Dr Adam Metzler is interested in using mathematics, statistics and probability to help the financial sector. Below, he discusses some of his work on contingent capital bonds and their potentially far-reaching implications for the global economy.

What interests you about applying research on probability and statistics to the challenges faced in the financial industry?

I am quite risk averse by nature. As the science of uncertainty, probability and statistics is basically the science of that which scares, it is something that has always fascinated me.

Could you introduce contingent capital bonds (CCBs)?

A CCB is effectively a loan that is forgiven if and when the borrower begins to experience financial distress. The hope is that this will provide the borrower with enough financial breathing room to avoid bankruptcy. As compensation, the lender becomes a part-owner of the borrower’s business. While this might appear as though the lender has become part-owner of a sinking ship, it is important to remember that the loan forgiveness is intended to be a lifetime that helps the borrower “right” the ship and return to profitability. As such, the lender is not simply forgiving the loan out of the goodness of their heart – by becoming part-owners of a now healthier firm they stand to profit.

How are CCBs supposed to solve the issue of governments having to bailout banks?

By forgiving the loan, the lender essentially bails out the borrower. So if a bank issues a CCB, then the investor in that CCB commits to bailing the bank out if and when it gets into financial trouble. In a perfect world this bailout has the desired effect and the bank does not fail – all without the government’s involvement. However, whether the investor-funded bailout would have the desired effect is far from certain, and there is no clear consensus among academics, bankers or regulators as to the merits of contingent capital and its optimal design.

What are the key aims of your work on CCBs?

Our ultimate goal is to play a supporting role in the ongoing discussion regarding contingent capital. To accomplish this goal, we try to develop mathematical models that are easy to use and understand – it is important that they can be used to generate insights into specific questions.

There are a range of questions we have considered in the past, or are currently considering, including the following: Should the interest rate on contingent bonds be higher than those on traditional bonds? and ‘How would this be affected by specific features of the CCB contract, such as the precise definition of financial distress?’

Our hope is that the models we develop prove useful to regulators and/or potential issuers of CCBs by providing them with a means to compare and contrast a variety of potential contract specifications.

Your research highlights that CCBs may provide investors with incentives to manipulate. Can you provide more information on the specifics of this?

The more shares CCB investors receive, the more of the bank they own; so, all else being equal, CCB investors prefer a lower conversion price to a high one. If the conversion price is tied to the firm’s stock price, then CCB investors may have incentives to manipulate the firm’s stock price and artificially push it below its fair value. This short selling of the bank’s stock is one potential mechanism and is a serious concern for all stakeholders.

One of our models was developed with a view to determining whether or not such action would be profitable for CCB investors. The answer is that it depends on a large number of factors, particularly how much capital CCB investors would have to put at risk in order to pull this off. One encouraging finding is that a judiciously chosen (i.e. sufficiently high) floor price can go a long way towards making this type of manipulation unprofitable.

Finally, how do you hope your research will benefit the financial industry and wider society?

The financial sector is different from other industries, in that everybody needs access to credit. This means that any trouble in the sector has immediate consequences for the wider economy. Whether we like it or not, finance is a large part of most developed economies; thus, anything that helps make it more stable is beneficial to all of us.
Uniquely and mathematically modelling financial markets

Researchers from Wilfrid Laurier University and Western University, Canada, have adopted a unique approach to mathematical finance that seeks to address questions of relevance to regulators and issuers of contingent capital. Their findings have uncovered considerations that could have global economic benefits.

THE GLOBAL FINANCIAL crisis of 2007-08 has repeatedly been labelled the worst the world has experienced since the infamous Great Depression of the 1930s. In the years since, there have been numerous investigations into the possible causes of the crisis, with several reasons being proffered, including excessive borrowing, high-risk investing, a lack of accountability and ethics, and a failure in financial regulation and supervision.

The effects were felt by individuals, businesses and financial institutions around the world. Indeed, the events ultimately led to a global recession that we are only just beginning to come out of – although this is still debatable according to some economists. Of course, banking systems are extremely important to a country’s economy, which best explains why governments around the world felt an obligation to ‘bail out’ the banks, using taxpayers’ money to prevent a total collapse of the banking system.

Yet this should not be thought of as a solution. For, while it might have alleviated the crisis to an extent and prevented more damage being done to the global economy, bailouts cannot be repeatedly drawn upon to ‘rescue’ the banks should a crisis happen again. As such, economists and researchers are continuing efforts to find the best means of preventing history repeating itself.

CONTINGENT CAPITAL BONDS

One proposed method for preventing the systematic collapse of financial institutions is contingent capital bonds (CCBs). Put simply, a CCB is a loan that is made to a borrower by an investor. If this loan fails, the responsibility for it is on the part of the investor and not the bank. This means – in theory – that there is less danger of a bank requiring a government bailout because the debt is the investor’s, not theirs. Because the investor ‘owns’ the CCB, they have a vested interest in the profitability of the borrower.

Currently, there is much discussion on contingent capital – the benefits, pitfalls and potential risk factors involved. A team of researchers at the Wilfrid Laurier University and Western University in Canada is helping to develop ways to make the financial sector more stable. Led by Dr Adam Metzler, the group is addressing questions that are of particular relevance to the regulators and issuers of CCBs, as opposed to investors and traders.

FLEXIBLE MODELS

Metzler is an expert in quantitative finance – a field of applied mathematics that seeks to model certain financial risks. Quantitative finance can be thought of as an area of the mathematical sciences that traditionally focuses on valuations and risk management of complex derivatives. Metzler believes that CCBs can be seen as complex derivatives, suggesting that some of the key ideas and questions from quantitative financing can be used to understand the quantitative aspects of CCBs. This provides him and his team with a means to approach contingent capital from a unique point of view. “Many of the approaches to CCBs that use tools from quantitative finance answer very focused questions, such as ‘how much should I pay for a CCB that has these specific features?’,” explains Metzler. “Whereas we develop more flexible models that can account for a wide variety of features and therefore answer a wider variety of questions.”

Metzler is therefore able to develop mathematical models that can provide insight into different questions, such as ‘what are the relative merits of issuing contract A versus contract B?’. These questions are of interest to regulators and potential issuers of contingent capital.

THE IMPORTANCE OF THE CONVERSION PRICE

One particularly notable aspect of Metzler’s research is the development of a structural modelling approach to price CCBs with coupon payments. Essentially, a bond’s coupon payment is an amount of interest paid to the bondholder periodically from the time of its issue until the time it matures. This structural approach to modelling the risk that
CONTINGENT CAPITAL BONDS

OBJECTIVES

• To better understand ways to make the financial sector more stable

• To use ideas from quantitative finance to better understand the quantitative aspects of contingent capital bonds (CCBs)

• To develop a structural modelling approach to price CCBs

KEY COLLABORATORS

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ADAM METZLER received his Master’s in Mathematics (2004) and PhD (2008) from the Department of Statistics and Actuarial Science at the University of Waterloo, Canada. He was an assistant professor in the Department of Applied Mathematics at Western University from 2008-12, before accepting his current position as assistant professor in the Mathematics Department at Wilfrid Laurier University, Canada.

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