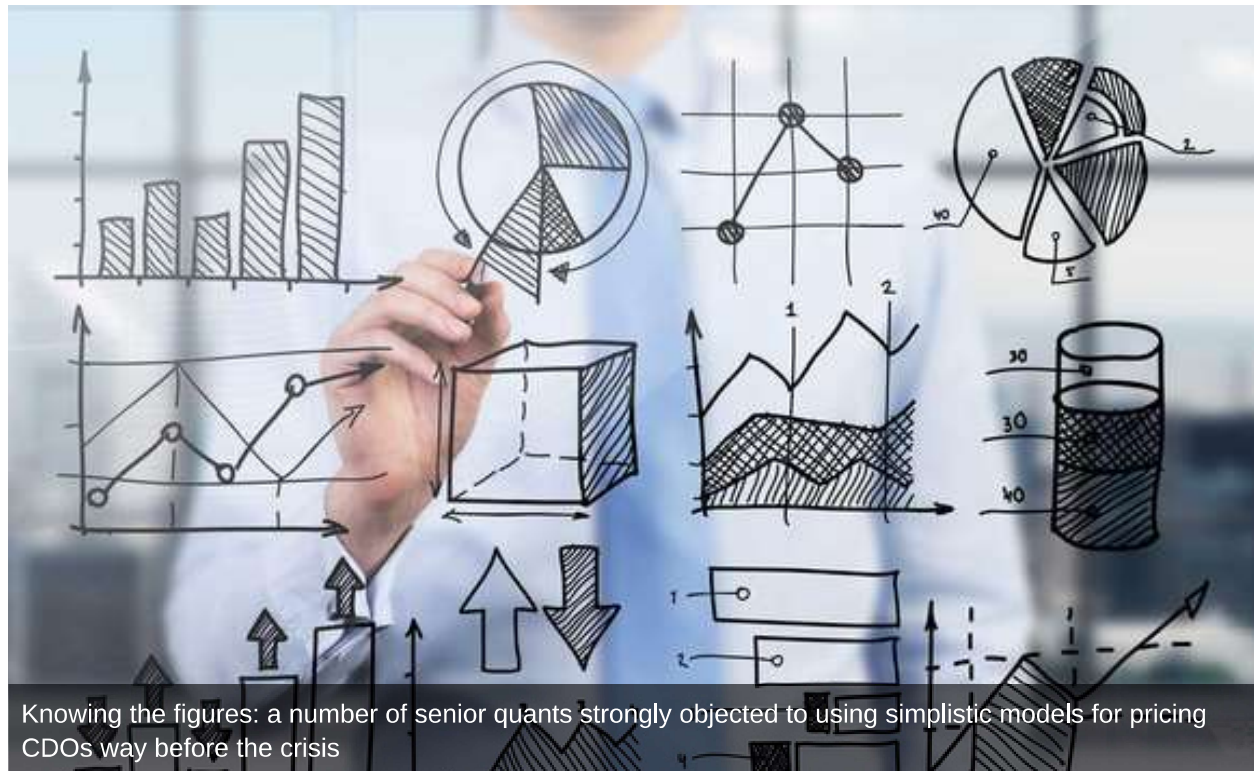


On derivatives and quants

Alex Lipton on how the role of quants is adapting to the new financial environment



Alex Lipton

24 June 2016

This is the first in a regular series of columns by Alexander Lipton giving the quants' view on key topics in the industry. Lipton is a Connection Science Fellow at MIT and an Adjunct Professor of Mathematics at NYU. He held various senior managerial quant positions at Bank of America Merrill Lynch for 10 years until May 2016. Earlier, he served as a quant at several investment banks and a prominent hedge fund. He was named Risk magazine's first quant of the year in 2000.

As the landscape of derivatives pricing, trading and risk management has shifted in recent

years, so too has the job of quants within banks. It will change even more as the derivatives market continues to evolve. However, the role of quants is often misunderstood internally and their views can be overlooked.


While very few parties remain blameless for the 2008 crisis, large-scale trading in asset-backed collateralised debt obligations (ABS CDOs) was widely cited as a major culprit. Although ABS CDOs were conceived by structurers and salespeople, their inadequate pricing and risk management was handled by quants, so it was logical to blame them along with other parties.

Reality is more nuanced, though. A number of senior quants, including myself, strongly objected to using simplistic models for pricing CDOs way before the crisis, but these objections were overridden by senior management.¹

However, a number of other factors affected the clout of quants internally, and still do in many cases. First, the skill set of a typical senior manager is not quantitative enough to appreciate technical arguments. Indeed, quants never had (and don't have now) a place at the high table, where the actual executive decisions are made. To the best of my knowledge, not a single major bank has a board-level quant.

Second, in many instances, quants do not do themselves any favours by not being able to articulate their points lucidly and simply and insist on them with determination. Third, many technologists masquerade themselves as quants, muddying the waters further.

In addition, the emergence of the so-called strats, who are neither quants nor technologists and whose main role is to keep their trading and sales stakeholders happy,² dilutes the role of modelling quants further. To paraphrase organisational theorist Ephraim McLean, one can describe the lifecycle of quants' engagement with investment banking as follows: "1. Enthusiasm, 2. Disillusionment, 3. Panic, 4. Search for the guilty, 5. Punishment of the innocent, and 6. Praise and honour for the non-participants." It looks like we are currently at stage six.



Amplified risk management and reporting requirements, including the need to calculate various derivatives valuation adjustments, collectively known as XVAs, will put enormous stress on banks' infrastructure

While some critics argue modelling has to be curtailed or even abandoned due to all of the above, I believe we need more of it, but it has to be much more intelligent, impactful, and independent. In particular, the internal deficiencies affecting quants have to be addressed as a matter of urgency.

In addition, the introduction of actuarial-style exams for quants is long overdue. I hope regulators will take this suggestion seriously.

Going forward, the role of a quant will change dramatically. The regulatory-driven move to central clearing of over-the-counter derivatives and increased regulatory capital and collateral demands for non-cleared derivatives will soon make many of them uneconomical, at least for investment banks, which will create a window of opportunity for non-bank players.

Amplified risk management and reporting requirements, including the need to calculate various derivatives valuation adjustments, collectively known as XVAs, will put enormous stress on banks' infrastructure, which in most cases is rather obsolete and rigid. While some of these XVAs are reasonable, others make little or no sense and are often computed inconsistently across the industry.

As a result, in the near future, we can expect disappearance of many types of exotic derivatives, such as ill-starred power reverse dual-currency and targeted accrual redemption notes. Instead of a plethora of bespoke derivatives, we will have a few standardised products, mostly traded electronically and cleared centrally. Non-standard products will be generally short-dated.

So what does this mean for quants? Tasks will become more technologically orientated. Efficiency, simplicity, uniformity, commercial common sense, statistical and risk management skills, and technological dexterity, rather than mathematical sophistication,

would be hallmarks of a successful sell-side derivatives quant.

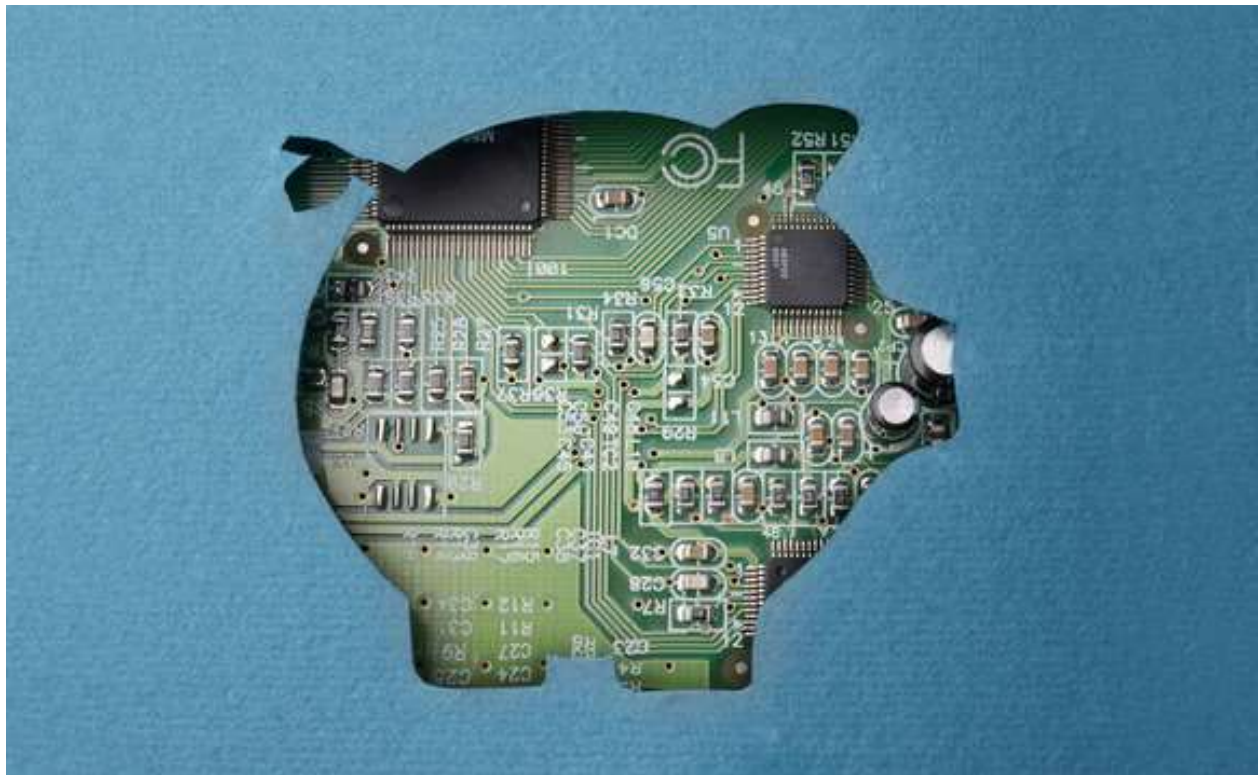
More entrepreneurial and mathematically orientated quants will naturally drift to the buy side, or abandon derivatives altogether for greener pastures such as investment management or fintech. There they can make use of their considerable skills – as long as the companies appreciate their views, of course.

¹ *Lipton, A and Rennie, A, eds, 2008. Credit correlation: life after copulas. World Scientific Publishing Company Incorporated.*

² *I remember a senior trader at Bankers Trust, who used to call their predecessors "shift F9 monkeys with PhDs".*

Banks must embrace their digital destiny

Alexander Lipton believes the time is right for advanced digital banks to take the industry forward, and quants can lead the charge



Alexander Lipton

29 July 2016

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To understand why banks are unloved and feared by customers, regulators and investors, and what can be done to rectify this unfortunate situation, we need to recognise the nature of the banking business. It is easier said than done, since banks are in the business of buying and selling money, and there is little consensus on what money is, and

how it is created. For example, nobody knows if bitcoin is a form of money or not.

It is universally accepted that money has several important functions, such as a store of value, means of payment for goods, services and taxes, and a unit of account. Currently, there are three schools of thought on how money is created: via credit creation; via fractional reserve lending; and via financial intermediation.

While the academic establishment positioned itself squarely behind financial intermediation, there is no doubt in my mind that credit creation is the correct mechanism of money creation. In short, money is created by banks "out of thin air".¹


In view of the above, the art of banking is one of skilful record keeping in the general ledger, which reflects flows of money and credit. By its very nature, record keeping is a mathematical and technological activity. Once this fact is recognised, the root causes of banking malaise become obvious: incumbent banks have a poor quantitative handle of the credit risks on their books, and are far behind the latest technological breakthroughs.

In the last 30 years, major industries such as retail, travel, communications, and mass media underwent revolutionary changes in their business models, while banking remained stagnant, living on its past accomplishments and oblivious to the winds of change.

The current state of banking is deeply unsatisfactory, because it is neither efficient, nor competitive. Moreover, customers are exposed to the risk of losing their deposits that are above the regulatory guaranteed minimum in the case of their bank's default, since they are mere junior creditors in a bank default waterfall.

Indeed, English common law established in the early nineteenth century that "money paid into a banker's [sic] becomes immediately a part of his general assets; and he is merely a debtor for the amount".²

This situation is not a pure coincidence, nor is about to change any time soon. Even the great financial crisis of 2008 didn't alter the banks' *modus operandi*. In essence, it made the situation even worse because "stronger" banks absorbed failed ones, thus becoming too-big-to-manage, in addition to too-big-to-fail.



This situation opens a unique opportunity for building a digital bank from scratch by utilising the most advanced technologies

Recently, incumbents started paying lip service to the digital challenges facing them. Not surprisingly, they have chosen the path of least resistance by backing the creation of digital apps, instead of dramatically revamping their technology framework.

While this strategy of "putting lipstick on a pig"³ is understandable given the enormous costs and complexity of retrofitting existing technologies to the demands of the internet economy, it's clearly inadequate for rising to the challenges facing the sector. As the *Harvard Business Review* [said recently](#), "it's an economy of limitless opportunities for some and disruption and displacement for others".

This situation opens a unique opportunity for building a digital bank from scratch by utilising the most advanced technologies: cryptography and distributed ledger techniques, artificial intelligence, big data, and deep learning.

This bank will naturally achieve a high degree of efficiency, profitability and agility based on balance sheet optimisation, deployment of digital distributed ledger-inspired infrastructure, and essential automation and digitisation of the treasury function and back office. It can also benefit from enhanced security employing the most advanced cryptographic techniques throughout the entire organisation.

Its infrastructure will be flexible enough to handle both private digital currencies such as bitcoin, and future government issued currencies such as 'britcoin', a centralised digital currency which is currently contemplated by the Bank of England. It will also be capable of issuing its own digital currency.

The bank will be able to deploy artificial intelligence and big data analytics for enhancing the customer experience, facilitate automated personal and small to medium-sized enterprise credit issuance, and improve risk management, which will be appreciated by investors, customers and regulators alike.⁴

It is clear that quants of the future will spend much more time creating flexible and versatile infrastructures for digital banking than on pricing exotic derivatives. Provided that

they learn economics and improve their communication skills, they have a fighting chance to lead the digital banking revolution.

¹ A. Lipton, "[Modern monetary circuit theory](#)". International Journal of Theoretical and Applied Finance, 2016.

² *Devaynes v. Noble (1816)*.

³ Mark Mullen, chief executive officer of UK startup Atom Bank.

⁴ Lipton, Shrier and Pentland, "*Digital banking manifesto: the end of banks*". Massachusetts Institute of Technology Connection Science, 2016.

Macroeconomic theories: not even wrong

Flawed and inconsistent mainstream macroeconomic theories such as efficient market hypothesis are dangerous to society, says Alexander Lipton



Alexander Lipton

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Austria-born physicist and Nobel prizewinner Wolfgang Pauli, who was well known for his dry wit and sharp tongue, once described a theory as "not even wrong" – that is, it was so fundamentally flawed that it could not even be used to make meaningful predictions.

Today, the same could be said about mainstream macroeconomic theories – including the dynamic stochastic general equilibrium model (DSGEM), modern portfolio theory (MPT), efficient market hypothesis (EMH) and a few others cut from the same intellectual cloth – that completely miss the point and cannot be used in practice.

These theories are not only pointless; they are dangerous. They adversely affect both academic discourse and the practical actions of regulators and politicians. The latter effect, in particular, is crucial and has enormous implications for society at large.

For instance, central banks use DSGEM to shape monetary policy and design banking regulations, but the model omits the banking sector completely and relies on the unconvincing concept of financial intermediation instead. Furthermore, DSGEM has been used by the European Central Bank to forecast the dynamics of the entire European market, rather than individual countries, thus neglecting their obvious differences.

“ These theories are not only pointless; they are dangerous. They adversely affect both academic discourse and the practical actions of regulators and politicians

From such a bird's-eye view, the introduction of the euro in 1999 looked like a great idea, while it turned out to be a flawed concept threatening the European project as a whole, partly because politicians and central bankers were lacking adequate tools for analysing stocks and flows across Europe.¹

Likewise, the rapid proliferation of robo-advisers, who rely almost exclusively on MPT and its variations, is rather worrisome. It is common knowledge that MPT allocations are unstable and do not work out-of-sample; in fact, a simple equal allocation of funds beats MPT-based allocations hands down.

This list can easily be extended further. There are many explanations of macroeconomic theories' flaws – some epistemological, some technical, and some political – but the main reason is clear. Originators of these theories and their disciples have been enamoured of relatively simple physical theories and tried to extend them to the realm of what is essentially social science, rather than physical science, by assuming that asset returns are governed by simple stochastic processes and modelling them accordingly.

At the same time, precisely because they have been dealing with social systems, some of the natural safeguards that have faithfully served physics and mathematics for centuries have been suppressed. In particular, the power of counter-example has been conveniently ignored.

Let's look at EMH. How could it be taken at face value if sudden, unexplained market plunges, such as those that happened in 1973–74 (or, for that matter, in 1873), October 1987, and, more recently, during the infamous flash crash of May 2010, contradict its main premise unequivocally?



Some of the natural safeguards that have faithfully served physics and mathematics for centuries have been suppressed. In particular, the power of counter-example has been conveniently ignored

How could one seriously talk about efficiency knowing full well about the tulip mania of 1636–37, the South Sea bubble, the sub-prime crisis, the Bitcoin bubble and numerous others? EMH confuses the indisputable fact that it is extremely difficult to beat the market with market efficiency. In fact, they are two completely different concepts. The power of these counter-examples alone would have forced physicists to go back to the drawing board and reconsider their main premises, but economists decided to push forward regardless.²

A well-known former chairman of the Federal Reserve testified in a Congressional hearing that he was "in a state of shocked disbelief" because markets turned out to be inefficient. As a result of these misguided views, a number of sensible regulations were abolished, the Glass-Steagall Act was repealed, and the global financial crisis of 2008–09 unfolded. New regulations were introduced after the crisis, including the Dodd-Frank Act. But additional regulations are still required – potentially the reinstatement of the Glass-Steagall Act, or at least an explanation of why it should not be reinstated.

The time has come for quants to look into some of the more ambiguous aspects of macroeconomics and try to build better theories explaining market dynamics and their salient features, propose better asset allocation methods, and generally add much-

needed rigour to the discourse. This will help not only their employers and themselves, but also society at large.

1. See, for example, J. Stiglitz, The euro: and its threat to the future of Europe, 2016. I have been opposed to the euro from day one, advocating instead the digitization of national currencies, thus removing frictions – and fighting financial crime along the way – while preserving necessary safety valves. Recent developments in blockchain-related technologies might help to make sovereign-issued digital currencies a reality.

2. By now, true believers in EMH have to rely on the "credo quia absurdum" line of defence first devised by Tertullian in the third century AD.

Blockchain: a solution looking for a problem

While new financial technologies show considerable promise, many proposed applications are either naive or miss the mark outright



Alexander Lipton

27 September 2016

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Fintech in general, and blockchain and distributed ledger technology (DLT) in particular, are currently the toast of the town. Expectations of their impact on the banking industry

are nothing short of miraculous; it looks like finance is going through a 'cold fusion' phase. Potentially, fintech can have numerous applications; as of now, it is not clear which ones.

Although the current obsession with blockchain and DLT is inspired by Satoshi Nakamoto's 2009 tour de force, *Bitcoin: A peer-to-peer electronic cash system*, bitcoin is not the first digital currency and very likely not the last one either.

There are multiple historical examples of blockchains and distributed ledgers. For instance, family trees of ruling dynasties are blockchains. Moreover, since they were independently maintained in several capitals, they also represent distributed ledgers. More recently, we've seen digicash invented by David Chaum in the 1980s, and Bit Gold invented by Nick Szabo in the 1990s.

While all the building blocks of bitcoin have been known for some time, their unique combination captured the public's imagination only recently. In the beginning, bitcoin's appeal was strong, especially given justifiable disenchantment with the banking sector. It was expected to be a viable non-inflationary peer-to-peer currency based on a proof-of-work unpermissioned public ledger.¹



Another problem to be addressed is the sheer scale of the global economy, which precludes the use of an unpermissioned public ledger such as bitcoin

Reality proved to be less glamorous. Bitcoin supports about seven transactions per second, with real transaction costs of approximately 1.5%. This is down from 2012, when costs were a whopping 8%.²

Anecdotally, bitcoin consumes as much electricity as eBay, Facebook and Google combined, making mining a cost-of-electricity game. The environmental costs of bitcoin, which are frequently ignored, are obviously huge. Additionally, bitcoin uses an archaic single-entry accounting rather than a double-entry one.

Bitcoin miners coalesce in gigantic pools, with the three largest pools responsible for about two-thirds of all the work; thus, collusion among these pools makes a 51% attack

possible, with the aggressor being able to revise a transaction history, or prevent new transactions from confirming.

Currently, rather than a worldwide distributed system, bitcoin is highly centralised and predominantly orientated towards the Chinese market. In the words of a Russian ex-prime minister Viktor Chernomyrdin, "we wanted the best, but it turned out as always".

Another problem to be addressed is the sheer scale of the global economy, which precludes the use of an unpermissioned public ledger such as bitcoin. This has led to permissioned public ledgers such as Ripple, and private ledgers such as those run by R3, IBM and Digital Asset Holdings, being proposed as alternatives.

That is not to say it is impossible to use DLT to good effect. Inspiration for its use comes from the Estonian experience of switching to a digital government, which was accomplished by connecting all important databases via an adaptor called the X-road.

A similar concept can be used to connect financial institutions via DLT. The financial X-road has to be a permissioned ledger, controlled by trusted notaries paid for their services. Two financial institutions use their respective adaptors to agree on a transaction, execute it via a smart contract, then secure it by hashing.

Afterwards, a quorum of notaries digitally signs the hash and posts it in the common layer, creating an immutable public record – 'laminating' the transaction, in other words. It is imperative that both securities and cash are treated on a par.

One of the juicier targets is the Holy Trinity of capitalism – trading, clearance and settlement. DLT is clearly unsuitable for high-frequency trading, since distributed clocks are not truly synchronised. However, permissioned private ledgers can certainly cut costs, increase speed of clearing and settlement, and reduce the burden of reconciliation and failures. Yet, the instantaneous settlement – or T+15 minutes as it is occasionally called – should not be implemented, because it obliterates pillars of the current system such as netting, stock borrowing and anonymity.

There are several other areas where DLT can be useful. Trade finance, syndicated loans and other similar high-friction areas are additional attractive candidates for DLT. In global payments, the potential to use DLT is also relatively high. However, despite statements to the contrary, the existing payment system is expensive but not broken, so competition will be tough.

So although the idea of a blockchain and DLT is not novel, modern technology gives it a new life. It remains to be seen where its applications will be best served, however.

¹ *The total number of bitcoins in circulation is now 21 million, 16 million of which have been mined and 3-5 million potentially irretrievably lost.*

² *Claims that bitcoin can solve the issue of half the world's population being unbanked are simply ludicrous.*

The decline of the cash empire

The last line of defence between us and punitive negative rates is paper currency



Paper cash is reaching the end of its reign

Alexander Lipton

28 October 2016

It is indisputable that civilization is not possible without money, and *vice versa*. The meaning of money has long preoccupied rulers and their taxmen, buyers and sellers, entrepreneurs and their labourers, economists and philosophers, writers and stand-up comedians, revolutionaries and ordinary folks alike. It is universally accepted that money is a store of value, a means of payment in general and taxes in particular, a unit of account, and, more broadly, a link between the past and the future.

Yet the concept of physical money – coins and banknotes – is under attack. Heated debates about the future of cash have been fuelled by the introduction of ideas such as

bitcoin on the one hand,¹ and clumsy attempts by policy-makers to justify persistent negative interest rates on the other.

The last line of defence between us and punitive negative rates is paper currency. Yet modern technology makes it possible to abolish cash, with central banks issuing digital cash (CBDC) instead. Paper cash is reaching the end of its reign. In many societies, particularly in Scandinavia, it is already relegated to the remote corners of the economy.² It does not require a leap of faith to see that in a few years, central bank digital currency will replace banknotes.

With cash abolished, interest rates could be set as negative as central bankers liked; rates would be determined only by the level of prevailing economic insight in policy-making circles. In effect, punitive negative interest would be used by central banks as a powerful tool for stimulating inflation-like behaviour, as they fail to stimulate proper inflation through increased demand. The crucial difference between inflation and negative rate regimes is that cash is highly undesirable under the former, and very valuable under the latter.

However, negative rates would take us back to medieval times, when royal treasuries were practicing demurrage – the periodic recall of coins, which were reminted and returned with a fraction retained by the treasury – which served as a tax on monetary wealth, and required a massive apparatus of coercion to impose efficiently.

“ It is possible incumbent banks have outlived their usefulness, and need to morph into something more compatible with technical progress achieved in other industries

Moreover, CBDC makes the execution of the celebrated Chicago Plan of 1933 (originally proposed by British economist David Ricardo in 1824) for introducing narrow or full-reserve banking – when banks hold as much central bank cash as they have deposits – entirely possible.

Both firms and ordinary citizens could have accounts directly with central banks, negating the necessity of having deposits with commercial banks, which will lose their central position in the economy and become akin to credit mutual funds. To preserve themselves,

banks can issue their own money, creating a situation where narrow banking and free banking coexist.

To understand the potential implications of narrow banking, one needs to follow the movement of money in the economy. It is best described by the monetary circuit theory, which explains how money is created and how it lubricates and facilitates the production and consumption cycles in society. It correctly reflects the mechanics of linking credit and money, emphasises the role of commercial bank as money creators and explains the limitations of central banks.

There is a lack of appreciation in mainstream economics of the special role banks play in this cycle. A vibrant economic and financial system cannot operate without banks as money creators. At the same time, the current system is unstable, complex and difficult to regulate, because banks have become heavily interconnected as a function of their lending activities. It is possible incumbent banks have outlived their usefulness, and need to morph into something more compatible with technical progress achieved in other industries.

CBDC would have obvious benefits. The absence of physical cash would partially cure societal ills, such as crime, drug trafficking and the like, or, at least, make them more difficult. It would lubricate the wheels of commerce, and help the unbanked to become participants in the digital economy, benefitting society at large. On the flip side, in a negative interest rate world, savers, pensioners, insurers who rely on fixed-income instruments would have to find some other means of fulfilling their goals – if such means exist.

While I doubt very much the feat of engineering required for central banks to issue digital cash will be achieved by using bitcoin-like technology, I do believe a clever reincarnation of David Chaum's DigiCash project – the ill-fated first stab at a digital currency based on cryptographic protocols – combined with suitable hardware, multi-party secure computation, dedicated tamper-proof satellite network, and the like, would do the trick.

CBDC has great promise, but should ideally be introduced in a very careful, thoughtful, and deliberate manner, modelling the implications before, rather than after, the fact.

¹ *Apart from its intriguing technical innovations, one could argue bitcoin does not differ that much from tally sticks used in the Middle Ages.*

² *Interestingly, the first banknotes in Europe were issued in Sweden, in 1661.*

Can quants defuse the pension time bomb?

Alex Lipton argues new quantitative methods are needed to solve the looming pension crisis



Time for a rethink: modern portfolio theory has clearly outlived its usefulness

Alexander Lipton

28 November 2016

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Otto von Bismarck, Duke of Lauenburg, was a man of many achievements, some of them positive, some negative; however, his greatest contribution to humanity was the invention of the modern concept of retirement.¹ Universal pension, proposed by Bismarck, was a

radical departure from the old ways, when people continued to work until they died.² In Bismarck's times, pensions were not difficult to pay, since life expectancy was roughly equal to the pension age. However, recent demographic trends – people living longer, fertility steadily declining, lacklustre investment returns and unnaturally low interest rates – have bankrupted several private pension plans, and put many others on the brink of bankruptcy. The term "pension time bomb" has even been coined to describe the looming crisis. This dire situation calls for new quantitative methods to alleviate the problem.

With time, pensions became ubiquitous in the developed world, until they eventually encumbered both governments and private companies with enormous liabilities, mostly uncovered. The percentage of workers participating in traditional defined benefit (DB) pension plans, paying a lifetime annuity, has been steadily declining over the past 30 years, because of mammoth expenses. In contrast, the percentage of workers covered by defined contribution (DC) pension plans, paying money from investment accounts owned and controlled by employees, has been steadily increasing.

In many instances, DB plans are administered by elected officials or public servants, who hire professional asset managers, including hedge fund and private equity firms, to do their bidding. In contrast, DC plans delegate investment responsibilities to employees, who are often ill equipped to shoulder them.

Passive index and exchange-traded fund investing is a promising approach, particularly if management fees are low, but the choice of instruments to invest into is anything but obvious. Many asset managers use modern portfolio theory (MPT), notably in the form proposed by Black-Litterman, to make investment decisions.

Unfortunately, MPT clearly outlived its usefulness. The reasons for this harsh, but inescapable, conclusion are manifold: the impossibility to calculate requisite expected returns, the highly unstable optimal weights, which are extremely sensitive to the measurement error of returns, the infeasibility of justifying investment views of a portfolio manager, the lack of rebalancing, the non-Gaussian nature of returns, and the unrealistic and inflexible objective function, to mention just a few.

“ There is an urgent need to develop a new, robust and intuitive asset management framework. The key to accomplishing this task is to be able to maximise the probability of achieving one's investment goal in the real-world measure

In fact, Harry Markowitz, the father of MPT, understood the limitations of the theory well enough, and never used it for making personal investment decisions. When asked about his pension investment strategy, he said: "I visualized my grief if the stock market went way up and I wasn't in it – or if it went way down and I was completely in it. So, I split my contributions 50/50 between stocks and bonds."

Moreover, most hedge funds and active asset managers fail to consistently outperform the market for long enough periods, as required for pension investments. In general, returns generated by hedge funds and private equity firms, who rely on a secret sauce to make investment decisions, lag major indexes, particularly, when their astronomical fees are counted in.

How can quants help to defuse the pension time bomb? There is an urgent need to develop a new, robust and intuitive asset management framework. The key to accomplishing this task is to be able to maximise the probability of achieving one's investment goal in the real-world measure, given investment constraints, rather than trying to find the celebrated (and elusive) efficient frontier based on unverifiable assumptions. This goal is similar to solving the celebrated 'beat the dealer' task of overcoming the house advantage by card counting in the game of blackjack. One obvious complication is that asset returns are not just random, but also non-stationary, so additional insights are necessary. The other one is that the problem is multi-period, hence portfolio rebalancing must be explicitly considered.

So, while fixing the crumbling pension edifice is a multi-faceted and rather complex problem requiring hard political decisions and sacrifices, quants can make a non-trivial contribution to solving it. However, whether new quantitative methods are used or not, greater pension contributions by both employees and employers might still be necessary.

¹ *With Bismarck's encouragement and brinkmanship, in 1881 the Reichstag passed a law guaranteeing financial support from the government to the older members of society, starting at the age of 70.*

² *Military pensions have been known since antiquity: Augustus, the first Roman Emperor, offered a pension to legionnaires who had served for 16 years (later 20), in the form of cash or land equal to 12 times their annual salary. This offer proved to be ruinously expensive, eventually bankrupting the empire. The rest is history.*