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"Models and their limitations"

Ladies and gentlemen

Today Peter Giger and I want to talk about using models to assess risk.

Why have we chosen this topic? Models play a key role in defining capital requirements for banks and insurance companies. They are used to assess financial stability and therefore determine the level of protection for bank clients, policyholders and the financial system as a whole.

Models are used to assess risk in all areas of life and the financial world is no exception. It does not matter whether we are talking about bridge-building, tunnelling, or logistics; safety margins are always derived from models, which use past outcomes to predict the likelihood and impact of future events. So, the key questions are: How reliable are predictions based on an understanding of past events? And how big do the safety margins have to be?

Just over 20 years ago, internal models for assessing financial risk were popping up everywhere as banks suddenly discovered the laws of physics. Bankers and supervisors were convinced that the modelling used to analyse natural phenomena could also be applied to financial risk. As it turned out, they were wrong.

Financial markets are driven by human actions and emotions, not wind and weather; and human beings are prone to fear, panic, greed and especially the herd instinct. Markets can be uneventful for a long time and suddenly turn, brutally and dramatically. During the financial crisis, it became clear that people and markets were not behaving as the statistical models had predicted. The experts were bewildered. The CFO of Goldman Sachs at the time was astounded that certain events had occurred much more frequently than the models had suggested they would. "We were seeing things that were 25-standard deviation events, several days in a row". Eight years later, after the Swiss National Bank removed the cap on the Swiss franc/euro exchange rate, his successor was equally appalled: "I think it was something like a 20-plus-standard-deviation move." To put this in context, the odds against a "20-plus-standard-deviation move" are almost unimaginable. Assuming the franc's ups and downs follow a normal distribution, a "20-plus-standard-deviation" event should only occur once in billions of years.

The remarks made by these two top executives from the world's allegedly smartest financial institution illustrate just how much faith the banking sector places in models and their predictive power. This was - and is - unsettling. Instead of questioning their internal models, the executives were baffled by reality. It is clear that internal risk models are no substitute for common sense, but this insight still has not

percolated down to everyone in the sector. For instance, one bank recently asked us to exclude 15 January - the date on which the exchange rate floor was lifted - from their market risk calculations because they considered it to be a unique and unrepeatable event.

Most banks, however, are aware that too much trust was placed in internal risk models and that something has to be done. But what course should be taken? One answer is to increase the safety margins – I will come back to that later. Another option is to overhaul models that do not work. In fact, the standard attitude of risk experts is that internal models simply need to incorporate more detail and more data and then they are bound to be better.

My personal feeling is that we have reached the limits of the modelling approach to financial risk. Financial markets are driven by human behaviour, which is notoriously unlike the laws of physics. So, I do not think we need more models with more complexity; what we need in fact is fewer and simpler models.

Misgivings about internal models

There are two ways to calculate the capital requirements for banks: the standard approach and the internal model approach. Under the standard approach, as the name implies, the same rules apply to all banks. For example, every bank has to set aside the same amount of capital for the same mortgage. In contrast, under the internal model approach the calculations are based on the bank's own models which incorporate its own assumptions, leading to wide variations in risk weightings and capital requirements.

Studies by the Basel Committee on Banking Supervision have shown that there are substantial differences in risk-weighted assets among banks using internal models. The Bank of England has calculated that the average risk weighting of globally active banks has been falling for over 20 years. While the average risk weighting at the start of the 90s was 70%, it fell steadily to less than 40% in 2008 and has stayed there ever since.

The reality is that internal model approaches often lead to lower capital requirements. Banks have an interest in building optimistic assumptions into their internal models because it keeps capital requirements low and the return on equity high. This leads to a situation in which the major banks, the very institutions where the need for protection is greatest, are the ones that use internal models. And the paradoxical result is that the major banks end up with lower capitalisation requirements.

How can we dispel the misgivings about internal models? It would be possible, for example, to ban their use, but I doubt that this would have the desired effect. The standard approach also has its shortcomings. Technically, it too is just a model, based on assumptions. In the euro zone, for example, all government bonds issued by member states are regarded by the standard model as risk-free - a classic example of false incentives.

The Basel Committee has therefore decided to take a different approach, by introducing floors for risk weighting which will prevent capital requirements from falling too low. The standard approach itself is

also being overhauled because it is simply too blunt an instrument. FINMA welcomes this development and is actively working on its implementation in various international working groups.

Multiplier, moratorium and disclosure

At the same time, we have already taken the initiative in Switzerland and introduced three measures. In the first place, we have introduced institution-specific multipliers for various portfolios. Under this approach, risk weightings based on internal calculations are multiplied by a factor, which leads to increased capital requirements. We had already introduced multipliers for mortgages on owner-occupied residential property at the end of 2012. We did this because at that time the average risk weighting generated by the banks' internal models was around ten per cent, a quarter of the standard approach figure. This was due to low default rates in the available data series. Although the internal models met the requirements, the data series for Switzerland included no stress situations because none had occurred during the relevant period.

Further analysis by FINMA and the Swiss National Bank has shown that some further credit portfolios are also undercapitalised. As a result, we have now introduced multipliers for mortgages on investment properties and some corporate loans in investment banking.

The purpose of multipliers is to ensure adequate capitalisation, not to eliminate differences between internal models and the standard model. The multipliers are defined using stress tests and other risk analyses with the aim of ensuring that each bank's capitalisation properly reflects its risk profile.

In a second step, we have introduced a model moratorium, under which we will no longer approve any adjustments to models if they result in substantially reduced risk weightings. Our aim here is to ensure that banks cannot circumvent more stringent capital requirements by understating their risks.

Thirdly, we have called on the banks to disclose the differences between the calculations produced by the standard approach and internal models. Our hope is that the resulting increase in transparency will have a disciplinary effect.

Taken together, these three measures mean that economic risks will be more accurately reflected and that incentives to understate risks will be curbed. Our primary aims are to build trust in the capital framework for major financial institutions and ultimately boost their resilience. The cornerstone of an effective capital regime is the availability of enough high-quality loss-absorbing capital.

Strengthening Switzerland's TBTF regime

A maximum leverage ratio has been introduced in Switzerland and elsewhere in addition to the current risk-weighted capital ratios.

This ratio has two aims. Firstly, it acts as a brake on continually rising debt financing. And secondly, it ensures that there is sufficient loss-absorbing capital to cope with events that models cannot predict. The leverage ratio therefore also acts as a safety net.

It is gaining in importance as an indicator of financial stability; regulators, supervisors and the market in general are increasingly adopting it. Both the US and the UK, for example, have announced higher leverage ratio requirements in the past year, with the US opting for five to six per cent.

Swiss targets are substantially lower at just over three per cent. In February, the Federal Council therefore asked for the leverage ratio and the risk-weighted capital ratios to be recalibrated. The objective, which FINMA welcomes, is for Switzerland to have among the toughest capital requirements.

The limitations of models

Internal models for calculating risk are not a bad thing as such, and it would be a mistake to ban them entirely. However, it is essential that economic risks are modelled properly. The measures announced by FINMA to underpin capital adequacy in the internal model approach, combined with plans to raise capital requirements and thresholds, will help build trust in the capital regime.

Yet the fundamental problem - that models are unreliable - remains. After all, models represent a simplification of reality – or as the English statistician, George Box, put it: "Essentially, all models are wrong, but some are useful."

It is vital for Switzerland's banks, particularly its major banks, that their capitalisation reflects their risks and that potential losses, including those that remain undetected by internal models, are matched by sufficient capital.

Thank you for your attention.