



# "Don't forget what happened!"

The global economy is repeatedly being rocked by severe financial crises. Paul Embrechts, a professor of mathematics from ETH Zurich, and Joachim Klement, Chief Investment Officer at Wellershoff & Partners, explain what we should learn from this and why the next crisis is probably inevitable.

*Interview: Felix Würsten and Roland Baumann*

*If you consider the last few years, it almost seems as if the global economy is stumbling from one crisis to the next. What exactly constitutes a financial crisis?*

**Joachim Klement:** There isn't one generally applicable definition. What is certainly required for a crisis is a shock that ripples throughout an entire system, such as a monetary or bank system, without petering out by itself.

**Paul Embrechts:** And this shock also has an impact on real life. We keep being hit with so many financial crises that it's almost as if we're condemned to live with them. But the reasons and effects are always different. The subprime crisis in North America isn't the same as the monetary crisis in Europe.

*The financial market participants play a key role here. Which factors affect the decisions that traders or investors make, for instance?*

**Embrechts:** One crucial aspect is the temporal horizon. If I'm a 60-year-old private investor, my temporal horizon is different from that of a pension or hedge fund. The various actors on the market also work with different volumes and have to comply with different regulations. Furthermore, their decisions are also affected by – for want of a better word – emotional factors as well as rational ones.

**Klement:** All our decisions are rational only in part. That goes for both traders on the stock exchange and for pension fund trustees.

**Embrechts:** And then there's the short-term, high-frequency trade, where purchases and sales are performed automatically by computers. Emotional factors hardly figure there at all anymore.

*In high-frequency trading, huge volumes change hands. But what of the economic benefits?*

**Embrechts:** I experienced the beginnings of high-frequency trading in Zurich back in 1988. Since then, the market has really come on in leaps and bounds. Nowadays, over 70 percent of Wall Street stock trading is carried out in this field. Naturally, those involved are emphatic about the economic benefits. First, they argue that a lot of liquidity results from this trade. This seems positive, as liquidity is like oxygen for the market; it doesn't work without it. Secondly, they stress that there is a more rapid exchange of information. I'm not sure whether this is really an advantage. Thirdly, it is said that the upward and downward turns are smaller because there are more offers on both sides. I'm sceptical whether the risk is actually reduced by

high-frequency trading. We lack the risk management structures to control these markets.

**Klement:** I wouldn't even accept the liquidity argument. Yes, we've got much more liquidity on the market. But it's pseudo-liquidity that is immediately lost in the event of a crisis. Sticking with the oxygen analogy: this liquidity is like the oxygen in an aircraft, which disappears in a heartbeat if there is a leak in the fuselage. I share Mr Embrechts' concerns: to this day, we haven't got an accurate risk management system for this field.

**Embrechts:** Nonetheless, we can no longer do without modern financial instruments. If you want to transform a variable mortgage into a fixed one, you need an opposing position. If you book a flight, you hope that the airline has hedged the kerosene prices. Modern financial instruments have also got their positive sides, you have to realise that. Most banks and funds do an important job for our national economy. But unfortunately certain developments were so powerful that there were negative consequences for the real economy.

*Isn't one problem also that all the parties involved use the same models?*

**Klement:** In normal times, we don't have to worry too much about whether we all use the same models. Even if I use the same model as you, I can have different expectations. It only becomes dangerous if models yield certain pearls of wisdom that everyone uses as a yardstick.

*So as long as I read in one paper that the euro will soon be gone, and in another that it is bound to survive, can I rest assured?*

**Klement:** Yes, only when all the papers write that the euro is to be abolished do we have a problem (laughs).

#### The interviewees:

*Paul Embrechts* has been a full professor of mathematics at ETH Zurich since 1989 and teaches insurance and financial mathematics. His main research interests include integrated risk management, the securitisation of insurance risks and the analysis of extreme values. He is also a consultant for various financial service providers and authorities.

*Joachim Klement* is Chief Investment Officer at the international business consultancy Wellershoff & Partners. He studied mathematics and physics at ETH Zurich and economics at the University of Hagen. Before taking up his current job, he held a number of positions at UBS Wealth Management in Zurich for six years.

Focus Complex systems



Paul Embrechts (I.) and Joachim Klement would like to see more humility again from the actors on the financial markets.

*But mightn't there still be people who bet against it?*

**Klement:** But they are mostly overwhelmed by the masses in such situations. To my astonishment, for instance, I discover that a country like Italy suddenly finds itself in a national debt crisis while other countries in a similar situation are spared. I suspect that people homed in on this one victim because various papers said so. This produced a problematic cascade of information.

*Another issue is how we tackle extreme situations. Can the models reasonably illustrate such events?*

**Embrechts:** We don't need to read a book about black swans to understand that our world isn't normal. However, we are genetically programmed to assess normal situations better than extreme occurrences. How do we deal with events that take place once every 10,000 years? The theory on this has been around for some time. But translating the events into a practical language and drawing the right conclusions is hard.

*Why is that so difficult?*

**Embrechts:** It all comes down to asking the right question. Let's assume that you want a capital estimate from me for an event that happens once every 1,000 years. There are reasonable models for this; perhaps you even have enough decent data to solve the problem. Then I deliver the point estimate you wanted – ten million francs, say –

but you also get an margin of uncertainty of five to forty-five million francs from me. If that isn't precise enough for you, maybe you asked the wrong question.

**Klement:** As a former physicist, I'll put it bluntly. In physics I can only publish if I state the margin of error; in the financial sphere I can only publish if I leave it out. The theories of error calculation aren't applied very often in practice. They tend to be used more for reinsurance schemes, but these are precisely the ones that are left with the risks at the end of the day.

*Why aren't these models used in banking, too?*

**Klement:** If you talk to a pension fund trustee or investor who hasn't got a degree in mathematics, then as a consultant

**"It all comes down to asking the right question."**

Paul Embrechts

you have to translate what you believe is right into a language that the customer can understand. In doing so, you have to make simplifications. And thus the customer might only hear "aha, the shares are going up" and overlook the fact that the probability distribution stretches way into the negative.

*So it isn't the fault of the models if something goes awry?*

**Klement:** The problem with many models is that they aren't robust. They stand and fall with the quality of the data. In practice, however, we often haven't got particularly good data. So we mostly use simple but robust models. This brings me to the subject of regulation: if something goes wrong somewhere, the call comes instantaneously: we need better models! We need more regulation! No, we don't. We need more robust models, not better ones; we need better regulation, not more of it.

*Isn't the state, as regulator, increasingly finding itself overwhelmed by the complexity of the financial markets?*

**Embrechts:** No, you also have increasing complexity in other areas, such as the supply of energy. There are examples where the regulator has operated highly successfully. Canada, for instance, weathered the banking crisis fairly well. Why? In Canada, politics is more conservative about the banks and the regulators work closely with the financial service providers. Over here, on the other hand, the banks were able to introduce insane products. And if someone warned against possible losses, he was told: that's the new economy! People thought they'd found the Holy Grail and could turn base metal into gold. We live in a free world, so developing new products is legitimate. But if the volumes increase too steeply, someone needs to monitor the development.

*It is probably no coincidence that Canada hasn't got a leading financial centre.*

**Klement:** It takes a lot of courage and strength to face up to the mainstream. Those who didn't buy any new financial products before the bank crisis were regarded as fools. Anyone who didn't invest in technology shares at the end of the 1990s was ridiculed.

**"We need more robust models, not better ones."**

Joachim Klement

*International competitiveness speaks against greater regulation...*

**Klement:** Oh, that's nonsense...

*But that's the stock response.*

**Klement:** Now for my classic comparison: we all want to stay healthy. We aren't all capable of performing a heart operation, so we need doctors to do it for us. What does the state do? It regulates the health system and makes sure that every doctor has to have a certain qualification. Switzerland is one of the few countries where anyone can call himself an asset consultant.

Focus Complex systems

At a systems level, independent consultants are unlikely to play a major role.

**Klement:** I don't mean to put anyone's nose out of joint, but the decision-makers in the larger banks don't always have the necessary qualifications, either. What's more, the banks are subject to a kind of self-regulation. Take the Basel III standard: basically, it's a group of international banks that call the shots here.

**Embrechts:** The Swiss Solvency Test, which we co-developed at ETH Zurich, is a step in the right direction. Since 2011 all insurance companies have had to submit their solvency figures to the Swiss Financial Market Supervisory Authority. We have thus created a sound basis for healthy cooperation. Unfortunately, that's less the case with Basel II and III.

So you're somewhat sceptical about the Basel III accord?

**Embrechts:** Yes, I'm sceptical. Admittedly, a document I call "Basel Three and a Half" was drawn up May 2012, proposing improvements that are a step in the right direction: a higher capital quota, a more precise definition of the capital types and a clearer definition of what the trading and banking books involve. But it is still a game of cat and mouse between the regulators and the banks. I'm convinced that we should reduce the complexity of today's banks.

**Klement:** I agree that the banks need to become smaller again. That especially goes for small countries with a large financial centre, namely Switzerland, Luxembourg and Singapore. The fact that a major bank like UBS or Credit Suisse shows a balance that is many times greater than Switzerland's GDP is simply ludicrous.

Looking ahead: can future crises be averted, based on past experience?

**Klement:** No chance! (laughs)

Might they at least be predicted more easily?

**Embrechts:** There are colleagues of mine at ETH Zurich who are conducting research along these very lines. We've had a serious crisis about every seven years so far. So we should take a leaf out of Cato the Elder's book, who called for the destruction of Carthage at the end of every speech. Our ceterum censeo should be: "Don't forget what happened!" Do you remember how much money the Swiss banks lost in the 1992 mortgage crisis? 42 billion francs! Have we learnt much from this?

**Klement:** We need to learn humility again.

**Embrechts:** Quite right!

**Klement:** We developed a certain hubris in this industry that ballooned with increasing modelling capabilities and computing power. It is remarkable that many are now trying to carry on simply as before.

But that's only human...

**Klement:** Yes, that's human. And it's a great opportunity for all those who want to learn something from the last few years. The customers aren't stupid. They know that

«We should reduce the complexity of today's banks.»

Paul Embrechts

things are done in the financial sector that you just can't do. No one can predict the exchange rate of the dollar. Nevertheless, we pretend that we can.

**Embrechts:** I always tell my students: "Be humble in the face of reality." If we break this "Master of the Universe" feeling that has prevailed for so long on Wall Street, including the remuneration aspect, then we can get somewhere. But I'm also a realist. I can only keep reminding my students of what happened, just as Mr Klement reminds his customers and we here are reminding the readers. ■

**LEGACY 4x4. SOVIEL ALLRAD-KOMBI FÜR SO WENIG GELD.**

Abgebildetes Modell: Legacy 2.0i AWD Advantage, man., Energieeffizienz-Kategorie G, CO<sub>2</sub> 199 g/km, Verbrauch gesamt 8,6 l/100 km, Fr. 27'350.-. Durchschnitt aller in der Schweiz verkauften Neuwagenmodelle (markenübergreifend): 159 g/km.

**Emil Frey AG, Autohaus Zürich-Altstetten**  
 Badenerstrasse 600, 8048 Zürich  
 044 495 23 11, [www.lhrAutohaus.ch](http://www.lhrAutohaus.ch)  
[facebook.com/lhrAutohaus.ch](https://www.facebook.com/lhrAutohaus.ch)

**Emil Frey**  
 Ihr Fachmann seit 1924.

**VENTURE KICK**  
 KICKSTART YOUR HIGHTECH BUSINESS

**130'000 to kick your startup**

**Explore the business potential of your technology**

Are you doing innovative research? Ever considered exploring the market potential of your application? venture kick provides you with CHF 130'000, support and network of investors to kick-start your own company.

**Get your kick: [www.venturekick.ch](http://www.venturekick.ch)**

venture kick is a fully private initiative supported by:

— GEBERT RUF STIFTUNG — ERNST GÖHNER STIFTUNG — OPO STIFTUNG — AVINA STIFTUNG — LOMBARD ODIER — DEBIO GROUP