Focus

#20 - March 2016

Managing the consequences of macroeconomic and (geo)political risks

What role for (re)insurers?

SCOR Global P&C

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This 20th FOCUS publication is based on content shared at the SCOR Global P&C 2015 Annual Conference, which was held on 1-2 October 2015 in Paris.

SCOR Global P&C wishes to thank all the contributors.

A FEW REMARKS ABOUT ASSET BUBBLES

Jean TIROLE
Chairman of the Toulouse School of Economics and Nobel Prize in Economics

Jean Tirole is Chairman of the Toulouse School of Economics and of the Institute for Advanced Study in Toulouse, scientific director of the IDEI at the University of Toulouse Capitole, and visiting professor at MIT. He is the laureate of numerous distinctions, including the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel in 2014.

Introduction

Financial markets do not necessarily reflect the evolution of the real economy. One aspect that has attracted much attention in this respect is asset overvaluation. I will focus my presentation on rational bubbles. You should be aware that overvaluation has been studied from other angles. Another approach that economists have used is based on disagreements about prior beliefs. For example, one investor may believe that a certain asset is valuable, while another may disagree, but may change his mind in the future and believe the asset is extremely valuable. This gives rise to some form of overvaluation. Another route to overvaluation that economists have studied is based on agency. Asset managers may be eager to buy a risky asset such as a bubbly asset just because it's risky, allowing them to gamble for resurrection if they are in trouble or to get a shot at moving to the top of the chart.

When I started working on bubbles many years ago, I was following in the footsteps of Allais, Samuelson and Diamond: I applied their ideas to asset bubbles, which I defined as the difference between the price and the fundamental, as described in the formula in Figure 1 in the case of investor risk neutrality and a safe bubble (a rather unrealistic case that is just meant to simplify the exposition). The fundamental is then equal to the present discounted value of future dividends. The bubble, which is the residual or overvaluation relative to the fundamental, grows at the rate of interest.

FIGURE 1:

Focus on rational bubbles: $p_t = F_t + B_t$ **where**

FUNDAMENTAL

$$F_t \equiv \Sigma_{T=1}^{\infty} \frac{d_{t+T}}{(1+r_{t+1})\ldots(1+r_{t+T})}$$

BUBBLE COMPONENT

$$B_{t+1} \equiv (1+r_{t+1})B_t$$

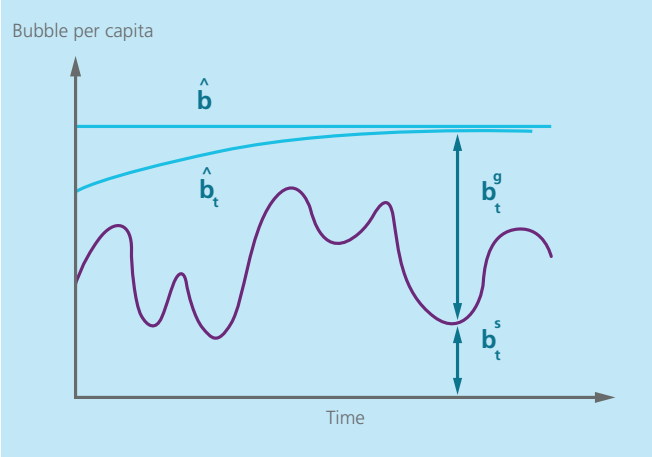
Detecting bubbles

In practice, it is not easy to detect bubbles. Robert Shiller at Yale has used two distinct strategies to detect them. The first consists in noticing that the volatility of stock prices vastly exceeds what would be predicted from the time series of dividends (and thus the fundamental). Second, one can look, as he did for the real estate market, at the price-earnings ratio; the presence of a bubble may be suspected if the price substantially exceeds what is expected from the likely earnings and interest rate evolution.

Only assets that are scarce and durable can support a bubble; otherwise, they would be replicated (for assets that are not scarce) or rational participants would anticipate that someone will get stuck with the hot potato (if the horizon is finite). Limited short sales are also necessary for bubble, so as to ensure scarcity.

It is also possible to end up with bubble substitutions, where individual bubbles burst, and then other bubbles appear elsewhere. Some have claimed that a bubble substitution, illustrated in Figure 2, may have occurred recently.
The Standard & Poor Shiller index, which is based on the price-earnings ratio, suggests that we may have entered a bubble in 2013. There can be various theoretical explanations for this, such as Quantitative Easing, the collapse of oil prices, or the collapse of bubbles in the emerging markets, creating bubble substitution across countries.

FIGURE 2:
BUBBLE SUBSTITUTION:
BUBBLE SHIFTS FROM ONE ASSET TO ANOTHER



Source: Tirole 1985.

What do we know about bubbles?

First, bubbles fill a void. It is important to understand that assets are stores of value. A shortage of stores of value leads to a rise in their price, lowering the interest rate. Investors then reach for yield and look for assets to invest in, and that is when rational bubbles can arise.
Such bubbles are indeed sustainable if the rate of interest is less than the rate of growth of the economy. Otherwise, the bubble would grow very fast relative to the economy, making it hard for people to buy and at some point; the bubble would necessarily burst.
The implication of this is that a bubble on an asset is less likely to occur if there is an abundant supply of competing stores of value (for example public debt, a bubble on another asset such as real estate, etc.).

Is the rate of interest less than, or equal to the rate of growth? Given that there is a multiplicity of rates of interest, and that the rate of growth is not easy to measure or forecast, Abel, Mankiw, Summers and Zeckhauser in a paper published in 1989 used another criterion.

They looked at the relationship between capital income, which includes equity, bonds, etc., plus investment, and related the following two inequalities:

rate of interest < rate of growth
and
capital income < investment

Their conclusion was that capital income was greater than investment for the US and the six other countries they studied, suggesting that such bubbles may not exist.

Using better statistics that were not available at the time of the Abdel *et al.* paper, François Geerolf, a French assistant professor at UCLA, showed recently that nowhere is capital income greater than investment. For countries like Japan and South Korea, capital income is much lower than investment, which suggests that the rate of interest is less than the rate of growth, a condition that makes rational bubbles feasible.

Do bubbles substitute for, or promote capital accumulation? The literature of the 1980s concluded that bubbles, competing for savings, crowd out productive investment.

With Emmanuel Farhi, a professor at Harvard, we showed more recently that if firms or banks need stores of value, it becomes quite ambiguous whether bubbles and capital are complements or substitutes.

A bubble is a store of value, albeit a very risky one. It can compete for savings with productivity investment, but at the same time it has a liquidity effect.

It has been observed that a bubble crash leads to a reduction in the interest rate. The reduction in the net worth of the banks and the firms which own the bubble leads to a recession, which causes the central bank to lower the interest rate even further.

We know that it is probably much costlier to prick a bubble than to prevent one, especially if the bubble is held by a leveraged institution. Policy decisions should indeed take into account the type of bubble in question. If the bubble is held by retail banks, for example, this is cause for concern especially if they do not possess enough capital and liquidity. If they are held by retail investors in mutual funds which are not guaranteed, the risk is not big, investors will just lose money when it bursts.

Globalisation can transform excess demands for assets in countries with underdeveloped financial systems into capital flows. China has a lot of savings, but no solid financial market in which to invest. In academia, this situation is known as having 'no parking spaces'. The US on the other hand can create and offer more parking spaces; securitisation, besides evading prudential requirements, was also about creating more parking spaces that could be purchased by the investors. Of course, this migration of savings raises the price of assets in the US, thus lowering the rate of interest. With low rates of interest, bubbles may emerge.

What don't we know about bubbles?

First, it is difficult to predict a bubble… We know they are likely to emerge if interest rates are low but it does not mean we can predict them, because a bubble is based on a consensus. Investors accept an overvaluation only because others do as well. For instance, a real estate bubble exists because we believe real estate prices are going to keep growing. There must be some consensus, and this is something that economists are not very good at predicting.

Second, we are not very good at detecting bubbles. To be certain, the formula is very clear; there is a fundamental and there is a bubble, but to detect a bubble, you have to know the fundamental, which is no easy task.

Third, should central banks lean against the wind if they perceive the existence of a bubble? In the Jackson Hole consensus 10 years ago, Bernanke, Gertler, Greenspan and others argued that bubbles are difficult to detect, and that, if that a bubble has been identified, monetary policy should not be used. Bubbles are associated with low rates of interest, so it is theoretically possible to raise the rate of interest and thereby try to prick the bubble. But when raising the interest rate for a short period of time, the bubble actually further inflates. In order for monetary policy to be successful in pricking a bubble, it must be credible in the long term, but it may not be possible to commit in the long term to a rise in interest rates, particularly if this creates a recession. The debate as to whether bubbles should be addressed with monetary policy or other tools (prudential regulation, loan-to-income requirements for real estate bubbles, etc.) is still very lively.

There is still a lot of work to do and we definitely need more time and data to understand bubbles.

"THE DEBATE AS TO WHETHER BUBBLES SHOULD BE ADDRESSED WITH MONETARY POLICY OR OTHER TOOLS (...) IS STILL VERY LIVELY."

MANAGING MACROECONOMIC RISKS

Denis KESSLER
Chairman & CEO, SCOR SE

Denis Kessler, a French citizen, is a graduate of HEC business school (Ecole des Hautes Etudes Commerciales), holds a PhD in economics and advanced degrees in economics and social sciences, and is a Fellow of the French Institute of Actuaries. He was Chairman of the Fédération Française des Sociétés d'Assurance (FFSA), Senior Executive Vice-President and member of the Executive Committee of the AXA Group and Executive Vice-President of MEDEF (Mouvement des Entreprises de France). He joined SCOR as Chairman and Chief Executive Officer in 4 November 2002. In January 2016, he was elected to join the French Institute's Academy of Moral and Political Sciences.

Introduction: reinsurance and macroeconomic and macrofinancial risks

SCOR likes to take calculated risks...
but it has no appetite for economic and financial risks.

Taking risks is intrinsic to the business of reinsurance. Each (re)insurance company has a risk appetite, whether it is low, moderate or high. Sometimes the risk appetite is not explicit, but it can be inferred from the risk portfolios the company chooses to underwrite.

At SCOR, we define our risk appetite every three years, within the scope of our Strategic Plan. It is the responsibility of our board to define the level of our risk appetite and to ensure that we respect it. The risk appetite will then determine everything we do with our partners and which lines of business we underwrite. SCOR is one of the very rare companies to have a formal risk appetite that is defined, approved and checked by its board.

That risk appetite is then translated into a series of well-defined metrics relating to risk drivers, lines of business, etc., which we are required to respect.

SCOR is open to insuring risk, as long as it is associated with a probability distribution.

It does not like to make bets (such as insuring Michael Jackson's last tour, for example). The probability distribution can be observed, inferred or modelled. Scenarios represent a way to infer probability distributions, even when historical data is scarce or not available. Emerging risks, such as cyber risks, create a problem of absorbability in the probability distribution, but even a hazy scenario will allow us to underwrite business. The more we accumulate knowledge and data, the more we enlarge the offering of coverage through (re)insurance.

It is easier to insure well defined and observable events that are accidental by nature, are not progressive, and whose consequences and occurrences are properly identifiable and measurable (e.g. death, survival, fire and natural catastrophes), than to insure serial events such as asbestos, or risks with moral hazard issues, which require extremely careful underwriting.

With regard to the latter type of events, millions of contracts that were written 20 years ago are now generating small but increasing payouts over a very long period of time, because scientific knowledge has changed.

The accumulative amounts generated by these payouts could create a serial risk, leading to a major catastrophe for insurers.

Events in the economic and financial world entail risks that could potentially cause huge losses, through:

- cycles, booms, fluctuations and bubbles
- disruptions, discontinuity and distress;
- failures, bankruptcies and systemic risk;
- market closure and liquidity issues.

At SCOR, we have deliberately chosen to refrain from offering protection for macroeconomic and macrofinancial risks.

However, SCOR is exposed to economic and financial risks even if it has no appetite for them, and has to manage that exposure.

As a reinsurer, SCOR is a "risk absorber" and faces a multiplicity of risks that vary by nature, by size and by frequency. However, we only have an appetite for risks that are diversifiable and proportionate to our absorbing capacities. The distinction between gambling and reinsurance lies precisely in the capacity of reinsurance to diversify its risk.

We have no specific appetite for macroeconomic risks because they are non-diversifiable by nature and too dependent on the political decisions made by governments or central banks. These decisions are not random but Diracian, and are altered by moral hazard, which means that they have no quantifiable distribution probability.

Furthermore, we have no appetite for interest rate risk. SCOR does not provide guarantees for capital or investment returns. It does not underwrite variable annuity portfolios. SCOR has no appetite to cover any kind of market risks faced by the assets associated with its clients' liabilities.

Concerning more specifically Credit & Surety, SCOR provides guarantees for individual failures and contains macroeconomic risk by underwriting only short-term guarantees.

At the same time, we believe that financial markets can offer agents tools to protect their assets from macroeconomic and macrofinancial risk, through options, swaps and derivatives. Such tools allow agents to directly exchange or trade their respective risks. Reinsurance companies, however, should not play the role of the counterparty of macroeconomic or macrofinancial risks.

Furthermore, we are exposed to the changes in the macroeconomic environment in which we operate. The value of what is insurable and insured is dependent on the macroeconomic environment. The values we protect will depend on the economic cycle and all the associated variables, such as Gross Domestic Product (GDP), inflation, interest rates, credit spreads and foreign exchange. These affect SCOR's assets and liabilities, its net worth and its capacity to take risk.

Let us take a more in-depth look at four of these macroeconomic risks: GDP evolution; inflation; interest rates; and foreign exchange rates.

"THE DISTINCTION BETWEEN GAMBLING AND REINSURANCE LIES PRECISELY IN THE CAPACITY OF REINSURANCE TO DIVERSIFY ITS RISK."

Dependency on Gross Domestic Product (GDP)

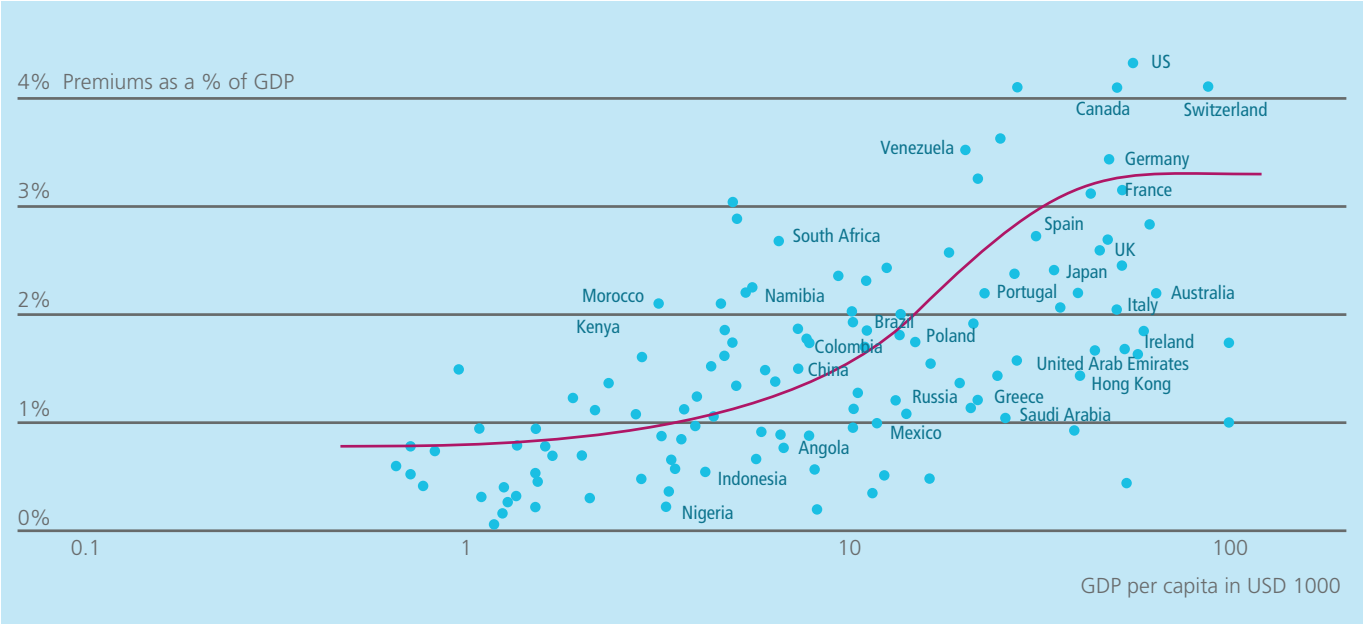
Insurable amounts are proportionate to GDP. As shown in Figure 1, insurance penetration increases with the GDP level per capita. Therefore an increase in GDP is good for insurance. It is also good for reinsurance, but not as much as for insurance, because reinsurance trades and deals more with stock variables (buildings, equipment, human capital, etc.) than with flow variables (revenues, consumption, investment, etc.). Let's take the example of a skyscraper in New York: even if it is standing empty, the owner will insure it and the insurer will have to reinsure it because of the size of the potential losses.

Moreover, over the long term, there is a co-integration relationship between insurable wealth, the level of GDP and the level of GDP per capita. Although economic development does provide more substance to insurance and reinsurance, we are subject to macroeconomic risk.

A crisis is less negative for reinsurance than for many other industries. But some lines of business, such as Marine, Credit & Surety and Construction, are significantly dependent on GDP fluctuations.

On the asset side, the interest rate of fixed income assets, as well as stock market and real estate values, fluctuates with GDP, being highest in booms and lowest in busts.

FIGURE 1:
INSURANCE PREMIUMS IN % OF GDP RISE FASTEST IN EMERGING MARKETS



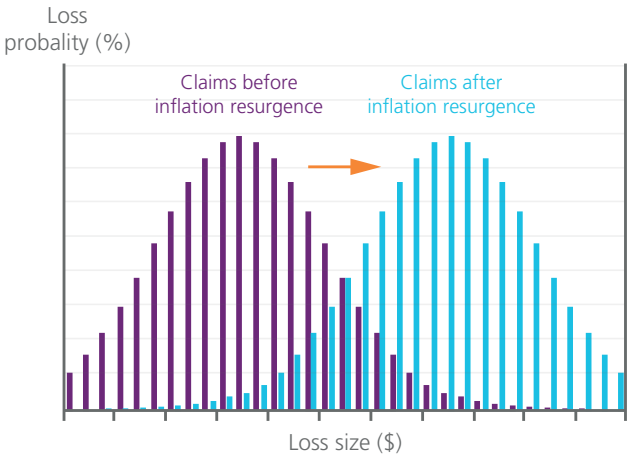
Source: Swiss Re Economic Research & Consulting

Dependency on inflation

Inflation is damaging for Property & Casualty (P&C) and Health because of the lag between premiums and claims. However, what is more damaging to these lines of business is not the actual level of inflation but a change of regime, i.e. an acceleration of inflation. As Figure 2 shows, inflation shocks push up the size of losses for any given loss distribution, whereas premiums have been collected on the basis of the initial size of losses. So it is not surprising that reinsurers usually prosper in locations with a history of low inflation.

P&C and Health liabilities typically have an elasticity to inflation of two or more. Conversely, liabilities consisting of biometric risks are not correlated to inflation, except in the very long term, because they cover fixed nominal amounts which exclude, by construction, any link to inflation. The value of statistical Life is only slightly correlated to inflation, its main drivers being court decisions and income levels.

FIGURE 2:
INFLATION SHOCKS PUSH UP THE SIZE OF LOSSES FOR ANY GIVEN LOSS DISTRIBUTION



Source: SCOR

On the asset side, the situation with regard to inflation is split: bonds are affected by inflation that induces interest rate increases/capital losses, while equities/real estate offer good protection against inflation.

SCOR has been able to profitably combine Life with P&C reinsurance, because these two risks are not exposed to the same type of economic variables. Moreover, we have worked out our diversification so as to diversify the risk of inflation in P&C. To estimate P&C dependencies when data is too scarce, SCOR uses ProBex, its own statistical tool based on pooling expert judgments. Based on ProBex, we estimate that there is only a 17.7% probability of a 1/100 years extreme inflationary shock happening in the same year as a 1/100 years or worse extreme P&C loss.

Thanks to diversification, the cost of a surge of inflation is minimised.

Dependency on interest rates

Interest rates and credit spreads are not independent variables: they are driven by and therefore correlated with other macroeconomic variables such as GDP, inflation and monetary policy.

SCOR's dependency on interest rates does not come from any macroeconomic guarantees it underwrites - we don't supply such guarantees - but through the discounting of anticipated liabilities, discounting which uses the "risk free" interest rate. An increase in interest rates is good for reinsurance as it increases the discounting of our liabilities, especially of those liabilities with the longest duration in P&C and Life (long tails). It shrinks the liability side of the company.

With regard to assets, these are highly dependent on the interest rate. An increase in interest rates increases the remuneration of new investments in bonds, but reduces the value of the existing fixed-income asset portfolio as well as the value of the equity and real estate portfolios, inducing capital losses. But, if the increase in interest rates is due to inflation and is proportionate to it, only the fixed-income asset portfolio will be negatively affected, while equities and real estate, which offer good protection against inflation, will not.

The impact of an interest rate increase on Net Asset Value depends on the accounting standards used (IFRS versus economic) and on the direction and magnitude of the Asset-Liability Mismatch, if any. In terms of Solvency 2 accounting standards, which are economic and therefore more accurate for assessing economic consequences, SCOR is well protected against an increase in interest rates thanks to a shorter duration of assets compared to liabilities: an increase in interest rates would increase the economic net asset value and the available capital, decrease the required capital and increase the solvency ratio, allowing us to take more risk.

Dependency on foreign exchange rates

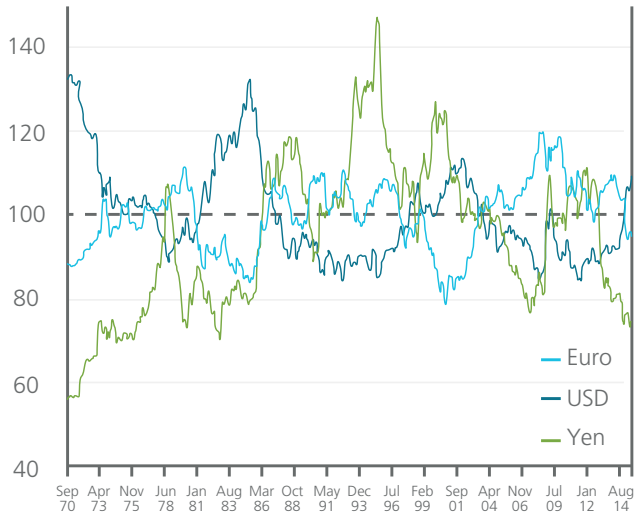
Foreign exchange rates are volatile (Figure 3) and driven by other macroeconomic variables such as the current account, the share of foreign debt, interest rates, GDP, inflation and monetary policy. As SCOR is an international group, all the items on our income statement and balance sheet are built from different currencies, especially the dollar and the euro, and are therefore affected by the fluctuations of these currencies.

Structurally, however, the Group is well protected against foreign exchange rate fluctuations as it is congruent, i.e. assets in one currency cover our liabilities in the same currency (reserves + risk margin + own funds). By not gambling on the exchange rate, we avoid exposure to foreign exchange rate fluctuations.

The Group is nevertheless affected in the following cases:

- When claims in one currency area deviate beyond the capital of the local entity, requiring the support of the Group and the injection of cash from a different currency area;
- Because we book them in euros , the Net Income, Net Asset Value, Available Capital, SCR and Solvency Ratio are sensitive to foreign exchange rates whose impact is positive when the euro weakens with regard to the other currencies.

FIGURE 3:
WIDE UNPREDICTABLE SWINGS OF (REAL EFFECTIVE) FX RATES



(100= long term average for each currency)

Source: SCOR

Concluding remarks

Taking macroeconomic risks into account helps us to anticipate shocks and to absorb them with limited stress.

SCOR has a well-defined strategy of avoiding unnecessary macroeconomic risks, which consists of:

- avoiding insuring global macroeconomic risks, i.e. importing the asset risks of our clients into our liabilities (for example, we don't reinsure variable annuities);
- anticipating and mitigating macroeconomic shocks.

The Group's strategic plan plays a key role in the process of anticipating macroeconomic shocks, through:

- the careful analysis of the current economic and financial situation and its risks (the Chinese slowdown, the decoupling of Europe, Asia and the US and the consequences thereof for underwriting, the uncertainties of monetary policies and their impact on the yield curve, the resulting international financial instability and its impact on FX rates);
- stress testing of the company under extreme scenario assumptions of activity, inflation, interest rates and FX rates.

When looking at the net asset value of SCOR over the last 10 years, it is not a straightforward matter to identify the impact of the economic and financial crisis on the Group, as SCOR's value (Figure 4) and ratings have been steadily increasing. Thanks to diversification and active macroeconomic management, the Group has remained well positioned throughout the crisis to absorb all the macroeconomic and macrofinancial shocks that have impaired the global economy since 2007.

(Re)insurers should protect themselves against macroeconomic and macrofinancial variables through the way in which they manage their assets and liabilities.

In this regard, (re)insurers have an incredible role to play in smoothing out macroeconomic fluctuations and financial situations, and helping to absorb macroeconomic shocks.

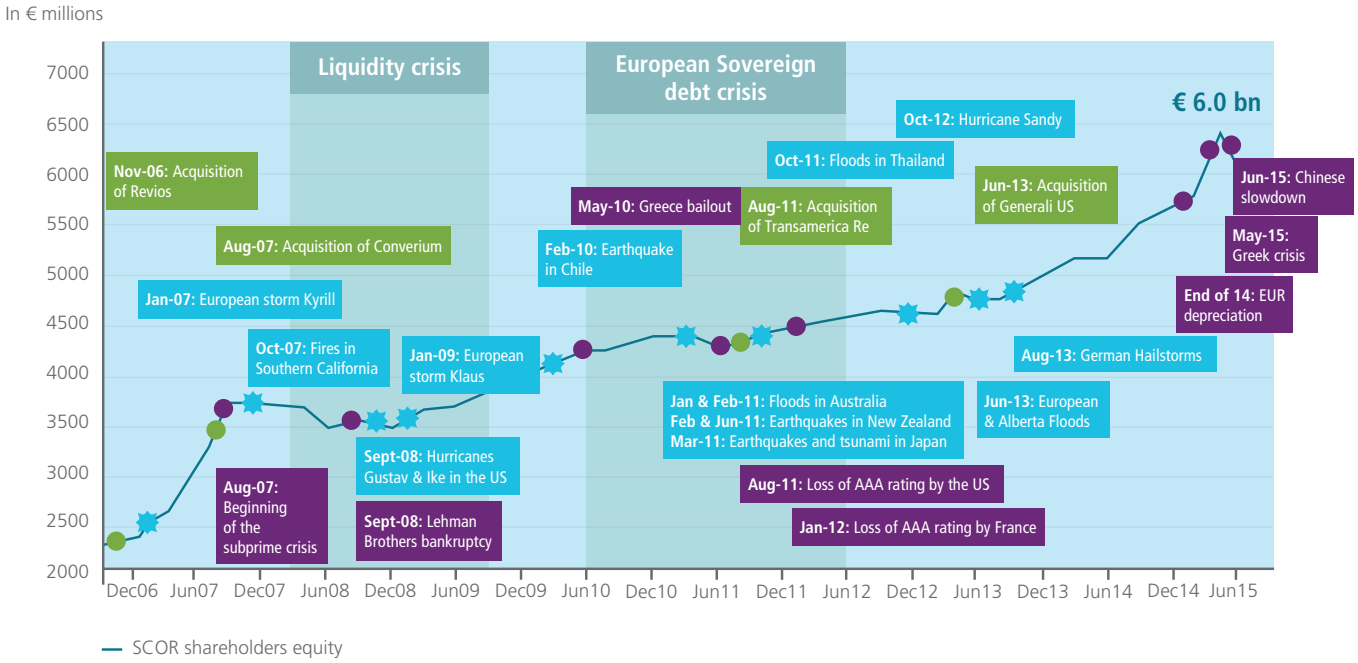
The nature of (re)insurance makes this possible. (Re)insurance covers catastrophe shocks, and thanks to its global reach it is able to mitigate their induced macroeconomic consequences. Because of its long-term liabilities and its positive cash flow business, (re)insurance is not forced into the hasty / distressed disposal of assets. It can wait and, over the longer term, manage the mean reversion of those assets that are temporarily

depressed by a financial shock. Reinsurers, especially Tier 1 reinsurers, are better equipped than other financial institutions to absorb very large deviations and shocks, because they have a structural excess of capital compared to prudential standards.

This ability to smooth and absorb macroeconomic shocks has been confirmed throughout the past few years. Around 60% of the losses generated by the World Trade Center attacks have been paid by companies whose headquarters are outside the US. High ratios of international participation can also be found for the losses generated by Katrina-Rita-Wilma, the Tohoku earthquake and Tsunami, Hurricane Sandy, and so on.

During the financial crisis, insurance demand for long-term risk-free bonds has increased their price, while durations have increased due to the fall in interest rates, and the share of stocks in European insurer portfolios has slightly increased. Moreover, in 2008, nine of the largest reinsurers incurred USD 30 billion in investment-related losses but, thanks to their robust liquidity positions and excess capital (estimated at USD 25 billion by Standard & Poor's), few reinsurers were forced to crystallize these investment losses, which were carried forward unrealized and began to be reversed in 2009.

FIGURE 4:
SCOR'S SHAREHOLDERS' EQUITY SINCE 2006



MODELLING OF ECONOMIC SCENARIOS AND THEIR IMPACT ON CAPITAL MANAGEMENT

Michel M. DACOROGNA
Senior Scientific Advisor to the Chairman and CEO, SCOR SE

Michel Dacorogna, is scientific advisor to the Chairman of SCOR. He conducts research in the field of insurance mathematics, capital management and risks. He is also involved in presenting to management and to customers SCOR models and capital management techniques. Member of the board of the SCOR Science Foundation and of the joint Research Center on Insurance Risk with the Nanyang Technical University of Singapore, he makes sure that SCOR sponsorship is well put in use and known in the academic world and recognized by the industry. Until July 2013, Michel was deputy group Chief Risk Officer in charge of Solvency II and the internal model. He was at the origin of SCOR's internal model, which he developed for more than 10 years.

Influence of the economy on insurance business and investments

We all know that the World economy has direct impacts on insurance business and investments. In Figure 1, we list the most important ones.

- **Interest rates have an effect on bonds**, affecting the value and the risk. When facing a distant risk 10 years down the road whilst able to earn a 5% interest in the meantime, the risk will look smaller than if there was zero interest.

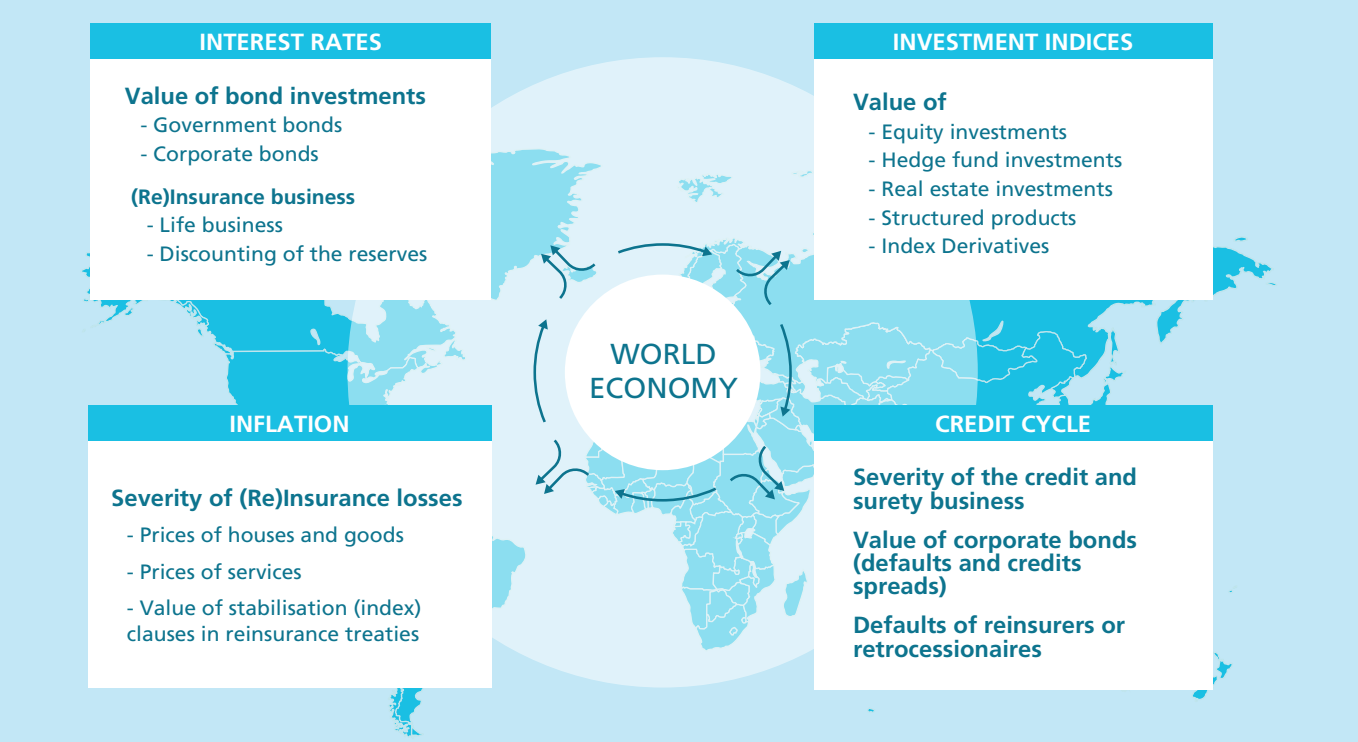
- **Inflation impacts insurance** because the claim inflation indices follow the Consumer Price Index (CPI) and are usually much higher. Moreover, inflation affects the price of houses, goods and services as well as the contracts which include stabilisation clauses.

- **Investment indices have an impact on the insurance market.** The assets that back the reserves must be placed on the market. A 0% interest on a risk-free rate has an impact on reserves. If an investment is lagging, the bottom line will also inevitably be lagging.

- **Credit cycles affect credit and surety insurance**, as well as the corporate bonds held by the company, perhaps even the equity and the default of the insurer or reinsurer. All of this will affect the balance sheet, both on the liability and asset side.

Indirectly, economy also affects the price of (re)insurance because if a certain target rate is fixed for a business without getting any related return on investment, underwriting will be changed in order to get a higher return. All of this has complex effects on the balance sheet of an insurance company.
The dependencies between these macroeconomic variables make it even more complex and hard to handle. The real Gross Domestic Product (GDP) will necessarily affect the investment indices as they move together but on the other hand, if there are problems on a market, central banks will try to fight the recession, which will in turn affect the interest rate. There are complex and dynamic dependencies which are very difficult to model for. Yet, to capture well the risks, an Economic Scenario Generator (ESG) must be able to include all those dependencies.

FIGURE 1:
INFLUENCE OF THE ECONOMY ON AN INSURANCE COMPANY



Source: SCOR

The Economic Scenario Generators (ESG), motivation and purpose

The economy can directly affect certain lines of business, like for example recession impacting the severity of aviation losses if people travel less and provide less premium while aviation companies try to save money by easing up in maintenance; or the dependency between mortality and financial risk which could reduce the investment return made on the market in case of very big pandemic, precisely when the company would have to pay big claims.

It is necessary to take into account both sides of the balance sheet -the liabilities and the assets- to build an internal model. These are linked not only through cash flow but are interdependent through various risk drivers.

In order to assess risk with the ESG, several things must be considered:

- **A consistent economic scenario:** modelling asset and liability affected by the Global economy, computing the expected return of investment, the risk and the full distribution and to taking a business decisions based on that.
- **A very demanding set of variables to model:** taking into account economic variables (yield curves, asset classes, inflation, GDP) plus several currency zones and calculating correlations and dependencies between all economic variables
- **Model additional known effects:** taking in to account the heavy tails of distributions and the autoregressive volatility clusters. In order to price business, an arbitrage-free yield curve and a dynamic behaviour are needed.
- **Short term and long term scenarios:** the scenarios should not only deliver expectation and risk for up to a year, but should be able to provide consistent scenarios over much longer periods like 30 years, if they were to be used for valuing long-term life business.

There are essentially two types of ESG: parametric and non-parametric models. Parametric models are scenarios based on calibrated models. They require a special calibration for the initial state of the model. The non-parametric models are direct simulation models for the future, using historical data. The method used at SCOR is semi-parametric models, or bootstrapping, wherein shocks must be added to the system and somehow smooth the yield curve.

The parametric model that is most often used in this kind of ESG is the Cox Ingersoll Ross model (CIR) which was designed to price interest rate swaptions over three months. By employing it on the Swiss yield curve of 2003, one can see how its dynamics evolved over the quarters (Figures 2 and 3). We display in these graphs, the average of 1'000 simulated yield curves over three quarters as produced by the CIR calibrated on the current yield.

It is to be noted that the CIR gives mostly an inverted yield curve while, in the market, it is only the case in 20% of the time, usually being a sign of an upcoming recession. It turns out that CIR gives 66% of the time an inversted yield curve on the long-run. This is due to the fact that it was developed mostly for short-term valuation of swaptions and is used here for one year forecast.

Putting an inverted yield curve as an average yield curve into an internal model would be a bad idea, because it would encourage setting a low duration on the bond portfolio in order to get the highest yield, which is not realistic since, most of the time, the highest yield is for the longer maturities. Therefore the CIR model needs to be replaced by other methods, such as the bootstrapping one that is used at SCOR.

FIGURE 2:
QUARTERLY BEHAVIOUR OF THE CHF YIELD CURVE: REAL BEHAVIOR

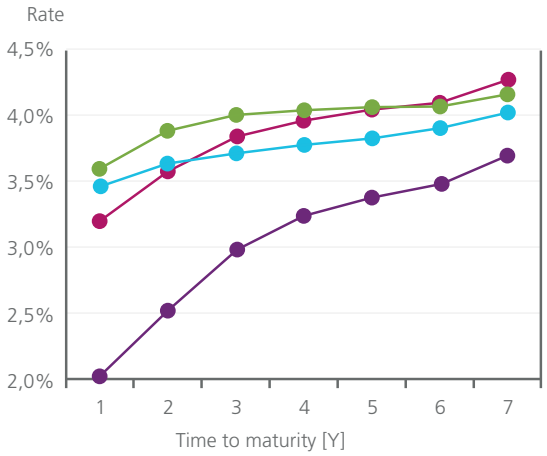
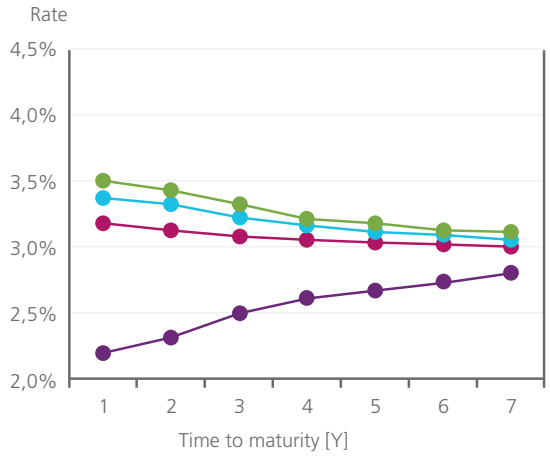


FIGURE 3:
QUARTERLY BEHAVIOUR OF THE CHF YIELD CURVE: COX INGERSOLL ROSS SIMULATION



The bootstrapping method, simulating and testing

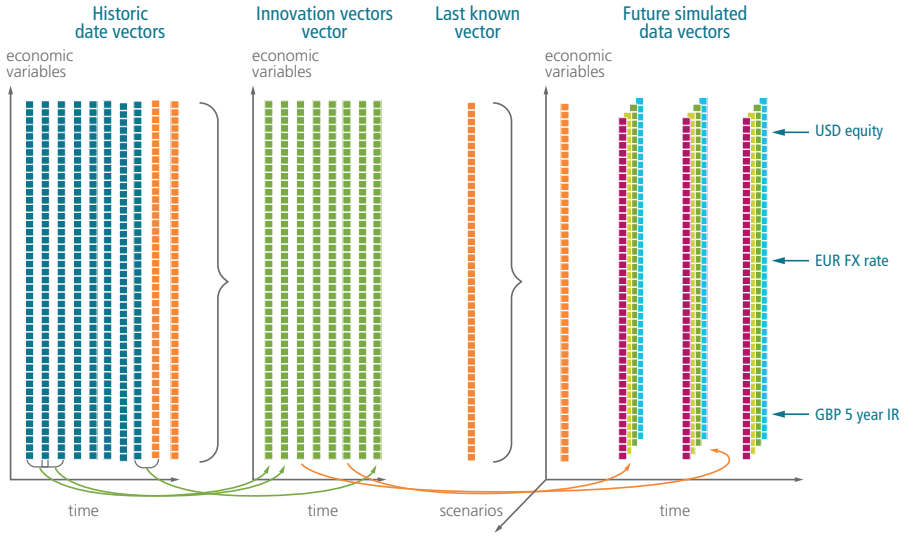
When the dependency between the variables is unknown, the bootstrapping method gambles that the future behaviour of the dependence will be similar to the one seen in the data (Figure 4). For this reason, the data set must be limited to a period where the dependency is accurately describing the current situation. It would not make sense, for instance, to use data of the beginning of the 20th century or of the great depression of the thirties, as the dependences between the various economies were very different at that time. So, our choice is limited to the most recent period. This makes it necessary to introduce artificially a tail correction to make sure that a sufficient number of financial crises is included in the projected scenarios as they are not already present in the considered history.

A weak mean reversion must also be added to the historical data. This prevents interest rate from being left to drift for over 30 years so that it reaches 120% or fails to minus 10%, for example.

For keeping the historical dependence between the data, they must be all taken simultaneously on a quarter, to build vectors of synchronised data. The last data vector will be used as the initial state, from which to start the simulation. The scenarios are then built by adding innovation vectors to this initial state.

The innovation is the difference between the expected price of the next step and the true price. It is built by looking at the

FIGURE 4:
THE BOOTSTRAPPING METHOD: DATA SAMPLE, INNOVATIONS, SIMULATION



change between two of these vectors. In this example based on 120 quarters and going back to about 30 years of data, the resulting innovations are randomly picked and a new scenario is built starting from the last observed vector. As many other innovations as we want can be added the same way to obtain various scenarios. Since innovations have been taken on the same day, at the same moment, they will present the same data dependency, this is a simple way to build consistent scenarios. In Figure 5, we have schematized this procedure.

Once this has been done, it is possible to choose the desired parameters. The tail factor alpha will show how heavy the tail must be for those scenarios, and this gives scenarios for the future. In Figure 6, we show a consistent example of a simulated yield curve over time. Another way to check that a scenario is consistent is to look simultaneously at the simulated patterns of the US dollar, the Swiss Franc and the British pound at one point when the US dollar drops against the Swiss Franc and the British Pound and verify that if USD-CHF goes down GBP-USD goes up in the simulation (Figure 6) as the exchange rates are inverted. We indeed see this in Figure 6 and we also see that EUR-USD goes up as expected, while the USD-JPY goes down. On the side, you also note that the US stock index goes down deeply which is also related to the foreign exchange movements.

However the aim of an ESG is not to forecast the outcome of the future of financial returns. The ESG is not here to play the role of a crystal bowl or to replace the specialists of macro-economics. We are rather trying to assess the risk of the future. The model will usually not produce very good economic forecasts. This is more the task of international bodies like the OECD or the IMF. We leave this task to more sophisticated macro-economic models. Here, we are more interested in the distribution of the various economic variables. This is the important outcome of an ESG and this is what will have to be statistically tested to assess its quality.

FIGURE 5:
EXAMPLE OF ONE SIMULATED EUR YIELD CURVE SCENARIO (ZERO COUPON, RISK-FREE), DEVELOPMENT OVER TIME, 2007Q3 ➜ END 2008

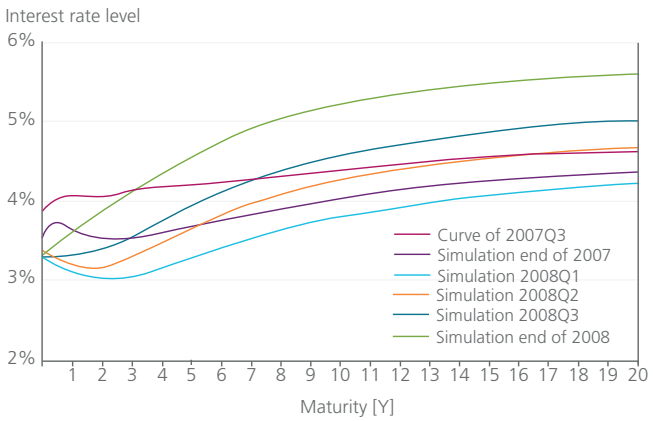
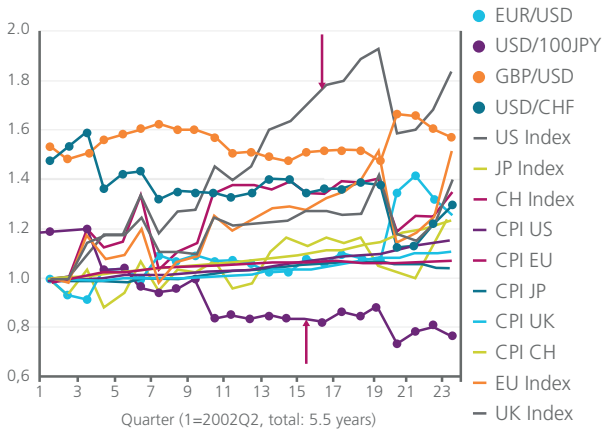


FIGURE 6:
EXAMPLE OF ONE ECONOMIC SCENARIO, BOOTSTRAPPING, SEVERAL VARIABLES. FOREIGN EXCHANGE RATES, CPI; EQUITY INDICES 2002 - 2007



Enhancements to the method: a full yield curve model, volatility clustering, tail correction and mean reverting effects

The ESG includes a complete yield curve model which is arbitrage-free and uses forward interest rates as market expectation values. It models forward interest rates as economic variables, using the bootstrapping method, accounting for the asymmetry of interest rates[1], in order to produce realistic, smooth forms of yield curves using the current yield curve as starting point for the simulation, allowing for long-run simulations (using weak mean reversion) and modelling yield curves of many countries, with dependencies.

These properties make it a multi-purpose model which can be considered as a serious alternative to other models.

The toughest challenge for any ESG is to calculate interest rates and yield curves as they follow a complex dynamic process. Most advanced models deal with forward interest rates for fixed dates (as in futures markets), mapping them in a nonlinear way to avoid too negative interest rates. Holding long-term deposits is risky: "term premium". This is why the standard form of yield curves is upward slanting.
Bootstrapping covers some market shocks and extreme price moves, however this sticks to those contained in historical data which is limited, particularly when in need of it for many variables. Extreme shocks such as a "1 in 200 years" event are probably missing in the recorded history except maybe now, for financial institutions, since the financial crisis of 2008/2009. In its ESG, SCOR applies a tail correction to the innovation to account for those possible shocks where η is a positive random variable with a mean of 1 and a Pareto-shaped upper tail (with a realistic tail index):

corrected innovation vector = innovation vector * η

Most of the time, η will be below one, thus reducing slightly the innovations, while from time to time, it will be much bigger than one shocking the whole vector. These corrections to the bootstrap method are needed to go beyond the data period we use. They allow us to include other properties that are not directly present in the bootstrapping data and to control the dynamics of the scenarios. That is why we qualify our ESG to semi-parametric since these corrections use parameters like the tail index or the speed of mean reverting. Those parameters are calibrated via empirical studies on longer data sets, for the mean reverting, or on data measured at higher frequency than quarterly for the tail index.

Conclusions and perspectives

In conclusion, ESGs are basic tools for building credible and realistic internal models. They are difficult to produce because of the large number of variables which need a good dependence structure between them.

> ESG's importance is often neglected by insurance companies as they are not part of the core knowledge of actuaries. However, they lie at the centre of the model and influence both the assets as well as the liabilities.

The ESG based on bootstrapping has several advantages. It covers a wide range of economic variables, and is flexible and modular when adding new variables, automatically preserving dependences which exist between variables.

A special care to the mean reversion effects allows short-term simulations (with exact initial conditions) as well as long-term simulations (where mean reversion plays an important role). The treatment of heavy tails and volatility clustering are included through refinements of the method. The method is essentially non-parametric and requires no large calibration procedures. Expert opinion (e.g. expected equity index performance) can be integrated and used instead of the model forecast. The model is fully integrated in the internal model landscape and the scenarios and results reflect real-world probabilities. However, they can be used to compute risk-neutral scenarios and probabilities. Those scenarios can then be used for valuation of life contracts.

Finally, in order to improve the flexibility of the model, the ESG should be able to integrate forecast for the expected values of inflation and interest rates coming from expert opinions. Using these opinions as input, the ESG will be able to provide the risk around these forecasts and thus allow for better strategic discussions.

[1] Interest rates are usally positive, thus their behavior is essentially asymmetric.

THE VALUE OF TRADE-CREDIT (RE)INSURANCE IN HIGH GROWTH/EMERGING MARKETS

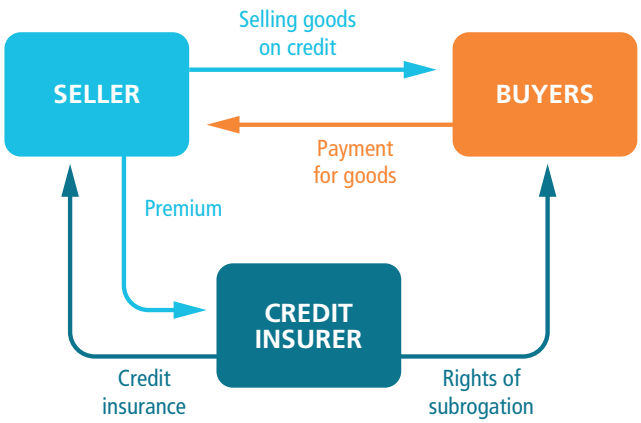
Tobias POVEL
Regional Credit & Surety Manager, Asia-Pacific, SCOR Global P&C

Tobias Povel started his career in Reinsurance as a Pricing Actuary in the area of P&C Structured Solutions, and joined SCOR's Credit & Surety team as an Underwriter in 2004. In 2011, he was seconded to SCOR Asia-Pacific to build up a Credit & Surety team based in Singapore, and to develop SCOR's presence and portfolio in Asia-Pacific for this Line of Business. Tobias holds a PhD in Mathematics from the Swiss Federal Institute of Technology (ETH) in Zurich.

Introduction to Trade Credit Insurance (TCI)

Trade credit insurance is more than just a way to protect a seller against financial loss; it is a real credit risk management and claims prevention tool that a credit insurer offers to its client. Figure 1 illustrates the way in which Trade Credit Insurance (TCI) covers the seller against non-payment by the buyer of undisputed (short-term) accounts receivable, stemming from an underlying sales contract of goods or services between the two parties.

FIGURE 1:
THE TRADE CREDIT INSURANCE (TCI) SCHEME-ENABLING (INTERNATIONAL) COMMERCE



"TRADE CREDIT INSURANCE SELLS MORE THAN JUST INDEMNIFICATION. IT ALSO ACTS AS A LOSS PREVENTION SERVICE, HELPING TO BUILD UP PROFITABLE (CROSS BORDER) TRADE RELATIONSHIPS."

TCI increases sales to new markets, facilitates (global) trade and, most importantly, alleviates the seller's financing needs, improving financing by insuring a significant portion of their trade receivables on the asset side of the balance sheet.

The list of covered non-payment risks can include insolvency, protracted default or even political risk for international trade.

The underlying credit periods mostly go from short to medium terms and the generic underlying types of policy include:

- Whole Turnover
- Single Buyer/Contract
- Pre-Shipment Coverage
- Buyer Credit Policy, insuring the Bank which is financing the underlying transaction
- Letter of Credit Policies, underlying trade secured by Letters of Credit
- Etc.

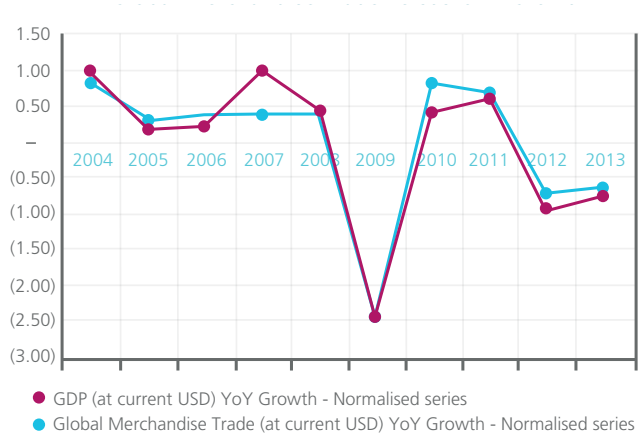
The estimated global TCI short-term market in 2015 is around EUR 10 bn, 55% of which is shared by only three private players. Some alternatives to TCI are especially used in emerging countries. They include factoring, payment guarantees, letters of credit, self-insurance and of course, the "cash and carry" approach. Trade Credit Insurance sells more than just indemnification. It also acts as a loss prevention service, helping to build up profitable (cross border) trade relationships.

Trade Credit Insurance versus Merchandise Trade

The conventional way of measuring the penetration of TCI is to relate it to Gross Domestic Product (GDP). However, in the equation of GDP it can be quite difficult to untangle the components potentially subject to TCI.

An alternative approach would be to measure the TCI penetration versus a country's Merchandise Trade, which is defined as the sum of its merchandise exports and imports. This approach also has obvious shortcomings. Firstly, merchandise trade does not capture services. As the latter only represents a small share of the global exposure insured by credit insurance (possibly in the range of 5-10%), the effect is considered to be second order. Secondly, using merchandise trade could overestimate the penetration rate if the domestic merchandise trade is much larger than the merchandise imports of a given country. In any case, as can be seen from Figure 2, Global Merchandise Trade (GMT) and GDP are highly correlated.

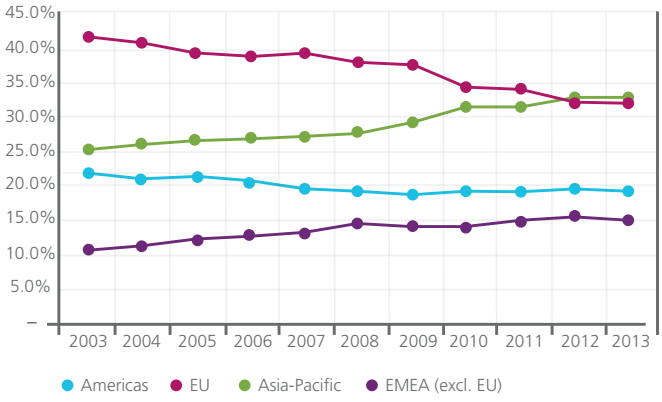
FIGURE 2:
GLOBAL MERCHANDISE TRADE VERSUS GLOBAL GDP GROWTH



Source: The World Bank

Looking at the evolution of the regional contribution to GMT, Figure 3 clearly shows that, while the Americas still remain the largest contributors to the regional share of GDP, the regional distribution of GMT has switched over the past ten years. Asia-Pacific has become the major regional contributor to GMT, having experienced phenomenal growth at a CAGR of 12.2% in nominal merchandise trade. Similarly, the Europe, Middle East & Africa (EMEA) region, excluding the European Union, recorded a CAGR of 13.4% in nominal terms, while Latin America's nominal CAGR stood at 11.8%.

FIGURE 3:
REGIONAL SHARE OF GLOBAL MERCHANDISE TRADE



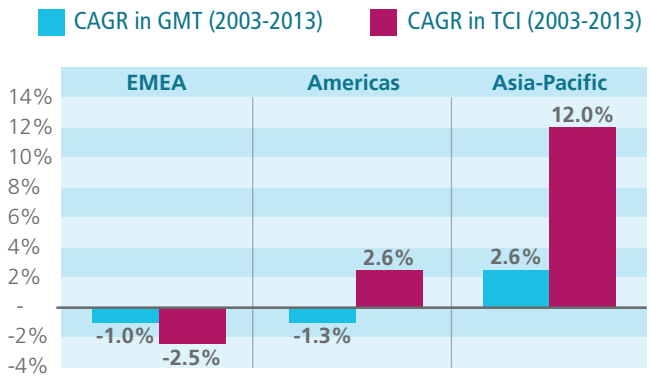
Source: The World Bank

On a nominal basis over that period of time, Global TCI has been growing at a CAGR of roughly 6.7%, to around USD 10 billion. When comparing the above regional merchandise trade growth rates to their TCI counterparts, it should be noted that the highest increase in terms of regional weight comes from Asia-Pacific, which in 2013 held a 22% share of global short-term TCI Premium, compared to 7.1% in 2003.

The regional TCI Premium Weight has grown in the Americas region too, mainly thanks to Latin America (with 14.1% in 2013 versus 11% in 2003), albeit at a significantly slower rate. While the Europe, Middle East & Africa market continues to be by far the most important contributor to the global TCI market, its regional weight has been shrinking quite significantly (minus 18.1 pts between 2003 and 2013) to a regional weight of 63.9%.

It is interesting then to compare the compound annual growth rates of GMT and TCI between 2003 and 2013 (Figure 4), which show that Asia-Pacific's regional TCI weight grew almost five times faster than its respective GMT weight over the period from 2003-2013 (CAGR of 12.0% versus 2.6%).

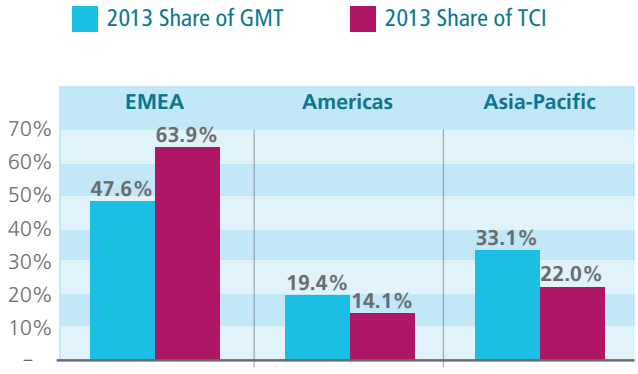
FIGURE 4:
COMPARISON OF CAGR FOR GMT VERSUS TCI REGIONAL WEIGHTS



Source: SR Economic Research & Consulting, October 2014; SCOR Estimate

Clearly, penetration in that part of the world has significantly increased, showing that TCI has helped to facilitate global and domestic trade.However, Figure 5 highlights that there is still a discrepancy in the contribution of GMT, with Asia contributing one third, versus 22% in TCI, clearly proving that TCI is still underrepresented in Asia-Pacific.

FIGURE 5:
CONTRIBUTION TO GMT VERSUS TCI



Source: SR Economic Research & Consulting, October 2014; SCOR Estimate

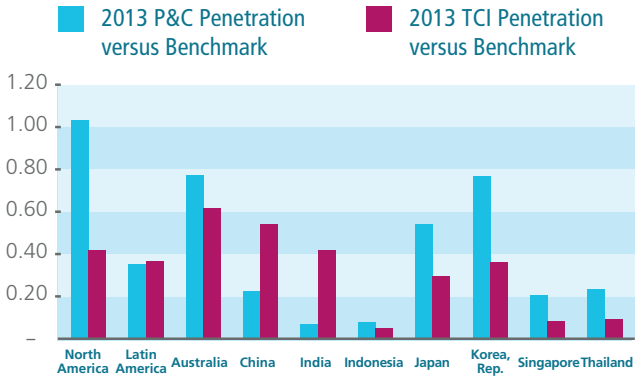
Property & Casualty penetration

This prevailing underrepresentation of TCI in Asia-Pacific and the Americas can be analysed in more detail. An initial way to look at this is to compare it to P&C Insurance penetration rates. Indeed, there is the perception that there should be a natural evolution of Property & Casualty (P&C) products in emerging or not yet fully mature (Asia-Pacific) markets.

This is supported by a comparison of the prevailing mix of P&C Products in mature markets (for instance the United States) with emerging/not yet fully mature markets (for instance the Chinese P&C market), which suggests a natural evolution of P&C insurance products depending on the immediate pressing needs (e.g. motor insurance prevails over liability insurance at an earlier stage of P&C market development). According to this perception, the credit insurance market will develop naturally at a later stage in emerging/not yet fully mature markets.
It turns out, however, that this perception is not completely accurate for the Chinese and Indian markets. Figure 6 illustrates this well, by comparing P&C country penetration rates over a mature market benchmark rate with its respective counterpart for TCI.

Figure 6 uses the "Advanced Europe, Middle East & Africa (EMEA)" P&C penetration rate as a benchmark (4.2% of GDP in 2013) and, for TCI, uses the penetration rate of 0.052% of the merchandise trade for that same region as a benchmark.

FIGURE 6:
P&C AND TCI PENETRATION RELATIVE TO ADVANCED EMEA REGION BENCHMARK



Source: Insurance Fact Book 2015

Comparing those ratios for P&C and TCI per country or region suggests that TCI in China and India is (significantly) ahead of P&C penetration. The situation is clearly different for Southeast Asian countries, for which the P&C product "evolution theory" seems to be applicable. It turns out that export credit insurance in China and India has been the main driver of the phenomenal penetration.

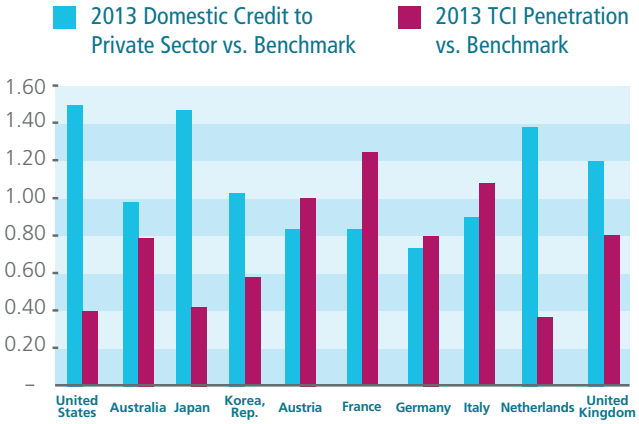
The above comparison gives rise to various other questions. Why is TCI underrepresented compared to P&C in some mature markets such as North America: is it related to the overall availability and level of funding/liquidity in the market? Or, for emerging markets, how is the evolution of TCI related to the dissemination of the banking industry, and to the significance of the private sector? Finally, what are the prevailing alternatives to TCI in emerging markets, and will TCI eventually be able to replace them?

To address these questions, it is first necessary to look at the availability and significance of "Domestic Credit to the Private Sector" (see e.g. The World Bank for data series). According to the World Bank, Domestic Credit to the Private Sector in terms of GDP for North America is at a significant level, standing at around 200% in 2013, followed by Asia-Pacific and Advanced EMEA (138% and 130% respectively), which is roughly at the same level, and Latin America, significantly lagging behind at a level of 50%.

"Domestic Credit to the Private Sector" refers to "financial resources provided to the private sector by financial corporations such as through loans, the purchase of non-equity securities and accounts receivable". This serves as an indicator of the availability of financial resources and the significance of the private sector.

Looking now at mature markets and comparing the penetration of TCI (for TCI generated – not consolidated – in the respective countries) over the Advanced EMEA benchmark rate of 0.052%, versus Domestic Credit to the Private Sector over the Advanced EMEA benchmark rate of 129% (Figure 7), seems to indicate that the higher the availability of funding, the lower the TCI penetration.

FIGURE 7:
DOMESTIC CREDIT (I.E. LIQUIDITY AND FUNDING) TO PRIVATE SECTOR VS TCI PENETRATION BENCHMARKS (MATURE MARKETS)



Source: Insurance Fact Book 2015

A linear regression analysis (x-axis: availability of funding/liquidity relative to advanced EMEA benchmark; y-axis: TCI penetration relative to the advanced EMEA benchmark; see Figure 8 below) indicates a negative correlation of -0.8 (we should point out that this value is independent of the respective choices of benchmark values).

This seems to suggest that, in mature TCI markets, the easier it is for a company to find alternative financing sources the lower the TCI penetration tends to be.

Even though the above does not pretend to be a fully-fledged model (e.g. one should be analysing a time series), applying the regression analysis to Asia-Pacific indicates that TCI is about "half way" to its (theoretical) potential for that region, as shown in Figure 9.

On the other hand, and coming back to emerging markets, Figure 9 also seems to indicate that it is necessary to have a critical level/depth to both the financial and the private markets in the first place, in order to "kick-start" TCI.

FIGURE 8:
LINEAR REGRESSION FOR "DOMESTIC CREDIT (I.E. LIQUIDITY AND FUNDING) TO PRIVATE SECTOR" VERSUS "TCI PENETRATION" BENCHMARKS (MATURE MARKETS)

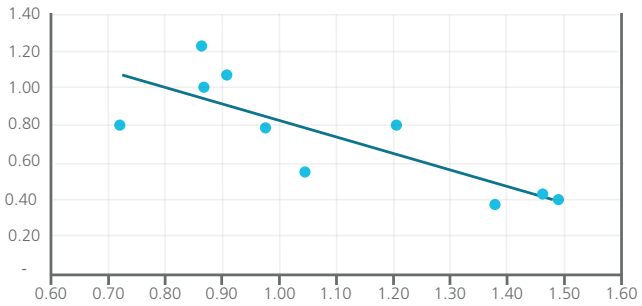
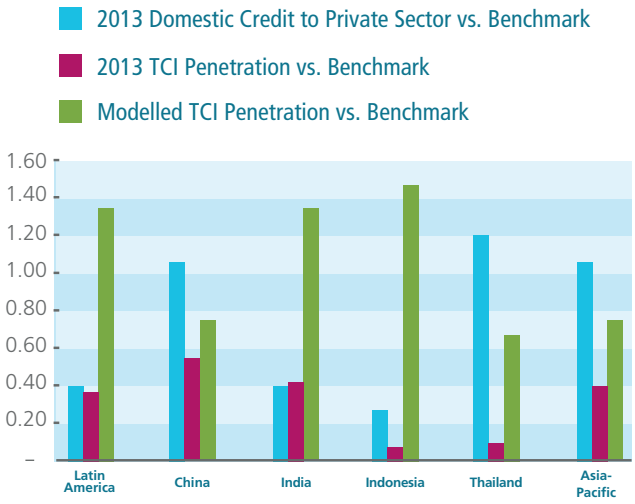


FIGURE 9:
DOMESTIC CREDIT TO PRIVATE SECTOR IMPLIED TCI PENETRATION BENCHMARKS (SELECTED EMERGING MARKETS)



Having said that, it is important to point out that a significant part of the gap between actual and potential TCI penetration in emerging markets is currently filled by other ways of securing trade. Such alternatives include the purchase of trade receivables (i.e. factoring), which is reflected in the blue bar in Figure 9, but also (and mainly) the confirmed letter of credit ("L/C") on which we will shed some more light in the next paragraph.

The "Letter of Credit" (L/T): the prevailing alternative used to secure trade in Asia-Pacific

Broadly speaking, trade secured by way of L/C is transferring the buyer's non-payment risk to the "issuing" (i.e. typically the buyer's) bank which, subject to the underlying shipment being made, and related documents being exchanged and in order, has a payment obligation vis a vis the "advising" bank. The latter, which is typically the bank of the seller, then reimburses the seller. If the seller only wants to assume the credit risk of the advising bank, the L/C is labelled as being "confirmed" which should be an even safer form of trading than using an "unconfirmed" L/C.

According to the 2013 and 2014 "Rethinking Trade and Finance" surveys published by the International Chamber of Commerce, 28% of merchandise trade in Asia-Pacific is actually secured using a letter of credit. This should be compared to the Advanced EMEA region or North America, where the respective L/C coverage rate would be around 5% of their merchandise trades (it is interesting to note that the L/C coverage ratio for Latin America is around 5% as well).

It is most probable that large parts of these L/Cs will be replaced by TCI, as this was the case progressively in Advance EMEA, and also because TCI has two major advantages:

- the seller pays the insurance premium with TCI, whereas the L/C freezes a portion of the buyer's available credit;
- with TCI the seller works with a (cancellable) credit limit per buyer and can trade on an open account basis, whereas the Letters of Credit are transaction-specific and are normally issued when an order is received.

Conclusion

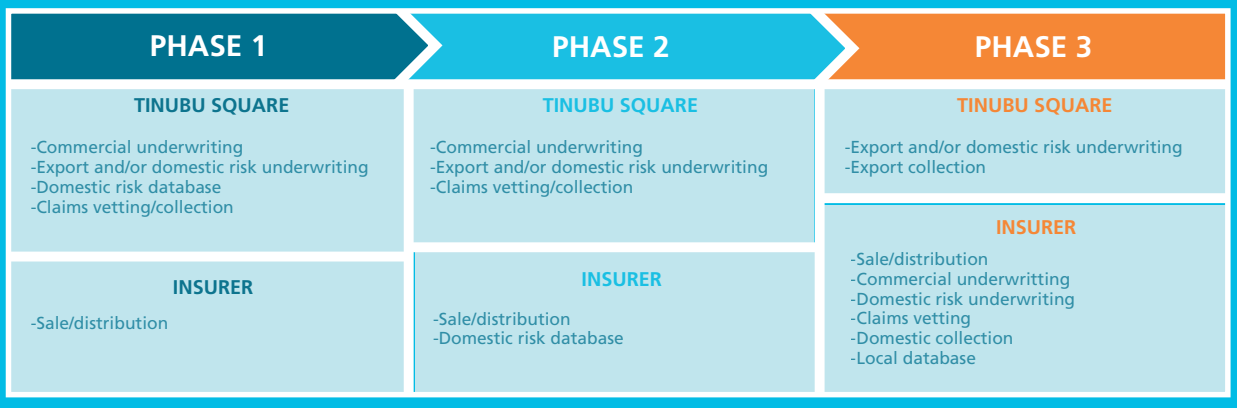
Through this article we hope to have shown that TCI growth in emerging markets, and in Asia-Pacific in particular, has significantly outpaced growth in merchandise trade, demonstrating the strong worth of the product offering, and enabling (global) trade. However, there remains a significant untapped TCI market potential, most notably on the domestic side in general, and for Southeast Asian markets in particular.

In this respect, we are of the opinion that a critical depth in both the banking industry and the private sector will drive the further development of TCI in emerging markets, and that TCI is likely to be a viable substitute for prevailing alternative instruments used to secure trade such as "Letters of Credit", most notably in Asia-Pacific.

The choice of SCOR for a local partnership to develop TCI in high growth markets

In early 2014, SCOR Global P&C entered into a partnership with a leading local Indian P&C insurance company, facilitated by Tinubu Square Risk Credit Solutions, with the goal of developing a short-term TCI underwriting practice for export and domestic trade.
This initiative aims to gradually transfer know-how and underwriting authority to the local ceding company, via a multiyear tripartite partnership as illustrated in Figure 10.

FIGURE 10:
THE TINUBU SQUARE TRANSFER SCHEME, EVENTUALLY LEADING TO THE "INDEPENDENT PHASE"



Source: SCOR

This article is based on a presentation made on October 2nd 2015. Market data and commentary rely on market conditions prevailing at the time of this conference.

WHAT ROLE FOR (RE)INSURERS IN FINANCING THE ECONOMY POST-2008 CRISIS?

François de VARENNE
CEO, SCOR Global Investments

Aged 48 and a graduate of the Ecole Polytechnique and the Ecole Nationale des Ponts et Chaussées, François de Varenne holds a PhD in Finance and is an actuary with a diploma from the Institut de Science Financière et d'Assurances (ISFA). François de Varenne joined the Fédération Française des Sociétés d'Assurances (FFSA) in 1993, where he was appointed Head of the Economic and Financial Affairs Department.

In London from 1998, he was successively an Insurance Strategist with Lehman Brothers, Vice-President at Merrill Lynch in charge of asset management solutions and structured transactions, specialising in insurance and reinsurance companies, before becoming Vice-President at Deutsche Bank. He was then Partner at Gimar France & Cie from 2003 to 2005.

He joined SCOR in 2005 as Director for Asset Management and Corporate Finance, becoming Group Chief Operating Officer and member of the Executive Committee in September 2007. He has been Chief Executive Officer of SCOR Global Investments since October 2008.

This article is a demonstration on how the current global recovery, which has developed positively since SCOR's last strategic plan was presented in September 2013, will enable SCOR Global Investments to generate higher investment returns by 2016 and to accelerate its positioning as a niche third-party asset manager.

Decoupling between Europe and the United States (US) is confirmed

The global recovery of economies is confirmed, but is affected by a number of headwinds, in particular since the beginning of this year: financial markets have been focusing on the slump in oil prices, major currency movements, and the European Central Bank (ECB) Quantitative Easing program. The second quarter of this year was marked by the situation in Greece and the Fed exit strategy. China's slowdown this summer drove a strong pull back on global equity markets.

The current context, though positive, is challenging and has resulted in increased volatility and risk aversion.

FIGURE 1A/1B/1C:
GROWTH DOMESTIC PRODUCT (GDP) GROWTH;

Source: IMF forecasts as at July 2015 (World Economic Outlook)

Nevertheless, the global economic situation continues to improve in developed economies. Growth continues to be strong in the US, as confirmed by the second quarter data. Unemployment dropped to its lowest level since April 2008, and inflation, even though still low, is accelerating to the 2% target of the Fed (Figure 1a).

Although the overall environment remains fragile in Europe, some factors are clearly supporting the economy such as the dovish monetary policy of the central banks, lower commodity prices and the Euro level, temporarily improving the relative competitiveness of the Euro area (Figure 1b). The Eurozone is entangled in an accommodative monetary policy.

Even though the ECB revised its growth and inflation expectations downwards end of September, bear in mind that they still follow a positive trend.

However, the situation for emerging markets, particularly in China, is quite different (Figure 1c). Growth in China has been constantly decelerating for the past few years and Chinese authorities have recently implemented a more supportive monetary policy.

This raises two questions:

- What will be the pace of China's economic deceleration? Our assumption at SCOR is that it will be most likely a soft landing, not a hard one.
- Taking into account the deceleration of the Chinese economy, what will be the impact on global markets worldwide? In our globalized context, multiple contagion channels exist. However, a recent projection by the Organisation for Economic Cooperation and Development (OECD) shows that the contagion effect from China will remain somewhat limited.

Going back to developed economies, which represent the bulk of our invested assets, decoupling of economic cycles is confirmed between the US and the UK on one side and the Eurozone on the other side. In the US, given the supportive environment, the question is no longer if, but when and at what pace the Fed will increase rates. The situation is fairly similar in the UK. In contrast, the Eurozone is entangled in an accommodative monetary policy which will most probably result in a prolonged low yield environment. SCOR has fully taken into account this environment, which justifies the positioning of our investment portfolio.

How does SCOR answer to the prevailing economic and financial environment?

Moving on to the tactical positioning of our portfolio, in this low yield environment, SCOR Global Investments is strictly remaining within the risk appetite framework that was defined for SCOR's last strategic plan. Interest rates are at historical lows today.

At SCOR, we have not increased our risk appetite, but we are able to increase the investment return within the investment portfolio by taking advantage of our unique currency mix in the investment portfolio, as a result of a strict currency matching policy between the assets and the liabilities.

The US dollar represented almost 46% of our invested asset portfolio at the end of the second quarter of this year (Figure 2).

This bucket benefits from a more supportive interest rates environment with steeper yield curves. As a consequence, we have tactically adopted a different portfolio positioning by currency bucket within our investment portfolio, and the US dollar-denominated portfolio benefits from a stronger bias towards corporate bonds, with a longer duration.

In contrast, the euro denominated bucket represents only one third of the portfolio. Yield curves are very flat, anticipating a prolonged period of low interest rates. In that context, there is limited value to invest on long term fixed income securities. Anticipating this prolonged low yield environment, two years ago we started to diversify the portfolio, deciding to focus on loans and real estate which are providing better value on the euro market today.

The second important item in the implementation of our investment strategy is the progressive re-matching of the portfolio towards the target duration. Figure 3 shows the material duration increase that we have implemented over the past few quarters, which has mostly been done on the USD and GBP buckets. We will continue to progressively reduce the duration gap over the next quarters and continue to benefit, on this particular front, from our unique currency mix.

FIGURE 2:
INVESTED ASSETS AT SCOR: 68% DENOMINATED IN CURRENCIES WHERE INTEREST RATES ARE INCREASING

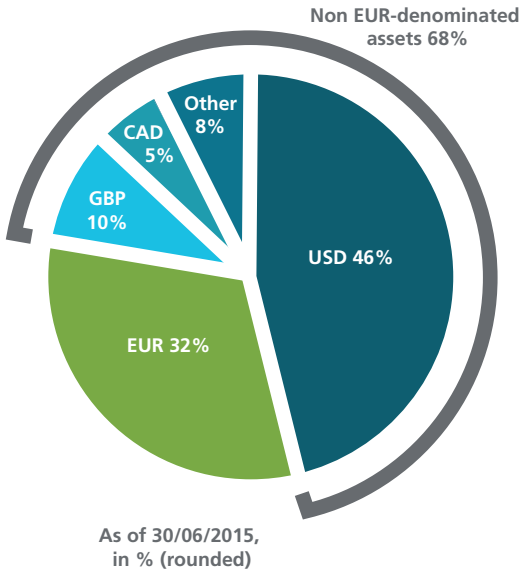
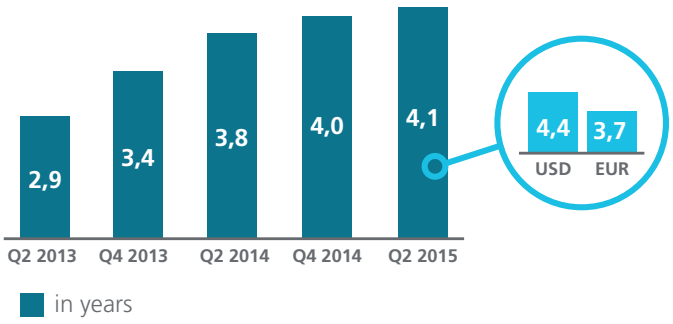


FIGURE 3:
EFFECTIVE DURATION OF THE FIXED INCOME PORTFOLIO OF SCOR. AS OF SECOND QUARTER OF 2015, THE DURATION OF SCOR INVESTED ASSETS STANDS AT 3.2 YEARS.



Development of loans as a new asset class in SCOR strategic asset allocation

The last wave of heavy regulation, especially in the banking industry, has created market segmentation and inefficiencies where value can be extracted more easily for investors. In this context, European loans are of a particular interest with a distortion of the market that should last for several years thanks to the joined influence of Basel III, CRDIV, Solvability II and a low yield environment.

Loans are one of the most significant adjustments we made in the asset allocation of the company during the last few years. Investing in loans does not put us in a direct relationship with the ultimate borrower, which means we are not in charge of the origination of the loan, the structuring of the loan or renegotiating terms and conditions with the borrower. We make sure when investing in loans that we have a full alignment of interest with banks and that a significant portion of the loan is kept on the balance sheet of the bank.

If there is any issue in the future which means a restructuring of the loan or a default of the company that has issued the loan, we want to be sure that the bank will protect its own interests, aligning their interest with us.

We have developed an internal expertise on 3 selected sub-segments of the euro loan market (see Figure 4):

- **Leveraged loans:** typically debt issued by a company under a Leverage Buy Out.
- **Reals estate loans:** typically, the security package through a real estate project is the entire building put up as collateral for the debt and typical leverage ratio is 50%. The loan has a protection on 100% of the value of the building, with strong collateral on the building in case of default. The type of remuneration we have on this asset class is in the range of 200-350 basis points (bps) over LIBOR.
- **Infrastructure loans:** typically quite long, 20 to 30 years, through a concession with a guarantee of the government or the country. For SCOR the maturity is too long, so we prefer to focus on some niches of the infrastructure market, like renewable energy. The remuneration is a little lower because the risk is lower, and the average weighted average maturity is around 10 years.

Since 2013, the investment strategies of this loan platform have been selectively opened to institutional third-party investors.

FIGURE 4:
SCOR GLOBAL INVESTMENTS STRATEGY IN THE LOAN MARKET: FOCUS ON 3 SELECTED SUB-SEGMENTS

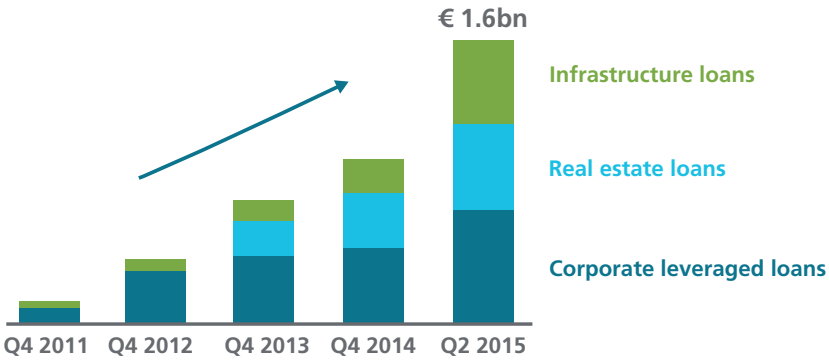
	LEVERAGED LOANS	REAL ESTATE LOANS	INFRASTRUCTURE LOANS
OUR STRATEGY	*Favoring private loans*	*Continue to favour value-added projects*	*A right mix between infrastructure and renewable energy*
KEY FEATURES	LBO/acquisition corporate financing Syndicated and standardise loans	Value-added real estate financing Average loan-to-value <65%	Tangible asset financing Defensive brownfied and greenfield mix
TARGETED RETURN	Libor/Euribor + 400 bps	Libor/Euribor + 200-350 bps	Libor/Euribor + 100-300 bps
AVERAGE LIFE	3-5 yrs	3-5 yrs	10-12 yrs
AVERAGE RISK PROFILE	Sub investment grade	Low investment grade	Low investment grade
EXPECTED LOSS GIVEN DEFAULT	25%	15%	20%

Today, our loan platform consists of around twenty professionals combining sourcing, analysis, risk and legal expertise and managing north of EUR 1.5 billion of loans. SCOR's portfolio is being ramped-up quickly, and we leverage on the recent successes of our funds on the 3 sub segments to launch new vintages with a growing proportion of third-party investors. As shown on Figure 4, our platform is growing rapidly, compared to what was managed in 2011.

Opening our strategies to external investors is at the heart of our strategy and our investment philosophy. Third party investors represent circa 50% of the loan platform AuM, enabling SCOR to:

- strengthen its market access
- increase its average investment size while maintaining a strong portfolio diversification

FIGURE 5:
EVOLUTION OF AuM OF THE LOAN PLATFORM (INCLUDING UNDRAWN COMMITMENTS)



SCOR and third party investors AuM, in € million

Conclusion

Our investor base is expanding and is more and more diversified. We have now established good and recurring relationships with a number of Tier 1 institutional investors. We have also enlarged the number of asset classes opened to external clients.

During the first quarter of this year, SCOR Investment Partners, the asset management company of SCOR Group, has reached the EUR 1 billion mark in terms of assets under management on behalf of third-party investors, which is a very important milestone for us. We continue to gather assets, even in the less supportive context we are facing today, which is also a strong testament to the quality of our products and of our teams. Given our high momentum, we are confident that we will stay in line with our strategic plan assumption of EUR 1.5 billion in terms of assets managed on behalf of external clients by the end of the current strategic plan.

MANAGING (GEO)POLITICAL RISKS: NEW RISKS, NEW OPPORTUNITIES FOR (RE)INSURERS?

Victor PEIGNET
CEO, SCOR Global P&C

Since July 2005, Victor Peignet has been the Chief Executive Officer of SCOR Global P&C, the operational entity in charge of all non-life (re)insurance business worldwide for the SCOR Group. He is a member of the Group Executive Committee.

He joined SCOR's Facultative Department in 1984 from the offshore contracting industry. He has more than 15 years' underwriting and management experience in Energy & Marine insurance with SCOR. He has headed the Corporate Business Division of the Group (SCOR Business Solutions) since its formation in 2000, first as Executive Vice President and as Managing Director from April 2004.

Introduction

The risks that we underwrite at SCOR are no different from those that corporates (insureds), insurers and reinsurers generally come across. These risks can be classified into three categories, as shown in Figure 1:

1. **Macroeconomic risks** (i.e., interest rate credit risk, foreign exchange risk, market risk and public debts and monetary policies),

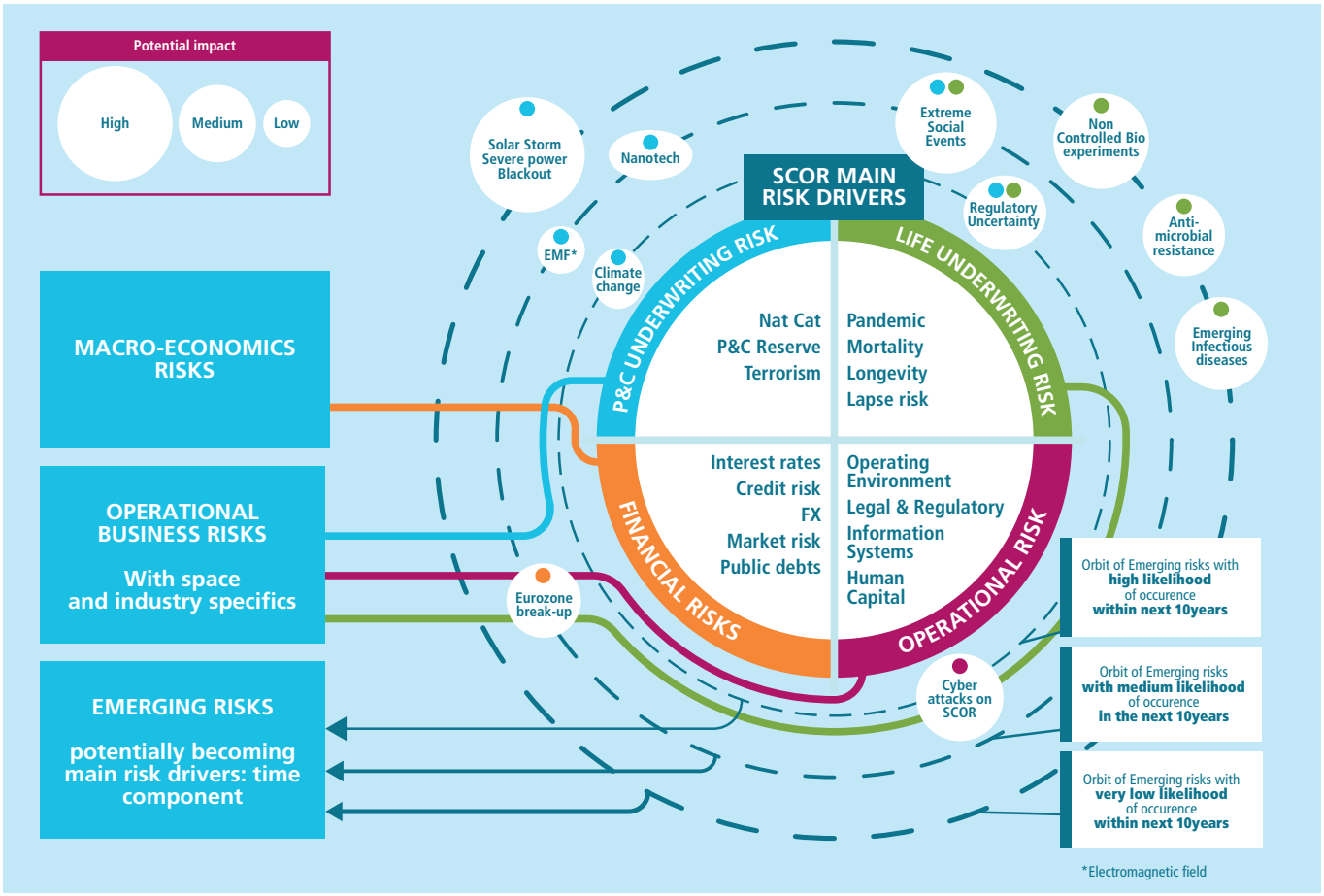
2. **Operational business risks** (containing elements of geography and industry specifications), and

3. **Emerging risks.**

These emerging risks can be distributed across three different orbits, each corresponding to a certain likelihood of materialisation within a 10 year horizon. The scale ranges from risks which are considered as the most likely to materialise, to those seen as more remote. Some of these risks, such as natural catastrophes or political risk, can be traditionally viewed as geopolitical, whether directly or indirectly.

In this presentation, we will show how the perception of risks has evolved from more "traditional" natural catastrophe-related risks, to more contingent and economic risks, and how risks have progressively gained a geopolitical nature, because of the globalisation of the world's economy: what could have been an isolated, local event 20 years ago is now more likely to be an event with direct or indirect global and geopolitical repercussions. The fundamentally evolving nature of risk repercussions is having a tremendous impact on insureds, insurers and their reinsurers: the overall risk transfer chain is being transformed, and requires deep analysis and understanding of risks by its stakeholders.

FIGURE 1:
THE UNIVERSE OF EMERGING RISKS FROM THE POINT OF VIEW OF SCOR



Source: SCOR

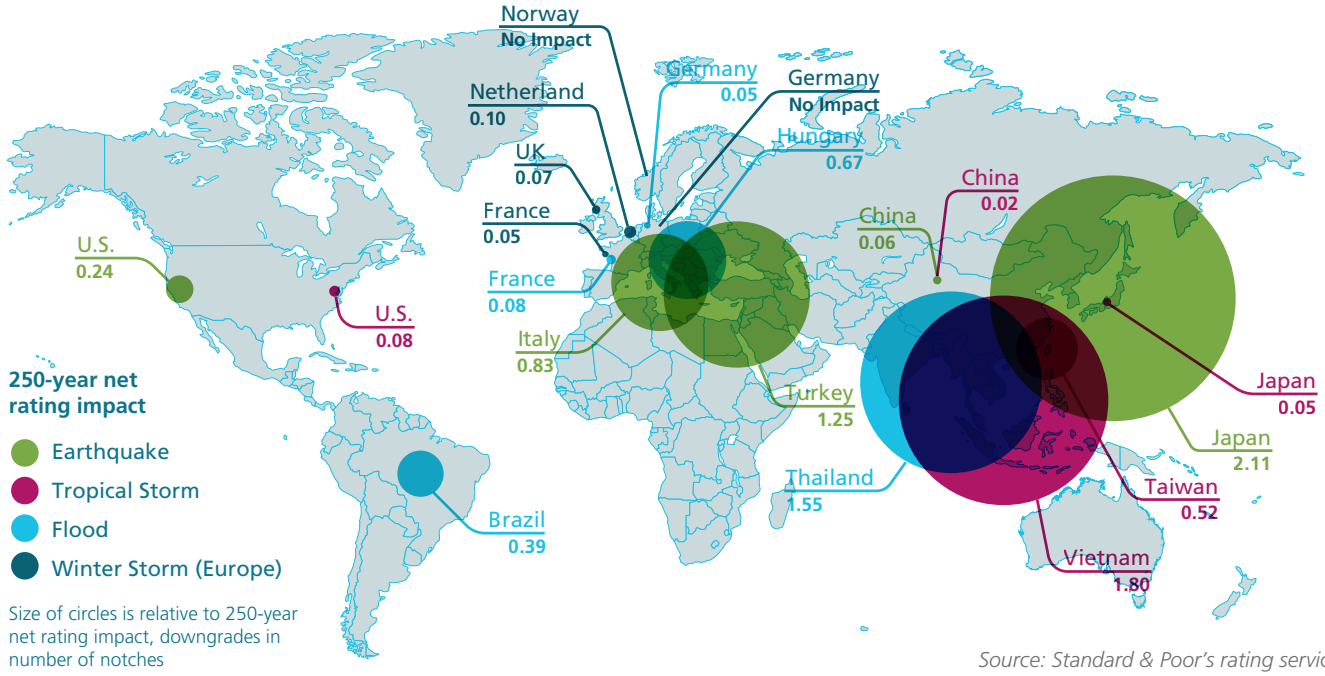
Natural Catastrophes have always had, and still have, severe repercussions on the global economy

Natural catastrophes remain the most visible and sensitive part of the (re)insurance industry. Nevertheless, they are a long way from being fully and properly covered in most of the countries, including mature, developing and emerging markets. There has systematically been major gaps between the economic and the insured values in the history of major natural catastrophe losses sustained, whatever the peril and the affected zone may have been, which means there is a huge amount of potentially insurable substance that is neither insured nor reinsured. This is what is commonly referred to as the "protection gap". And this "gap" still very much relates to one of the most ancient risks against which human societies have sought protection: Nature.

First and foremost, these natural catastrophes have human consequences, followed by economic and insured consequences, which in turn can have far-reaching macro-economic and financial consequences: Standard & Poor's has published a study linking the extent of natural catastrophe risks, their impact on local economies, and the consequential risk of downgrading on countries' sovereign ratings as a function of the insurance penetration rates. (See Figure 2)

Sovereign ratings play such a key role in global finance that they drive significant parts of the global economy and financial system, being a frequently used indicator of the perceived solvency of all companies from a given country. While all countries face this significant natural catastrophe related risk to their credit ratings, only a few of them seek to mitigate the risk through (re)insurance mechanisms.

FIGURE 2:
SIMULATED NATURAL CATASTROPHES IMPACTS ON SOVEREIGN RATINGS



Source: Standard & Poor's rating services

It is part of the role and field of expertise of (re)insurers to help to close the gap between economic and insured losses, whether in emerging countries where this gap frequently impedes sound social and economic development, or in mature markets where there is a growing need to build and expand effective public-private partnerships, in order to more effectively manage the challenges associated with catastrophic losses in view of the current economic stagnations/depressions and budgetary burdens.

Even though natural catastrophes are probably the most ancient risks against which human societies have sought to protect themselves (most notably since the Lisbon 1655 earthquake), they remain the most under-(re)insured risks.

A more and more globalised perception of risks

As economic and social development has progressed, the nature of risks and the perception of them have both evolved, leading to what are fundamentally risk-aware societies and economies. In fact, economies and societies have probably never been so risk-aware, if not so risk-averse.

This is well illustrated by the yearly Allianz Risk Barometer 2016[1] on the perception of risk for businesses worldwide, which shows that there is a growing convergence of risk perception throughout the world. The three geographical regions of the survey are the Americas, Asia-Pacific, Europe, and Middle East & Africa. In the ranking of risks as they are perceived by a large sample of companies in each of those three regions, the top perceived risks are very similar (but in different orders): business interruption and supply chain disruption, market developments, macro-economic developments, natural catastrophes, cyber incidents or changes in legislation and regulation.

> "THERE IS A GROWING CONVERGENCE OF RISK PERCEPTION THROUGHOUT THE WORLD."

[1] http://www.agcs.allianz.com/assets/PDFs/Reports/AllianzRiskBarometer2016.pdf

The growing place and role of "political" risks

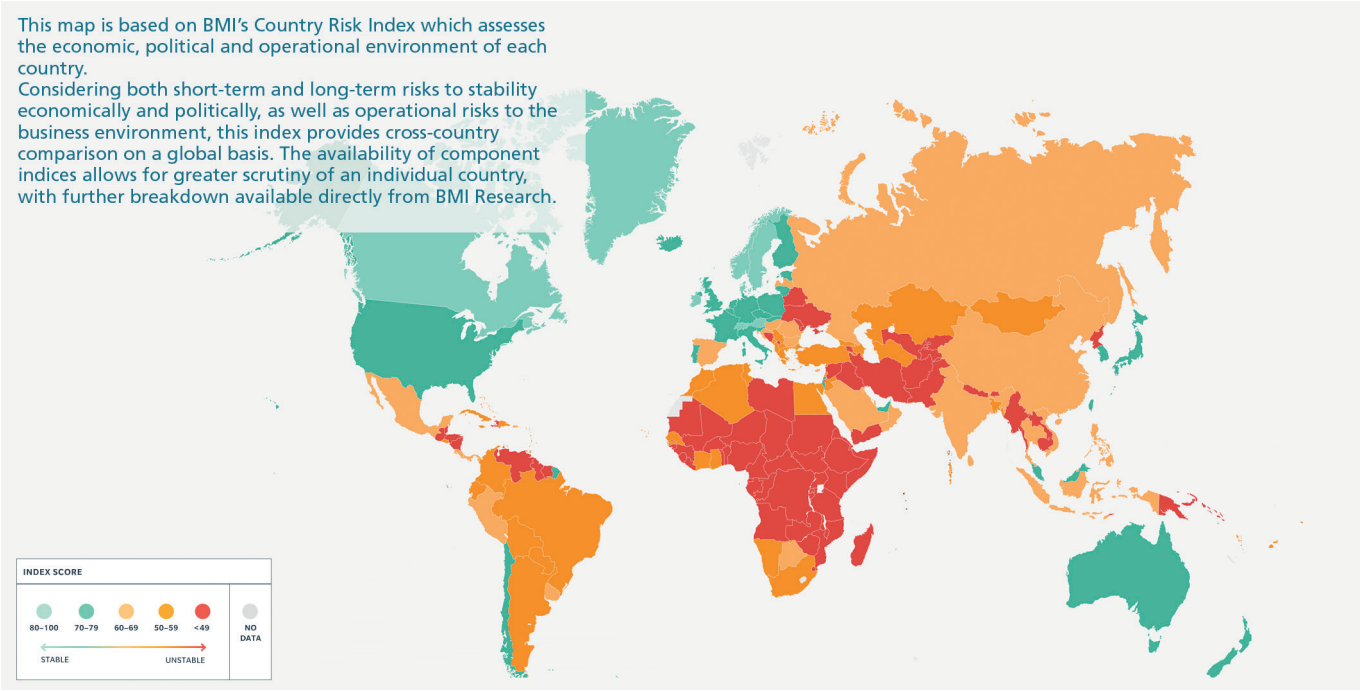
As far as political and political violence risks are concerned, the situation today (Figure 3) is characterised by three main trends:

1/ One of the most important elements is the volatility and recent downward trend (collapse?) in oil prices, which is significantly impacting a number of countries and making these countries to move from a state of relative wealth to a much more constrained situation. Whether or not this wealth was distributed within the countries is another matter but, in any case, the degree of dependence of the countries on oil & gas and commodities and their level of industrialization are going to play a critical role for their social and political stability and integrity.

2/ The second element is political instability, which is growing globally. The number of politically destabilised countries is increasing, putting an additional burden on political risks, and creating greater (re)insurance needs.

3/ The third element is the growing divide between so-called "emerging economies", with a diverging perception between China, India and Indonesia at one end and Russia and Brazil at the other, and possibly soon a further divergence between India at the upper end and China and Indonesia.

FIGURE 3:
POLITICAL RISK IN 2016



Source: Marsh's political risk map 2016; Business Monitor International

The combination of the above-mentioned factors has led to a shift from the traditional treatment and perception of geopolitical risks. Since 2007, many shocks have been felt all over the world, such as financial illiquidity, financial market failures, the materialisation of systemic risk, and unprecedented public debt levels in most countries, whether they are mature or developing.
This is shaping new geopolitical risks.

Essentially, what started as a US financial (sub-prime) problem in 2007 morphed from 2008 into a global financial crisis, which in turn led to an economic crisis, with profound social consequences in many countries, which number keeps increasing. These social crises led themselves to political instability, forcing global powers to refocus on their domestic issues, and opening up a number of global governance and (geo)political instabilities. These instabilities are being felt at various levels depending on the regions and countries concerned, and are being dealt-with in contrasting ways.

All of this has produced what is today a globally more geopolitically exposed world, with increased risks and volatility all round.

Tomorrow's (if not today's) risks: Cyber and Supply Chain risks

a. Cyber risks

Cyber risks emerged in the United States in the late 1990s, and are now becoming a major insurance issue, with an expanding focus on Europe.

Among large corporations, there is a growing perception at board level that cyber risks are very serious, and that it may be necessary to transfer part of these risks to (re)insurers: Transferring risk that you have identified can indeed be an efficient way to manage capital in a sound manner.

So far, we have not found a way to start discussions to build a proper, sound and balanced cyber (re)insurance market. People are counting on the new European Directive obligations to declare and to disclose cyber-attacks in Europe. Although it is impossible to predict whether this will be a product for the future or not, there is no doubt that the risk is real today.

b. Supply chain risks

Another risk whose extent has more recently been understood lies in the Supply Chain: the 2011 Thai floods made us aware of the geopolitical risks resulting from the globalization of economies and trade. These risks lead to bottlenecks in supply chains worldwide, highlighting the concentration of monopoly suppliers in certain countries and the extent to which these suppliers are exposed to natural catastrophes.

Although there has been a lot of improvement in risk awareness and mitigation techniques since the 2011 Thai floods, supply chains remain extremely complex and they lack transparency. Insureds have made progress in risk management, but the insurance/reinsurance market still offers blanket coverage, settling for a soft market and ignorance, which is unacceptable.

The supply chain can also affect casualty (re)insurance. Product liability is a form of catastrophe casualty risk that can become geopolitical. If a given product is disseminated throughout a number of industry sectors, it can have detrimental secondary effects in the countries where these particular base products are being incorporated. As illustrated in Figure 4, this can emerge with a time lag of decades, in some cases at the level of first, and even second generation consumers, and this is creating a massive accumulation of possible casualty risk for insurers and reinsurers.

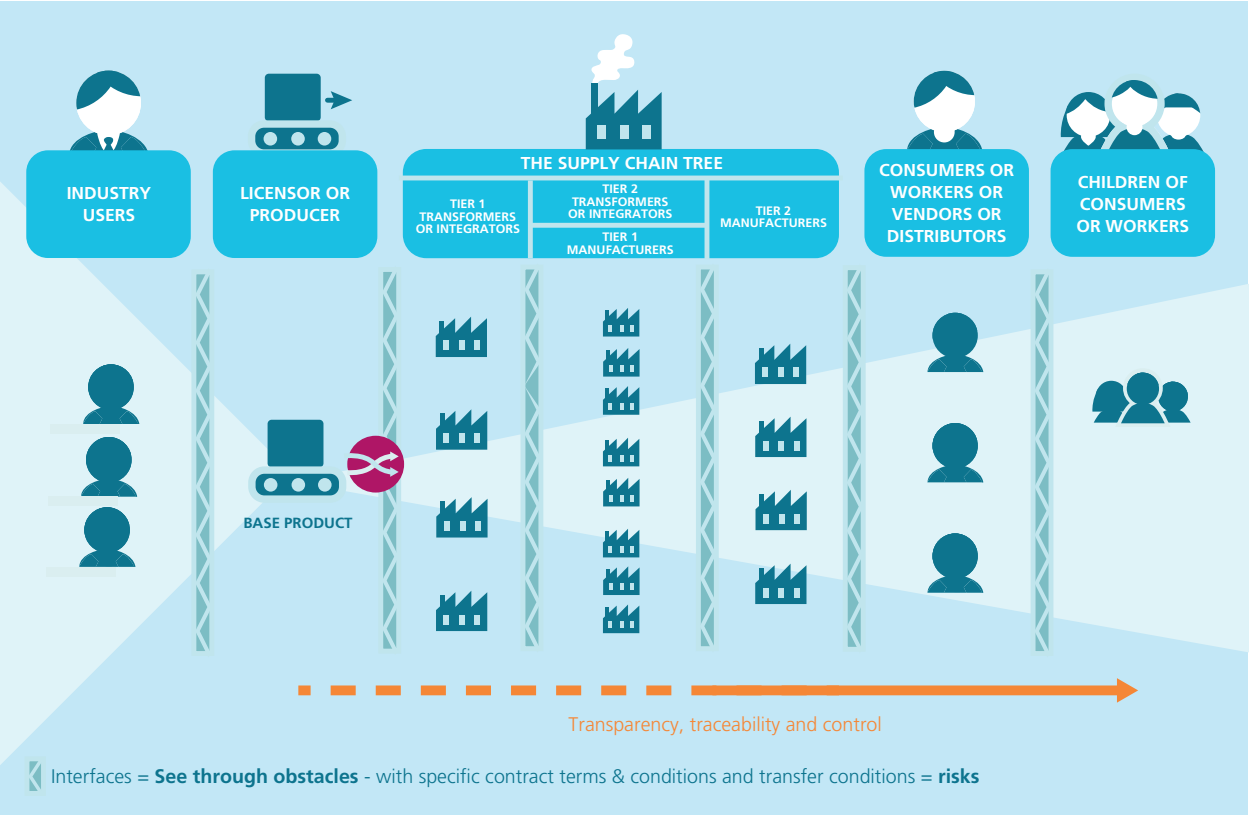
At SCOR Global P&C, we have embarked on sponsoring thorough studies to identify and monitor base products that have the potential to cause detrimental effects throughout the world, in the hope of developing a system of alerts to notify insurers and reinsurers in due time of the risk of potential exposures to materialize in catastrophes. Another element of risk perception is the industry sector. Insureds are segmented by industry sector, with perception of risk varying widely between these sectors. Changes in regulation and legislation, and the political risks that are adjacent to this, are becoming predominant in the perception of risk.

The role of a (re)insurance company can be summarised as identifying uncertainties, identifying risks, trying to quantify them, creating modelling in order to better apprehend the distribution of losses, determining the frequency and severity equation of identified risks, and trying to develop some insurance and reinsurance solutions. The (re)insurer's job is to help clients absorb shocks and to help society continue its progression by smoothing over shocks when they do occur: reinsurers provide capital, in the form of underwriting capacity.

At SCOR, we try to build and transfer product knowledge from one part of the world to another, offering insights into how a given product might operate in a given environment. We believe that the alignment of interests between the insurer and the reinsurer is essential.

Creating shared best practices is certainly the best approach for a long-term partnership.

FIGURE 4:
CAT AND CLASH RISK STEMMING FROM LIABILITY EXPOSURE IS AMPLIFIED BY INTERDEPENDENCIES AND THE WORLDWIDE DISTRIBUTION CHAIN



Source: SCOR

Concluding remarks

When it comes to managing risks, one of the key challenges is how to create a proper market and how to create the right conditions for risks to be properly shareable and transferrable. The insurance market is based on mutualisation, which involves accepting a certain degree of anti-selection, but this must be controlled and contained within appropriate limits. In a country where a legally-based system has been operating for a number of years, albeit with some drawbacks, it can be a major challenge to change laws and go against the inertia of people who are used to live in the existing system and accept it.

If the system is non-existent or failing, how can (re)insurers offer a solution to a country where natural catastrophe is a major risk? Mutualisation will not work if those who are exposed are the only ones buying insurance: it becomes impossible to find a premium that is economically viable for the insurers, economically bearable for the insureds and by which a balanced, mutualized market can be created. A number of countries in the world today are blocked by this type of situation when it comes to covering the natural catastrophe risks just as when it comes to finding solutions to handle debts that are out of scale compared to the tax paying capabilities in these countries.

One country that seems ready to address this issue is the UK. The Flood Re pooling system is trying to address the lack of flood insurance in the UK. This partly subsidized system has been designed to cover a period of 25 years and only time will tell whether this commitment can withstand the changing political landscape in the future. This is a joint venture between a government that wants to address loss prevention, and an insurance market that accepts that, through this effort, perhaps it can create a market for flood insurance in 20 to 25 years.

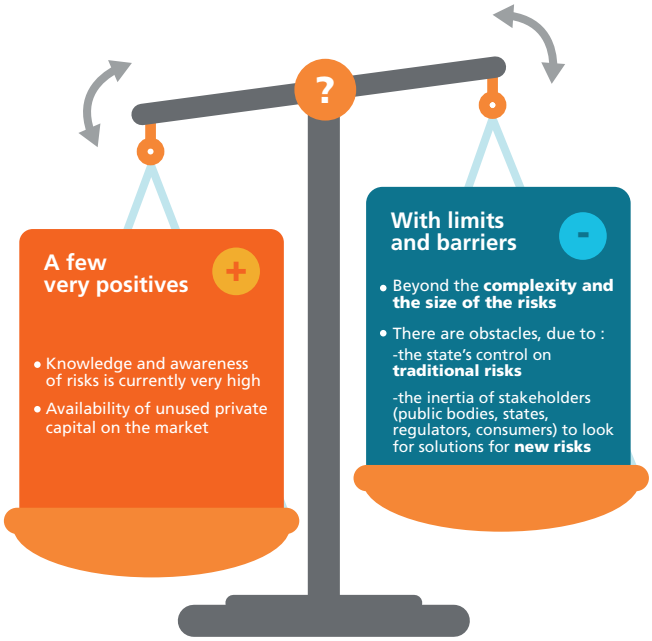
Changing a system is a long-term commitment between the insurance industry, consumer associations, and government bodies.

A lot of effort is still needed to create casualty (re)insurance products that are technically sound for all stakeholders. Products able to address the asymmetry of information between the insureds and the insurers for casualty risk, or the propagation and accumulation of risks across industry sectors for cyber risk, are not yet sound or commercially viable in the long term.

From a (re)insurance perspective, and with the exception of supply chain and cyber, there are not many risks today that offer Property & Casualty (re)insurers the opportunity to expand their market. (Re)insurers must drive their propositions towards a position whereby countries, governments, insureds and consumer associations can see the validity of ensuring that this market takes off.

A lot of capital is currently being left unused, and finding the ways and the means to have it put to work is in the best interests of all the stakeholders. The complexity of geopolitical risks, the lack of information and the difficulty involved in quantifying risks individually and collectively, are obstacles to the development of a proper market in which those risks could be transferred to our capital and to the unused financial market capital that is abundantly available today.

"CHANGING A SYSTEM IS A LONG-TERM COMMITMENT BETWEEN THE INSURANCE INDUSTRY, CONSUMER ASSOCIATIONS, AND GOVERNMENT BODIES."



Source: SCOR

There is a certain amount of inertia regarding the transfer of well-known, "traditional" risk, where existing systems block the ability to transform, if not to reform, thus preventing the development of a balanced marketplace.

There is also inertia regarding the identification of new risks. An agreement must be made to deal with certain risks. The consensus today is that we, as an industry, have not been able to reach this agreement. The challenge for the reinsurance industry going forward is not reinsurance itself, but the lack of growth in insurance, the low penetration rates of insurance in most markets and the fact that we have not yet found solutions to sustainably increase these penetration rates.

WHAT NEW DEAL BETWEEN THE INSURANCE AND REINSURANCE INDUSTRY AND THE STATE TO MANAGE THE RISKS OF THE XXI CENTURY?

Nicolas BAVEREZ
Partner at Gibson, Dunn & Crutcher LLP

Nicolas Baverez is partner in the Paris office of Gibson, Dunn & Crutcher. Mr. Baverez's practice is focused on privatizations, public-private partnerships, regulatory law and complex transactions. He has extensive experience representing and assisting the French State, governmental bodies and state-owned and private entities in their development, the management of their regulatory environment and their administrative and arbitration proceedings. He previously served as a magistrate in the Cour des Comptes, was a member of staff for the President of the French Parliament and was the Director of Communication and Business Development at FIMALAC. He has practiced as a lawyer since 1998 and has managed the Public Law activity of two Paris law firms.

The beginning of the end of history

We are living in the century of universal history, driven by globalisation. The following three main trends have been observed:

- A balance of integration with universal capitalism and technologies, and divergence in a multi-polar world. There is no longer a true super power that will be able to reinsure the world order and we have very diverse values, institutions and rules.
- General and global competition, not only between companies, but also between nations, political and social systems.
- Globalisation has led to the take-off of emerging countries around the globe: more than one billion people have come out of poverty during the last quarter of a century.

This new world has been interpreted as the beginning of the end of history. On the contrary, history is accelerating and is linked to unprecedented, unexpected events around the globe.

Major shifts

Could a developed country lose 30% of its GDP? It sounds impossible, but it has happened in Greece. Is it possible for more than one million migrants to arrive in Europe within one year and for a city like Berlin to receive 1,000 people per day? It may sound mad, but it's our reality. But these surprising events are happening in business as well. We have seen Volkswagen crash and burn in 2015. New business models are emerging that will challenge established industries like Airbnb, BlablaCar or Uber.

Looking at these history or business examples, we must conclude that the key factor is disruption: improbable, extreme and irreversible events. And our world of disruption must be managed. Major shifts are taking place, like the historical paradigms of past centuries: at the end of the 19th century, we had deflation, the establishment of labor law; the Great Depression implemented the beginning of mass production and consumption and brought about the creation of the Welfare state; the oil chocks of the 70ies ended the Keynesian era.

We will clearly be facing major revolutions in the next century.

- Population is the first revolution. The world population will grow and then stabilise, concentrating within a network of cities after a shift from rural life. In addition, by the second half of this century, 60% of the world population will be located near the coasts.
- Another revolution is in technology. This includes the Uber-isation of many sectors of the economy as well as the emergence of cyber risk. Automatic cars, for example, will totally change the automobile insurance model.
- There has already been a big shift in capitalism, bringing an increase in entrepreneurship and partnerships.
- Alongside the crises of capitalism managed for the past five years, we are now confronted with the comeback of geopolitical risks. The main elements of these risks are of course the current wars, and also the rise of empires making a comeback, such as China, Russia and Turkey.
- Finally, there exists a convergence between criminal and terrorist activities. For example, trafficking is a cross border business: it is possible that the same people who are trafficking cigarettes are also trafficking drugs, migrants and weapons, it is the same profitable business.

What does this mean for risk?

There has been a transformation of nature with the rise of global risks.

This leads to the transformation in the intensity of risks, which amount to increasingly large percentages of countries' Gross Domestic Premiums (GDP).

Fukushima made up 5% of Japan's GDP, Chile 10% and the floods in Thailand 15%. Then you add the risk of pandemics and terrorism. In the last decade, each year there were 2,000 deaths by terrorism. Today it is 20,000 a year.

There has also been a transition linked to the change of the location of risk. Traditionally, the insurance and reinsurance industry was a Western industry, but now most are in the South or in the East.

This means that we have to adapt to this changing world. There are also lots of positive aspects and new frontiers for growth which include:

- Big international cities and their network throughout of the world.
- The rise of the new middle class in the emerging countries, particularly in Africa, with 5.5% of growth since the beginning of this century and one billion supplementary population up to half of this century.
- The digital economy, the green economy and the silver economy –important sources of growth and business.

How to manage this new environment?

States and politicians in the developed world have had to deal with the damages of the crises, such as underinvestment, especially in Europe, under competitiveness, unemployment and debt. The Western states are going bust, with 120% of public debt and the liabilities of the welfare state between 200% and 450% of the GDP, varying with countries.

On the other hand, it is important to invest to try to adapt to the new challenges, such as the ageing population, the environment, and the necessity to invest in the green and digital economy, with its impact on the States and the services they are delivering to the population.

Looking at the world as it is now, the big divide is no longer between the triumph of the South and the decline in the North. In addition, the monopoly of the West and the Welfare states to manage risks has ended. The creation of the pension schemes was the answer to the terrible crisis of the thirties, when the problems were unemployment, health and of course ageing people. In fact, the Welfare states are now bust and they are not able to deal with the new risks. For example, dependence and dementia will be very big problems for the developed world, and there is no clear answer of the Welfare state.

This unsustainability was very well explained by Angela Merkel when she said, "Europe is 7% of the world population, 25% of the world production and 50% of the world social transfers." This very simple sentence highlights the fact that managing risks require innovation.

Since the eighteenth century, it was the role of the State to maintain civil order within nations and society and to guarantee national sovereignty against external threats. Today, some States are collapsing and are unable to manage risks, or will even create risk by their collapse.

"THE PUBLIC/PRIVATE PARTNERSHIPS AND INTERNATIONAL COOPERATION IS KEY."

They are facing two challenges: from the top with the bypass by technologies and the market, and from the bottom with the autonomy of the regions, the big cities, the movement of society and individuals.

For this reason it is very difficult for the State now to answer for these new risks. Taking the example of Google, we see that the regulation authorities in the US as in Europe experience critical difficulties in human resources and in expertise to deal with Google and its advanced technology.

We have to confront with this multi-polar world, dealing with various countries, cultures and civilization to try to manage this risk. The US is no longer a superpower able to reassure the world capitalism. There is a new paradigm now, with new responsibilities for markets and companies. The public/private partnerships and international cooperation is key for this new management.

I believe one of the main ideas and a very important consequence of this new technological revolution is the fact that there is no clear difference now between the producer and the consumer. It is possible for an Uber cab driver to use an Uber cab, or an Airbnb host to use Airbnb as a guest. Crowd funding makes it possible to invest, and to receive funds and capital. This is a major change that is true in risk management too.

Conclusion

In conclusion, individuals, nations and companies have to adapt to this new world or they will suffer.

I do not believe that we will have a world without the State, but it will be very crucial for States, private companies and people in society to cooperate to manage new risks. No doubt in this new world there will be an important increase in the need for protection, but with different ways to manage the risks.

Whether it is terrorism, cyber risk, or climate change, there is an absolute need for international cooperation because all of these risks are global. The idea to manage these risks through a sole nation or State is no longer a pertinent and efficient idea. That is why we will have to work on the institutions of this multi-power world.

The six lessons we must learn in order to manage risks are:

- Anticipate
- Be resilient to shocks and surprises
- Adapt
- Innovate
- Have a global and strategic vision
- Cooperate between the States, the business and the citizens

In the words of Thucydides about Peloponnese "to rest or to be free is the fundamental choice".

I believe that we must not rest, but we must work because the management of global risks is not only fundamental for growth and prosperity in the 21st century, it's fundamental for freedom too.

MANAGING POLITICAL RISKS: AN INSURER'S POINT OF VIEW

Ian ROSS
Executive Director and Group Chief Underwriting Officer, Hollard

Ian Ross is an executive director of Hollard insurance Company Ltd, South Africa's largest independent insurer. Ian started his insurance career underwriting construction and engineering risk in South Africa, moved into insurance broking in the South African and London market and joined the Hollard group in 1995 focusing on Rent a captive and risk finance activities. Since then, Ian has held various executive positions within the Hollard group and currently holds the position of Group Chief Underwriting Officer with responsibility for the group's reinsurance strategy and purchase. In addition Ian is head of strategy for the group's international expansion in Africa and Asia.

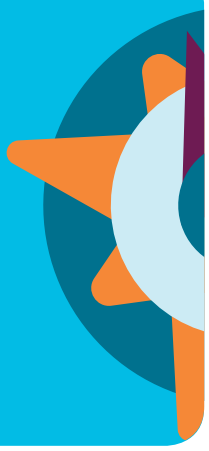
Different perception of political risks

An emerging market such as South Africa develops its own perception of political risk based on local knowledge and experience but international perceptions may differ substantially. To illustrate look at Figure 1 showing a different somewhat light-hearted summary of the perception of Africa from different viewpoints. Whilst slightly tongue in cheek, the map does illustrate that the perception of political risk is essentially often subjective and depends very much on where the viewers' perceptions are formed.

From a sheer size perspective, all of eastern and western Europe, China and India, plus several more countries could be contained within the African continent. With such a large geographical span and so many countries with diverse cultures and economies it is impossible to build a "one size fits all" African heat map for political risks.

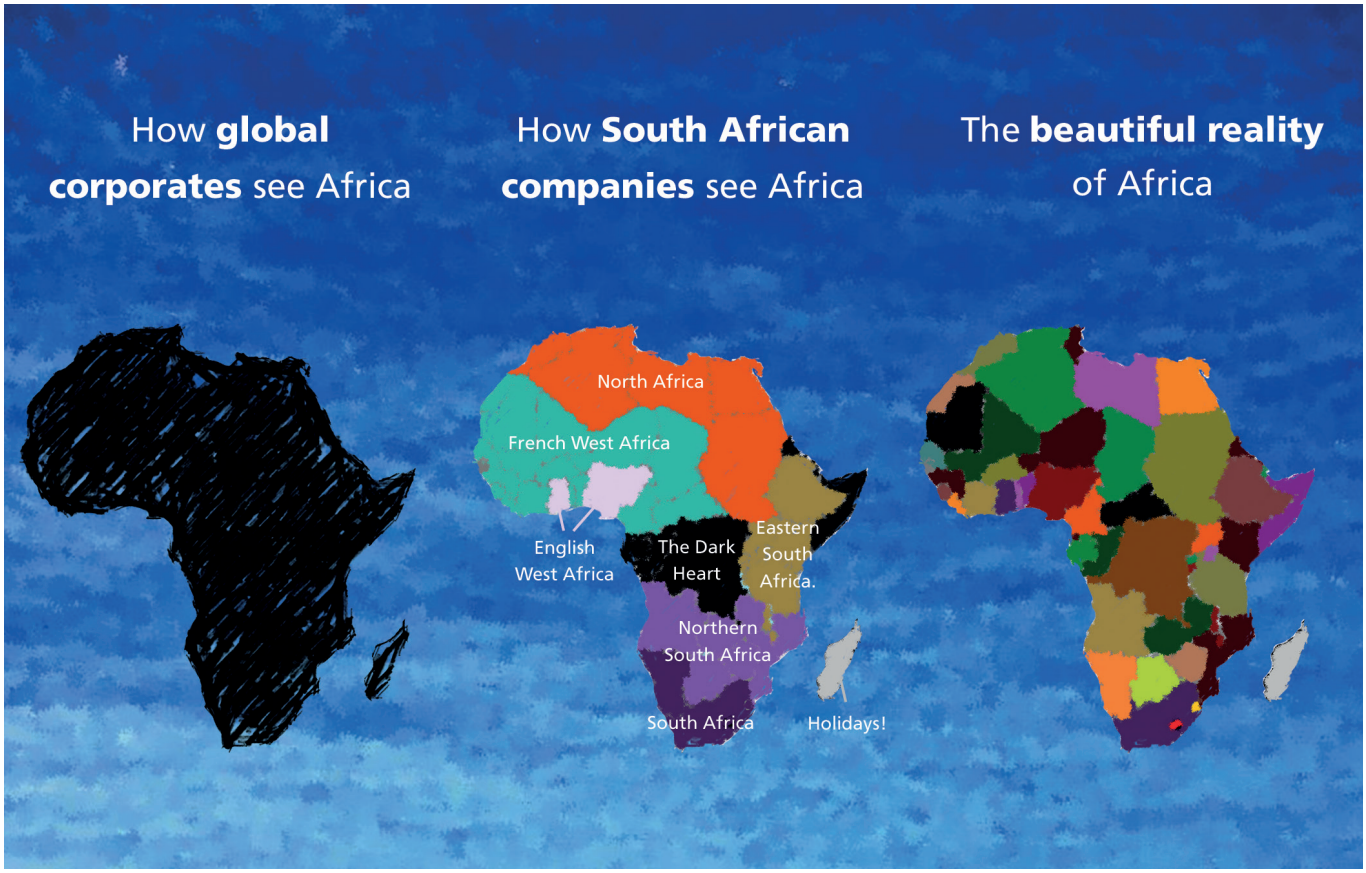
Taking two geographically close countries as an example, Angola and Namibia, there are immense differences between the two countries despite their common history of colonialism. Angola is Portuguese speaking with a legal system based on Portuguese law. In Namibia business is predominantly English and Afrikaans speaking and is based on Roman Dutch law, making it more simple for South Africans to do business there. Looking at some heat maps, however, they are shown as being the same. This is a classic example of why it is important to avoid generalisations in an African context and consider each of the countries individually in order to form strategies.

Information is key for a company thinking about globalisation and nowadays information is available in abundance: for example, typing "Ghana risk analysis" into a Google search, results in 1,708,000 hits in 47 seconds, but the information can be misleading. The problem is that this is "information" and not "knowledge".



There is a vast gap between information and knowledge for a company trying to expand into new territories.

FIGURE 1:
DIFFERENT PERCEPTIONS OF AFRICA FROM VARIOUS VIEWPOINTS



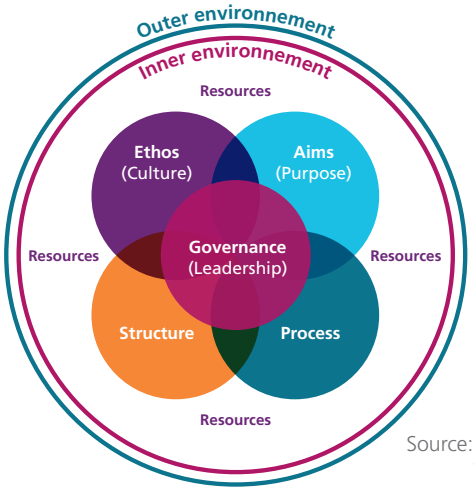
Source: HOLLARD

Organising forces within a system

At Hollard, systems thinking forms part of our company ethos. Accordingly in the knowledge that third party political risk assessments are subjective, and independent assessment is made by looking at regions and countries as unique systems. Figure 2 shows seven organising forces that form part of a system.

In order to understand a country, a territory or an opportunity, it is important in the absence of a track record of having worked in the territory, to place people locally for a prolonged period in order to truly understand the business dynamics and environment. The system theories approach and immersed investigation underpin our approach to political risk. We use the seven aspects of the system as a series of lenses through which we look at a country or an opportunity. We start with the outer and inner environment, knowing that there is not much you can do about the outer environment.

FIGURE 2:
ORGANISING FORCES WITHIN A SYSTEM



Source: *Biomatrix Systems Thinking (adapted)*

Focus on resources and ethos

The next step in our process is to look at the resources of a country, such as telecommunications, roads, railways, etc. It is important to identify what the resource structure means in the context of our products and services.

The third element in the system is looking at the ethos, and the spirit or the culture to gain some understanding before investing.

> "I BELIEVE THE BEST STRATEGIES ARE BORN OUT OF MISTAKES, NOT SUCCESS."

I believe the best strategies are born out of mistakes, not success. Here is a concrete example: in South Africa Hollard is known as being a young, innovative company.

As a company we are not very formal and whilst we take what we do very seriously we try not to take ourselves too seriously.

We had a very successful partnership, with an Asian company which despite having very common values had a far more rigid structure, formal dress codes and a distinct hierarchical approach to management. Based on our very successful operating model in South Africa we suggested changes to the operating model to bring it more in line with our South African operations. Within a matter of months, it was clear that something was wrong, the market was the same, the products were the same, the people were the same, but the business was suffering. It soon became clear that the "cultural" changes we had suggested were not sitting well with either the management or staff. Formality and clear defined reporting lines with defined hierarchy are characteristics consistent with the culture or ethos of the region and deviating too far proved to be counter productive. When, on the advice of our partners we reintroduced some (though not all) of the formal structures the team became more settled and the business once again flourished.

In terms of management style, what works in Johannesburg does not necessarily work elsewhere.

There are no rights or wrongs, but understanding and respecting cultural differences is vitally important. Simply to impose one management style upon another can lead to disaster.

Focus on processes and aims

Another aspect of systems thinking is to understand processes and how business takes place in the region. The World Bank has a list of the countries where there is ease of doing business. South Africa is in the mid 40s and India is in the 100s. It is essential to not simply take these indices at face value but to gain a thorough understanding of the systemic characteristics that give rise to these differing perceptions in order to successfully evaluate and develop regional opportunities.

It is about understanding the dynamics, the processes and how the processes operate. South Africa is an open market and foreign investors can own and control 100% of their business.

In many other territories this is not the case with ownership and management control for foreign entities being strictly governed. This can prove difficult for businesses particularly if a uniform operating model and centralised governance structure are essential components of success. These are important considerations for a company with global ambitions.

Once we have an understanding of the culture and ethos of a country or region, attention is given to understanding the processes that are taking place especially in the context of the governance and the regulatory environment. Many failures have occurred and criticisms made of a particular regulatory regime simply because people have not taken the time to understand the systemic characteristics of the local or regional economy and the driving forces influencing regulatory activity.

Last but not least, it is necessary though often difficult to try and understand the aims of a country in the context of systems thinking.

Once we have a first hand understanding of this important aspect, we question whether the country is consistent with our core values. We take care to avoid finding ourselves in a part of the world where we the practices or aims are inconsistent with our core values irrespective of the financial returns that may be presented.

Conclusion

In this short presentation I have only briefly touched on the concepts and principles of systems thinking and its implications for strategic decision making. However hopefully I have shed some light on the importance of developing your own thorough and comprehensive understanding of the territory based on a multifaceted approach which takes into consideration those characteristics of you own business that are the driving forces behind your success and how these may play out in a new territory. So far this approach has been very successful for Hollard.

MACROECONOMIC AND GEOPOLITICAL RISKS FOR GLOBAL COMPANIES: A CORPORATE'S POINT OF VIEW

François QUENTIN
Chairman France, HUAWEI

François is Chairman of the Board of Directors of HUAWEI France since October the 1st 2010. He is also a member of the HUAWEI Group Advisory Council and member of the Board of Directors of French and foreign companies.

Since 1992, he was CEO of various THALES subsidiaries, and since 2003, he was a member of the Group Executive Committee and CEO of the Aerospace Division of the THALES group. In 2009, as SVP and as member of the Executive Committee of THALES, he took charge of the Group global Transformation. In parallel, from 2003 to 2012, he was Chairman of the Advisory Council for Aeronautics Research in Europe (ACARE) Brussels a European Commission body in charge of the 2020 Aeronautics Strategic Research Agenda. In 2008, on behalf of the French Minister for Transport, he launched and chaired CORAC (Committee for Research in Aeronautics chaired by the French Ministry in charge of Transport), in charge of defining the research strategy for Aeronautics in France in 2030. From 2000 to 2010, he was member of the board of the French Aerospace Trade Association (GIFAS) and a member of the board of the European Trade Association (ASD: Aero Space and Defense). He is a member of the "Académie de l'Air et de l'Espace".

A change in paradigm

The global economy is changing and I believe we are facing a change in paradigm. We are facing emerging risks and some of them are quite important.

The optimum balance of business shifts every day, depending on price of oil, the Chinese Gross Domestic Product (GDP) growth or decrease and the Brazilian elections for example. Tens of thousands of employees from the Fortune 500 groups are not familiar with the companies' home country culture, ethics and values, so when there is a mismatch, there is a problem.

The global exposure to economic and political challenges has grown enormously. Currencies are not neutral. When you do business from Europe in dollars with a third party, you are exposed to the US laws.

Global companies have grown enormously: twenty years ago, global companies were established in 30 or 40 countries. Today, these companies are present in 100 to 185 countries out of the 188 countries of the International Monetary Fund (IMF). These companies are implanted in the Americas, Asia and Africa, which is a complete change of scope.

Supply chains have become very extensive and are now very fluid. Operations are switched from China to Bangladesh, then from Bangladesh to Ethiopia, but they have no idea of the types of risks they are running.

Emotional reactions from the public are tremendously powerful, illustrating that business is not just a matter of law and regulations. When the dockers went on strike in Los Angeles, blocking all incoming traffic from Asia to the United States, this caused a major disruption for the supply chains of US operations and businesses. Companies must be empathetic and react emotionally.

The business pace has increased greatly. Shares are traded every day and the value of a company can move up and down sometimes by 40% in two days, such as was the case recently for Volkswagen. Newswires are disseminating information by the minute and the reaction time allowed to management is much shorter than it used to be. In the past, boards had more time to convene and think about their response to an event, but today big corporations are expected to respond to an event instantly.

> "COMPANIES MUST BE EMPATHETIC AND REACT EMOTIONALLY."

From a duopoly to a multipolar world

We are moving from a duopoly towards a multipolar world. In the 1980s business decisions were "easier" and "more stable". Today, the multipolar world allows a very fast change in perception. Politics can become quite erratic. The multipolar powers must find ways to exist together and businesses must adapt to that.

New technologies exist and are used on a large scale and at a much faster pace by global companies. There is much talk today of the digitalisation of industry, but it is debatable whether the boards truly understand all the risks they must manage, and this could be a major threat to the company. Furthermore the privacy laws are not the same in the US, China and Europe, which can cause complications when you have operations across the world.

The environmental impact of global corporations is critical, and it is not possible to simply ignore what is going on in their operations or in their supply chains in China or in Africa, such as exporting dumped material from Europe to Africa, as it was the case a few years ago.

Multicultural operations create new risks. When you have 170,000 employees in 170 countries worldwide, the behaviours are widely different and risks are perceived differently, depending on the level of maturity of the countries or regions. Corruption, child labour, whale fishing and environmental regulations must also be taken into account. The attitudes towards these issues may vary widely between different countries and there are risks taken by the companies when dealing with such cultures and local governments.

In summary, it is possible to be 100% compliant with laws and regulations in some countries and at the same time be caught in very nasty traps.

Some solutions

- Switch from a formal risk assessment prepared on a yearly basis and presented to the board yearly to a concept designed by the Air Forces to address Air Defence called OODA (Observe, Orient, Decide and Act) Loop. This is not a review based organisation that should be fostered in the company, but a kind of control tower for fact gathering and decision making.
- Be prepared to face un-rationalistic situations: companies have to face irrational situations where intuition, emotional response and empathy are key.
- Build a comprehensive international management training to understand the deep differences between countries and region cultures. It is a long term risk management process. Experience is key in order to achieve this. When you have managed discussions with the Indian government about selling war planes, you have an experience which cannot be written in a book or transferred into a two-hours training course.

Conclusion: what role for the (re)insurance industry?

The insurance industry has a role to play in helping clients face these new challenges and investing in serious research is key. Funding think tanks, specialised in dealing with geostrategic issues, cultural management in partnership with universities and targeting key client executives could be a tremendous help to the industry people.

There is a need of specialisation according to issues, countries, etc., and a need to shape new graduate and postgraduate programs to address these new risks very early in a professional career.

TRADITIONAL COVERS AND INNOVATION IN POLITICAL RISKS INSURANCE

Tom CORFIELD

Chief Underwriting Officer, The Channel Syndicate

Tom is The Channel Managing Agency's Active Underwriter. Beginning his career at Sedgwick in 1981 he moved to underwriting in 1987. At Liberty Syndicates he was the Active Underwriter of syndicate 190 from 1998-2004 and subsequently of syndicate 4472 from 2004-2009, before becoming Director of Underwriting. In Lloyd's, Tom was the Chairman of the LMA Non Marine Committee from 2004-2009 and a Board member of the LMA from 2005-2009. He was a member of the Council of Lloyd's in 2006.

Kade SPEARS

Head of Specialty, The Channel Syndicate

Kade Spears joined the Channel Syndicate in October 2013 to head up the Political and Credit Risks team and has worked in this field since graduating with a Bachelor of Science from Washington & Lee University. Kade was previously the head of a team in the London market and has worked in Bermuda, Houston and Singapore during his career.

Brief history of the Lloyd's Syndicates

Lloyd's began underwriting political risk 300 years ago through marine insurance, giving coverage for piracy and theft in foreign countries. When the Great War broke out, Cuthbert Heath, known as the father of non-marine insurance, developed the first policy for damage by missiles from hostile aircraft. Only two months after the beginning of the First World War, Lloyd's started offering more and more policies but without real regulations.

This resulted in 1923, with the Lloyd's underwriter Stanley Harrison offering loans on the value of used cars on dealers' lots, thus leading to a huge loss of £360 000 (equivalent of US$171 million today), for which Lloyd's members unanimously agreed to pay a share. Four years later, the Lloyd's Central Fund was established and Lloyd's implemented its first rules on Financial Guarantee including what is known today as Contract Frustration and Trade Credit today.

The key development in the political risk market came during the Spanish Civil War of 1936-1939 with the implementation of the War and Civil War Exclusion Agreement. These were then amended after the bombing of Hiroshima in 1945 to address nuclear weapons. Eventually, war itself was excluded from standard coverage and became a standalone product: this has been the case for the last 60 years.

Numerous definitions of political risk are available. The Bloomberg & Economist Intelligence Unit considers for instance political risk as "the evaluation of a range of political factors relating to political stability and effectiveness that could affect a country's ability and/or commitment to service its debt obligations and/or cause turbulence in the foreign-exchange market".

The concept of political risk insurance itself was developed just after the Second World War with the Marshall Plan by State-supported export credit agencies established in many countries, to assist in rebuilding post-war Europe.

It wasn't until the 1970s that Lloyd's underwriters were allowed to offer political risk insurance along the lines of what is done today.

What does the political risk market look like in Lloyd's today?

The political risk market in Lloyd's today has around 32 syndicates which provide this coverage able to generate approximately US$1 billion in risk capacity. They have paid out US$ 700 million in claims since 1993.

In previous times, Lloyd's was backed by individual names, but now less than 10% of Lloyd's capacity is generated that way and big corporations like SCOR have moved in to fill that void.

Lloyd's is a co-insurance market, which means that checks and balances of the subscription market are in place. The concept of leading underwriter is still present, meaning that there is a balance and diversification against capacities, but by the same token there are "Lead Underwriters" for the majority of negotiations.

A Lloyd's syndicate such as Channel is a specialty syndicate that covers approximately 14 classes of business, writing technical and traditional insurance products with the backing of the SCOR Group. Having access to SCOR capacity enables Channel to punch above its weight, broadening its client base in geographical reach through access to SCOR clients. On the other way round in turn, SCOR benefits from an access to the wide product range the syndicate can offer to the P&C treaty clients in emerging markets and it can use the Lloyd's license range in various parts of the world where SCOR is not necessarily licensed. This relationship is definitely mutually beneficial.

Understanding and quantifying the political risk

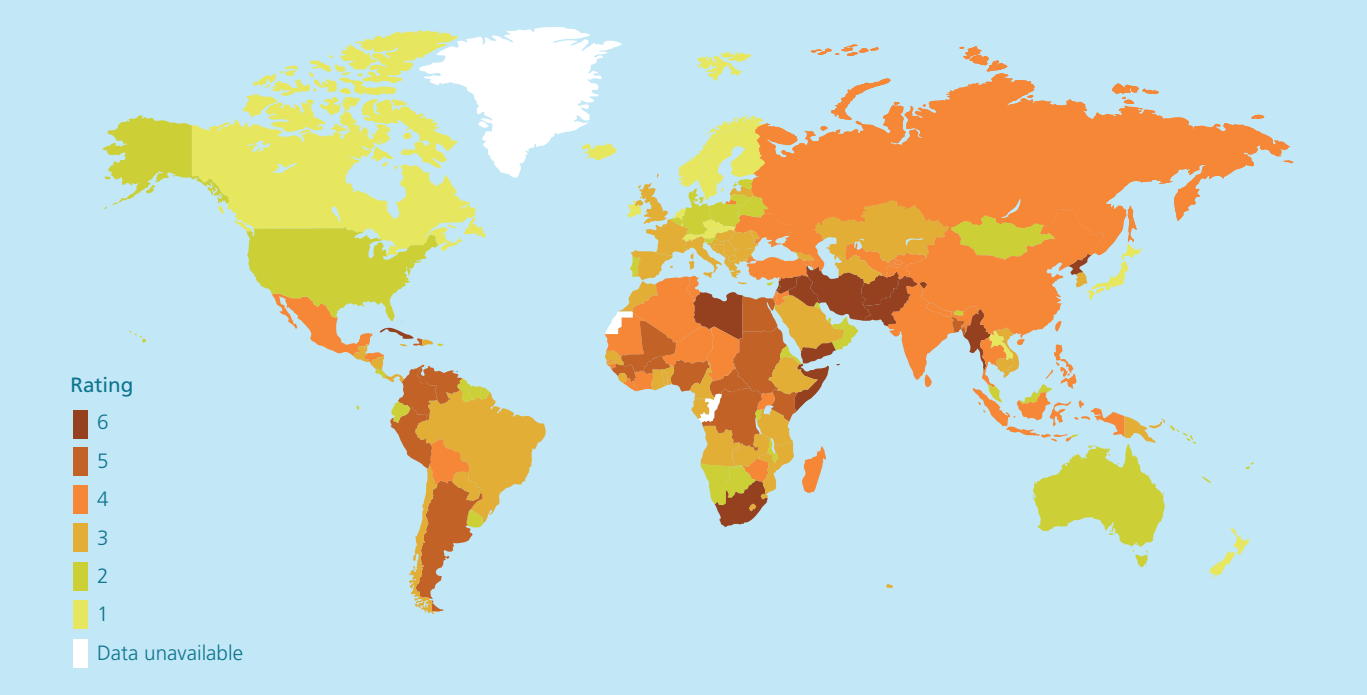
Although the definition of political risk can vary from one company to another, it is important to see that politics and economics are intertwined. One way that people look at political risks is through risk maps, even though they are often too macro and unnecessarily scary as in figure 1 shows. But it is necessary to understand how these maps were produced in the first place, and what factors are driving them.

The seven factors to look at when evaluating political risks in a country are the following:

- Political instability: the potential change in government, its overall policy direction and state failure (a vote of no-confidence, intensification of a secessionist movement, etc.).
- Violent risks: the impact of terrorism, strikes, riots, civil commotion and war on a country's assets.
- Contract frustration: evaluating the legal system of a country and the risk that private contracts are not enforced by the state.
- Expropriation: defining the risk for a government or a political party to aim at expropriating or nationalising assets.
- Currency risks: the risk associated with currency exchange controls (exchange local currency for foreign currency or withdraw money from the country). This excludes the basic currency ups & downs
- Taxation risks: looking at the taxation regime of a country, the plans in the various political parties to tax corporate or individuals, etc.
- Bribery and corruption: estimating the material impact on businesses.

The factors of political risk are not static; they are constantly moving and changing. Just because there is an issue in a certain part of the country, this does not mean that the entire country has problems. Parts of a country could be relatively safe, with riots occurring in an industrial part without impacting the touristic part. It is therefore necessary to dig deeper to find out the details.

FIGURE 1:
A POLITICAL RISK MAP



Source: IHS

It is interesting to see how a blind analyse based on the hypothesis of a risk neutral world can sometimes lead to consider investment opportunities that a macro map would not have outlined. This is illustrated in figure 2.

Looking at the basic statistics included in this example, countries C and D, which are offering a growing labour force and a strong economic growth, would really be interesting to consider for business purposes. On the opposite, countries A and B would not. In fact, countries A and B are respectively The Netherlands and Sweden, where most companies do operate and have teams, while countries C and D are Nigeria and Egypt.

FIGURE 2:
WHERE TO INVEST IF THE WORLD WAS RISK NEUTRAL

COUNTRY A • 16.8 million people • -0.08% labour force growth[1] • 1.4% real GDP[2] growth[3]	**COUNTRY C** • 178 m people • 3.02% labour force growth • 5.5% real GDP growth
COUNTRY C • 9.7 m people • 0.23% labour force growth • 2.2% real GDP growth	**COUNTRY D** • 83 m people • 2.61% labour force growth • 3.5% real GDP growth

Source: *Bloomberg / Economist Intelligence Unit*

Conclusion

Although political risk will always exist due to the unstable nature of the world we live in, it is possible to protect assets against physical damage due to violent risks and to protect business against the resulting business interruption.

It is key to anticipate and to evaluate the risk with extensive analytics.
Only a good understanding of political and economic risks can create bespoke solutions for political risks insurance.

[1] Estimated labour force growth per annum from 2015-2030
[2] Growth Domestic Product
[3] Estimated real GDP growth per annum from 2015-2030

HOW RISK MODELS HELP TO CREATE NEW (RE)INSURANCE MARKETS BY SUPPORTING RISK QUANTIFICATION AND MANAGEMENT

Paul NUNN
Head of Risk Modelling and Global Natural Hazards, SCOR Global P&C

Paul Nunn is responsible for pricing catastrophe risk on inwards business, and accumulation of catastrophe loss potential for natural hazard perils globally. A key aspect of the role is the provision of analytics and data for internal and external stakeholders including SCOR's internal capital model, rating agencies, regulators and retrocessionaires. Paul is also responsible for directing strategic Cat platform system development to facilitate more efficient deployment of catastrophe capital. Before joining SCOR, Paul was Head of Exposure Management at the Corporation of Lloyd's and has also held senior level positions in catastrophe management at ACE European Group and Applied Insurance Research Ltd. Alongside his role at SCOR Global P&C, Paul is a director of the non-profit Oasis Loss Modelling Framework company.

Catastrophe models as historical enablers

The catastrophe models that most people may be aware of from suppliers like RMS, AIR and EQECAT (now CoreLogic) have been around for 25 to 30 years now. They represent an established part of the toolkits used in the industry to quantify catastrophe risk from earthquakes, hurricanes, tropical cyclones and winter storms. They have underpinned our competence in counting, analysing and optimising the way that these risks are priced, the way portfolio accumulation analyses are done and, crucially from the perspective of a reinsurer, the way that we were able to further balance our diversified portfolio of global risks through retrocession or possibly even transfer into the capital markets. With the development of Solvency II and capital modelling over recent years, catastrophe and natural hazard models have become even more deeply embedded in the ways that they are used within the industry.

Expanding the scope of Natural Catastrophe modelling

The scope of catastrophe models has recently been expanding, particularly for under-supported markets and developing economies, as shown in Figure 1, with Cat Models taking on a new challenges such as the development of flood models, for which Thailand flooding in 2011 certainly acted as a wakeup call.

FIGURE 1:
NEW CAT MODELS RECENTLY DEVELOPED / UNDER DEVELOPMENT

- China
- India
- Thailand
- Vietnam
- Malaysia
- Indonesia
- Saudi Arabia
- United Arab Emirates

One reason that flood models have not been as widely developed is that flood is not typically a standard covered peril – it is also really hard to do! Flooding has very localised effects, complex dynamics and human intervention plays a much bigger role in the outcome from an insured loss perspective.

New hazard models are supporting new pooling arrangements which are created to support a particular need. For example, JBA has been constructing a new model to support the placement of the Flood Re program in the United Kingdom and the new Caribbean Catastrophe Risk Insurance Facility (CCRIF) model is enabling them to expand beyond the Caribbean into Central America and cover additional perils within the Caribbean risk sharing fund.

Earthquakes and hurricanes are the perils which represent the biggest loss potential for an individual event. But overall, a surprising amount is paid out as a global reinsurer on low level, localised events, so having a greater complete set of risk models, including increasingly global coverage for flood, will certainly contribute to improve understanding of a significant part of the Cat 'budget' in business planning.

There are also a lot of broader initiatives beyond insurance, with activity from various inter-governmental stakeholders around disaster finance, disaster risk reduction and risk resilience areas like micro insurance. There is a growing sense that the time has come for various stakeholders around the world to work more closely together to solve some of these problems.

"THERE IS A GROWING SENSE THAT THE TIME HAS COME FOR VARIOUS STAKEHOLDERS AROUND THE WORLD TO WORK MORE CLOSELY TOGETHER TO SOLVE SOME OF THESE PROBLEMS."

Low insurance penetration is a problem and bridging the gap between economic losses and those natural disaster losses that are insured is an important challenge. (Re)Insurance has a big role to play in to making developing economies more resilient to shocks brought by disasters.

The amount of money that is spent from charitable sources or international aid on an ex-post basis is relatively small, but there is increasing acknowledgement that it is much more effective to spend disaster finance on an ex-ante basis. Insurance is a good way to leverage the money spent in making these vulnerable societies more resilient.

The ambitious programme of the **Insurance Development Forum** is to upscale the role insurance can play in terms of underpinning economic development. Founded by the World Bank and the United Nations together with Government development agencies, (re)insurance companies and trade associations, this new initiative aims at:

- achieving global coverage and inclusive access to catastrophe risk (resilience) modelling and mapping systems, in which a lot of money from outside of the industry is now being invested.
- integrating catastrophe risk (resilience) modelling standards and platforms across public science research institutions and programs, operational agencies and private sector institutions.

At the moment there is a very small number of proprietary models that are selling their services to the reinsurance and insurance industry at quite a premium. This organisation is looking to create standards and platforms that will open up catastrophe modelling as an activity to a much broader group, including academia and public institutions.

Modelling geopolitical and other macro hazards

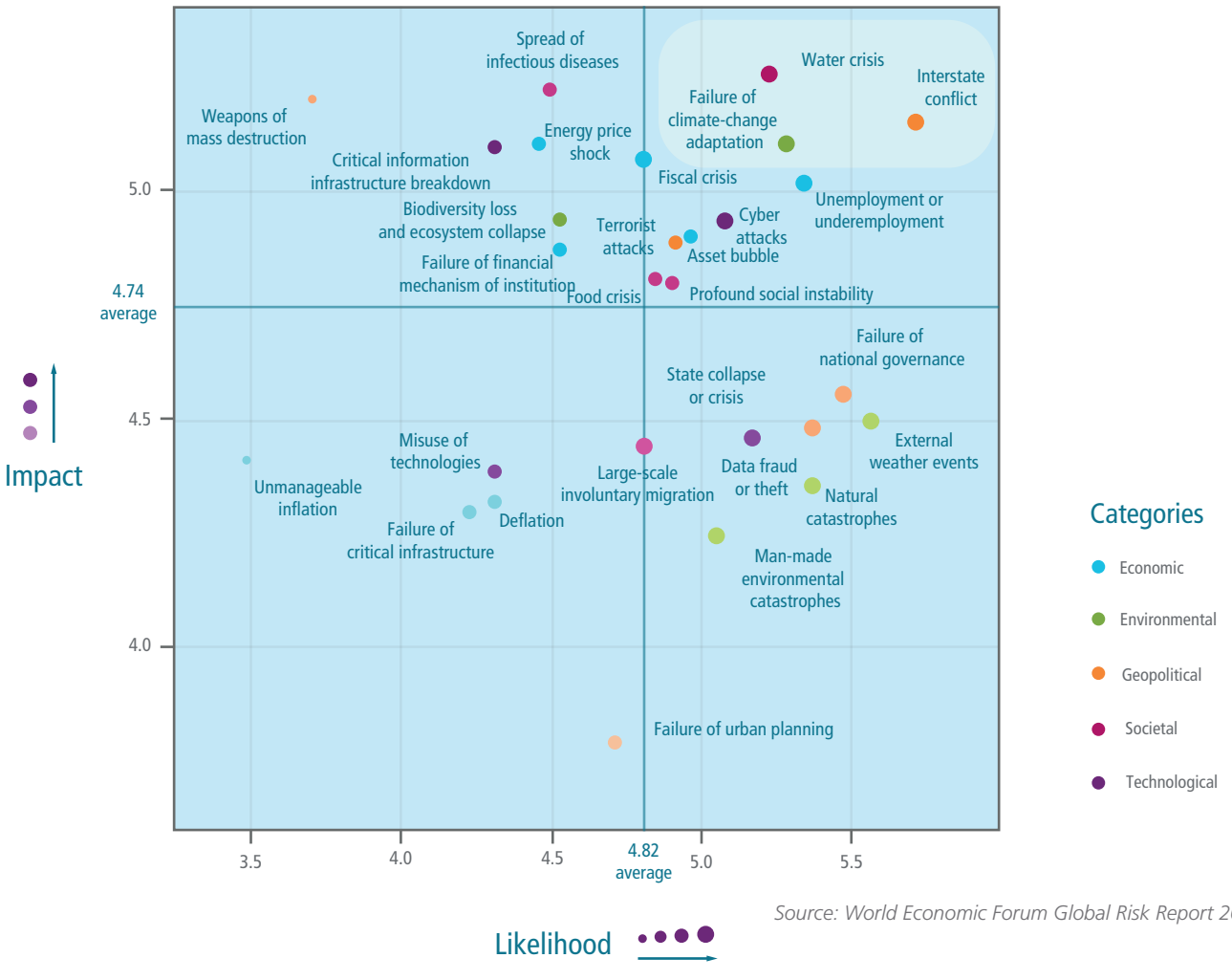
Risk models can also play a role in the geopolitical space. While the below chart from the World Economic Forum 2015 Global Risk Report (see Figure 2) highlights **interstate conflict, water crisis** and **failure of climate change adaptation** as being the most likely and impactful global risks, other recent hot topics include **terrorism, food crisis, social instability and large scale migration.**

It is interesting to note the interconnectedness between these issues. A report from the US organisation the Centre for American Progress drew out links between the Arab Spring and climate change. They say a 1 in 100 year winter drought in China contributed to a global wheat shortage, which acted as a threat multiplier in terms of the underlying conditions giving rise to the Arab Spring. This is not to say that climate change directly caused the Arab Spring, but a lot of these macroeconomic, geopolitical and environmental threats have ripple effects that can certainly aggravate each other. As the industry develops, it will become possible to better identify some of the connections between different threats that were thought to be separate in the past.

The first geopolitical risk area where natural hazard modelling approaches are being used is for terrorism. Before 9/11, damage caused by fire and explosion in a terrorist attack were covered by standard insurance policies and retained by the private market. Policy wordings did not typically exclude terrorism except in two markets:

- Spain: catastrophe risks, including terrorism, have been pooled through Consorcio de Compensación de Seguros (CCS) since the Spanish Civil War in 1941
- United Kingdom: following IRA campaign escalation, Pool Re was created in 1993

FIGURE 2:
THE GLOBAL RISKS LANDSCAPE 2015



Source: World Economic Forum Global Risk Report 2015

One of the typical responses to the 9/11 terrorist attack was a kneejerk reaction and pools were created to try to continue to provide coverage.

- France: GAREAT (2002)
- Germany: EXTREMUS (2002)
- Australia: ATIA (2003)
- US: TRIA and successor legislation

Now there exist terrorism models that analyse the pool. What was a public sector response is now more of a public/private partnership often involving risk transfer and sharing with reinsurers. The discipline of collecting and recording exposure information in detail is essential to risk modelling needs. One of the big challenges with terrorism modelling is that, unlike natural hazards, the probabilities can change dramatically throughout the course of a 12 month insurance policy. For example, one speech from the president of the United States could change the terrorism outlook overnight. Thus, the representation of probabilities and the understanding of frequencies is a big challenge.

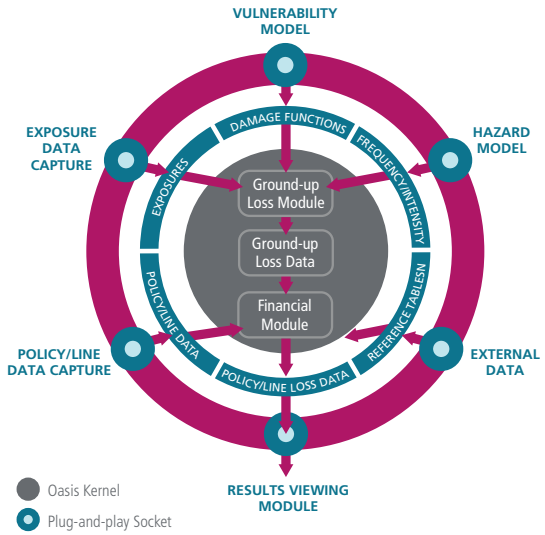
> "THE DISCIPLINE OF COLLECTING AND RECORDING EXPOSURE INFORMATION IN DETAIL IS ESSENTIAL TO RISK MODELLING NEEDS."

A number of specialist organisations are trying to better understand probabilities. This is illustrative of some the benefits around the communicability of risk that catastrophe risk models have enabled will increasingly creep into other areas, including the political risk landscape.

Examples are:

- IHS has developed its exclusive analysis drawing on intelligence based outlooks for geopolitical risk over various timeframes (e.g. 3 months, 1 year, 3 years) often supported with data from various thematic risk maps.
- The VAPOR[1] (Value at Political Risk) model which was inspired by the catastrophe risk modelling approach and Combines Oxford Analytica intelligence insights with Willis Analytics modelling know-how.
- OASIS, a non-profit open source loss modelling initiative illustrated in Figure 3, is funded and supported by 40 different insurance companies, including six major brokers and quite a few Lloyd's syndicates, as well as global reinsurers from London, Continental Europe and Bermuda.

FIGURE 3:
OASIS – OPENING UP THE BLACK BOX



Oasis is an industry-led initiative which allows other organisations to plug in a new model for a new region or a new peril. By genericizing the tools and allowing different models to plug in, (re)insurance professionals will be able to access a wider choice of risk models in the future.

The Oasis initiative has a huge amount of goodwill from the insurance industry and support and is really driving to open up the pipeline of models while reducing the technical barriers to entry, allowing more organisations to package their intellectual property in a way that is accessible to the (re)insurance market.

Conclusion

As we move forward, we will increasingly see more and more risk models being made available to us, filling the gaps in our current understanding globally, but also extending the capability of models into new lines of business, new coverage and new areas.

[1] More information about VAPOR: www.oxan.com/analysis/VAPOR/

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Editor: SCOR Global P&C
Strategy & Development
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No. ISSN 1638-3133
Focus #20 - March 2016

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