

# Prudential Regulation and Climate Change\*

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**ABSTRACT:** Prudential regulators seek to ensure that the institutions (banks, insurers, pension schemes) making financial promises to their customers are capable of meeting those promises. Over time that has caused them to take an increasingly holistic view of the risks faced by those entities. It should be no surprise, therefore, that risks caused by climate change have emerged over the past decade as requiring concerted attention, both from the institutions and the prudential regulators who supervise them. Institutions and prudential regulators urgently need to design frameworks and processes that capture and assess the risks from climate change in a way that is tractable, rigorous and capable of integration into their existing frameworks and processes.

This paper maps briefly how the practice of prudential regulation has evolved in recent years across a number of major jurisdictions (the United Kingdom, the European Union, Australia, South Africa and Singapore) to engage with the risks from climate change. This has value in its own right. Climate change is the most urgent existential risk currently facing mankind. However, the analysis in this article also provides a case study of how prudential regulation itself needs to be conceived, and in particular the need for prudential regulators to be ready continually to address nascent types of risk, the precise dimensions and nature of which emerge only over time.

## I. Introduction

Prudential oversight of financial institutions is a feature of governmental regulation in many developed economies. Financial institutions, such as banks, insurers and pensions schemes, have emerged over the past fifty years as significant long-term intermediaries, mediating between the opportunities in the capital markets and the interests of their customers. Inevitably some will fail, whether by poor management or bad luck. When they do, their customers typically bear much of the financial consequence

of that failure. Prudential regulators therefore seek to ensure that financial institutions are capable of meeting the promises they have made.<sup>1</sup> This concern for customer protection is reinforced by recognition that a local failure can also metastasize into a systemic issue, or even affect the macro-economy, if it propagates through the networks of interconnection that constitute modern financial markets.<sup>2</sup>

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<sup>1</sup> This paper most often employs the term prudential regulator rather than prudential supervisor to reflect the fact that some of the agencies under consideration have express rule-making powers in addition to their supervisory responsibilities. However, the term prudential supervisor is used where that narrower designation is appropriate.

<sup>2</sup> M. Taylor, *Twin Peaks: A Regulatory Structure for the New Century*, (London: Centre for the Study of Financial Innovation, 1995), 3; V. V. Acharya, 'A theory of systemic risk and design of prudential bank regulation' (2009) 5 *Journal of Financial Stability* 224; A. Haldane, 'Rethinking the Financial Network', speech delivered at the Financial Student Association, Amsterdam. Accessed at [www.bis.org/review/r090505e.pdf](http://www.bis.org/review/r090505e.pdf) on 19 September 2022.

It follows from this that prudential regulators are inevitably concerned about risk. At a time when existential risks compete for our attention (think viral pandemics, geo-political instability amongst nuclear powers or the threat of an AI-induced technological singularity), climate risk is particularly salient and troublesome for prudential regulators. Climate risks directly affect both the asset and liability sides of the balance sheet for many prudentially-managed financial institutions. Moreover, the risks to financial institutions caused by climate change are challenging to quantify precisely and, in many cases, hard to mitigate entirely by diversification. There is however an additional layer of complexity that further complicates the task facing prudential regulators; the so-called Knightian uncertainty arising from not being able to forecast with confidence how different actors will adapt their behaviour in response to the risks and opportunities they perceive arising from climate change.

This article maps how the practice of prudential regulation has evolved in recent years to engage with climate risks across a number of major jurisdictions. It focuses on the United Kingdom, the European Union, Australia, Singapore and South Africa. This ignores developments in other countries from which valuable insights might be gained, such as China, Brazil and the United States of America. The article also does not purport to be a comprehensive review of the burgeoning literature on the impact of climate change on financial institutions. The article does however contend that the analysis of how the members of this subset of jurisdictions have wrestled with the effects of climate change provides insight into the peculiar form of commercial regulation we know as ‘prudential regulation’ and in particular, the challenges faced by prudential regulators in dealing with the Knightian uncertainty posed by climate change.

This article, therefore, in Parts 2 and 3 briefly examines the nature of risk and of prudential regulation respectively. It then, in Part 4, maps the way in which the prudential regulators in different jurisdictions have responded to the risks posed by climate change, noting in particular the parallel timing and methodological development across the jurisdictions. Part 5 reflects on what this tells us about the practical challenges of prudential regulation. Taken together, the analysis in this article illustrates the challenges faced by prudential regulators in engaging effectively with a phenomenon as urgent, complex, pervasive and politically-charged as climate change.

## II. Coming to grips with risk

Much has been written in recent decades on the nature of risk. However, 2021 marked the centenary of the publication of one of the seminal texts in risk management – Frank Knight’s *Risk, Uncertainty, and Profit*.<sup>3</sup> In that book, Professor Knight, proposed a distinction between ‘risk’ and ‘uncertainty’. The implications of his distinction were for a long time underappreciated.<sup>4</sup> Risk, in his conception, is well-behaved and can be modelled. Uncertainty is not well-behaved.<sup>5</sup> Uncertainty arises because some processes are so complex that their products are, as a practical matter, unforecastable quantitatively using either deterministic or stochastic methods.<sup>6</sup>

Prudential regulators have traditionally focused on the first type of risk identified by Professor Knight; the risk that can be modelled. The essentially pragmatic<sup>7</sup> mathematicisation of finance theory initiated by Markowitz in the 1950s, and elaborated by Linter, Sharpe, Fama, Merton and others in the decades that followed, suggests that the mathematics of probability can be applied not only to actuarial estimation of liabilities but also to estimates of investment risk. This insight inspired regulators (and the regulated community) to focus on analytical approaches and procedures that privilege the conception of risk as a stochastic process. Indeed, one learned commentator, in describing the history of conceptions of risk in financial

<sup>3</sup> F. H. Knight, *Risk, Uncertainty and Profit*, (Boston: Houghton Mifflin, 1921, reprinted by Martino Publishing, 2014). It is also the centenary of John Maynard Keynes’ *A Treatise on Probability* which traverses some similar geography, albeit from a somewhat different perspective. See P. Faulkner, A. Feduzi, C. R. McCann, Jr. and J. Runde, ‘F. H. Knight’s *Risk, Uncertainty, and Profit* and J. M. Keynes’ *Treatise on Probability* after 100 years’ (2021) 45 *Cambridge Journal of Economics* 857.

<sup>4</sup> For a discussion see, S. Le Roy and L. D. Singell, Jr, ‘Knight on Risk and Uncertainty’ (1987) 95 *Journal of Political Economy* 394.

<sup>5</sup> Knight, above n 4, 19 – 20 and Ch. 7.

<sup>6</sup> In simple terms, a deterministic model is one in which the future event can be forecast precisely if you have the required input data. A stochastic model on the other hand accommodates the presence of randomness, meaning that the forecasts are (typically) expressed in statistical terms (such as the expected value and the range of probable outcomes).

<sup>7</sup> Nobel Prize winners Harry Markowitz (in his use of standard deviation as a measure of risk) and Gene Fama (in the use of the lognormal distribution to describe stock price movements), both expressly concede this pragmatism; H. M. Markowitz, *Portfolio Selection. Efficient Diversification of Investments* (New York: Cowles Foundation Monograph 16, 1959), 77, 193–194; E. Fama ‘Efficient Capital Markets: A Review of Theory and Empirical Work’ (1970) *Journal of Finance* 383, 399–400.

markets concluded in 2004 that ‘In finance, it [Knight’s uncertainty] has played essentially no role.’<sup>8</sup>

A predilection on the part of prudential regulators to focus on Knight’s first type of risk ought perhaps not be a surprise. Government agencies such as prudential regulators are quintessentially bureaucratic institutions, seeking to apply consistent and defensible analytical frames across and through time. The structure and processes of prudential regulators embody and operationalize those analytical frames.<sup>9</sup> Risk models such as the Value-at-Risk (VaR) measures employed by Basel Committee to calculate the market risk component of bank capital requirements and the PAIRS model employed by the Australian Prudential Regulation Authority (APRA) until recently<sup>10</sup> are good examples of analytical approaches focusing on Knight’s first type of risk.

The risks caused by climate change are difficult to model on this basis. Historical experience is a poor means of calibrating a model when the underlying processes are evolving – you cannot simply dial up the frequency or the amplitude of the events when path dependency, non-linearity and positive feedback loops are present. Those ‘complex’ characteristics are manifest in many markets and economic processes over the timeframes relevant to climate change.<sup>11</sup> The same is true in climate science and also in the models that attempt to gauge the impact of climate change on the economy.<sup>12</sup> There is also a danger in simply assuming that a dynamic process will necessarily possess an equilibrating tendency. As a result, as Edward Lorenz’s ‘Butterfly Effect’ demonstrated sixty years ago, forecasting even a deterministic model is significantly complicated by the presence of dynamic processes.<sup>13</sup> Sto-

chastic models are similarly challenged, although, if anything, the problem is further compounded by the additional challenges of drawing inferences and assessing the robustness of models in the presence of such complexity.<sup>14</sup>

In addition to this, dynamic systems such as financial markets, the economy and the climate are constituted of many interdependent elements. The participants in financial markets and economies are linked in a multiplicity of ways.<sup>15</sup> Elements of the earth’s climate are similarly part of an interconnected system. Not only does this systems perspective explain some of the complexity that frustrates traditional forecasting and modelling approaches, it also underscores the importance of systemic resilience as a crucial consideration for prudential regulators. The internal complexity and opacity of many financial institutions, and the ubiquity of circuit-breakers like insurance and limited liability that redistribute risk within and without the institutions, add further complexity to this picture.

Finally, analysis of the risks from climate change must also accommodate the uncertainty arising from the unpredictability of ‘human’ and political factors. There are, for instance, pockets of denial and recalcitrance in a number of countries notwithstanding the strong momentum towards climate sensitivity in civil society globally. As Knight recognised a century ago, how individuals and groups of individuals will respond in the real world to the opportunities and risks they perceive is much harder to predict than the models of rationality on which most econometric and financial models are based. That is true for entrepreneurs and decision-makers in a commercial context, and it is true for politicians. It is not that those actors are being ‘irrational’, but that the wealth of information and precise decision criteria being applied at the point of decision cannot easily be identified by outside observers.<sup>16</sup> Multi-nodal decision processes involving

<sup>8</sup> G. A. Holton, ‘Defining Risk’ (2004) 60(6) *Financial Analysts Journal* 21.

<sup>9</sup> J. Black, ‘Managing Regulatory Risks and Defining the Parameters of Blame: A Focus on the Australian Prudential Regulation Authority’ (2006) 28 *Law and Policy* 2.

<sup>10</sup> APRA, *Supervision Risk and Intensity Model* (October 2021), accessed at [www.apra.gov.au/sites/default/files/%5Bdate%3Acustom%3AY%5D-%5Bdate%3Acustom%3Am%5D/Supervision%20Risk%20and%20Intensity%20Model%20Guide.pdf](http://www.apra.gov.au/sites/default/files/%5Bdate%3Acustom%3AY%5D-%5Bdate%3Acustom%3Am%5D/Supervision%20Risk%20and%20Intensity%20Model%20Guide.pdf) on 19 September 2022.

<sup>11</sup> Amongst a burgeoning literature see W. B. Arthur, *Complexity and the Economy* (Oxford: Oxford University Press, 2015).

<sup>12</sup> E. Campiglio, Y. Dafermos, P. Monnin, J. Ryan-Collins, G. Schotten and M. Tanaka, ‘Climate change challenges for central banks and financial regulators’ (2018) 8 *Nature Climate Change* 462, 463.

<sup>13</sup> Originally presented (though without the catchy metaphor) in E. Lorenz, ‘Deterministic Nonperiodic Flow’ (1963) 20 *Journal of Atmospheric Sciences* 130. See more generally, J. H. Holland, *Hidden Order: How Adaptation Builds Complexity* (Cambridge, MA: Perseus, 1995).

<sup>14</sup> E. Winsberg, *Philosophy and Climate Science* (Cambridge: Cambridge University Press, 2018).

<sup>15</sup> D. Hendricks, J. Kambhu and P. Mosser, ‘Systemic Risk and the Financial System’ (2007) 13(2) *Economic Policy Review* 65; P. Gai, A. Haldane and S. Kapadia, ‘Complexity, Concentration and Contagion’ (2011) 58 *Journal of Monetary Economics* 453; D. Besar, P. Booth, K. K. Chan, A. K.L. Milne and J. Pickles, ‘Systemic Risk in Financial Services’ (2011) 16 *British Actuarial Journal* 195; M. S. Donald, H. Bateman, R. Buckley, K. Liu and R. Nicholls, ‘Too connected to fail: the regulation of systemic risk within Australia’s superannuation system’ (2016) 2 *Journal of Financial Regulation* 56; A. Roncoroni, S. Battiston, L. O.L. Escobar-Farfán, S. Martinez-Jaramillo, ‘Climate risk and financial stability in the network of banks and investment funds’ (2021) 54 *Journal of Financial Stability* 100870.

<sup>16</sup> G. S. Becker, ‘The Economic Approach to Human Behavior’ in: G. S. Becker, ed., *The economic approach to human behavior* (Chicago: Chicago University Press, 1976) 3, 7.

such actors, so common inside large financial institutions, are even more inscrutable. Thus, although it might be contended that public policy and corporate behaviour over the very long term is conditioned by scientific understanding and the evolving views of civil society (and hence that appreciation of the relevance of climate change will eventually win out), the lags can be very long and the path bumpy indeed.<sup>17</sup>

### III. Prudential regulation and supervision

Before reviewing the climate change-related initiatives of prudential regulators in key jurisdictions, it is worthwhile to consider the concept of prudential regulation in a little detail.

Prudential regulation is a feature of the regulatory landscape in many jurisdictions.<sup>18</sup> Like anti-trust regulation, it is a type of corporate regulation that is defined by its objective rather than the sector to which it is applied.<sup>19</sup> Also like anti-trust regulation, it is designed to address a shortcoming of the market mechanism, in this case because of the social and economic externalities that arise when certain types of financial institution suffer commercial failure.<sup>20</sup> Prudential regulators, the governmental agencies empowered to give effect to prudential regulation, seek to ensure the solvency of the financial institutions under their supervision. In laypersons' terms, this is typically articulated as seeking to ensure that financial institutions 'keep their promises' to their customers. It is however perhaps more accurate to say that prudential regulation aims to ensure that the institutions are capable of keeping their promises. That is, do the institutions have the financial wherewithal and operational infrastructure that will enable them to keep their promises? Whether the

institutions do in fact keep their promises is more commonly the province of market conduct regulators.

In pursuing the objective of ensuring that financial institutions are capable of meeting the promises they make, prudential regulation inevitably has to engage directly with risk. Fraud and the criminal law are available as mechanisms to deal with situations in which financial institutions (and the individuals animating them) have made promises they know they cannot keep.<sup>21</sup> But the future is uncertain and personal ambition and/or market pressure can blind even well-intentioned managers to the potential for events to unfold in ways unpropitious for their business. Prudential regulation has therefore traditionally been designed to ensure that businesses operate within a margin of safety in case those unpropitious scenarios arise. It doesn't purport to preclude failure,<sup>22</sup> as that is deemed to unduly suppress the disciplines of the market, but rather to reduce the likelihood of failure and also the quantum of any failure that does arise. Traditionally, therefore, in addition to operational risk prudential supervision has focused on the credit, market and liquidity mismatch risks that threaten each entity's capital adequacy and solvency.

Notwithstanding their predilection towards stochastic conceptions of risk, in recent decades prudential regulators have come to recognise the impact of complexity and systemic interdependence in the risks faced by financial institutions, and to adapt their supervisory practices accordingly. In large part it was phenomena such as the systemic liquidity crisis of 2008 rather than the increasing prominence of climate change that forced them beyond their traditional comfort zones.<sup>23</sup> Nonetheless, this evolution in approach is to be commended and encouraged because without this evolution in thinking it is hard to see how the peculiarly Knightian uncertainties posed by climate change could be addressed effectively.

All that said, to achieve its substantive objective, prudential regulation has to be operationalized. The practice of prudential regulation is implicitly premised on a number of beliefs. The first is that it is possible to identify

<sup>17</sup> See for instance, R. Repetto (ed) *Punctuated Equilibrium and the Dynamics of U.S. Environmental Policy* (New Haven: Yale University Press, 2006), esp Ch. 2, F. M. Baumgartner 'Punctuated Equilibrium Theory and Environmental Policy' and Ch. 3, W. Brock 'Tipping Points, Abrupt Opinion Changes, and Punctuated Policy Change'.

<sup>18</sup> For a description of the distinction between prudential and market conduct regulation see A. Godwin and A. Schmulow eds, *Cambridge Handbook of Twin Peaks Regulation* (Cambridge: Cambridge University Press, 2021).

<sup>19</sup> Taylor, above n 2; R. Dale and S. Wolfe, 'The structure of financial regulation' (1998) 6 *Journal of Financial Regulation and Compliance* 325.

<sup>20</sup> M. J. Flannery, 'Prudential Regulation for Banks' in K. Sawamoto, Z. Nakajima, H. Taguchi (eds) *Financial Stability in a Changing Environment* (New York: St. Martin's Press, 1995).

<sup>21</sup> See for example the seminal corporate Anglo-Australia law case; *Re City Equitable Fire Insurance Co* [1925] Ch. 407.

<sup>22</sup> Indeed, some prudential regulators go so far as to expressly disclaim an intention to eliminate all failures. See APRA, *Statement of Intent – September 2018*. Accessed at [www.apra.gov.au/state-of-intent-september-2018](http://www.apra.gov.au/state-of-intent-september-2018) on 19 September 2022.

<sup>23</sup> See Acharya, above n 3; Haldane, above n 3; P. Bolton, M. Despres, L. Awazu, P. Da Silva, F. Samama and R. Svartzman, *The green swan – central banking and financial stability in the age of climate change* (BIS, 2020). Accessed at [www.bis.org/publ/othp31.pdf](http://www.bis.org/publ/othp31.pdf) on 19 September 2022.

characteristics of an institution that are predictive of impending failure. As we have seen, the presence of Knightian uncertainty such as that present in relation to climate change makes this much harder. Assessments have to be more holistic, and potentially impressionistic, when narrowly defined measures potentially fail to provide the full picture. Bureaucratic organizations typically find such assessments uncongenial. Some examples of how prudential regulators have wrestled with this challenge in respect of climate change is illustrated in Part 4 below. Of particular interest is the trend for regulators to impose parameterized ‘stress-testing’ that incorporates climate factors on regulated entities in apparent defiance of the inherent complexity of the task, not to mention the formidable data issues and the presence of unresolved parameter uncertainty.

The second belief is that the risk signal is received in a sufficiently timely manner (and is sufficiently precise and reliable) to permit action to head-off, or at least ameliorate, the effects of the failure that would otherwise occur. This justifies the focus, described below in relation to the work of the Task Force on Climate-Related Financial Disclosures (TCFD), on ensuring that corporate disclosures include relevant information about the impacts of climate change. Without reliable data, neither the financial institutions nor the prudential regulators who supervise them can be confident of the assessments they make. However, the pace with which security and derivatives prices can change, the complexity of some security and derivative pricing structures and the speed with which institutions can and do modify their investment portfolios means that any risk exposures reported to a regulator are almost certainly stale by the time they are received and assessed.<sup>24</sup> This in turn justifies, albeit only partially, the emphasis on decision processes and culture seen in much modern prudential regulation: if the cross-sectional picture reported is only fleetingly representative of the reality, then understanding the way that the picture is generated may be the only way to get a measure of comfort. In addition, even if a reliable signal is received by the prudential regulator, it should not be assumed that forced divestment of assets adversely impacted by climate change will be effective in eliminating or mitigating the risk. That paradox of efficient markets is that security prices adjust to new information even in the absence of transactions that crystalize the revaluation. A financial institution seeking to sell an impaired asset, for instance, faces a market that

is quite likely already apprised of that impairment.<sup>25</sup> In many cases the financial damage is already done and the owner of the asset may be forced to consider means other than divestment to ameliorate further financial damage. It is important, however, not to underestimate the challenges in interpreting information related to the liability side of the balance sheet also, and in particular, as alluded to above, the complexities introduced by complicated group structures (such as subsidiaries, special purpose vehicles and intra-group indemnities and guarantees) that complicate the task of identifying with any certainty ‘where the buck stops’.

The third belief is that there exist forms of regulatory intervention that are politically and practically viable and efficacious. Financial institutions exercise significant political influence in many developed countries, influence which can be temporarily undermined by public scandals (see for instance Northern Rock in the United Kingdom and HIH in Australia) but which is largely exerted behind closed doors. Even absent political dissonance on issues such as climate change, measures taken by governmental authorities that seek to tighten prudential controls are prone to being cast by those affected as anti-competitive and suppressive of economic growth. On the other hand, those arguing for attention to the underlying risk may allege that prudential measures are too slow, too indirect or too compromised.<sup>26</sup> On top of these essentially political challenges, it is also challenging in an environment of significant information asymmetry to identify regulatory mechanisms that will inspire compliant behavior in both those institutions minded to comply and also those with a greater appetite for regulatory risk. Regulatory overreach risks undermining support for the measures, and mis-specified measures risk distorting decision-making in the regulated population in ways that are unintended. The nuanced fine-tuning required to finesse this problem on a case-by-case basis can also lead to private negotiations beyond the view of the public, with the potential for regulatory capture (or coercion) that such negotiations can entail.

<sup>24</sup> D. Awrey, ‘Complexity, Innovation, and the Regulation of Modern Financial Markets’ (2012) 2 *Harvard Business Law Review* 235, 275–276.

<sup>25</sup> On the mixed empirical findings on the extent to which climate risk is priced into markets, see A. Venturini, ‘Climate change, risk factors and stock returns: A review of the literature’ (2022) 79 *International Review of Financial Analysis* 79, which amongst other things identifies a recent trend towards recognition (and hence pricing) of climate risks in published empirical studies.

<sup>26</sup> In respect of environmental protection more generally, see D. Demortain, *The Science of Bureaucracy: Risk Decision-Making and the US Environmental Protection Agency*, (Cambridge, MA: MIT Press, 2020) 11.

#### IV. National (and trans-national) responses to climate change by prudential regulators

Prudential regulators have always been concerned about the broad suite of risks threatening a financial firm's capacity to make good on its promises. However, prudential regulators have, over the past decade, started to dedicate attention specifically to the effects of climate change, reflecting widespread recognition that climate change is a pervasive and material source of risk on both the asset and liability sides of the balance sheet of many financial institutions.<sup>27</sup> Presented below is a description of how a handful of key jurisdictions have risen to the challenges of formally incorporating consideration of climate risk into their processes and models. However, before progressing to those descriptions it is appropriate to recognise the role played by some key trans-national organizations and groupings that have been instrumental in the generation and transmission of regulatory best practice in this area.

##### A. Trans-national Initiatives

Although informal and imperfectly coordinated initiatives had been circulating for some time,<sup>28</sup> prudential regulators' attention to climate risk can be said to have moved onto a concerted, formal footing in 2015. In April of that year the G20 Finance Ministers and Central Bank Governors requested that the Financial Stability Board (FSB) of the Bank for International Settlements (BIS) draw on public and private sector input to consider how the financial sector ought to take into account climate-related issues. In response, in December 2015, the FSB created the TCFD under the leadership of Michael Bloomberg. The TCFD has promoted and participated in the development and dissemination of know-how related to the measurement and disclosure of climate-related risks, including the publication in 2017 of a report outlining how climate risks

ought to be disclosed as part of corporations' ongoing disclosure obligations.<sup>29</sup> It was intended that this would be useful to investors, lenders, and insurance underwriters but it has also proven a major boon to the work of prudential regulators whose scenario analysis and stress testing models rely heavily on the data produced in accordance with the TFCF's recommended methodologies. This guidance was further updated in October 2021.<sup>30</sup>

More recently, in 2020, the FSB issued a report on financial authorities' experience in including physical and transition climate risk as part of their financial stability monitoring.<sup>31</sup> Largely synthetic (in the sense that it drew extensively on other sources), the report concluded, amongst other things, that at that time just under three quarters (72%) of financial authorities were considering climate risk monitoring and that some were starting to quantify those risks.<sup>32</sup> It also noted that 'No approach to quantification provides a holistic assessment of climate-related risks to the global financial system.'<sup>33</sup>

Also influential has been the Network for Greening the Financial System (NGFS) established in late 2017 by a group of central banks and financial supervisors. The NGFS now comprises 125 members and observers. In addition to convening conferences at which regulators can share ideas, the NGFS has published a number of influential research papers,<sup>34</sup> including, in 2020, a *Guide to climate scenario analysis for central banks and supervisors* and an *Overview of Environmental Risk Analysis by Financial Institutions*, and in 2021, a *Progress report in bridging data gaps*. The papers provide blue-prints for national regulators to emulate or adapt to their circumstances. They are also frequently referenced in public by national regulators in support of the approaches they are each taking.

In addition, there have been industry specific initiatives. For instance, in December 2016, the Sustainable

<sup>27</sup> See M. Feridun and H. Güngör, 'Climate-Related Prudential Risks in the Banking Sector: A Review of the Emerging Regulatory and Supervisory Practices' (2020) 12 *Sustainability* 5325; D. Sinclair, 'Speak Loudly and Carry a Small Stick: Prudential Regulation and the Climate, Energy, and Finance Nexus,' (2019) 59 *Jurimetrics* 141. Also E. Campiglio, Y. Dafermos, P. Monnin, J. Ryan-Collins, G. Schotten and M. Tanaka, 'Climate change challenges for central banks and financial regulators' (2018) 8 *Nature Climate Change* 462, and the research literature cited therein.

<sup>28</sup> One example, involving jurisdictions (other than South Africa) not the focus of the present paper, was the meeting of the Sustainable Banking Network (now the Sustainable Banking and Finance Network) in Beijing in 2012.

<sup>29</sup> TFCF, *Recommendations of the Task Force on Climate-related Financial Disclosures*, (June 2017). Accessed at [www.fsb.org/2017/06/recommendations-of-the-task-force-on-climate-related-financial-disclosures-2/](http://www.fsb.org/2017/06/recommendations-of-the-task-force-on-climate-related-financial-disclosures-2/) on 19 September 2022.

<sup>30</sup> TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures* (October 2021). Accessed at [www.fsb.org/wp-content/uploads/P141021-4.pdf](http://www.fsb.org/wp-content/uploads/P141021-4.pdf) on 19 September 2022.

<sup>31</sup> Financial Stability Board, *Stocktake of Financial Authorities' Experience in Including Physical and Transition Climate Risks as Part of Their Financial Stability Monitoring* (22 July 2020). Accessed at [www.fsb.org/wp-content/uploads/P220720.pdf](http://www.fsb.org/wp-content/uploads/P220720.pdf) on 19 September 2020.

<sup>32</sup> *Ibid.*, 6.

<sup>33</sup> *Ibid.*, 1.

<sup>34</sup> Available at [www.ngfs.net/en/liste-chronologique/ngfs-publications](http://www.ngfs.net/en/liste-chronologique/ngfs-publications).

Insurance Forum (SIF) was established by the International Association of Insurance Supervisors to strengthen insurance supervisors' and regulators' understanding of and responses to climate change. Research and consultation over several years led to the issuance, in May 2021, of the *SIF/IAIS Application Paper on the Supervision of Climate-related Risks in the Insurance Sector*.<sup>35</sup> In the pensions sector, in 2019, the International Organisation of Pension Supervisors (IOPS) issued supervisory guidelines on the integration of ESG factors in the investment and risk management of pension funds<sup>36</sup> in which IOPS argues that explicit integration of ESG factors into pension fund investment and risk management processes is in line with the fiduciary duties owed by pension fund trustees. The guidelines are not mandatory and IOPS is careful to emphasise that regulators need to have regard for the local legal and supervisory context. Finally, the Basel Committee on Banking Supervision (BCBS) of the BIS published two reports in April 2021 which, respectively, analyse climate-related risk drivers and their transmission channels and discuss the range of measurement methodologies that are either currently available specifically to banks or under development.<sup>37</sup> As yet, however, although Basel III requires banks when assessing lending related to commercial or residential real estate to 'appropriately monitor the risk of environmental liability arising in respect of the collateral, such as the presence of toxic material on a property',<sup>38</sup> the BCBS has not incorporated climate risk specifically into the Basel III regulations on capital adequacy more generally.<sup>39</sup> There are also indica-

tions that some in the BIS may have some reservations about whether such a move would be desirable.<sup>40</sup>

## B. United Kingdom

Prudential supervision of financial institutions in the United Kingdom is currently split between two government bodies. Prudential supervision of deposit-taking institutions,<sup>41</sup> insurers and certain investment firms has, since 2013, been the responsibility of the Prudential Regulation Authority (PRA), a unit within the Bank of England. Prudential supervision of occupational pension schemes has, since 2005, been the responsibility of The Pensions Regulator (TPR), a non-departmental public body sponsored by the Department for Work and Pensions. Both the PRA and TPR have started to engage publicly with the impact of climate risk on the institutions under their supervision in recent years.

Although concern about climate change had been percolating through the insurance industry for some time,<sup>42</sup> the PRA issued its first formal report<sup>43</sup> on its assessment of the impact of climate change on the UK insurance sector in September 2015. The report was issued in response to an invitation from the Department for Environment, Food and Rural Affairs and was designed to inform the UK Climate Change Risk Assessment of 2017 and contribute to international dialogue leading into the Paris meeting of the Conference of the Parties to the UN Framework Convention on Climate Change. Launched by Mark Carney, Governor of the Bank of England and Chairman of the Financial Stability Board,<sup>44</sup> the report popularised

<sup>35</sup> Accessed at [www.sustainableinsuranceforum.org/publication/application-paper-on-the-supervision-of-climate-related-risks-in-the-insurance-sector/](http://www.sustainableinsuranceforum.org/publication/application-paper-on-the-supervision-of-climate-related-risks-in-the-insurance-sector/) on 19 September 2022.

<sup>36</sup> Accessed at [www.iopsweb.org/IOPS-Supervisory-guidelines-integration-ESG-factors.pdf](http://www.iopsweb.org/IOPS-Supervisory-guidelines-integration-ESG-factors.pdf) on 19 September 2022.

<sup>37</sup> Basel Committee on Banking Supervision, *Climate-related risk drivers and their transmission channels* (April 2021) and Basel Committee (April 2021) *Climate-related financial risks – measurement methodologies*. Accessed at [www.bis.org/bcbs/publ/d517.htm](http://www.bis.org/bcbs/publ/d517.htm), and [www.bis.org/bcbs/publ/d518.htm](http://www.bis.org/bcbs/publ/d518.htm) respectively, on 19 September 2022.

<sup>38</sup> Basel Committee on Banking Supervision, *Basel Framework*, Paragraph 36.128. See further A.S. Kern, 'Stability and Sustainability in Banking Reform: Are Environmental Risks Missing in Basel III?' (Cambridge: CISL UNEP, 2014).

<sup>39</sup> It did, however, release a Consultation Paper in November 2021 in which it outlined its principles-based approach to improve banks' risk management practices and supervisory practices related to climate-related financial risks; *Principles for the effective management and supervision of climate-related financial risks*, accessed at [www.bis.org/bcbs/publ/d530.htm](http://www.bis.org/bcbs/publ/d530.htm) on 19 September 2022. The public consultation closed on 16 February 2022. At the time of submission there has been no public indication of when the BCBS will respond to the consultation.

<sup>40</sup> R. Coelho and F. Restoy, 'The regulatory response to climate risks: some challenges' (FSI Briefs, No. 16, February 2022). Accessed at [www.bis.org/fsi/fsibriefs16.pdf](http://www.bis.org/fsi/fsibriefs16.pdf) on 19 September 2022. Note these views have not been disavowed by the BIS, but are expressed to be the view of the authors and not necessarily of the BIS or the Basel-based standard-setting bodies.

<sup>41</sup> Encompassing banks, building societies and credit unions.

<sup>42</sup> For instance, in 2009 the Association of British Insurers co-authored Research Paper No. 19: 'The financial risks of climate change: examining the financial implications of climate change using climate models and insurance catastrophe risk models', with AIR Worldwide and the Met Office. Accessed at [www.air-worldwide.com/siteassets/Publications/Research/documents/Financial-Implications-of-Climate-Change](http://www.air-worldwide.com/siteassets/Publications/Research/documents/Financial-Implications-of-Climate-Change), on 19 September 2022.

<sup>43</sup> Accessed at [www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/publication/impact-of-climate-change-on-the-uk-insurance-sector.pdf](http://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/publication/impact-of-climate-change-on-the-uk-insurance-sector.pdf), on 19 September 2022.

<sup>44</sup> Mr. Carney's speech was accessed at [www.bis.org/review/r151009a.pdf](http://www.bis.org/review/r151009a.pdf), on 19 September 2022. I am indebted to the Editors for pointing out that the typology pre-dates Mr. Carney's speech and that his (important) contribution was to bring it to a wider audience.

a typology that classifies the impacts of climate change into Physical Risks, Transition Risks and Liability Risks. A report on the impact of climate risk on the UK banking sector was released in September 2018.<sup>45</sup> Notably this latter report was titled »Transition in thinking«, reflecting the slower pace of engagement found by the PRA in the banking sector at that time.<sup>46</sup>

The PRA has developed an increasingly elaborate and sophisticated approach to climate risk since those early steps.<sup>47</sup> It now requires Board level engagement with the implications of climate change in both banking and insurance entities.<sup>48</sup> Although the PRA expressly recognises that each entity's response to climate change may 'mature over time'<sup>49</sup>, assessment and management of climate risks across the entity are expected to be integrated into the entities' governance and risk management processes, including the entity's ICAAP (for banks) or ORSA (for insurers) assessments.<sup>50</sup> Importantly, this means that it is reinforced by the Senior Managers and Certification Re-

gime (SCMR)<sup>51</sup> imposed on senior officers and executives of financial services firms generally.

In June 2021 the PRA announced that it would conduct a modelling exercise, termed the Climate Biennial Exploratory Scenario (CBES) to explore the financial risks posed by climate change for the largest UK banks and insurers.<sup>52</sup> In so doing, it recognized that the task was 'fiendishly complicated' and that therefore it 'intends the CBES to be a learning exercise.' The release went on to note that 'Experience and expertise in modelling climate-related risks is still relatively immature, so this exercise will develop the capabilities of both the Bank and the CBES participants.'<sup>53</sup>

The PRA has also employed less formal means of securing attention in climate change. For instance in July 2020, the PRA issued an open letter to the Chief Executive Officers of all PRA-regulated firms expressing its desire that recipients fully embed their approach to climate related financial risks by the end of 2021.<sup>54</sup> It repeated this tactic in January 2022, sending a letter to the Chief Executive Officers of all banks, noting that 'Managing the risks to firms' safety and soundness from climate change requires action now, and remains a key PRA priority.'<sup>55</sup> Tellingly however, the letter went on to observe that 'Some firms have made good progress in embedding the PRA's supervisory expectations (as set out in SS3/19), but progress has not been consistent across all firms, with further work required by many to meet those expectations. We have observed that most firms are focused on the business opportunities presented by climate change and remind firms that climate change also presents an increasing business risk that is foreseeable and requires action now.'<sup>56</sup>

<sup>45</sup> Prudential Regulation Authority, *Transition in thinking: The impact of climate change on the UK banking sector* (September 2018). Accessed at [www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/report/transition-in-thinking-the-impact-of-climate-change-on-the-uk-banking-sector.pdf?la=en&hash=A0C99529978C94AC8E1C6B4CE1EECD8C05CBF40D](http://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/report/transition-in-thinking-the-impact-of-climate-change-on-the-uk-banking-sector.pdf?la=en&hash=A0C99529978C94AC8E1C6B4CE1EECD8C05CBF40D) on 19 September 2022.

<sup>46</sup> Ibid. Specifically, the PRA found that approximately 90% of survey respondents fell within the euphemistically titled 'responsible' (aka reputation-managing) and 'responsive' (aka reactive) categories and only 10% in the 'strategic' category that took 'a more comprehensive approach taking a long-term view of the financial risks', [4.7].

<sup>47</sup> See Feridun and Güngör, above n 28, 8–14.

<sup>48</sup> Prudential Regulation Authority, *Supervisory Statement SS3/19 Enhancing banks' and insurers' approaches to managing the financial risks from climate change* (April 2019). Accessed at [www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/supervisory-statement/2019/ss319](http://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/supervisory-statement/2019/ss319) on 19 September 2022. (SS3/19).

<sup>49</sup> Ibid [3.1].

<sup>50</sup> Ibid [3.7]. The Internal Capital Adequacy Assessment Process (ICAAP) and Own Risk and Solvency Assessment (ORSA) assessments are processes imposed by the PRA upon banks and insurers respectively that relate to the entity's overall financial soundness and solvency. See Prudential Regulation Authority, *Supervisory Statement SS31/15 - The Internal Capital Adequacy Assessment Process (ICAAP) and the Supervisory Review and Evaluation Process (SREP)* (July 2015) and Prudential Regulation Authority, *Supervisory Statement SS19/16 Solvency II: ORSA* (November 2016). Accessed at [www.bankofengland.co.uk/prudential-regulation/publication/2013/the-internal-capital-adequacy-assessment-process-and-supervisory-review-ss](http://www.bankofengland.co.uk/prudential-regulation/publication/2013/the-internal-capital-adequacy-assessment-process-and-supervisory-review-ss), and [www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/supervisory-statement/2016/ss1916.pdf?la=en&hash=E97A3B0B-DCF1EC899EC0214273BBE1E618E189B2](http://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/supervisory-statement/2016/ss1916.pdf?la=en&hash=E97A3B0B-DCF1EC899EC0214273BBE1E618E189B2) on 19 September 2022.

<sup>51</sup> For a description and critical analysis, see J. McGrath and C. Walker, *New Accountability in Financial Services. Changing individual Behaviour and Culture* (Cham: Palgrave, 2021), Chapter 5.

<sup>52</sup> Bank of England, *News Release: Bank of England publishes the key elements of the 2021 Biennial Exploratory Scenario: Financial risks from climate change* (8 June 2021). Accessed at [www.bankofengland.co.uk/news/2021/june/key-elements-of-the-2021-biennial-exploratory-scenario-financial-risks-from-climate-change](http://www.bankofengland.co.uk/news/2021/june/key-elements-of-the-2021-biennial-exploratory-scenario-financial-risks-from-climate-change) on 19 September 2022.

<sup>53</sup> Ibid.

<sup>54</sup> Accessed at [www.bankofengland.co.uk/prudential-regulation/letter/2020/managing-the-financial-risks-from-climate-change](http://www.bankofengland.co.uk/prudential-regulation/letter/2020/managing-the-financial-risks-from-climate-change) on 19 September 2022.

<sup>55</sup> Accessed at [www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2022/january/uk-deposit-takers-2022-priorities.pdf?la=en&hash=C4AF2E8171C532EF391CF8378BEB4E94B7738BE5&fbclid=IwAR3z1b7FnHgTxXaSc0YSC-jlEOHs6kM2MsQzBC9uxQPLiTCsXdr1amxstM8](http://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2022/january/uk-deposit-takers-2022-priorities.pdf?la=en&hash=C4AF2E8171C532EF391CF8378BEB4E94B7738BE5&fbclid=IwAR3z1b7FnHgTxXaSc0YSC-jlEOHs6kM2MsQzBC9uxQPLiTCsXdr1amxstM8) on 19 September 2022.

<sup>56</sup> Ibid.

Finally, in October 2021, the PRA noted that ‘As we enter 2022, the PRA will switch its supervisory approach on its climate-related supervisory expectations from one of assessing implementation to actively supervising against them.’<sup>57</sup>

The UK’s other prudential regulator, the Pensions Regulator, is also alive to the risks of climate change. It updated its guidance for trustees considering environmental risks in 2016.<sup>58</sup> However, it has been placing greater emphasis on the importance of climate risk with its constituency since an unflattering recommendation from the Parliamentary Environmental Audit Committee in February 2018 that it ‘get up to speed.’<sup>59</sup> This effort was given further impetus with the enactment of the *Occupational Pension Schemes (Climate Change Governance and Reporting) Regulations 2021*. In addition to requiring the trustees of large UK pension funds to publish a report annually conforming to the TCFD recommendations, the Regulations require trustees to introduce processes to ‘identify, assess and manage climate-related risks and opportunities which are relevant to the scheme’<sup>60</sup> ‘as far as they are able,’ recognising both the costs and time such analysis might require<sup>61</sup> and the incomplete data and methodological limitations that currently exist.<sup>62</sup> The Regulations apply to trustees of funds with assets of greater than £5bn, from October 2021, and £1bn from October 2022.

All that said, TPR is acutely aware of the thin governance infrastructure supporting many occupational pen-

sion plans in the United Kingdom.<sup>63</sup> Nonetheless, in its recent response to consultation on climate-related governance and reporting by the trustees of such funds, TPR notes that ‘Ultimately, the responsibility for decisions rests with the trustees. They need to be comfortable that they, not their advisers, are making the final decision.’<sup>64</sup> When combined with TPR’s conclusion in a report issued in October 2021 that ‘too few schemes give enough consideration to climate-related risks and opportunities’<sup>65</sup> it seems likely that TPR will continue to scrutinise closely this aspect of pension fund governance in coming years.

### C. European Union

Europe is commonly identified as being at the forefront of regulation designed to address climate action.<sup>66</sup> Although there is variation both in the pace of change and the extent of progress at a national level, the European Union has introduced Directives and other initiatives that aim to promote consideration of climate change by prudential regulators in the Member States and the financial institutions they oversee.

Again, the Paris Agreement of 2015 was a crucial catalyst. In December 2016 the Directive (EU) 2016/2341 on the activities and supervision of institutions for occupational retirement provision (IORPs) provided that pension funds in the European Union should be required to conduct risk management assessments »which should, where relevant, include, inter alia, risks related to climate change, use of resources, the environment, social risks, and risks related to the depreciation of assets due to regulatory change (‘stranded assets’).<sup>67</sup> Also in December 2016, the European Commission (EC commonly referenced as ‘the Commission’) established the High-Level Expert Group on Sustainable Finance (HLEG), one of whose objectives was to provide advice to the Commission on how

<sup>57</sup> PRA, *Climate-related financial risk management and the role of capital requirements. Climate Change Adaptation Report 2021* (28 October 2021), vii. Accessed at [www.bankofengland.co.uk/-/media/boe/files/prudentialregulation/publication/2021/october/climate-change-adaptation-report-2021.pdf?la=en&hash=FF4A0C618471462E10BC704D4AA58727EC8F8720](http://www.bankofengland.co.uk/-/media/boe/files/prudentialregulation/publication/2021/october/climate-change-adaptation-report-2021.pdf?la=en&hash=FF4A0C618471462E10BC704D4AA58727EC8F8720) on 19 September 2022.

<sup>58</sup> The Pensions Regulator, *Guide to investment governance* (July 2016).

<sup>59</sup> Environmental Audit Committee, *Greening Finance: embedding sustainability in financial decision making*, at [102], [108]. Accessed at [publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1063/106307.htm^tfootnote-009-backlink](http://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1063/106307.htm^tfootnote-009-backlink) on 19 September 2022. See also speech by TPR Lead Investment Consultant Fred Berry to an industry group in April 2018 accessed at [webarchive.nationalarchives.gov.uk/ukgwa/20180702134632/http://www.thepensionsregulator.gov.uk/press/fred-berry-uksif-ownership-day.aspx](http://webarchive.nationalarchives.gov.uk/ukgwa/20180702134632/http://www.thepensionsregulator.gov.uk/press/fred-berry-uksif-ownership-day.aspx) on 19 September 2022.

<sup>60</sup> *The Occupational Pension Schemes (Climate Change Governance and Reporting) Regulations 2021*, Schedule, Part 1.

<sup>61</sup> *Ibid.*, [19].

<sup>62</sup> Department of Work and Pensions, *Statutory Guidance, Governance and reporting of climate change risk: guidance for trustees of occupational schemes* (24 June 2021), Part 2, [2].

<sup>63</sup> M. S. Donald, ‘Modern challenges to the prudence expected of pension fund trustees’ (2022) 33 *Kings Law Journal* 92.

<sup>64</sup> Accessed at [www.thepensionsregulator.gov.uk/en/document-library/consultations/climate-change-guidance/climate-change-guidance-response](http://www.thepensionsregulator.gov.uk/en/document-library/consultations/climate-change-guidance/climate-change-guidance-response), on 19 September 2022.

<sup>65</sup> Quote from Press Release PN 21–29 accompanying the report. Climate Adaptation Report accessed at [www.thepensionsregulator.gov.uk/en/document-library/corporate-information/climate-change-and-environment/climate-adaptation-report](http://www.thepensionsregulator.gov.uk/en/document-library/corporate-information/climate-change-and-environment/climate-adaptation-report) on 19 September 2022.

<sup>66</sup> See for instance L. Sander and T. Harding, *The Depth & Breadth of Regulatory Initiatives Across Regions in 2021*, (ISS Research Report, January 2022).

<sup>67</sup> Directive (EU) 2016/2341 on the activities and supervision of institutions for occupational retirement provision (IORPs) (recast), [57].

to ‘identify the steps that financial institutions and regulators should take to protect the stability of the financial system from risks related to the environment.’ The HLEG reported in January 2018<sup>68</sup> and recommended, amongst other things, that national supervisors be required to encourage the banks under their supervision to develop ESG and longer-term sustainability risk assessments,<sup>69</sup> that consideration ought to be given as to whether and how supervisory reviews in the insurance sector needed to encompass more explicitly climate-related risks<sup>70</sup> and that pension funds should consult their members on their sustainability preferences and build those into their investment strategy.<sup>71</sup>

Over the following years there was a flurry of activity, the most prominent of which were the Commission’s Action plan for Financing Sustainable Growth announced in March 2018; the European Parliament and Council announcing an intention to amend Directive (EU) 2016/2341 to enhance climate risk disclosures in April 2019; in June 2019 the EC amending the non-financial reporting directive (NFRD) (Directive 2014/95/EU) to include new non-binding guidelines relating to climate risk. Most recently, in October 2021, the EC adopted revisions to the EU *Capital Requirements Regulation* and *Capital Requirements Directive* that expressly require banks to systematically identify, disclose and manage ESG risks as part of their risk management.<sup>72</sup>

The European Banking Authority (EBA) and European Central Bank (ECB) have been active in articulating the Basel III framework into the specifically European regulatory environment.<sup>73</sup> Again, although much of the attention is on the identification, measurement and disclosure

of environmental risk, the EBA and ECB’s approach require that banks implement governance and management strategies that ensure that the outputs from those technical processes are incorporated integrally into the commercial and risk management decision-making practices of the bank.

As is often the case, progress amongst Member States within the EU in this area is not uniform. Space permits only the briefest outline of two of the more prominent: the Netherlands and France. The Netherlands was a relatively early mover. The Nederlandsche Bank established the Sustainable Finance Platform in 2016 to provide a forum for dialogue between the private sector (insurers, pension funds, banks and asset managers) and government departments and financial supervisors on issues related to sustainable finance. The first climate-related stress testing was conducted in 2018<sup>74</sup> and in March 2021 the Nederlandsche Bank published its first report on financial climate-related risks and opportunities in accordance with TCFD recommendations as part of its 2020 Annual Report.<sup>75</sup> In France, the Autorité de Contrôle Prudentiel et Résolution (ACPR) has announced that it is working toward the integration of climate related risks into prudential supervision in response to the enactment in August 2015 of Article 173 of the Act on the Energy Transition for Green Growth.<sup>76</sup> Of particular note, over 2020–21 it conducted a pilot exercise to assess the risks associated with climate change in the banking and insurance industries.<sup>77</sup> The pilot exercise was reported to be ‘unprecedented’ and as illustrating the ‘leading role’ played by the French financial authorities in respect of climate change.<sup>78</sup> The ACPR has also issued reports specifically on the climate

<sup>68</sup> High-Level Expert Group on Sustainable Finance, *Financing a Sustainable European Economy. Final Report 2018*. Accessed at [ec.europa.eu/info/sites/default/files/180131-sustainable-finance-final-report\\_en.pdf](https://ec.europa.eu/info/sites/default/files/180131-sustainable-finance-final-report_en.pdf) on 19 September 2022.

<sup>69</sup> Ibid, 69.

<sup>70</sup> Ibid, 72.

<sup>71</sup> Ibid, 74.

<sup>72</sup> EC, *Banking Package 2021*, accessed at [ec.europa.eu/info/publications/211027-banking-package\\_en](https://ec.europa.eu/info/publications/211027-banking-package_en), on 19 September 2022.

<sup>73</sup> See for instance EBA, *On Management and Supervision of ESG risks for Credit Institutions and Investment Firms* (EBA/REP/2021/18); ECB, *Guide on climate-related and environmental risks Supervisory expectations relating to risk management and disclosure* (November 2020). Accessed at [www.eba.europa.eu/sites/default/documents/files/document\\_library/Publications/Reports/2021/1015656/EBA%20Report%20on%20ESG%20risks%20management%20and%20supervision.pdf](https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Reports/2021/1015656/EBA%20Report%20on%20ESG%20risks%20management%20and%20supervision.pdf) and [www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentaltalrisks~58213f6564.en.pdf](https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentaltalrisks~58213f6564.en.pdf) respectively on 19 September 2022.

<sup>74</sup> De Nederlandsche Bank, *An energy transition risk stress test for the financial system of the Netherlands* (Occasional Studies Vol 16–7, 2018). Accessed at [www.dnb.nl/media/pdnpdalc/201810\\_nr\\_7\\_-2018-\\_an\\_energy\\_transition\\_risk\\_stress\\_test\\_for\\_the\\_financial\\_system\\_of\\_the\\_netherlands.pdf](https://www.dnb.nl/media/pdnpdalc/201810_nr_7_-2018-_an_energy_transition_risk_stress_test_for_the_financial_system_of_the_netherlands.pdf) on 19 September 2022.

<sup>75</sup> De Nederlandsche Bank, *Annual Report 2020* (March 2021). Accessed at [www.dnb.nl/media/geubhers/web\\_131565\\_jvsl\\_eng\\_h4-verantwoording.pdf](https://www.dnb.nl/media/geubhers/web_131565_jvsl_eng_h4-verantwoording.pdf) on 19 September 2022.

<sup>76</sup> Banque de France, *Charter of Responsible Investment* (March 2018). Accessed at [www.banque-france.fr/sites/default/files/media/2019/03/12/charte\\_ir\\_bdf\\_vf.pdf](https://www.banque-france.fr/sites/default/files/media/2019/03/12/charte_ir_bdf_vf.pdf) on 19 September 2022.

<sup>77</sup> ACPR, *A first assessment of financial risks stemming from climate change: The main results of the 2020 climate pilot exercise* (Banque de France, Analyses et synthèses, No.122–2021). Accessed at [acpr.banque-france.fr/sites/default/files/medias/documents/20210602\\_as\\_exercice\\_pilote\\_english.pdf](https://acpr.banque-france.fr/sites/default/files/medias/documents/20210602_as_exercice_pilote_english.pdf) on 19 September 2022.

<sup>78</sup> Ibid, 2.

change-related risks facing French banking<sup>79</sup> and insurance groups,<sup>80</sup> and, most recently, climate governance in the insurance and re-insurance sectors.<sup>81</sup>

#### D. Australia

APRA is responsible for prudential supervision of the banking, insurance and superannuation (occupational pensions) sector in Australia. Engagement with climate risk issues arose sporadically in the superannuation sector in the period before 2015, mostly in questions around whether a specific statutory requirement that superannuation trusts be administered for the sole purpose of providing retirement benefits to members precluded consideration by the trustee of ESG issues.<sup>82</sup>

As in other jurisdictions, the intensity of attention to climate risk by APRA has escalated considerably in the period since Australia ratified the Paris Agreement in November 2016. Initially APRA's approach relied on public expressions of intent by APRA Member, Geoff Summerhayes, at industry fora and the like,<sup>83</sup> that were designed to encourage regulated entities to incorporate climate risk into their risk management and strategic planning activities. These were followed, in 2018 with a survey of 38 large banks, insurers and superannuation trustees. The results were released in March 2019.<sup>84</sup> In summary, APRA found that 'a substantial majority of regulated entities were taking steps to increase their understanding of the threat, including all of the [banks], general insurers and superannuation trustees surveyed.' However, progress in the life

and private health insurance sectors was less advanced.<sup>85</sup> Tellingly, 'reputational risk' was identified as the equal top climate related risk (along with floods) and 'regulatory risk' was third,<sup>86</sup> suggesting a degree of cynicism in the survey population.

In 2020 APRA announced it would conduct Climate Vulnerability Assessments (CVAs) of Australia's five major banks and update the paragraphs in its *Prudential Practice Guide SPG 530 Investment Governance* in relation to ESG issues.<sup>87</sup> The former is currently underway, with aggregate results expected in 2022,<sup>88</sup> but the latter was overtaken by the development of a discrete cross-industry Practice Guide on climate risk, CPG 229 (see below). APRA expressly referenced the examples of prudential regulatory peer organisations in the design of the CVA.<sup>89</sup>

Following public consultation over the course of 2021, in November 2021, APRA issued a Prudential Practice Guide on climate change.<sup>90</sup> Consistent with its status as a Prudential Practice Guide, CPG 229 is not prescriptive and is not enforceable directly. It has been described by APRA's Chair as 'a direct response to their request for more clarity about regulatory expectations and examples of better industry practice.'<sup>91</sup> Applying the 'physical/transition/liability' risk typology as well as rehearsing the PRA's description of the challenges of modelling climate risk, CPG 229 is designed to apply to banks, insurers and superannuation fund trustees alike, and to be read in conjunction with the other risk management and governance regimes imposed by APRA on those entities. It focuses attention on the board's role and on the role played by senior management without specifying any particular process or structure be introduced. Although not expressly referenced, the expectations expressed in CPG 229 in this regard are reinforced in the banking context by the

<sup>79</sup> ACPR, *French banking groups facing climate change-related risks* (Banque de France, Analyses et synthèses, No.101–2021) Accessed at [acpr.banque-france.fr/node/336744](https://acpr.banque-france.fr/node/336744) on 19 September 2022.

<sup>80</sup> ACPR, *French insurers facing climate change-related risks* (Banque de France, Analyses et synthèses, No.102–2021) Accessed at [acpr.banque-france.fr/node/162194](https://acpr.banque-france.fr/node/162194) on 19 September 2022.

<sup>81</sup> ACPR, *Climate change risk governance* (February 2022). Accessed at [acpr.banque-france.fr/node/415196](https://acpr.banque-france.fr/node/415196) on 19 September 2022.

<sup>82</sup> For a discussion of this debate, see S. Barker, M. Baker-Jones, E. Barton and E. Fagan, 'Climate change and the fiduciary duties of pension fund trustees – lessons from the Australian law' (2016) 6 *Journal of Sustainable Finance and Investment* 211.

<sup>83</sup> See for instance 'Australia's new horizon: Climate change challenges and prudential risk' presentation by Geoff Summerhayes to Insurance Council of Australia Annual Forum, 17 February 2017, accessed at [www.apra.gov.au/news-and-publications/australias-new-horizon-climate-change-challenges-and-prudential-risk](https://www.apra.gov.au/news-and-publications/australias-new-horizon-climate-change-challenges-and-prudential-risk) on 19 September 2022.

<sup>84</sup> APRA, *Climate change: Awareness to action* (Information Paper, 20 March 2019). Accessed at [https://www.apra.gov.au/sites/default/files/climate\\_change\\_awareness\\_to\\_action\\_march\\_2019.pdf](https://www.apra.gov.au/sites/default/files/climate_change_awareness_to_action_march_2019.pdf) on 19 September 2022.

<sup>85</sup> Ibid, 4.

<sup>86</sup> Ibid, 13.

<sup>87</sup> Media Release, 'APRA outlines plans for climate risk prudential guidance and vulnerability assessment' (24 February 2020). Accessed at <https://www.apra.gov.au/news-and-publications/apra-outlines-plans-for-climate-risk-prudential-guidance-and-vulnerability> on 19 September 2022.

<sup>88</sup> APRA, *Climate Vulnerability Assessment* (Information Paper, 3 September 2021). Accessed at [www.apra.gov.au/sites/default/files/2021-09/Climate%20Vulnerability%20Assessment\\_1.pdf](https://www.apra.gov.au/sites/default/files/2021-09/Climate%20Vulnerability%20Assessment_1.pdf) on 19 September 2022.

<sup>89</sup> Ibid, 21.

<sup>90</sup> APRA, *Prudential Practice Guide CPG 229 Climate Change Financial Risks* (November 2021).

<sup>91</sup> Media Release, 'APRA finalises prudential guidance on managing the financial risks of climate change' (26 November 2021); Accessed at [www.apra.gov.au/news-and-publications/apra-finalises-prudential-guidance-on-managing-financial-risks-of-climate](https://www.apra.gov.au/news-and-publications/apra-finalises-prudential-guidance-on-managing-financial-risks-of-climate) on 19 September 2022.

Banking Executive Accountability Regime (BEAR) in much the same way as the SMCR functions in the UK.<sup>92</sup>

CPG 229 also identifies that ‘it would be prudent for institutions to develop [or have access to] capabilities in climate risk scenario analysis and stress testing’<sup>93</sup> commensurate with the institution’s ‘size, business mix and complexity’<sup>94</sup> and makes high level suggestions about methodology, process, data and disclosure issues. That said, like the PRA, APRA expressly recognises that such analytical processes are ‘a developing area.’ CPG 229 does however note that ‘the expectation of future improvements in approach is not a justification for delaying its use.’<sup>95</sup> Surveys of regulated entities’ progress towards meeting the requirements of CPG 229 are planned for 2022.<sup>96</sup>

### E. South Africa

The Prudential Authority (PA), an authority operating formally within the administration of the South African Reserve Bank (SARB), has since 2017 been responsible for the prudential regulation and supervision of commercial, mutual and co-operative banks, insurers, co-operative financial institutions, financial conglomerates and certain market infrastructures. The PA is an active participant in the SIF and NGFS.

Perhaps the most prominent initiative undertaken by the PA in respect of climate change is the Climate Risk Survey, the findings from which were reported in October 2021.<sup>97</sup> As in other jurisdictions, the survey was directed to the presence of governance and risk processes, and resources, related to climate risk rather than specific financial data.

In addition, climate change has been identified as one of the four major themes in the SARB’s Research Agenda for 2021–2023, in part because it recognises that approaches that are relevant in highly integrated developed economies may be less relevant to economies with great-

er regional fragmentation and developmental disparity.<sup>98</sup> The PA has also established a dedicated climate risk-focused unit, the Prudential Authority Climate Think Tank, to ‘promote, develop and coordinate the PA’s regulatory and supervisory response to climate risks that impact entities regulated and supervised by the PA.’<sup>99</sup>

### F. Singapore

The Monetary Authority of Singapore (MAS) is the integrated regulator and supervisor of financial institutions, including banks and insurers, in Singapore. It first included environment-related matters in the Industry-Wide Stress Test (IWST) it applies to insurance entities in 2018, and has been an active member of the NGFS. However, it was not until the 2020 Financial Stability Review, which included a Special Feature on ‘Climate Change and Financial Stability’ that MAS publicly engaged with the issue broadly. At that time, it committed to incorporating a broader range of climate risks in thematic scenarios as part of the IWST.<sup>100</sup> In addition, it issued formal Guidelines on Environmental Risk Management to enhance financial institutions’ resilience to environmental risks, including but going beyond the risks from climate change. Firms have until the middle of 2022 to comply with the Guidelines. MAS issued its inaugural report on climate resilience and environmental sustainability in June 2021.

## V. Implications for the practice of prudential supervision

The overwhelming impression from even this brief survey of how prudential regulators are responding to the impact of climate change on the entities and industries they supervise is one of increasing emphasis, intensity and sophistication. That is a good thing. On the other hand, it is appropriate to recognise that the correlated timing is not a coincidence and does in fact signal something important about the practice of prudential supervision. It would be hard to argue that climate change was not prominent on the policy agenda for most governments at least since the Kyoto protocol in 1997, at the latest. Many industry as-

<sup>92</sup> A bill to extend a version of the BEAR to all APRA-regulated entities recently lapsed when Parliament was prorogued in preparation for a Federal Election; *Financial Accountability Regime Bill 2021*.

<sup>93</sup> CPG 229, above n 91, [37].

<sup>94</sup> CPG 229, above n 91, [38].

<sup>95</sup> CPG 229, above n 91, [37].

<sup>96</sup> Ibid.

<sup>97</sup> Prudential Authority, *Climate Risk Survey Report 2021* (October 2021). Accessed at [www.resbank.co.za/content/dam/sarb/publications/prudential-authority/pa-public-awareness/financial-sector-awareness/2021/PA%20Climate%20Survey%20Report%202021.pdf](http://www.resbank.co.za/content/dam/sarb/publications/prudential-authority/pa-public-awareness/financial-sector-awareness/2021/PA%20Climate%20Survey%20Report%202021.pdf) on 19 September 2022.

<sup>98</sup> South African Reserve Bank, *Research Agenda 2021–2023*, 11. Accessed at [www.resbank.co.za/content/dam/sarb/what-we-do/research/Agenda 12.01.2021 CL KHM.pdf](http://www.resbank.co.za/content/dam/sarb/what-we-do/research/Agenda%2012.01.2021%20CL%20KHM.pdf) on 19 September 2022.

<sup>99</sup> PA, *Climate Risk Survey Report*, above n 98, 37.

<sup>100</sup> MAS, *Financial Stability Review 2020*, 86. Accessed at [www.mas.gov.sg/-/media/MAS/resource/publications/fsr/Financial-Stability-Review-2020.pdf](http://www.mas.gov.sg/-/media/MAS/resource/publications/fsr/Financial-Stability-Review-2020.pdf) on 19 September 2022.

sociations and market participants engaged actively with the issue over the 15 years following the Kyoto Protocol,<sup>101</sup> but as the brief survey in Part 4 reveals, prudential regulators were not (formally at least) part of that discussion. It seems, rather, that it was the intensification in governmental rhetoric and policy following the Paris Agreement in 2015 that was the catalyst to overcome the bureaucratic inertia impeding formal consideration of climate change by prudential regulators. Seemingly it was not until they were given the green (sic) light by their political masters, in the processes and fora leading to and proceeding from the Paris Agreement in 2015, that prudential regulators in the jurisdictions examined above engaged formally in a meaningful and public way with climate change. That conclusion does little to encourage optimism about the ability of prudential regulators to identify and engage with the macro-prudential risks of the future in a timely manner.

Also, as the descriptions in Part 4 demonstrate, there has been considerable similarity in the ways in which the prudential regulators have responded to the requirement that they engage with climate change. This is evident, for instance, in the identification and measurement of different types of climate risk and in the design of stress-testing methodologies.<sup>102</sup> Collaboration and interaction can certainly promote the dissemination of new ideas, a crucial issue as governments and regulators come to grips with climate change. However, there is a point at which such collaboration stifles innovation and serves rather to protect adherents from criticism. Certainly, the frequency with which the regulatory agencies described above refer to their participation in (or in some cases leadership of) relevant collaborative groupings, and their application of externally validated methodologies is suggestive of a desire to manage their reputational risk.

There is moreover a deeper, more fundamental issue. Every parameterized risk methodology, no matter how sophisticated and how carefully implemented, necessarily contains shortcomings by which it can be undone. The failure of the Basel II capital adequacy regime to head off the global financial crisis in 2007–2008 is a salient reminder

of this. There is therefore a risk that the considerable energies being dedicated to building an increasingly sophisticated and elaborate set of climate risk analytics becomes overwhelming, and that the need to scan the horizon for novel, unmodelled Knightian risks is under-resourced; a sort of modern financial Maginot line.<sup>103</sup> Climate risk management on a global scale will arguably be more vulnerable if all prudential regulators are looking at the problem through the same lens and hence share the same blind spots. It will be important therefore for prudential regulators to remain open to alternative methodologies and also to indicia of risks not accommodated within their increasingly closely-defined models. This is both a cultural and an operational issue for prudential regulators because the individuals and teams involved in the maintenance of the core risk models will inevitably develop a loyalty and affinity with those models. That methodological allegiance is only strengthened by the similarities being pursued by regulators from different jurisdictions. So, although it is important that prudential regulators refine and hone their models, sharing best practice where possible, it will also be important for those at the helm of these organisations to ensure that they commit resources to scanning the horizon for risks that the core models miss, and for models that might offer different perspectives on the risks emerging from climate change.

Another issue that the discussion above identifies is the problem of timeframe. Unlike market conduct regulation, prudential regulation and supervision is forward-looking. However, the timeframe for solvency and capital adequacy is typically measured in days or, at the most, months. This makes sense because many banking and insurance products are issued for less than a year, and in many cases the exposure from longer-dated products can be effectively hedged. The timeframes for climate change risks extend much further, even if the realization of some of the risks can play out quite quickly (as in the case of flooding or forest fires). Traditional prudential modelling doesn't mesh well with this length of perspective, making it hard to integrate climate risk models into other prudential risk modelling.

On the other hand, recent decades have seen prudential regulators around the world focus increasingly on the role of boards and senior management in establishing structures and processes to deal with matters of regulatory interest, such as risk. The recommendations in Pillar 2 of the

<sup>101</sup> See for instance The Geneva Association (2009), 'The Insurance Industry and Climate Change – Contribution to the Global Debate', (Liedtke, P M Ed), July, The Geneva Reports Risks and Insurance Research. Accessed at [www.genevaassociation.org/media/201070/geneva\\_report\[2\].pdf](http://www.genevaassociation.org/media/201070/geneva_report[2].pdf) on 19 September 2022; ABI, above n 43.

<sup>102</sup> P. Baudino and J.-P. Svoronos, 'Stress-testing banks for climate change – a comparison of practices' (FSI Insights on policy implementation No 34, Bank for International Settlements, July 2021).

<sup>103</sup> The Maginot line was an extensive set of defensive fortifications built in eastern France in the aftermath of the first World War. It was famously bypassed to the north by the invading German army in 1940, rendering it largely ineffective.

Basel III Capital Accord, the SCMR in the United Kingdom and the BEAR in Australia are each prominent examples of this sensibility. This focus is a legitimate means of engaging, if incompletely, with Knightian uncertainty. Indeed the unpredictability of commercial judgment was one of the examples given by Knight of risks that defied stochastic modelling and hence required a distinctive approach. Unfortunately, there has so far been considerably less attention given to placing this type of supervision on a robust conceptual foundation than has occurred in respect of the more traditional modes of prudential supervision.<sup>104</sup> Concepts such as ‘governance’ and ‘culture’ are less honed than the assessment of credit and liquidity risks traditionally incorporated within the capital adequacy and liquidity regimes deployed by most prudential regulators. Again, however, the issue is a deeper one, because accountability measures are also challenged by the long latency period of many climate change risks. The agency risks sought to be addressed by the SMCR and BEAR, for instance, cannot realistically be addressed by the threat of ex post sanction or financial claw-back if the ‘agent’ (the director or senior officer of the institution) may well be retired before the effects of his or her dereliction of duty in respect of climate change are felt.

Finally, questions have been asked about whether it is appropriate for prudential regulators to go beyond merely addressing the risks to entity solvency and financial resilience posed by climate change. Ought prudential regulators be expected to promote actively a process of transition to a more environmentally sustainable global economy?<sup>105</sup> Setting aside the question of whether prudential regulators would have the skillset to expand their regulatory horizon in this way (they could presumably acquire them if required), consideration would need to be given to the extent to which we could reasonably expect a prudential regulator to compromise pursuit of the traditional prudential objectives in favor of the broader objective in circumstances when the two could not be perfectly reconciled.<sup>106</sup> That said, some prudential regulators (e.g. APRA

in Australia<sup>107</sup> and the PA in South Africa<sup>108</sup>) and central banks already have composite objectives in which economic or other considerations are expressly referenced,<sup>109</sup> even if in practice those regulators have not been publicly held accountable in respect of those objectives. It is also important to recognise the relevance of the institutional setting in which the prudential regulator operates. How independent from both a formal and a practical perspective is the prudential regulator from the entity (usually the Central Bank) responsible for setting monetary policy in the country, for instance?<sup>110</sup>

## VI. Concluding comments

Any attempt to review comprehensively the flurry of activity related to climate change by prudential regulators in recent years would be a formidable task. It is clear from even the brief descriptions presented above that progress is being made, albeit belatedly and unevenly. The analysis above does, however, illuminate very effectively the challenges facing prudential regulators. It is understandable that prudential regulators favor supervisory pro-

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being granted multiple or composite mandates that contains similar concerns about mandate ambiguity. See I. Lazopoulos and V. Gabriel, ‘Policy mandates and institutional architecture’ (2019) 100 *Journal of Banking and Finance* 122 and the literature cited therein. Also A. S. Kern, ‘Reconciling Lopsided Mandates, Secondary Objectives and the Importance of Sustainability: The Role of the European Central Bank in the Single Supervisory Mechanism’ (October 12, 2021). Available at SSRN: [ssrn.com/abstract=3941010](https://ssrn.com/abstract=3941010) or <http://dx.doi.org/10.2139/ssrn.3941010>.

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<sup>104</sup> Two important contributions starting to address this gap are A. S. Kern, ‘Regulating Risk Culture in Banks’ (2019). Available at SSRN: <https://ssrn.com/abstract=3321163> or <http://dx.doi.org/10.2139/ssrn.3321163> and Elizabeth Sheedy, *Risk Governance. Biases, Blind Spots and Bonuses* (Oxford: Routledge, 2021).

<sup>105</sup> See for instance Coelho and Restoy, above n 36. Also K. Rismanchi, J. McDaniels and S. Gringel, *Prudential Pathways: Industry Perspectives on Supervisory and Regulatory Approaches to Climate-related and Environmental Risks* (Institute of International Finance, January 2021), at 2–3, 20.

<sup>106</sup> There is a rich body of literature pre-dating consideration of climate change that addresses the desirability of regulators

<sup>107</sup> Section 8(2) of the *APRA Act 1998* (Cth) provides that ‘in performing and exercising its functions and powers, APRA is to balance the objectives of financial safety and efficiency, competition, contestability and competitive neutrality and, in balancing these objectives, is to promote financial system stability in Australia’.

<sup>108</sup> Section 34 of the *FSA Act 2017* requires the PA to support ‘sustainable competition’ and ‘financial inclusion’ in addition to its core prudential objectives listed in section 33.

<sup>109</sup> S. Dikau, S. and U. Volz, ‘Central bank mandates, sustainability objectives and the promotion of green finance’ (2021) 184 *Ecological Economics* 107022.

<sup>110</sup> P. d’Orazio and L. Popoyan, ‘Taking up the climate change challenge: A new perspective on central banking’ (LEM Working Paper Series, No. 2020/19). Accessed at [www.econstor.eu/bitstream/10419/228158/1/170385313X.pdf](http://www.econstor.eu/bitstream/10419/228158/1/170385313X.pdf) on 19 September 2022. Unfortunately, the authors appear to mis-classify the model of prudential regulation employed in a number of the jurisdictions (including the UK, Australia and South Africa) considered in this current paper, so the subsequent econometric modelling should be viewed with caution. See also Lazopoulos and Gabriel, above n 107.

cesses that are demonstrably consistent and analytically rigorous. Both are crucial regulatory norms. However, the sorts of risks with which prudential regulation must engage are often not well-behaved in a Knightian sense. History may give few clues about the way risks emerge and play out, and local political factors may promote or stultify regulatory initiatives. Relevant data may not be available and even where it is, it may be stale by the time it arrives in the hands of the prudential regulator. So, although it is perhaps going too far to suggest that the type of open-mindedness that is required for effective risk management is inconsistent with a bureaucratic mindset, it is important that prudential regulators do not fall into the Maginot trap of building elaborate defences for those risks that are tractable, while failing to scan the horizon for those that are not. That way, to adapt Shakespeare, disappointment lies.