed on a frequent basis during the reform phase. Dedicative resources are needed to keep up to date with any changes to optimize corporate strategies in light of the new regulatory environment.
- Regulations are not yet fully established for new lines of business or product. This poses a unique challenge to some innovative insurance business, such as P2P insurance. Companies should balance the potential benefits from entering new product lines and markets with the potential penalties and costs if regulations work against them in the future.
- Innovation, while a business necessity, is also a compliance challenge. Some of the innovative products in recent years were quickly pulled off the shelf as they violated compliance standards. As one industry professional put it: “On one side is innovation and the other might be breaking compliance. If not handled carefully, the line between the two becomes paper thin.”

### CLOSING REMARKS:

In summary, Chinese Insurers are at a new era which not only offers great reform, innovation, and growth opportunities; it also brings more complex business and thus greater risk. It is not surprising for us to see that the Chinese insurance market will go through big changes in the coming years in the form of company consolidations. Specifically, companies with limited risk management capabilities can fall behind while companies with stronger risk management capabilities can grow bigger and seize more business opportunities, thus more market share. Fortunately, both the Chinese insurance regulator CIRC and insurance companies themselves are fully aware of this situation. They are working to adapt the risk oriented solvency system (C-ROSS) for proper risk management. C-ROSS presumably will go into effect in 2016. With companies managing business on a risk based solvency system, it will foster stronger risk culture and risk management and thus stronger risk management capabilities in the long run. ■

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## **Policyholder Behavior in the Tail - Variable Annuity Guaranteed Benefits 2014 Survey Results**

SOA

The SOA issued its eighth survey to gather the range of assumptions actuaries use in pricing, reserving, and risk management of minimum guarantees on Variable Annuity products, such as death benefits, income benefits, withdrawal benefits and maturity benefits.

<https://www.soa.org/files/research/research-2014-policy-behavior-survey-results.pdf>

## **Report on the Current State of Enterprise Risk Oversight: Opportunities to Strengthen Integration with Strategy**

American Institute of CPAs

<http://www.aicpa.org/interestareas/businessindustryandgovernment/resources/erm/downloadabledocuments/aicpa-erm-research-study-2014.pdf>

## **European Risk and Insurance Report: Executive Summary of the FERMA Risk Management Benchmarking survey 2014**

Federation of European Risk Management Associations (FERMA)

<http://www.ferma.eu/app/uploads/2014/10/20141009-FERMA-BenchmarkingSurvey2014-v8-FINAL-FINAL.pdf>

## **Cyber resilience – The cyber risk challenge and the role of insurance**

CRO Forum

<http://www.thecroforum.org/wp-content/uploads/2014/12/Cyber-Risk-Paper-version-24.pdf>

## **Minimum standards for reporting incidents to an insurance operational risk loss data consortium**

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[http://www.thecroforum.org/wp-content/uploads/2014/12/20141218\\_Data-Standards.pdf](http://www.thecroforum.org/wp-content/uploads/2014/12/20141218_Data-Standards.pdf)

## **C-ROSS Preparing for Solvency II with Chinese Characteristics**

Oliver Wyman

<http://www.oliverwyman.com/insights/publications/2014/jul/c-ross-preparing-for-solvency-ii.html#.VMutxmjF9QE>

## **2014 Insurance Risk Benchmarks Report: Annual Statistical Review**

Guy Carpenter and Oliver Wyman

<http://www.oliverwyman.com/insights/publications/2014/oct/2014-insurance-risk-benchmarks-report--annual-statistical-review.html>



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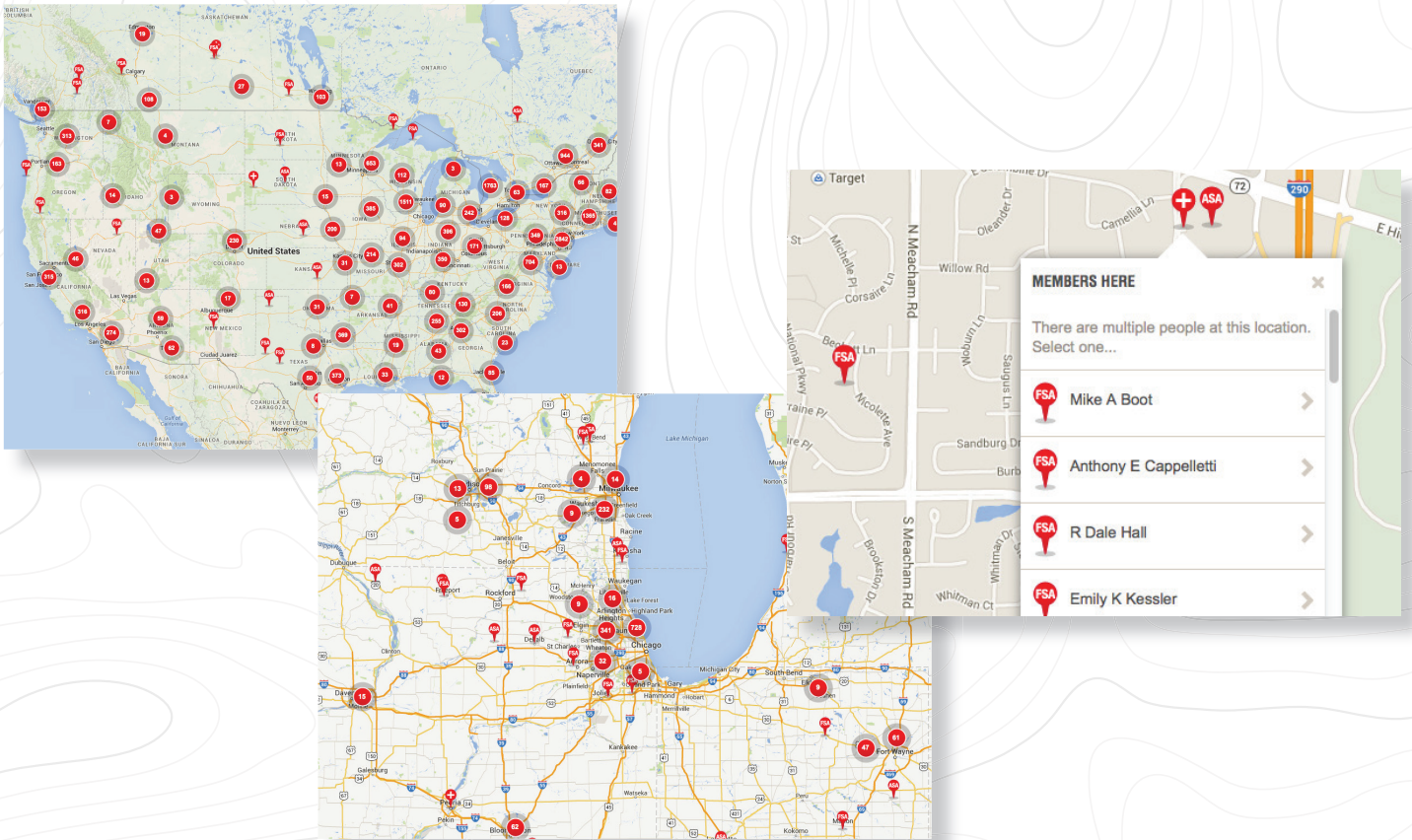
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