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THE WEALTH OF NATIONS: BUILDING SUSTAINABLE FINANCE CAPACITY

Climate change and sustainability are two key issues of our time. They present significant financial risks to business and society, and offer opportunities to lead the transition to a sustainable, low-carbon world, and at the same time to protect our all-important natural capital – the one world we have to live on (at least for now). Governments around the world (including the UK) are reviewing their sustainable finance strategies. To support that urgent process, the Chartered Body Alliance – the CISI with our colleagues, the bankers and insurers – working with PwC has been conducting research and analysis on behalf of the Green Finance Education Charter (GFEC) bodies on the knowledge and skills requirements in this central field.

The UK government launched the GFEC in 2020, a collective initiative across UK finance professions to align professional education and training with national and global sustainability objectives. This research programme, conducted in association with the main UK government departments, has identified current gaps and future knowledge and skills needs related to sustainable finance across the financial sector. The aim is to map the landscape, drawing attention to strengths, weaknesses, and gaps, benchmarking best practice globally.

The research will be published in March 2023, and indicates significant gaps in skills and training provision for our sector and a particular need for formal training plans for sustainable finance, including assessments of current knowledge and skills gaps in firms and individuals. This needs a combination of effort, and more joined-up thinking, both internally in organisations and externally through professional bodies, training providers, and government departments.

That needs careful thought on bridging the gap between knowledge and skills. Take, for instance, the voluntary carbon market launched in 2022 by London Stock Exchange Group (LSEG, where life on CISI began). Companies must demonstrate credible science-based strategies to reduce the carbon footprint of their activities to address unavoidable and residual emissions on their decarbonisation journey. Many companies are buying carbon credits as interim emission reduction targets are approaching. Corporate demand for these credits is sharply on the rise.

As in any market, there is a clear requirement for scale, liquidity, and transparency. In response, LSEG has launched its voluntary carbon market. It is designed to channel finance into projects that are seeking to reduce greenhouse gases in the atmosphere, giving rise to carbon credits, provide access to carbon credits for investors and corporates, and all with the benefits of public market regulation and disclosure requirements.

How will the voluntary carbon market work? That's where both knowledge, and skills, and the bridge linking the two, come in. The market is open to closed-ended investment funds and operating companies admitted or seeking admission to trading on the LSEG markets. A fund or a company raises capital from investors for a fund. The capital raised will be invested into a portfolio of climate change mitigation projects alongside other climate-aligned assets. Projects are managed by expert project developers and accredited by recognised industry bodies, with the objective of generating carbon credits that can be distributed to investors, retired on behalf of investors, or sold, leveraging the market infrastructure, regulation, discipline, and transparency inherent in public markets. The development of both knowledge and skills required here is becoming clear.

See CISI TV for Sustainable Finance: The World in 2023, our first programme for the new year, featuring the City of London's policy chair (next article) and Katya Gorbatiouk, head of investment funds at the stock exchange and the brains behind the new market, bringing that very knowledge, and the related skills, to our members.

SUSTAINABLE FINANCE: THE WORLD IN 2023

AT THE CISI'S FIRST EVENT OF 2023, CHRIS HAYWARD, POLICY CHAIR OF THE CITY OF LONDON CORPORATION, OFFERED A TOUR D'HORIZON OF THE CHALLENGES WE FACE

Collectively, markets from London to Los Angeles, Singapore to San Francisco, need better transparency, comparability, and credibility in the sustainable finance agenda. We need to position the UK as a one-stop shop: the go-to partner for countries and companies looking for capital and expertise, to help them meet their sustainability goals.

The City Corporation is working to facilitate this shift because it knows that sustainable finance is one of the best tools available to policymakers in the urgent race to meet climate targets.

Looking back on the world in 2022, it was unquestionably a year of challenge and change. The economy struggled to cope with successive crises precipitated by Russia's illegal invasion of Ukraine, post-pandemic supply chain shocks, and political upheaval just a couple of miles away in Westminster. Earth continued to warm with disastrous consequences for humans and animals alike. Mass flooding devastated 33 million people in Pakistan, while the western United States experienced severe droughts, and the United Kingdom's average temperature passed the 10°C threshold for the first time in recorded history.

These aren't the records to which we should be aspiring. It's no surprise that the Collins Dictionary's word of the year for 2022 was 'permacrisis'. But this suggests that we are resigned to the status quo, that our problems are entrenched, that we find ourselves in a hole so deep that it is inescapable.

We must not accept that defeatism. Collectively, just as humans have been the problem, so too we can and must be the solution. That starts with shifting the paradigm that has held sway for too long: that finance and sustainability are unrelated at best and opposing forces at their worst. The Green Horizon Summit at COP26 in Glasgow, our own Net Zero Delivery Summit in May 2022, and the launch of the Glasgow Financial Alliance for Net Zero (GFANZ) showcased that finance and sustainability are connected. Green action can lie at the heart of financial services, and financial services can lie at the heart of green action.

I realise that 2022 provided immense challenges to the sustainable finance agenda. The war in Ukraine prompted discussions in some quarters of retrenching to outdated, carbon-intensive fuel sources. Such short-termism would only saddle future generations with a planetary debt that they would struggle to repay. Together, we must ensure that we keep our eyes fixed beyond the immediate horizon, rather than looking down at our feet.

That means looking for global solutions to this global problem. We need a four-pronged approach.

First, we need to reduce frictions. This means strengthening UK policy and regulation with an effective and coherent sustainable finance framework. Second, we need to nurture innovation. More creativity in the market will create better products for green and impact finance and services from the UK. Third, we need to attract capital, firms, and exports. With better products for the market, we then need the customers to ensure a greater uptake of green and impact finance and services from the UK to the world. And fourth, we need to retain size and scale, encouraging firms to prioritise strategic skills planning to enable effective engagement with the sustainable growth markets of today and tomorrow.

The City Corporation supports the International Regulatory Strategy Group, which is providing the joint secretariat with the International Capital Market Association for a new industry working group with a mandate from the FCA to develop a voluntary code of conduct for ESG data and rating providers. The group met for the first time in December 2022 and will produce a Code of Conduct by June 2023. A comprehensive, proportionate, and globally consistent voluntary Code of Conduct for ESG ratings and data will help ensure the market is fit for purpose, supporting practitioners to assess risk more accurately. It is a valuable opportunity to contribute to the sustainable finance regulatory agenda as the UK becomes the second country in the world to develop a code of conduct for ESG ratings.

The City Corporation is also harnessing the powers of its brand and reach to lead the debate on the wider challenges the net zero imperative presents. Having previously identified that the 'COP circuit' lacked a defined mid-point, an opportunity for business to look both back and forward, we stepped into that void. In 2022, the City Corporation hosted the inaugural Net Zero Delivery Summit together with the UK COP presidency and GFANZ. That summit brought together nearly 200 international guests, including prominent business and public sector leaders in climate finance, such as Special Presidential Envoy on Climate John Kerry, COP26 President Alok Sharma, and GFANZ Co-chair Mark Carney.

FOCUS ON DELIVERY

On 24 May 2023, we will host our second Net Zero Delivery Summit at the Mansion House in partnership with the Egyptian COP27 presidency. This year's focus will be on delivery, promoting examples of best practice from the different sub-sectors of financial services in emerging markets, so that no community, no city, and no country is left behind.

We know that sustainable finance is one of the best tools available to policymakers in the urgent race to meet climate targets. We also understand that good growth and good regulation are two sides of the same coin. If we make sustainable finance an integral cog in the engine of our economic system, we will have more enduring, less harmful growth that is better for the bottom line and better for the planet. This year is our chance to convert green soundbites of aspiration into a symphony of action, and to convert the fear of 'permacrisis' into the hope of 'permachange'.

HOW CLOUDY IS THE FINTECH FUTURE?

TIM SKEET, A VETERAN BANKER IN THE CITY OF LONDON, SURVEYS THE PROSPECTS FOR 'FINTECH' AS IT SHOWS SIGNS OF LOSING SOME OF ITS ALLURE

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The history of banking and tech has not been a good one. The relationship between conventional finance and technology and its fintech sector has been difficult, confusing, indeed fraught. There are many reasons for this awkward relationship. Lack of mutual understanding across the technology divide is only part of the issue. The financial services sector is caught between dealing with its rickety tech past and being challenged to embrace a shimmering tech future. This can be an uncomfortable place to be.

On the fintech side, the term covers a multitude of diverse services from crypto to various software applications or online banking. Some parts of the sector were designed to challenge, disrupt, and eventually replace conventional finance, although this bit of the plan does not appear to have worked out well, at least so far. Where does the relationship between tech and banking go from here? A string of high-profile failures and PR disasters has pushed banking management to address some of the industry's pressing tech-related issues. There has been accelerated investment in and rebuilding of some of the dodgy old systems in the hope that they will prove more robust in future. Patching up old and outdated systems is no longer enough.

There is also acknowledgment that penny-pinching in IT can be a mistake, after past experiments in offshoring, outsourcing, and underinvesting. Those lessons have generally been learned and boards along with banking regulators no longer accept the idea that IT is an arm's-length black box. Tech is an integral part of a bank's operations and front-and-centre to the customer's experience. But banks will need to consider carefully how to economically adopt and adapt new technology to fit their existing IT infrastructure.

If banking is under pressure to clean up its act, a string of recent scandals and failures in the fintech sector has reminded us all why we have regulators and their rules in the first place. Much of recent tech headline-grabbing has been in the not-so-niche crypto market, a sector ripe for a regulatory overhaul. Crypto is a sector deliberately built around an attempt to recreate financial services without banks and their associated regulatory framework. The broader question for regulators, beyond working out what to do about crypto, is how to go about dealing with those other unregulated parts of the fintech industry that overlap with banking.

CROSS-BORDER REGULATORY RESPONSE

The regulators have, like the rest of us, been on a steep learning curve. It also remains unclear how the global regulatory apparatus will respond in this age of deglobalisation, protectionism, and geopolitical tension. Modern tech, just as financial services, is global and cross-border in nature. Will the regulatory response manage a suitably cross-border approach to tech, as was achieved for the banking industry following the 2008 crisis? Even as bankers and their regulators wise up to technology and its challenges, the banking industry is still faced with grappling with future tech needs and the 'solutions' on offer that might or might not live up to their ever-expansive promises. Tech decisions can be a very expensive and risky business.

> // A BETTER UNDERSTANDING OF THE RISKS AND REGULATORY NEEDS ON BOTH SIDES OF THE BANKING-TECH DIALOGUE WILL OFFER A WAY FORWARD //

To illustrate the nature of the debate, a recent banking industry discussion of the potential for using cloud-based services highlighted some of the problems. On paper, cloud computing offers great potential for efficiency and streamlining certain services and data processing. There were three broad conclusions from the discussion. The first focused on concerns over the costly nature of employing cloud-based processes on the scale required. Then there were worries over security and data control, and finally concerns over probable regulatory resistance. These discussions all contributed to what one newspaper recently referred to as the cooling of 'big tech's hottest growth market'.

A TOUGH FUTURE

However well thought out, much of today's fintech sector is also having to face up to some other recent and pressing concerns. Crashing equity market valuations for tech stocks, a shortage of capital, lack of revenues, and struggles to scale up operations point to a tough immediate future. It is not clear who will survive and flourish, as wannabe disrupters find themselves now disrupted. It should probably now seem clear that banks need technology, and the new tech operators need banks. Both sides also need a more comprehensive, well-thought-out regulatory framework. This should call for open minds and a good understanding of the issues.

There remain significant risks and expenses for banks as they approach unavoidable IT and tech decisions. The industry is right to proceed with caution. Perhaps a better understanding of the risks and regulatory needs on both sides of the banking-tech dialogue will offer a way forward pointing to opportunities for those companies with ideas that the banks can use. We just need to understand how to navigate our way through the clouds of confusion.

LIABILITY-DRIVEN INVESTMENT – THE FINAL ROUNDUP

BRITAIN'S GILT MARKET DRAMA IN SEPTEMBER 2022 DROVE DOWN THE VALUE OF RETIREMENT SCHEMES BY AS MUCH AS £500 BILLION. WHAT LESSONS WERE LEARNED?

Dr Iain Clacher and Dr Con Keating, long-time contributors to the CISI's thought leadership in the worlds of fixed income and pensions, were at the heart of the drama that stemmed from the then UK government's ill-fated economic policies under its short-lived prime minister Liz Truss. In this major contribution to our thinking on retirement provision, they analyse the fault lines in long-accepted funding arrangements.

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Liability-driven investment (LDI) has become the catchall, portmanteau expression for a wide range of defined benefit (DB) pension scheme investment strategies, with the only-too-predictable result of confusion and even deliberate misrepresentation. In this article, we shall endeavour to disentangle some of the intertwined threads of different strategies and the arguments revolving around them.

MATCHING

The practice of buying bonds to match the contracted or projected future payment obligations of a company is as old as the hills. A portfolio constructed to achieve this objective is sufficiently commonplace that the technique has acquired a name – 'dedication'.

In the early 1980s, the high levels of interest rates prevailing in the international bond markets saw much activity from companies looking to retire their old low coupon outstanding issues, which were trading at very deep discounts to par value in the markets. It was simply not possible just to buy these bonds in markets as trading was rather thin. One contributor to this thinness was that many holders were constrained by the prevailing accounting standards from selling, as the realisation of prices lower than their book values would result in charges to the holder's profit and loss account.

The technique of dedication involved no more than buying a portfolio of government securities, usually strips,[1] whose contractual payments matched those due under the company's outstanding bond. The company would then place the securities bought into an escrow account from which funds could only be withdrawn to meet the company's specific payment obligations under the bond's indenture.

The motivation for the company to do this was firstly that this arrangement offered after-tax returns which were competitive and often superior to the returns available to them from further investment in their business activities. The question of realisation of the profits from these operations in the company's accounts, over time or in a single lump sum, seemed to lie entirely at the discretion of the company's auditors, and it was this discretion that provided secondary motivation. Once these arrangements were completed, the outstanding company bond issue ceased to appear in published company accounts. The process had also acquired a name – 'defeasement'.[2]

// THE BOOTS PENSION SCHEME IS OFTEN CITED AS AN EARLY EXAMPLE OF MATCHING LDI //

Over time, the range of securities that might be used to offset a company's bond obligations was in practice widened to include agency securities and even high credit quality corporate bonds. The limits of which securities were and were not suitable lay again at the auditor's discretion.

The widening of the range of securities employed brought with it the risk of default by the obligor, and with that failure to match cash flows. In 1975 even the possibility of default by the UK on its sterling debt obligations (gilts) was being openly discussed in the international bond markets. Some high-grade sterling-denominated corporate and multilateral development bank bonds traded at persistently lower yields than gilts.

The overarching problem with this pairing of security and debt obligation was its cost; it was expensive to acquire the matching portfolio.

In recent times, the Boots Pension Scheme has acquired the (unwarranted) status of posterchild for matching using government bonds to meet pension obligations and is often cited as an early example of matching LDI. In 2001/02 the Boots Pension Scheme sold its diversified portfolio of assets and was, according to legend, invested solely in gilts. In fact, derivatives were used to 'match' some index-linked characteristics, and that takes the strategy into a different and riskier class of LDI. Nonetheless, the cost of implementing the strategy became obvious and in 2007, Boots's new private equity owners, Kohlberg Kravis & Roberts, had to agree to pay £418m in deficit repair contributions[3] (over ten years) to plug what was then described by commentators as "the retail and pharmaceutical group's pension hole", just six years after the gilts switch. By 2010, the Boots schemes had closed even to future accrual.

There is an important shift to consider when moving from the defeasance of corporate debt obligations, where these obligations are

[1]*Even though strips and zero-coupon government bonds did not gain widespread usage until the early 1980s, the use of depositary receipts as claims on specific coupons or principal amounts of government securities was quite common, for example, in the syndicate accounts within the Lloyd's American Trust Fund.*

[2]*See: OECD Glossary of Statistical Terms - Defeasement Definition*

[3]*Source: 'KKR agrees deal with Boots' pensioners' Financial Times, 19 June 2007.*

known with certainty, to the matching of pension obligations whose future values are uncertain in term and amount, and may only be estimated, using actuarial techniques.

The Pensions Regulator (TPR) is prone to describe LDI in these simple matching terms,[4] a practice we consider misleading, but the reality is that most LDI does not have this form, objective, or even motivation.

CHANGING TIMES

Changes to accounting standards in the early 2000s drew attention to a company's pension scheme in annual reports. These standards used market prices (or close proxy arrangements) to value the assets in a scheme's fund, and present values of the projected pension payments to scheme members as the estimated current value of liabilities. It is worth noting that the standards are mixed attribute in nature.

On the asset side, the use of market prices to value assets has long been criticised as it is obvious that portfolios of the magnitude of pension fund asset holdings could not be realised at such prices, but as that is not typically a required operation, it has become custom and practice within the industry to value assets in this way as if they are readily tradeable and such values could be realised. However, the recent gilt market turmoil has shown this price and market capacity/depth issue to be a concern once again. There have been reports that some illiquid private investment structures traded at prices as low as 40% of their year-end valuations.

While on the liability side, the use of market-based yields to discount liabilities introduces a sensitivity error in the present values derived from those present in market prices. If we have an observation error of 1% in our asset price, the error in valuation is 1%, but if we have a 1% error in the observation of our market-based discount rate, the error in valuation is no longer 1%. With market yields at 10%, a 1% error in observation produces a near doubling of the error in valuation of liabilities for a typical pension scheme.

Holding to account: analysis and resolution of a crisis
Con Keating and Iain Clacher discuss the cause of market turbulence and present a solution in *The Review* article at *cisi.org/giltmarket*

Among the changes introduced by the changes to accounting standards in the early 2000s was the reporting of scheme deficits in the accounts of the scheme sponsor company. The treatment of surpluses is asymmetric; only the amount of surplus, which may be readily refunded to the sponsor company, is allowed to be reported. The return of any surplus to sponsor is also subject to tax, currently set at a rate of 35%. When combined with the use of a market-based discount rate which introduced and magnified the trend and volatility of market rates into the valuation of scheme liabilities, this provided motivation for schemes to hedge the scheme's liability valuations. It is important to recognise that this is not the matching of benefits payable with asset cash flows, but rather the matching of changes in asset values with changes in the estimated present value of projected liabilities.

// TRUSTEES' RESPONSIBILITIES LIE WITH THE BENEFITS ULTIMATELY PAYABLE RATHER THAN THEIR INTERMEDIATE VALUATION //

While this process may involve eliminating or mitigating many or all of the factors whose variation influences the projected values of liabilities, such as longevity and inflation, we shall focus solely on the largest, the choice of discount rate employed in the estimation of the present value of pension scheme liabilities. This is also the only factor which is not a determinant of the ultimate benefits payable, and as such it is not a risk of those benefits. This raises a question which has passed without discussion: trustees' responsibilities lie with the benefits ultimately payable rather than their intermediate valuation, and in this context, actions taken to manipulate these intermediate liability valuations may be beyond their powers, that is ultra vires.

IMMUNISATION

The technique used for the matching of hedging interest rate sensitivities is known as 'immunisation'.[5] The first-order measure used within this technique is the modified duration,[6] which, as it is mathematically the tangent of the price/yield curve, is only accurate locally, that is to say, it is only valid for very small changes in the yield or discount rate.

Duration is the local rate of change of the price/yield curve. The second-order measure, which captures the rate of change of duration, is known as convexity.[7] Hedging using these techniques requires periodic adjustment of the amounts of assets held in order to

[4] See for example, Neil Bull's testimony to the House of Lords Industry and Regulator's Committee on 14 November 2022.

[5] https://www.investopedia.com/terms/i/immunization.asp

[6] https://www.investopedia.com/terms/m/modifiedduration.asp

[7] https://www.investopedia.com/terms/c/convexity.asp

maintain the accuracy of the hedge. It is, however, significantly less costly to implement than the strategy of dedication, which does match, and continues to match through time, the duration and convexity of assets and liabilities.

Duration is a measure of the term of a sequence of cash flows; in the case where the discount rate is set to zero, it is simply the average life of the sequence. There are also estimation problems for the duration of non-gilt securities. Durations may even be derived for equities (students are often surprised that this is usually relatively short – between eight and 12 years). The market yields of these non-gilt securities reflect not just the time value of money, but also the specific default and other idiosyncratic risks, such as the security's liquidity. Duration, measured without correction for these factors, will understate the riskiness of the security as interest rate sensitivity.

Hedging of the valuation uncertainty could in theory take place in either scheme or the sponsor, but we have not encountered any case where the hedging has been undertaken within the sponsor. There is, of course, a reason for this, which is that TPR can and will insist on additional contributions being made by the sponsor when the scheme is reporting valuation deficits. There are also further differences between the statutory valuation requirements of schemes and their equivalent sponsor accounting requirements, most notably that scheme accounts should be prudently based, using assumptions and discount rates which are prudently based, while sponsor accounts should be based on best estimates of those values.

The Pensions Regulator appears married to interest rate sensitivities and is promoting the use of duration as a measure of scheme maturity, with 12 years being the trigger threshold for action in the proposed new DB Funding Regulations and associated Code, when in reality the average life of the scheme would be more intuitive, more predictable, and stable. To highlight this, there was a single day during the gilt market turmoil when the modified duration of the UK DB sector varied by over 12%, more than two years in term. During that day, the present value of UK DB liabilities varied by £181bn – to offer this a sense of scale, the total UK national tax receipts for 2021–22 were £718bn; the variation was equivalent to 25% of total annual tax receipts.

FUNDING RATIO

The funding ratio is the most commonly used and cited measure of the financial health or sufficiency of the scheme. It is simply the ratio of the value of the scheme's assets to the present value of scheme liabilities. As we have not seen the theoretical statistical properties of this ratio described elsewhere, we provide these in Box 1.

> // SCHEMES CURRENTLY OWN FEWER ASSETS BY VALUE FROM WHICH THEY WILL HAVE TO PAY PENSIONS WHICH ARE BASICALLY UNCHANGED //

The funding ratio is often presented as if it is a settled and certain fact, when it should in fact be treated as the estimate it is, and good practice would require its confidence intervals to be shown alongside its estimated value.

Under normal market volatility conditions, for a fully funded scheme, the one standard deviation confidence interval ranges from 96.2% to 104.1%. Under the market conditions seen recently, that confidence interval has expanded, ranging from 89.1% to 112.6%. These values have been estimated by simulation from empirical data on intraday prices and yields. There are very few, if any, schemes employing LDI with improvements large enough to qualify as statistically significant; there are many not employing LDI where the improvements are statistically significant.

Many of the advocates for the widespread continuance of LDI, including TPR, have been quick to point to the sector-wide improvement in the estimated funding ratio of DB schemes overall. The majority of this improvement will have been delivered by schemes not employing LDI. None of it should have been delivered by schemes employing LDI fully, as that was by design intended to eliminate both positive and negative variations in valuations.

The most elementary analysis of the crisis tells us that schemes now have far fewer assets than at the beginning of the year. Simply put, schemes currently own fewer assets by value from which they will have to pay pensions which are basically unchanged.

Common sense tells us that a greater reliance on uncertain future returns is riskier, but the modified duration, which will have fallen with rising interest rates, suggests that the assets and liabilities have a shorter modified duration and are less volatile or risky. It is also far from certain that the expected returns from assets held will warrant the use of the higher gilt yields as the scheme discount rate, given the various sales and other actions taken to meet collateral calls. In distress, these sales included the high-growth, high-return assets of schemes, and this was done without any true regard for their return prospects.

BOX 1: STATISTICAL PROPERTIES OF THE FUNDING RATIO

To model the funding ratio **(r)** analytically, we begin by considering both assets **(A)** and liabilities **(L)** to be lognormally distributed.

The variance is then just the sum of the two original variances, so if the ratio is r and r = A/L,

$$\mathrm{Var}(\log(r)) = \mathrm{Var}(\log(A)) + \mathrm{Var}(\log(L))$$

The means should just be the difference of logs:

$$E(\log(r)) = E(\log(A)) - E(\log(L))$$

THE SPONSOR COMPANY

The hedging being undertaken considers only the assets and liabilities of the scheme, even though the scheme has recourse to the sponsor in the event of shortfall. The sponsor, in its business activities, has exposure to many of the same risk factors as are considered in the scheme context.

For example, most companies prosper as interest rates fall and this constitutes a natural offset of some or all of the discount rate exposure of a DB scheme. There are similar relations arising from the limited price inflation of DB scheme benefits, and of course, the presence of a larger population of pensioners consuming but not producing carries opportunities and benefits for most companies. It is clear that any economically justified hedging would not follow the partial consideration of the scheme alone, but rather it would be concerned with the sponsor and scheme combined – their net exposures.

Given TPR's fervent desire to eliminate any reliance of a scheme on its sponsor company, we can only hope that the incongruity of their recent advice on LDI to trustees, on the agreement of standby lines of credit with sponsors for use in times of market distress, struck them as much as it did us. The specific advice commences with: "Schemes may prefer to establish a line of credit with their sponsoring employer to ensure liquidity."

This emphasis on scheme funding, once expressed as 'funding trumps covenant', is the cause of much excess and unnecessary expense for schemes and their sponsors. In effect, this is considering the fund alone as meeting the promise made by the sponsor, rather than the fund defraying the sponsor's costs of production of the promise made. Using market-based discount rates for the valuation further distorts the valuation; this is the current cost of replacing the benefits promised using market assets rather than the cost of producing the benefits as originally promised by the sponsor employer.

The fund's value as security for members in the event of sponsor insolvency was always secondary and has been further reduced in relevance by the introduction of the Pension Protection Fund (PPF).

THE PENSIONS REGULATOR

TPR has, in its statutory obligation to protect the Pension Protection Fund, an incentive to consider only the level of scheme funding. Its obligation to consider corporate growth prospects has been relegated to trustees. The obligation to protect the PPF also provides an incentive for TPR to promote and encourage the use of market-based discount rates. This in effect is estimating the cost of producing the projected promised benefits today, though these benefits were promised previously on different terms by the sponsor employer through time. TPR has been an avid supporter and zealous promoter of LDI strategies in all its forms.

> // THERE CAN BE SOME PROFOUNDLY UNDESIRABLE CHARACTERISTICS TO REPOS AND DERIVATIVES //

This amounts to the promotion of riskier investment asset allocations. For a scheme in deficit, for the assets to match the variability of liabilities, they must be riskier than those liabilities. If these assets are also to reduce the deficit, they must be riskier still. The promise of LDI was that this asset allocation strategy would do both.

The expense of LDI immunising portfolios reduced the expected returns of assets and raised the effective cost of provision for schemes, and that in turn led to the use of derivatives and repo. We have publicised our concerns over the lawfulness of schemes using repos and derivatives fully in our evidence submission to the parliamentary Work and Pensions Committee.[8] The authorities' response to the 2007–09 financial crisis, which saw short interest rates fall dramatically while gilt yields responded only slowly, provided the incentive for schemes to adopt leveraged LDI strategies en masse.

REPO AND DERIVATIVES

Setting aside our concerns over the lawfulness[9] of the use of repo and derivatives by schemes to leverage assets and hedge liabilities, there can be some profoundly undesirable characteristics to these instruments.

There are in essence two types of derivative: those which carry recourse for the counterparty to scheme assets, such as interest rate swaps, and those which don't, such as options (the right but not the obligation to undertake some activity). It is possible and indeed usual for derivatives to provide leverage, that is to have a small price relative to the notional amount of underlying asset exposure they control or reference. In fact, a fairly priced interest rate swap will have a price of zero at inception. In practice, there will be a price applied reflecting the counterparty's concern with their potential credit exposures over the life of the contract, a 'haircut'.

Non-recourse derivatives such as options may be highly leveraged, but as there is no further recourse to the scheme fund, the presence of leverage within them simply increases the riskiness and potential returns of the instrument. There are debates to be had over the suitability of the use of options within a prudently diversified portfolio of assets, but that debate would be institution specific. The fund's exposure is limited to the price initially paid for them, whereas it is the counterparties of the swaps and repos who would lose if a fund's net asset value became negative and the fund is wound up.

By contrast, derivatives such as interest rate swaps do offer the counterparty recourse to the fund's other assets; these take the form of collateral calls or variation margin on contracts outstanding. These calls reflect adverse variation in the price of the derivatives contract.

The standard risk management tools for financial contracts are initial and variation (or maintenance) margins. The initial margin is set to reflect the variability of the underlying asset and the variation margin reflects changes in the current price of the contract.

Similar risk management techniques are applied to repo transactions. These are agreements under which an asset is 'sold' to a counterparty for spot

[8] *See Clacher and Keating, Submission in Evidence to Work and Pensions Committee*

[9] *ibid*

settlement with this contract being accompanied by an agreement to repurchase the security at a future date at a higher price. The price differential is effectively the interest cost of borrowing the proceeds of the sale of the security. There is no doubt that a repo transaction is economically borrowing.

The terms covered by pension fund repo are mainly in the one-month to six-months range and occasionally for as long as one year – this is not short-term borrowing for liquidity purposes. The initial 'haircut' will reflect the volatility of the asset sold and agreed to be repurchased; a 2% haircut would simply mean that the fund receives 98% of the current market price of the asset. The variation margin reflects change in the credit exposure of the counterparty arising from changes in the market price of the asset under repo (relative to the contracted repurchase price) and the short rate for its remaining term. They are, in other words, mitigants of credit risk exposure.

Much of leveraged LDI is through pooled funds. These have limited liability for unit holders. They are also typically highly leveraged using repos and derivatives. In a 2019 survey, TPR reported fourfold leverage as the average. Any fund with this degree of leverage will be highly volatile – leverage simply magnifies the volatility of the underlying assets, while the manager has no enforceable call on unit holders. In times of adverse market developments, they may and do request additional subscriptions from existing unit holders for new units to be bought to recapitalise the fund and maintain the fund's prior properties, such as the level of leverage in the fund.

In the event of unit holders failing to comply with these requests, the managers will restructure the fund, selling assets and reducing indebtedness. Such restructuring in the recent crisis has been the cause of much dispute between unit holders and scheme managers, notably where the fund was de-levered, with the hedge provided being reduced or eliminated, leaving unit holders exposed to the decline in gilt yields seen since the Bank of England's intervention. There are no reliable statistics on the overall magnitude of pooled LDI funds, but it seems likely that they account for at least £200bn of the £800bn total of pooled funds held by UK DB schemes, and that if leveraged fourfold, as reported by TPR, they control some £1tn of nominal gilt exposure, almost half the outstanding cash gilts in issuance.

Anatomy of a bond crisis
On CISI TV, Con Keating discusses why pension funds destabilised markets in the latter part of 2022 *cisi.org/anatomy-crisis*

// AT THE END OF 2022, UK PENSION SCHEMES CONTROLLED MORE GILTS THAN EXIST IN THE OVERALL CASH MARKET //

It should also be recognised that any particular pooled fund manager will offer a wide range of funds with different characteristics, for example some funds may be confined to conventional gilt performance while others are concerned only with index- linked gilts, with further distinctions in the term of the maturity ranges a specific fund contains. This allows the pension scheme to pick and mix these funds so as to closely replicate the perceived exposures of the scheme.

The Bank of England's conclusion that mismanaged leverage was the proximate cause of the gilt market disruption is undoubtedly correct. The more important issue, though, is the motivation for funds to indulge in LDI, and that we believe was primarily the elimination of valuation volatility, with a secondary objective, for some, to boost returns by leverage.

While pooled funds have been widely used by small schemes, there are many large funds which have used segregated mandates and/or self-managed portfolios. The Investment Association published an estimate that there were approximately £1.5tn notional interest rate swaps outstanding held by this group of schemes early in 2022. At year end, it is estimated that these schemes had borrowed some £200bn using repo and they held approximately £500bn of cash gilts. The totality of this is that UK pension schemes controlled more gilts than exist in the overall cash market, about 1.5 times as many.

This should not be a surprise. With the gilt market and the present value of DB liabilities similar in magnitude, and the durations of the gilt market and pension schemes respectively, say, 10 years and 20 years, then two 'gilt markets' are needed to hedge the pension liabilities if all are to be fully hedged. However, if only around 75% of schemes by value have hedged and they average around 80% coverage of their liabilities, then 1.2 gilt markets would be needed to hedge those covered liabilities.

We have seen this position before, where outstanding derivative exposures have been larger in amount than the underlying real assets. Those situations have rarely ended well – the 1987 US stock market crash induced by portfolio insurance was an early example, and the US mortgage securities crisis which developed into the Great Financial Crisis of 2007–09 is the most recent and largest.

It is important to recognise also that index-linked gilt (ILG) ownership is dominated by pension funds; they own well over 80% of all outstanding issued stock. The earliest ILGs were explicitly

targeted at pension funds.

Concentration of ownership is a well-understood issue in financial markets. It lies behind the 'free float' rules for listed equity. It is also well known in the trading behaviour of individual bonds; it is not uncommon for issues to be reopened in order to maintain or enhance the liquidity, that is tradability, of benchmark bonds. Securities whose ownership is concentrated are more volatile than would otherwise be the case; in extreme circumstances, idiosyncratic risks can become systemically critical.

GEMMs[10] reported turnover of £132bn in the week ending 23 September and £264bn in the week ending 30 September. This market turnover in the week ended 30 September approached 14% of the market value of all outstanding gilts, roughly twice the normal level of turnover. The one occasion when turnover of this level had been seen previously was March 2020 at the beginning of the pandemic.

CONTINUATION OF LDI

The advocates of the continuing use of leveraged LDI, and this includes TPR, have offered two main arguments in support of its continuing use, with only minor modifications such as overall leverage restrictions.

The first of these is that schemes should be explicitly permitted to borrow since all other large financial institutions and even individuals can do so. This ignores the fact that all other institutions have equity capital which supports their borrowing. The future earning potential of an individual is the equity capital which supports and services their mortgage debts. All that a pension scheme has is recourse to the capital of the sponsor employer, and the sponsor may borrow if it chooses to, and of course that borrowing will be tax-advantaged.

We have seen sponsor companies issue bonds where the proceeds were applied to the scheme and its pension fund. This is quite a common practice for state and municipal plans in the US.

The simple fact is that borrowing by a scheme raises the riskiness of the scheme and lowers the member security arising from the presence of the fund in the event of sponsor insolvency. These concerns were the motivation for the prohibition on scheme borrowing in the European IORP directive and its transposition into English law.

The second argument is that LDI has been beneficial for schemes. This assertion needs some unpacking. LDI as simple hedging of liability valuations should have been neither positive nor negative for schemes. Schemes which were less than 100% hedged will have profited, but that is scarcely an argument in favour of LDI. The argument reduces to that as schemes use leverage through derivatives and repo to minimise the cost of LDI hedging; this enables the fund to buy other higher-yielding, riskier growth assets. It follows that this beneficial argument is simply a statement that the speculation has been successful thus far. Borrowing at short rates to buy long-dated fixed-rate securities can be expected to be profitable as long as rates remain low and long-term rates decline. Of course, this ceased to be the case at the end of 2021 and this process simply accelerated through 2022 as concerns with increasing and persistent inflation have influenced market yields and central bank activity.

> // MANY OF OUR LONG-TERM STABLE INVESTMENT INSTITUTIONS HAVE BECOME CONCERNED AND DRIVEN BY SHORT-TERM LIQUIDITY ISSUES //

The Bank of England's QE portfolio, the Asset Purchase Fund, faces just this situation. The £800bn of assets bought were financed at the rate paid on commercial bank reserves, and over the period of the fund's existence it has contributed around £120bn to the Exchequer. However, with short rates now at 3%, the strategy is already cash flow negative, and its disposal is likely to realise substantial losses, perhaps larger than the earlier receipts.

We have also seen some official responses about what is required for the continuance of leveraged LDI, but they do not inspire confidence.

The statements from the Central Bank of Ireland and Luxembourg's CSSF that buffers need to be held at the levels of 300 to 400 basis points miss two points. The first is that assets will nonetheless need to be sold once the cash element of these buffers is exhausted, and these buffers will need to be replenished. It also completely fails to recognise that it was a two-day move of just 37 basis points which triggered the LDI liquidity spiral when buffers were reportedly set at 100 basis points. This is indicative of grossly inadequate risk modelling; the models in use are exercises in comparative statistics but the models needed are those based on the risk dynamics of these processes.

The statements offered by many that they were surprised by the speed and magnitude of the moves seen are recognition of the inadequacy of their existing risk management models and practices.

FINAL THOUGHTS

The most important problem though is that the use of these strategies and instruments has converted many of our long-term stable investment institutions, DB pension schemes and their funds, into bodies concerned and driven by short-term liquidity issues. Commercial banks have precisely this form of exposure. They borrow short and lend long, and the resultant maturity mismatch is subject to Pillar 2 regulatory capital 'add-ons', which most unusually are not made public.

We also have the issue that many schemes are seen as funded to 'buyout' or much closer to that position than ever expected in the near term. However, this misses a crucial point. The depth of the buyout market historically has been between £20bn and £30bn a year. If we even assume that the market was able to underwrite £75bn in 2022 – and let us be clear, insurers can pick what funds to transact with as it is a buyers' market – that still leaves the rest of the DB universe having to pay pensions in full, on time, as they fall due, with considerably fewer assets available to them to do so.

[10] *UK Debt Management Office GEMMs weekly gilt turnover report*

PLUGGING THE REGULATORY GAPS TO KEEP PENSIONS SAFER IN FUTURE CRISES

IN FEBRUARY 2023, THE HOUSE OF LORDS INDUSTRY AND REGULATORS COMMITTEE CRITICISED THE USE OF LIABILITY-DRIVEN INVESTMENT (LDI) STRATEGIES BY DEFINED BENEFIT PENSION FUNDS, RAISING CONCERNS THAT REGULATORS HAD NOT FOCUSED SUFFICIENTLY ON THE RISKS AND DANGERS THAT BORROWING TO BOOST INVESTMENT RETURNS COULD POSE TO PENSION SCHEME FINANCES, AND TO WIDER FINANCIAL STABILITY IN THE EVENT OF INTEREST RATES RISING

Key findings from the committee's scrutiny, during which it heard from industry and regulatory representatives, including Legal & General, the Financial Conduct Authority, The Pensions Regulator, and pensions experts, included:*

- LDI investment strategies, particularly those that use leverage, were created as a solution to an artificial problem created by accounting standards, which drive sponsoring companies to focus heavily on current, rather than long-term, estimates of pension deficits. Pension schemes aimed to hedge volatility in these estimates by investing in bonds, but due to the low returns these offered and the need to close their deficits, they borrowed to boost their returns.
- The use of borrowing and derivatives for these purposes is not permitted by the relevant underlying EU legislation, which appears to have been permissively transposed in the UK to allow pension schemes to continue using such strategies.
- It is likely some pension scheme trustees were not aware of the potential implications of their LDI strategies and their decision-making struggled to match the pace of markets. This has led them to become dependent on advice from investment consultants, whose advice to schemes is currently unregulated and may not be comprehensive over the whole portfolio or cover operational requirements.
- Despite calls for more information and a review of stress tests from the Financial Policy Committee, regulators in the sector appear to have been slow to recognise the systemic risks caused by the concentration of pension schemes' ownership of assets such as index-linked gilts, and the increasing use of more complex, bank-like strategies and instruments by pension funds.

THE RECOMMENDATIONS

The Lords committee calls for action to improve regulation and reduce the risk of similar disruption in the future. It recommends that:

- UK government and the Endorsement Board should review whether the current system of accounting for pension scheme finances in company accounts is appropriate and whether to introduce a system that does not drive short-termism in pensions investment. More schemes should be allowed to take an asset-based approach if this is appropriate for them.
- The government should review the relevant regulations and consider whether the use of repos and derivatives should be more tightly controlled and supervised in future. If schemes are to continue to use leveraged LDI, there should be far stricter limits and reporting on the amount of leverage allowed in LDI funds.
- The government should ensure that investment consultants are brought within the regulatory perimeter as a matter of urgency. Following this, regulators must have heed to the non-professional nature of trustees in their regulation of consultants and ensure consultants are liable for their advice. Regulators should ensure they have more information on the leverage present within pension scheme finances and that stress tests are conducted. The government should consider giving the Prudential Regulation Authority a role in overseeing pension schemes.
- The Pensions Regulator should be given a statutory duty or ministerial direction to consider the impacts of the pensions sector on the wider financial system. The Financial Policy Committee should continue to take the lead on systemic risks to financial stability and should be given the power to direct action by regulators in the pensions sector if they fail to take sufficient action to address risks.

The use of leverage and derivatives is key to considerations of the risks posed by LDI. The Pensions Regulator published a survey on DB pension scheme leverage and liquidity in 2019 which found that 45% of all schemes had increased their use of leverage over the past five years, accounting for 58% of scheme assets. The notional principal of schemes' leveraged investments totalled almost £500bn. The survey set out that the level of leverage ranged from 1x to 7x. Critics of LDI suggest that LDI funds, and particularly pooled funds which involve several small and medium-sized pension schemes, tend towards the higher end of that leverage, making them unstable and requiring only relatively small declines in price or yield to require high degrees of leverage to be unwound.

Lord Hollick, chair of the Industry and Regulators Committee, said:

> The evidence we heard overwhelmingly suggests that the use of LDI strategies caused the Bank of England intervention. If it were not for the use of leveraged LDI, then it is likely there would only have been some volatility and a market correction, rather than a downward spiral in government debt markets that threatened the UK's financial stability and led to significant losses as pension fund assets had to be sold in order to meet LDI liquidity requirements.
>
> The impacts of accounting standards and the widespread adoption of leveraged LDI have transformed pension schemes from being long-term institutions into ones focused mainly on short-term volatility in prices and interest rates.
>
> We are calling for regulators to introduce greater control and oversight of the use of borrowing in LDI strategies and for the government to assess whether the UK's accounting standards are appropriate for the long-term investment strategies that are expected of pension schemes. This will help ensure that the turbulence that followed the September 2022 fiscal statement doesn't happen again.

**Source: UK Parliament Committee report, 'Leveraged LDI strategies worsened September 2022 financial turmoil'*

DEBATING THE ECONOMICS OF FINANCIAL TECHNOLOGY CONFERENCE, 21–23 JUNE 2023

THE UNIVERSITY OF EDINBURGH TOGETHER WITH THE EDINBURGH FUTURES INSTITUTE IS BRINGING TOGETHER LEADING EXPERTS IN THE WORLD OF FINANCE AND TECHNOLOGY TO ASSESS THE NEXT PHASE IN THE APPLICATION OF TECHNOLOGY TO FINANCE

As rising consumer expectations continue to apply pressure on the financial services sector, digital transformation is now at the top of the list of strategic initiatives of every major financial services stakeholder, from companies to regulators and academics – and it is clear that the next major phase of the digital transformation of the sector is imminent. Research teams from world-leading universities and technology and financial services companies are working on exciting, under-the-radar technologies that will be at the heart of this transformation. The Economics of Financial Technology Conference, organised by the Edinburgh Futures Institute and the University of Edinburgh Business School, aims to give all stakeholders, in particular practitioners, a front-row seat to the work of these teams as it brings together academics, policymakers, and finance professionals to share new insights and discuss the critical issues related to the application of technology to the practice of finance in a rapidly evolving regulatory landscape.

Speakers and teams at the conference will present the latest research and insights driving new ideas and regulation, bringing together finance, technology, and policy. Among others, presentations will explore game-changing developments in artificial intelligence and machine learning, distributed ledger technologies, open banking and finance, robo-advising and the gamification of investment vehicles, peer-to-peer lending and crowdfunding markets, credit risk modelling, and regtech.

The three-day conference will include keynotes, panel discussions, and parallel sessions. Areas to be covered include theoretical and empirical contributions on topics including, but not limited to:

- the application of AI and machine learning in finance
- the application of distributed ledger technologies in finance
- cryptofinance
- cyber risk in finance
- the microstructure of modern financial markets: algorithmic/high-frequency trading, dark trading, blockchain settlements, and more
- behavioural economics in financial technology
- alternative data (structured and unstructured datasets)
- crowdsourcing and investment strategy
- new exchange traded financial derivatives
- financial stability risks from the development of fintech
- regtech
- open banking.

EDINBURGH MASTER'S STUDENT RESEARCH

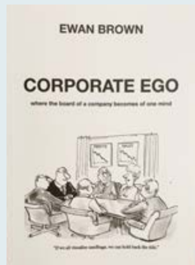
In parallel with this, the university runs a regular programme of engaging its master's students in industry research programmes. These are meant to address challenges or opportunities in a business that practitioners would be keen to have researched but don't have the time or resources. A finance master's student might be able to carry this out as part of their summer dissertation project.

Students carry out an in-depth research project as part of their programme, and the university welcomes project enquiries from industry practitioners so that students can apply their academic knowledge to a real-world business challenge. There is no charge and each student is supported by world-leading academics. The project would investigate a defined research area, and result in a substantial report (the student's MSc dissertation) with extensive research, analysis, and practical conclusions.

The students combine their strategic business and management skills and specialist knowledge with the refinement offered through the 12-month, intensive programmes they are following. Students come from a wide range of backgrounds, offering fresh, often international perspectives and ideas for your business.

CORPORATE EGO: FAILURES OF CORPORATE GOVERNANCE IN SCOTLAND AND BEYOND

SIR EWAN BROWN, DOYEN OF SCOTTISH BANKERS, AND WHO HAS SERVED ON THE BOARDS OF MUCH OF SCOTLAND PLC, SET THE CAT AMONGST THE PIGEONS IN DECEMBER 2021 WITH HIS BOOK CORPORATE EGO



Using seven once-prominent Scottish listed companies as examples, *Corporate Ego* postulates that the prime culprit for each company's fall from grace was the development of a collective mindset in the boardroom. Ten recommendations are offered to improve the workings of listed company boards and, thereby, reduce the risk of future corporate accidents.

That all seven companies were Scottish is incidental. The weaknesses that led to the failures of Burmah Oil, Lilley, Ivory and Sime, HBOS, RBS, Standard Life, and Johnston Press are generic. The equally dramatic collapses of Barings, Carillion, Patisserie Valerie, and Thomas Cook provide compelling evidence of this.

I received many constructive comments on the recommendations; and these were reflected in a supplement published in May 2022.

The modified recommendations are:

> Since it is within the boardroom that the role and influence of the chair is most discernible, but at the same time is not well understood, there should be an independent review initiated by the London Stock Exchange and the Financial Reporting Council into the role and effectiveness of the chairs of UK listed companies.
>
> Since the roles of chair and chief executive require very different skill sets, and to avert potential boardroom dominance, it should require shareholder approval for the chief executive of a UK listed company to become the chair.
>
> Directors must read and analyse the company's cash flow statement over time to determine the relationships between operating cash flow, borrowing, investment and dividends. Do this before looking at the profit and loss account and, where possible, convert operating cash flow into a rolling average to eliminate inevitable fluctuation and to determine a trend.
>
> Before the annual accounts of a UK listed company are finalised, the board should be required to approve a working capital statement prepared to the same standards as are required for a prospectus – and this should be reported on by the company's auditor.
>
> On each occasion that a UK listed company issues a statement or makes an announcement, including changes to board membership, the board should state there are no issues of which shareholders should be made aware that are not already in the market.
>
> To ensure that the views of employees are heard and taken account of in the boardroom, there should be at least two meetings each year between the non-executive directors and employee forums.
>
> The number of non-executive positions one person can hold in listed companies, wherever registered, should be no more than three. In evaluating board candidates, nomination committees should ask how much time they think it will take to do the job effectively.
>
> It should be a listing requirement that there is, at minimum, an annual meeting between the board of a UK listed company and the trustees of the company's defined benefits pension scheme.
>
> The criteria for recruitment of non-executives to the board of a UK listed company should be made public.
>
> Non-executive directors should ensure that where they have challenged or disagreed with a decision at a board meeting, there is a proper record of this in the minutes of the meeting.

I had thought that *Corporate Ego* and its recommendations would generate comments and suggestions from the chairs of Scotland's then 15 (now fewer) listed companies [excluding investment trusts]. However, there was no response from Abrdn, AG Barr, Aggreko, Cairn Energy, Devro, FirstGroup, John Menzies, Macfarlane Group, J Smart, SSE, STV, Weir Group, or Wood Group.

Although any change to corporate governance is a UK issue, a strong, coordinated voice from respected professional bodies and influential stakeholders might just resonate with policymakers and regulators. More than 30 listed companies have been lost to Scotland over the past four decades. They include Bells, Christian Salvesen, Dawson International, Distillers, General Accident, and United Biscuits. More recently, John Menzies and Stagecoach have been taken over and others are under threat.

It was put to me that:

> A contributory factor has been insularity, with Scottish boards and directors lacking experience of living and working outside Scotland and not having the breadth of perspective required to compete in ever evolving global markets. Too often, the same faces appeared on multiple Scottish boards and attended the same awards dinners and knew each other socially. This insularity and possible unwillingness to upset the apple cart may have induced an unconscious complacency into Scotland PLC over the years and a lack of non-executive knowledge and experience to challenge, for example, unwise international expansion.

Scotland can ill afford to lose so many substantial companies, some of international importance and all contributing strongly to local and regional communities. The fact that they disappeared, or were taken over, one at a time may explain why so little public concern about corporate decline has been expressed over the years. In proportion to the rest of the UK, they represent a cataclysmic loss of head office and corporate influence. Over the same timescale, more than a dozen prestigious mutual life assurance companies, headquartered in Scotland, also disappeared.

What will it take to get key stakeholders to engage, collectively, in strengthening board effectiveness and achieving better decision-taking across the private sector?

Sir Ewan Brown was an executive director of Noble Grossart, merchant bankers, for over 35 years, then became a non-executive director of Stagecoach Group, chair of James Walker (Leith), a board member of Entrepreneurial Scotland, and a trustee of the Royal Scottish Academy Foundation. Past directorships have also included Scottish Financial Enterprise (chair), Lloyds TSB Scotland (chair), Lloyds TSB Group, Wood Group, Scottish Widows Bank, Pict Petroleum, Scottish Transport Group and Scottish Development Finance.