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Citation: Bryce, C. & King, A. (2025). Regulating Risk for Growth: The many faces of Janus. *Journal of Risk Research*, pp. 1-9. doi: 10.1080/13669877.2025.2565580

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Permanent repository link: <https://openaccess.city.ac.uk/id/eprint/35876/>

Link to published version: <https://doi.org/10.1080/13669877.2025.2565580>

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Journal of Risk Research

Regulating Risk for Growth: The many faces of Janus

Submission ID	251125423
Article Type	Perspective
Keywords	Regulation, Growth, Innovation, Precautionary Principle, Risk Management
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Regulating Risk for Growth: The many faces of Janus

Abstract

This perspective examines the evolving landscape of risk regulation, particularly within the UK, where a governmental shift towards prioritising economic growth is underway. It explores the tension between safeguarding society through regulation and the fostering of economic outcomes. This tension manifests itself as ‘Janus faced’ with risk regulation simultaneously trying to balance what has gone before, with what may come. The perspective revisits the precautionary principle, arguing it can lead to ‘precautionary iatrogenesis’, stifling innovation and growth. It calls for a broader discussion within the risk research community about the appropriate balance between risk and growth, emphasising the need to consider risk/risk trade-offs and the unintended consequences of excessive precaution.

Keywords

Regulation, Growth, Innovation, Precautionary Principle, Risk Management.

Regulating Risk for Growth: The many faces of Janus

Regulation plays a crucial role in shaping and safeguarding the well-being of society, modern economies could not function smoothly without it in some shape or form (Parker & Kirkpatrick, 2012). It establishes a framework of rules, standards, and guidelines that help protect individuals, communities, markets, and societies (Bergkamp, 2016). In doing so it promotes public safety, consumer protection, environmental sustainability, and fair competition, while also attempting to foster innovation and economic growth (Davies et al, 2010; Farrow, 2010; Lindøe & Olsen, 2009; Naime & Andrey, 2013; Wiener & Rogers, 2002). The importance of economic growth within this context should not be understated, it is a crucial driver of positive societal outcomes that generates new jobs, supports rising living standards, improves life expectancy, and funds social services that improve the overall quality of life. (Bergkamp, 2016; Cerra et al, 2021). The outcome of this framework when imposed on society is sometimes referred to as the 'regulatory state' (Majone, 1998), in which government regulations and societies co-exist, sometimes uneasily (Parker & Kirkpatrick, 2012).

By attempting to strike a 'delicate balance' between managing risks and enabling progress, risk regulation serves as a mechanism for ensuring the stability and prosperity of our societies. The work of balancing these often-competing objectives has been described as the 'Janus-faced' nature of risk regulation by Lindøe & Olsen (2009). Looking backwards at what has gone before, whilst simultaneously looking forwards to what may come after. In considering the many faces of Janus, this perspective aims to illuminate the rapidly evolving landscape of risk regulation within the UK as its role in fostering economic growth comes into sharp focus.

On the 16th of January 2025 the UK Chancellor of the Exchequer Rachel Reeves told several watchdogs that a cultural shift *'from excessively focusing on risk to helping drive growth'* is needed (HM Treasury, 2024). Put simply, the UK government considers the 'delicate balance' to have tipped too far the wrong way. It will therefore come as no surprise that the current UK government has set its sights on reducing the regulatory burden on organisations in an attempt to increase economic growth and raise living standards in every part of the UK by the end of the current parliamentary term (Gov, 2024). As part of this endeavour, they have appointed a new Task Force with the mandate to identify opportunities to reduce or repeal red tape within 17 regulators including transportation, environmental, health and safety, and financial services

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4 watchdogs (Rach, 2025). As a recent example of the direction of travel by the government, one
5 UK regulator - the Competition and Markets Authority, had the head of the organisation
6 removed over what was described as a 'different approach' to growth (Jack and Edwards,
7 2025). When considered through the lens of financial services, this proposed reduction in
8 regulatory burden has already received widespread criticism within the academic ranks
9 spanning multiple disciplines (Delaney, 2025). In support of the Janus-faced nature of risk
10 regulation and Delaney et al (2025), the Governor of the Bank of England has stated "*Let's not*
11 *forget the pain of the 2008 crisis in pursuit of growth*" (Bailey, 2025). The 'delicate balance'
12 it seems, is not so delicate after all, and the consequences of tipping it towards regulating for
13 growth too far could also be profound.
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21 Risk regulation has become increasingly important as organisations and policymakers grapple
22 with the challenges of managing complex and dynamic risks in competitive domestic and
23 international marketplaces (Hutter, 2005; Ojo, 2010). This is best seen currently in the
24 international race to lead on AI that is occurring on two axes' simultaneously - the vertical race
25 to develop the technology, and the horizontal race to determine how best to regulate it. The
26 challenges in this domain are multifaceted, as AI systems can be pervasive, economically
27 embedded, and subject to fragmented regulatory oversight (White & Lidskog, 2021). The
28 regulation of AI systems has emerged as a critical area of focus in this horizontal race, with
29 policymakers and researchers exploring frameworks to manage the risks associated with the
30 deployment of these technologies (Gonçalves, 2019; Macrae, 2024; Smuha, 2021; White &
31 Lidskog, 2021). This balance between risk and economic growth has been a central and often
32 contentious aspect of newly developing AI regulation, as national governments continue to
33 foster the development of these technologies for geopolitical and economic competitive
34 advantage (Smuha, 2021). As highlighted by Löfstedt et al (2011), complex interactions
35 between risks and society, as is the case with AI currently, calls for better 'governance' of risk.
36 Over the past several decades, in support of better governance a shift has occurred in the
37 regulatory landscape, moving away from prescriptive, one-size-fits-all approaches towards
38 more flexible, risk-based frameworks (Davies et al, 2010; Gonçalves, 2019).
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51 The growing importance of risk in regulatory and governmental spheres has been driven by a
52 confluence of factors, none more so than when things go wrong at a societal level. The many
53 faces of Janus are particularly evident in the aftermath of major crises such as COVID (Bouder
54 and Löfstedt, 2024; Aven, 2024), the 2008 global financial crisis (Moshirian, 2011; Avgouleas,
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2009), Fukushima (Aven and Ylonen, 2016), and Bovine Spongiform Encephalopathy (Lofstedt et al, 2011). These events have also led to increased public distrust of regulators and industries leading to changes of style and approaches to enforcement as regulators and governments look to the future (Lofstedt 2004, 2005). A key aspect of this distrust relates to the fact that these events do not exist in isolation - media attention often amplifies regulatory failures, leading to a reactive 'runaway' from potential risks (Lofstedt et al, 2011). In this context, regulators may be tempted to enact hasty, ill-conceived policies driven by 'knee-jerk reactions', creating a destructive cycle, known as the 'post-trust circle of risk aversion' (Lofstedt et al, 2011).

Regardless of the policy domain under investigation a key concept that has shaped the field of risk research is the '*precautionary principle*' (Mythen 2018; Baldwin et al, 2012, Khodadayan et al, 2021; Balzano & Sheppard, 2002; McAlea et al, 2014). It emphasises the need to take preventive action in the face of uncertain risks and has been used as a decision-making principle by regulators in a wide range of industries, emerging from the environmental protection policy domain and becoming embedded in multiple other policy domains. The basic idea of the principle is reflected by saying '*an ounce of prevention is worth a pound of cure*' or '*better safe than sorry*' (Deiseler and Schling, 2000; Miller and Engemann, 2019). However, even with the best intentions, a '*pound*' of regulation may not always achieve its intended goal, at an acceptable economic cost, whilst considering the opportunity costs of forgone progress (Parker & Kirkpatrick, 2012; Sunstein, 2003; Orset, 2014).

It is important to note that the precautionary principle is not about absolute avoidance of all risks, it's about making informed decisions in the face of uncertainty - in theory at least. However, as Adams (1995) observed many years ago, in most countries in the developed world the rate at which new risk regulations have been added to the statute book greatly exceeds the rate at which old ones are removed. A key consideration of this is that the precautionary principle can potentially entrench the status quo, as regulatory bans often make subsequent approvals difficult due to their impact on public risk perception (OECD, 2023). This could explain some of the arguments made by (Delaney, 2025) against a loosening of the regulatory restrictions within the financial system. Now that the principle has been enshrined in law in the European Union through the Treaty on the Functioning of the European Union (TFEU, Article 191), it seems that it has become the de-facto guiding principle for risk regulation (Bouder & Lofstedt, 2024). A crucial aspect of the principle involves the many faces of Janus looking into

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4 the uncertain future, weighing potential risks against potential benefits, and considering the
5 'proportionality' of precautionary measures (Aven et al, 2025).
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9 It has been highlighted by Aven (2011) that there are over 19 different interpretations of the
10 precautionary principle. It is not the intention of this perspective to discuss each of their merits,
11 but rather to acknowledge the influential role this amorphous principle, and subsequent law has
12 played in shaping the regulatory landscape of multiple policy domains. This has not gone
13 unnoticed within the research community (Graham, 2001, 2010; Fisher, 2007, 2010; Wiener,
14 2010; Zander, 2010), leading Lofstedt (2014) to call for a formal review of the principle due to
15 its misinterpretation by numerous stakeholders.
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21 Given the ambiguity that surrounds the principle, the concept of proportionality is arguably
22 harder to determine and more likely to be and misinterpreted by policy makers. From a
23 theoretical perspective is it the case that Rachel Reeves is merely asking regulators to shift the
24 balance away from excessive precaution, towards a more calibrated and 'proportional'
25 approach to enable greater economic growth? The OECD has performed research for similar
26 reasons, as such this doesn't seem to be a revolutionary approach from the current UK
27 government (Parker & Kirkpatrick, 2012; OECD, 2023). Nonetheless, risk research is littered
28 with examples advocating for the application of the precautionary principle. However, there is
29 much less detailing the rationale for rejecting its application or at least diluting it as a decision
30 principle in consideration of others (Balzano & Sheppard, 2002; Boudier & Löfstedt, 2024;
31 Randall, 2009; Lofstedt, 2014). It could be argued that now more than ever the boundaries of
32 the precautionary principle require scrutiny as the global economy grapples with the
33 geopolitical tensions that are consuming a post-pandemic world.
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42 Recently, Aven (2019) has discussed the idea of an '*Anti-Cautious Principle*' - if the
43 consequences of an activity could be highly positive and subject to uncertainties, then the
44 activity should be carried out and supporting (stimulating) measures should be taken. An
45 argument could be made that economic growth would be a good example of such a
46 consequence. The consideration of this anti-cautious decision principle is particularly
47 important when we consider precaution being used as a means to suppress innovation (Wildavsky,
48 1988). Further, Baldwin et al (2012) cite instances of the absence of 'scientific certainty' and
49 use of the precautionary principle as an opportunity for manipulation of public concerns by
50 power brokers such as NGO's harbouring vested interests, or protectionism in international
51 trade by governments, an example being US beef exports to the EU (Wallstrom, 2002).
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4 The concept of anti-caution as a decision principle therefore relates closely to the lesser known
5 '*Innovation Principle*' (OECD, 2023), which has been proposed as a way of ensuring the
6 benefits of innovation are properly considered against potential risks. During the development
7 and embedding of this principle within EU policy-making cycles Garnett et al (2018)
8 highlighted that if 'qualified' properly, it could bind twin the desires to foster innovation
9 alongside protecting consumers and the environment. Nonetheless, it is not without criticism
10 as its genesis from lobbying forums has been viewed by some stakeholder groups as an attempt
11 to undermine environmental and health policy objectives or dilute the precautionary principle
12 (Ducuing, 2021; EC, 2022). The innovation principle states that to ensure regulations do not
13 become overly cautious or restrictive, the forward-looking face of Janus should consider how
14 regulation can foster rather than hinder innovation. To this end, the UK government has
15 recently launched a new Regulatory Innovation Office with the aim of reducing bureaucratic
16 hurdles and speeding up regulatory decision making for emerging new technologies such as AI
17 (DSIT, 2023a; DSIT, 2023b; Reed, 2018; White & Lidskog, 2021). The innovation principle
18 draws on the work of economists like Schumpeter (1954) who argued that innovation drives
19 economic growth, and that regulations should be careful not to impede the 'creative destruction'
20 and 'entrepreneurial spirit' so vital to prosperity (Harvey et al, 2010; Mthanti & Ojah, 2017).

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32 With the anti-cautionary and precautionary principles on opposing ends of the regulating for
33 growth spectrum, the innovation principle may sit somewhere in between. This suggests a more
34 nuanced appreciation of the many faces of Janus as they simultaneously look to history and the
35 future, one that considers multiple risk concepts beyond just the precautionary principle as a
36 sole guiding framework (Lindøe & Olsen, 2009). Applying the precautionary principle too
37 forcefully can paradoxically increase overall risk exposure by stifling beneficial innovation and
38 therefore growth (OECD, 2021). We call this spillover effect '*Precautionary Iatrogenesis*' in
39 the context of economic growth, aligning closely to the historic discussions around the
40 consequences of 'risk/risk' trade-offs in the literature (Graham and Wiener, 1995; Hansen et
41 al, 2008; Zander, 2010; Wiener, 2020; Zander 2024). The failure of regulators to consider
42 risk/risk trade-offs highlights the fact that the many faces of Janus tend to focus on individual
43 silos of risks (Baldwin, 2016; Wiener, 2020), and fail to consider side effects (OECD, 2023;
44 Graham and Wiener, 1995).

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54 Taking nuclear power as an example - a proverbial hot potato in terms of risk regulation and
55 policy implementation (Fischhoff, 1983). Its emergence in the 1970s was met with widespread
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4 public concern internationally over its potential catastrophic risks. Regulators were compelled
5 to take a precautionary approach with stringent safety requirements (Kadak, 2018), in part due
6 to widespread media attention that amplified its apparent riskiness to the public (Wiener &
7 Rogers, 2002). Post Fukushima, this was a primary justification by the German government for
8 winding down their remaining 3 nuclear power plants (Glynos & Scharf, 2024; OECD, 2023).
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13 However, with the huge benefit of hindsight via the backward face of Janus, we can now see
14 that an overly cautious approach of national governments over the last 50 years may have
15 come at the cost of lost economic opportunities and delayed the scale-up of a technology that
16 could have provided a reliable, low-carbon energy source (OECD, 2023). Further, an over-
17 reliance on oil and gas as a long-term substitute for nuclear energy infrastructure projects has
18 led to the unintended consequence of leaving countries more vulnerable to energy supply
19 shocks (Chung & Kim, 2024), inflation (Rojas-Romagosa, 2024), and less resilient to address
20 the challenges posed by climate change (Bélaïd, 2022). The spill-over effects of precautionary
21 iatrogenesis have far-reaching consequences beyond just economic growth when considered
22 holistically. It is for this reason that Germany postponed its nuclear plant phaseout, leading to
23 a rethinking of the role of nuclear power as a bridge technology in the clean energy transition
24 by the Nuclear Technology Association (KernD, 2025; Glynos & Scharf, 2024), and a more
25 'holistic' vision of what precaution means has been called for (OECD, 2023). The case of
26 nuclear power in Germany is an example of geo-political and economic circumstances dictating
27 a change in regulatory risk approach. A justification of sorts for Rachel Reeves' calls to
28 reexamine the 'delicate balance' between risk and growth in certain sectors to reduce
29 precautionary iatrogenesis.
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41 The work of Bryce et al (2024) and to a lesser extent Palermo et al (2016) has highlighted the
42 many faces of Janus in strategic decision making in the boardrooms of private companies i.e.
43 strategic decision makers who regulations are imposed upon. In these companies Enterprise
44 Risk Management (ERM) is the dominant framework for managing corporate risk,
45 acknowledging the importance of balancing risk and reward to drive growth and innovation
46 (Aven & Aven, 2015; COSO, 2017; Hayne & Free, 2014; ISO, 2018; Purdy, 2010). Within the
47 Bryce et al (2024) study, those boards who emphasised risk as a *'threat'* tended to adopt a more
48 linear, compliance-driven, *'precautionary'* approach to strategy. In contrast to those who
49 viewed risk as *'opportunity'* took a more *'entrepreneurial'* approach. Put simply, risk taking is
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4 a strategic decision of proportionality, which can result in a variety of gains (opportunities) and
5 losses (threats) for these organisations.
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8 This distinction in board directing lends support to the idea of ‘precautionary iatrogenesis’,
9 whereby the presence of regulation creates corporate risk aversion even if unintended by
10 policy, with sub-optimal business and macroeconomic performance as a by-product. This has
11 been reflected in the 2024 City of London Lord Mayor's ‘Growth Unleashed’ theme, which
12 focusses on creating the conditions for growth, by resetting risk appetite so the UK takes more
13 positive risk to access the reward levels required for growth. These changes will require
14 boardroom decision-making by the key regulated financial institutions to reinvigorate their
15 ‘*entrepreneurial*’ spirit when looking to the future (FRC, 2024). With this in mind, and as an
16 extension of the work by Bryce et al (2024), Bryce et al (2025) has focussed on the regulatory
17 mandated role of Chief Risk Officers (CRO). In the aftermath of the Global Financial Crisis,
18 regulators pushed for CROs to have greater seniority and authority, which contributed to the
19 adoption of a more compliance focused, threat mitigation boardroom lens of strategic decision
20 making as previously evidenced in Bryce et al (2024). It will therefore come as no surprise then
21 that the prevailing opinion of CRO’s and their teams of risk managers from the outside was
22 that they inhibited, rather than drove organisational growth and innovation. So much so that
23 the CRO of a leading UK bank stated that they are “*resetting our approach to risk and*
24 *controls*” to speed up and reduce the barriers to the right corporate and customer outcomes
25 (Wise, 2024). A decision that seems to embody the innovation principle by those charged with
26 managing strategic corporate risks, whilst corroborating the rationale for reconsidering the role
27 of regulating for growth as outlined by Rachel Reeves.
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41 No one will argue with the idea that regulating nuclear energy (or AI, or financial services)
42 isn’t worth considering, recent history in Chernobyl and Fukushima has shown us that.
43 However, as a risk research community are we open to the idea that the precautionary principle
44 may be over relied upon? Spillover effects in the form of regulatory creep and organisational
45 risk aversion are pervasive due to it? Precautionary iatrogenesis can be detrimental to growth?
46 Shouldn’t this debate, in a similar vein to risk/risk trade-offs, be more prominent in our
47 communities’ thoughts?
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53 There have been multiple attempts within the academic community to critically examine and
54 analyse this dominant paradigm of precaution and call for a re-evaluation. This debate is being
55 played out in political and societal real-time within the UK, the many faces of Janus are already
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4 being reconsidered by the corridors of power. We would argue that being outside of these
5 conversations is a dangerous place for the risk research community to find itself, as they're
6 happening with or without us.
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10 Now more than ever it feels like the moment has come to broaden the discussion around the
11 precautionary principle as a decision tool in regulating risk for growth across several policy
12 domains.
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References

- Adams, J. (1995) *Risk*. UCL Press.
- Ansell, C. and Baur, P. (2018) 'Explaining Trends in Risk Governance: How Problem Definitions Underpin Risk Regimes', *Risk Hazards & Crisis in Public Policy*, 9(3), p. 397. doi:10.1002/rhc3.12153.
- Asselt, M.B.A. van and Vos, E. (2006) 'The Precautionary Principle and the Uncertainty Paradox', *Journal of Risk Research*, 9(3), p. 313. doi:10.1080/13669870500175063.
- Aven, T. (2011) 'On Different Types of Uncertainties in the Context of the Precautionary Principle', *Risk Analysis*, 31(9), p. 1515. doi:10.1111/j.1539-6924.2011.01612.x.
- Aven, T. (2019) 'The cautionary principle in risk management: Foundation and practical use', *Reliability Engineering & System Safety*, 188, p. 106585. doi:10.1016/j.ress.2019.106585.
- Aven, T. (2024) 'A risk science perspective on the COVID-19 risk handling', *Journal of Risk Research*, 27(3), p. 337. doi:10.1080/13669877.2024.2340019.
- Aven, T. and Aven, T. (2015) 'On the need for rethinking current practice that highlights goal achievement risk in an enterprise context', *Risk Analysis*, 35(10), pp. 1706-1716.
- Aven, T. and Ylönen, M., (2016). 'Safety regulations: Implications of the new risk perspectives', *Reliability Engineering & System Safety*, 149, pp. 164-171.
- Aven, T., Glette-Iversen, I. and Karatzoudi, K. (2025) 'A risk science perspective on some fundamental issues in climate change research', *Journal of Risk Research*, 28(1), p. 1. doi:10.1080/13669877.2025.2466540.
- Avgouleas, E., (2009). 'The global financial crisis, behavioural finance and financial regulation: in search of a new orthodoxy', *Journal of Corporate Law Studies*, 9(1), pp. 23-59.
- Bailey, A. (2025) 'Monetary Policy Report Press Conference Speech, Feb 11th, 2025', Bank of England – London.
- Baldwin, R., Cave, M. and Lodge, M., (2011). *Understanding regulation: theory, strategy, and practice*. Oxford University Press.
- Balzano, Q. and Sheppard, A.R. (2002) 'The influence of the precautionary principle on science-based decision-making: questionable applications to risks of radiofrequency fields', *Journal of Risk Research*, 5(4), p. 351. doi:10.1080/13669870210154485.
- Bélaid, F. (2022) 'Implications of poorly designed climate policy on energy poverty: Global reflections on the current surge in energy prices', *Energy Research & Social Science*, 93, p. 102790. doi:10.1016/j.erss.2022.102790.
- Bergkamp, L. (2016) 'The concept of risk society as a model for risk regulation – its hidden and not so hidden ambitions, side effects, and risks', *Journal of Risk Research*, 19(10), p. 1275. doi:10.1080/13669877.2016.1153500.

- Block, W.E. et al. (2018) 'The case against drug prohibition', *Ekonomia/Acta Universitatis Wratislaviensis. Ekonomia*, 24(2), p. 49. doi:10.19195/2084-4093.24.2.4.
- Bouder, F. and Löfstedt, R.E. (2024) 'Risk and uncertainty: what it means for the Dutch energy transition and how a tolerability of risk approach could help', *Journal of Risk Research*, 27(7), p. 1. doi:10.1080/13669877.2024.2360906.
- Broughel, J. and Hahn, R.W. (2020) 'The Impact of Economic Regulation on Growth: Survey and Synthesis', *SSRN Electronic Journal* [Preprint]. RELX Group (Netherlands). doi:10.2139/ssrn.3684759.
- Bryce, C., Ashby, S. and Ring, P. (2024) 'Reconciling risk as threat and opportunity: The social construction of risk in boardrooms', *Risk Analysis*, 44(11), p. 1959. doi:10.1111/risa.14275.
- Bryce, C., Caciatorira, E., Chung, D., Motson, N., Webster, M. (2025) 'Optimising Growth: The Evolving Role of the Chief Risk Officer', Bayes Business School Working Paper. Available at: https://www.bayes.citystgeorges.ac.uk/_data/assets/pdf_file/0010/851977/Bayes-Lord-Mayors-CRO-Report-WEB_Final.pdf
- Cerra, V., Lama, R. and Loayza, N. (2021) 'Links Between Growth, Inequality, and Poverty', in *Oxford University Press eBooks*. Oxford University Press, p. 32. doi:10.1093/oso/9780192846938.003.0002.
- Chung, C. and Kim, J. (2024) 'Greenflation, a myth or fact? Empirical evidence from 26 OECD countries', *Energy Economics*, 136, p. 107906. doi:10.1016/j.eneco.2024.107906.
- COSO (2017) *Enterprise risk management: integrating strategy and performance*. Available at: www.coso.org/Pages/erm.aspx (last accessed 29 September 2022).
- Davies, G. et al. (2010) 'Regulators as 'agents': power and personality in risk regulation and a role for agent-based simulation', *Journal of Risk Research*, 13(8), p. 961. doi:10.1080/13669877.2010.486075.
- Deisler, P.F. and Schwing, R.C., (2003). *History of the Society for Risk Analysis through the year 2000*, Society for Risk Analysis. Available online at: <https://www.sra.org/wp-content/uploads/2020/04/SRA20YearHistory.pdf>
- Department for Science, Innovation & Technology (2023) 'UK Artificial Intelligence Regulation Impact Assessment'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147045/uk_ai_regulation_impact_assessment.pdf (Accessed: March 17, 2025).
- Delaney, P. (2025) 'Response to Financial Services Growth and Competitiveness Strategy Call for Evidence – Open Letter', Positive Money UK, Available at: <https://www.datocms-assets.com/132494/1734021836-financial-services-growth-and-competitiveness-joint-response-1.pdf>
- DSIT (2023) 'A pro-innovation approach to AI regulation'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1176093/a-pro-innovation-approach-to-ai-regulation-amended-print-ready.pdf (Accessed: March 17, 2025)
- Ducuing, C. (2022). A legal principle of innovation? Need for an assessment against the principle of democracy. *Law, Innovation and Technology*, 14(2), 237–266.

- European Commission (2022) The innovation Principle, Research and Innovation Factsheet, European Commission: Brussels, 17/05/2022. Available at: https://research-and-innovation.ec.europa.eu/system/files/2022-07/ec_rtd_factsheet-innovation-principle.pdf
- Farrow, S. (2010) 'Incorporating Equity in Regulatory and Benefit-Cost Analysis Using Risk-Based Preferences', *Risk Analysis*, 30(6), p. 902. doi:10.1111/j.1539-6924.2010.01474.x.
- Fischhoff, B. (1983) "Acceptable Risk": The Case of Nuclear Power', *Journal of Policy Analysis and Management*, 2(4), p. 559. doi:10.2307/3323574.
- Fisher, E. (2007) *Risk: Regulation and Administrative Constitutionalism*. Oxford: Hart Publishing.
- Fisher, E. (2010) 'New regulatory concepts and the law', in OECD (ed.) *Risk and Regulatory Policy: Improving the Governance of Risk*. Paris: OECD, pp. 45–92.
- FRC (2024) *UK Corporate Governance Code 2024*, Financial Reporting Council – London. Available at: <https://www.frc.org.uk/library/standards-codes-policy/corporate-governance/uk-corporate-governance-code/>
- Garnett, K., Van Calster, G., & Reins, L. (2018). Towards an innovation principle: an industry trump or shortening the odds on environmental protection? *Law, Innovation and Technology*, 10(1), 1–14. <https://doi.org/10.1080/17579961.2018.1455023>
- Glynos, D. and Scharf, H. (2024) 'Postponing Germany's nuclear phase-out: A smart move in the European energy crisis?', *Energy Policy*, 184, p. 114208. doi:10.1016/j.enpol.2024.114208.
- Gonçalves, M.E. (2019) 'The risk-based approach under the new EU data protection regulation: a critical perspective', *Journal of Risk Research*, 22(2), p. 139. doi:10.1080/13669877.2018.1517381.
- Graham, J.D. (2001) 'Decision-analytic refinements of the precautionary principle', *Journal of Risk Research*, 4(2): 127–141.
- Graham, J.D. (2010) 'Why governments need guidelines for risk assessment and management', in OECD (ed.) *OECD Reviews of Regulatory Reform – Risk and Regulatory Policy: Improving the Governance of Risk*. Paris: OECD.
- Graham, J. D., and J. Wiener. (1995). *Risk Vs Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard University Press.
- Hansen, S.F., von Krauss, M.K. and Tickner, J.A., (2008). 'The precautionary principle and risk-risk tradeoffs', *Journal of Risk Research*, 11(4), pp. 423-464.
- Harvey, M., Kiessling, T. and Moeller, M. (2010) 'A view of entrepreneurship and innovation from the economist 'for all seasons'', *Journal of Management History*, 16(4), p. 527. doi:10.1108/17511341011074004.
- Hayne, C. and Free, C. (2014) 'Hybridized professional groups and institutional work: COSO and the rise of enterprise risk management', *Accounting, Organizations and Society*, 39, 309-330.
- HM Treasury, H.T. (2024) 'Chancellor fires up financial services sector to drive growth'. Available at: <https://www.gov.uk/government/news/chancellor-fires-up-financial-services-sector-to-drive-growth> (Accessed: March 12, 2025).

Hutter, B.M. (2005) 'The attractions of risk-based regulation: accounting for the emergence of risk ideas in regulation'. Available at: <https://eprints.lse.ac.uk/13309/> (Accessed: February 2025).

ISO (2018) 'ISO31000:2018 Risk Management', International Organization for Standardization, Geneva, Switzerland.

Jack, S and Edwards, C. (2025) 'Government ousts UK competition watchdog chair, 21st January 2025'. BBC, Available at: <https://www.bbc.co.uk/news/articles/c2d3e6zklxgo>

Kadak, A.C. (2018) 'The evolution of the U.S. nuclear regulatory process'. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0149197017301257> (Accessed: March 12, 2025).

Khodadadyan, A. et al. (2021) 'Grasping the nettle? Considering the contemporary challenges of risk assessment', *Journal of Risk Research*, 24(12), p. 1605. doi:10.1080/13669877.2021.1894472.

Lindøe, P.H. and Olsen, O.E. (2009) 'Conflicting goals and mixed roles in risk regulation: a case study of the Norwegian Petroleum Directorate', *Journal of Risk Research*, 12(4), p. 427. doi:10.1080/13669870902952861.*

Löfstedt, R.E., (2004). 'The swing of the regulatory pendulum in Europe: from precautionary principle to (regulatory) impact analysis', *Journal of Risk and Uncertainty*, 28(3), pp. 237-260.

Löfstedt, R.E. and Löfstedt, R.E., (2005). 'Sweden: Barsebäck, Risk Management and Trust', *Risk Management in Post-Trust Societies*, pp. 83-102.

Lofstedt, R., (2014). 'The precautionary principle in the EU: Why a formal review is long overdue', *Risk Management*, 16, pp. 137-163.

Löfstedt, R.E. et al. (2011) 'The changing nature of communication and regulation of risk in Europe', *Journal of Risk Research*, 14(4), p. 409. doi:10.1080/13669877.2011.557479.

Macrae, C. (2024) 'Managing risk and resilience in autonomous and intelligent systems: Exploring safety in the development, deployment, and use of artificial intelligence in healthcare', *Risk Analysis* [Preprint]. Wiley. doi:10.1111/risa.14273.

Majone, G. (2002) 'The Precautionary Principle and its Policy Implications', *JCMS Journal of Common Market Studies*, 40(1), p. 89. doi:10.1111/1468-5965.00345.

Majone, G., 'The Rise of the Regulatory State in Europe', in Robert Baldwin, Colin Scott, and Christopher Hood (eds), *A Reader on Regulation*, Oxford Readings in Socio-Legal Studies (Oxford, 1998; online edn, Oxford Academic, 22 Mar. 2012).

McAlea, E.M. et al. (2014) 'Engineered nanomaterials: risk perception, regulation and insurance', *Journal of Risk Research*, 17(4), p. 444. doi:10.1080/13669877.2014.988168.

Miller, H.E. and Engemann, K.J., (2019). 'The precautionary principle and unintended consequences', *Kybernetes*, 48(2), pp. 265-286.

Moshirian, F., (2011). 'The global financial crisis and the evolution of markets, institutions and regulation', *Journal of Banking & Finance*, 35(3), pp. 502-511.

- Mthanti, T. and Ojah, K. (2017) 'Entrepreneurial orientation (EO): Measurement and policy implications of entrepreneurship at the macroeconomic level', *Research Policy*, 46(4), p. 724. doi:10.1016/j.respol.2017.01.012.
- Mythen, G. (2018). 'Thinking with Ulrich Beck: Security, Terrorism and Transformation', *Special Edition: Journal of Risk Research*, 21 (1): 17–28.
- Naime, A. and Andrey, J. (2013) 'Improving risk-based regulatory processes: identifying measures to pursue risk-informed regulation', *Journal of Risk Research*, 16(9), p. 1141. doi:10.1080/13669877.2012.761265.
- OECD (2023) Understanding and Applying the Precautionary Principle in the Energy OECD Publishing, Paris. doi:10.1787/5b14362c-en.
- Ojo, M. (2010) 'The growing importance of risk in financial regulation', *The Journal of Risk Finance*, 11(3), p. 249. doi:10.1108/15265941011043639.
- Orset, C., 2014. 'Innovation and the precautionary principle', *Economics of Innovation and New Technology*, 23(8), pp. 780-801.
- Palermo, T., Power, M. and Ashby, S. (2016) 'Navigating Institutional Complexity: The Production of Risk Culture in the Financial Sector', *Journal of Management Studies*, 53(1), p. 154. doi:10.1111/joms.12241.
- Parker, D. and Kirkpatrick, C. (2012) 'Measuring Regulatory Performance - the economic impact of regulatory policy: a literature review of quantitative evidence', OECD Expert Paper No3.
- Purdy, G., (2010). 'ISO 31000: 2009—setting a new standard for risk management', *Risk Analysis: An International Journal*, 30(6), pp. 881-886.
- Randall, A. (2009) 'We Already Have Risk Management — Do We Really Need the Precautionary Principle?', *International Review of Environmental and Resource Economics*, 3(1), p. 39. doi:10.1561/101.000000022.
- Reed, C. (2018) 'How should we regulate artificial intelligence?', *Philosophical Transactions of the Royal Society A Mathematical Physical and Engineering Sciences*, 376(2133), p. 20170360. doi:10.1098/rsta.2017.0360.
- Rach, S (2025) 'Govt calls in regulators as it plans to cut red tape for businesses', *FT Adviser, Financial Times - London*. Available at: <https://www.ftadviser.com/uk-government/2025/3/17/govt-calls-in-regulators-as-it-plans-to-cut-red-tape-for-businesses/>
- Rojas-Romagosa, H. (2024) 'Medium-term Macroeconomic Effects of Russia's War in Ukraine and How it Affects Energy Security and Global Emission Targets', *IMF Working Paper*, International Monetary Fund, p. 1. doi:10.5089/9798400264269.001.
- Schumpeter, J.A. (1955). *History of Economic Analysis* (1st ed.). Routledge. <https://doi.org/10.4324/9780203983911>
- Smuha, N.A. (2021) 'From a 'race to AI' to a 'race to AI regulation': regulatory competition for artificial intelligence', *Law Innovation and Technology*, 13(1), p. 57. doi:10.1080/17579961.2021.1898300.

1
2
3
4 Sunstein, C.R. (2003) 'Beyond the Precautionary Principle', *University of Pennsylvania Law Review*,
5 151(3), p. 1003. doi:10.2307/3312884.

6
7 Wallstrom, M. (2002) 'EU and US Approaches to Environment Policy', Speech given at the European
8 Institute. Washington DC, 25 April.

9
10 White, J.M. and Lidskog, R. (2021) 'Ignorance and the regulation of artificial intelligence', *Journal of*
11 *Risk Research*, 24(4), p. 488. doi:10.1080/13669877.2021.1957985.

12
13 BOE (2023) 'Why does economic growth matter?' Bank of England: London Available at:
14 <https://www.bankofengland.co.uk/explainers/why-does-economic-growth-matter> (Accessed: March
15 17, 2025).

16
17 Wiener, J.B. and Rogers, M.D. (2002) 'Comparing precaution in the United States and Europe',
18 *Journal of Risk Research*, 5(4), p. 317. doi:10.1080/13669870210153684.

19
20 Wiener, J.B., (2020). 'Learning to manage the multirisk world', *Risk Analysis*, 40(S1), pp. 2137-2143.

21
22 Wildavsky, A.B., (1988). *Searching for safety* (Vol. 10). Transaction publishers.

23
24 Zaidan, E. and Ibrahim, I.A. (2024) 'AI Governance in a Complex and Rapidly Changing Regulatory
25 Landscape: A Global Perspective', *Humanities and Social Sciences Communications*, 11(1), p. 1.
26 doi:10.1057/s41599-024-03560-x.

27
28 Zander, J. (2010) *The Application of the Precautionary Principle in Practice: Comparative*
29 *Dimensions*. Cambridge: Cambridge University Press.

30
31 Zander, J., (2024). 'Commentary: risk, uncertainty and innovation: what does this mean for the Dutch
32 energy transition?', *Journal of Risk Research*, 27(5-6), pp. 653-657