

# A MARKET FOR LIMES

## *The Information View on Green Banking Regulation*

*EARLY DRAFT – PLEASE DO NOT CITE OR CIRCULATE*

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### ABSTRACT

This article proposes a novel approach to the sustainable banking regulation debate, focusing on information asymmetry and, thus, departing from the current legal literature which assumes perfect information about the quality of banks' assets. In contrast to capital markets, banks operate through opaque balance sheets and enjoy structural informational advantages over both supervisors and the market. These features make climate-related prudential regulation prone to adverse selection: brown assets can be disguised as green, undermining transition goals and increasing bank leverage.

The article conceptualises this dynamic as a 'market for limes' and takes a critical stance against green capital requirements. It argues that existing regulatory proposals underestimate the informational architecture of banking and the limitations of public law tools in this domain. The article proposes the use of mandatory contractual clauses—imposed through regulation and enforced through supervision—as the key legal mechanism to prompt bank transition to low-carbon activities.

Unlike the proposals focusing on the alteration of prudential regulation, this approach does not require the regulator and the supervisor to possess all the relevant information about the (sustainability) quality of banks' assets. This article demonstrates that private law can represent a micro-based tool of climate governance in banking and that it can work effectively if mixed with ex ante regulatory requirements on bank contracts and ongoing supervision.

**KEYWORDS:** bank capital; green transition; information asymmetry; bank supervision, green capital requirements.

**JEL CLASSIFICATION:** G21; K22; K23

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## *1. Introduction*

The need to foster the green transition of the global economy is uncontroversial.<sup>1</sup>

However, reasonable people disagree on how to achieve it effectively and efficiently.<sup>2</sup> This article offers a structural explanation for why sustainable banking regulation has proven so difficult to implement effectively. While much of the existing literature focuses on the calibration of prudential tools or institutional barriers to reform, this article diagnoses a more fundamental problem: the informational architecture of banking law is at odds with the epistemic demands of green asset verification.

Sustainable finance has gained traction in the policy and academic debate – aiming to channel (cheap) finance towards ‘green’ projects rather than ‘brown’ ones. This is closely related to the role of law and regulation in governing such a shift towards a low carbon economy. Over the last decade, the discussion and regulatory proposals on sustainable finance have focused overly on securities markets.<sup>3</sup> By contrast, bank finance has only recently received closer attention from both finance and legal scholarship.<sup>4</sup>

However, the recent literature in bank sustainability has not considered the different patterns through which information is generated and accrues in banking and capital markets.<sup>5</sup> In capital markets – such as stock or bond markets – complete and publicly

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<sup>1</sup> IPCC, ‘Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change’ (IPCC 2023).

<sup>2</sup> Lasse Heje Pedersen, ‘Carbon Pricing versus Green Finance’ (2023) <https://ssrn.com/abstract=4382360> accessed 21 May 2025 16 October 2024.

<sup>3</sup> Hao Liang and Luc Renneboog, ‘Corporate Social Responsibility and Sustainable Finance’ (2021) Oxford Research Encyclopedia of Economics and Finance <https://oxfordre.com/economics/view/10.1093/acrefore/9780190625979.001.0001/acrefore-9780190625979-e-592> accessed 21 May 2025.

<sup>4</sup> For finance view see Martin Oehmke and Marcus Opp, ‘Green Capital Requirements’ (2022) Swedish House of Finance Research Paper 22-16 <https://ssrn.com/abstract=4040098> accessed 21 May 2025 ; Leticia da Silva Inácio and Ivete Delai, ‘Sustainable Banking: A Systematic Review of Concepts and Measurements’ (2022) 24 Environment, Development and Sustainability 1, pp. 1-39 ; for legal view see Anjan V Thakor, ‘Politics, Credit Allocation and Bank Capital Requirements’ (2017) <https://ssrn.com/abstract=2910011> accessed 21 May 2025.

<sup>5</sup> Franklin Allen and Anthony M Santomero, ‘What Do Financial Intermediaries Do?’ (2001) 25(2) Journal of Banking & Finance 271.

available information is crucial in determining the efficient allocation of resources.<sup>6</sup> Accordingly, the whole regulatory architecture is centered around the information disclosure, allowing investors to correctly price securities.<sup>7</sup> In contrast, banks' business model relies on accruing superior information about the quality of the assets they invest in compared to the market.<sup>8</sup> Accordingly, the core of (prudential) banking regulation focuses on the quantity of capital or liquidity that banks need to hold against such assets to guarantee their safe and sound management.<sup>9</sup>

This difference is far from being a technical detail that should only be of interest for financial economists. Rather, it represents the quintessential element for legal and regulatory interventions to be effective, without bringing about dangerous unintended consequences. Complex dynamics and mutual influence between financial stability, prudential policy and climate change have been noticed almost ten years ago. Mark Carney in his speech in 2015 talked about this twisted relation, criticizing adjusting capital regime to boost financing of low carbon economy.<sup>10</sup> Already then, he opposed 'changes in prudential rules – designed to protect financial stability – for other ends.' He made a point that information should be the key to understanding and tackling climate-related risks.<sup>11</sup> However, this early warning never turned into operation, especially in the legal domain. To

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<sup>6</sup> Eugene F. Fama, 'Efficient Capital Markets: A Review of Theory and Empirical Work' (1970) 25 *Journal of Finance* 383.

<sup>7</sup> Itay Goldstein and Liyan Yang, 'Information Disclosure in Financial Markets' (2017) 9 *Annual Review of Financial Economics* 101. For comparative approach see: Matteo Gargantini, 'Mandatory Disclosure' in Alessio M Paces, Emiliou Avgouleas and Hossein Nabilou (eds), *Comparative Financial Regulation* (Edward Elgar Publishing 2025).

<sup>8</sup> Douglas W Diamond, 'Financial Intermediation and Delegated Monitoring' (1984) 51(3) *Review of Economic Studies* 393.

<sup>9</sup> It is most vividly reflected in Basel Accords: Basel Committee on Banking Supervision, *International Convergence of Capital Measurement and Capital Standards* (BIS 1988); Basel Committee on Banking Supervision, *International Convergence of Capital Measurement and Capital Standards: A Revised Framework* (BIS 2006); Basel Committee on Banking Supervision, *Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems* (BIS 2010).

<sup>10</sup> Mark Carney, 'Breaking the Tragedy of the Horizon – Climate Change and Financial Stability' (Speech at Lloyd's of London, London, 29 September 2015) 8–9.

<sup>11</sup> *Ibid*, p. 9 ff.

address such a serious shortcoming, we study the resilience of different legal constructions to foster sustainability in banking taking into specific account the ways in which information is generated and circulates in banking.

The starting point of the analysis is the relaxation of the (often implicit) assumption of perfect information about the ‘green’ or ‘brown’ quality of banks’ assets. We examine the consequences of relaxing this assumption and we document an adverse selection mechanism. Adverse selection is a phenomenon first documented by Nobel laureate George Akerlof in his seminal contribution “A Market for Lemons”.<sup>12</sup> In the US market for used cars, a ‘lemon’ refers to a poor-quality car with flaws that are not immediately observable. Akerlof demonstrates that when the quality of goods in the market is uncertain, and information is asymmetric, bad quality goods crowd out good quality goods. This article shows that this mechanism also applies to bank assets whose ‘greenness’ is not consistently observable and verifiable – the ‘limes’. This creates what can be described as a ‘market for limes,’ where assets that appear green crowd out genuinely green assets, incentivizing greenwashing. This phenomenon is more acute when prudential regulation provides regulatory reliefs to banks investing in green assets or, conversely, when the regulatory regime becomes stricter for banks investing in brown assets.

We show that incorporating climate goals into bank prudential requirements exacerbates moral hazard and adverse selection, especially for the case of Pillar 1 green capital requirements, unless the inherent opacity of banking is fully addressed. Pillar 2 powers are more resilient to these issues but remain unable to tackle information asymmetry. However, Pillar II powers help to strike a balance between asset opacity and

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<sup>12</sup> George A Akerlof, ‘The Market for “Lemons”: Quality Uncertainty and the Market Mechanism’ (1970) 84 *The Quarterly Journal of Economics* 488.

appropriate oversight. These can play a positive role as a complement to other environmental policies. Finally, we show that private law requirements that are more burdensome for banks engaging in brown activities than those engaged in green ones is crucial to construct an effective legal regime prompting banks to transition towards a low-carbon economy. These ‘regulatory private law’ requirements should be backed by supervisory oversight and provide a promising path to ensuring both financial stability and meaningful climate progress despite the persistent information asymmetry.

This article lies at the intersection of law and finance, looking at the impact of information generation and dissemination on legal effectiveness. This aspect that is not scrutinised by lawyers and not understood by economists. Therefore, the analysis innovates the literature as it proposes a novel and original analysis of the effectiveness of different legal constructions to prompt the bank sustainability transition. It is also societally and policy relevant as it can inform policy makers around the world on how to avoid ineffective or even counterproductive reforms in the area of sustainable banking.

The article is organised as follows. Section 2 sets the stage looking at the peculiarities of banking that make sustainability-related regulation special compared to capital markets. Section 3 develops a theory of adverse selection in bank sustainable regulation, deriving the conditions under which a ‘market for limes’ can arise. Section 4 analyses the main legal tools for bank sustainable regulation against the theory developed in the previous section. Section 5 concludes.

## *2. The Bank Conundrum*

One of the defining characteristic of banks is the special role played by information—its production and dissemination. To understand bank uniqueness, it is useful to compare

banking and capital markets.<sup>13</sup> In capital markets, all publicly available information is reflected in the asset prices.<sup>14</sup> This informational efficiency should guide the market to efficiently allocate financial resources;<sup>15</sup> accordingly the paramount goal of securities regulation across the globe is to ensure adequate public disclosure of price-sensitive information to safeguard the efficiency of the price formation process so as to ensure that financial resources are allocated to those who values them the most.<sup>16</sup>

The allocation of financial resources through banks operate differently. The bank business model relies on acquiring superior information. Banks act as ‘delegated monitors’ on behalf of bank investors, screening borrowers ex ante and overseeing their financial conditions ex post.<sup>17</sup> Delegated monitoring refers to the costly activities carried out by banks for assessing and overseeing borrowers, which include information gathering, ongoing monitoring, enforcing contractual covenants, monitoring the collateral, if any. These monitoring activities are performed ‘on behalf’ of their dispersed creditors, who lack the means or incentive to do so individually.<sup>18</sup> In doing so, they reduce adverse selection and moral hazard arising in credit relationships. However, this monitoring function is costly, and banks have an incentive to keep their internal assessments confidential to avoid the free ride of other financial actors.<sup>19</sup>

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<sup>13</sup> Distinction useful for explanatory purposes. See for instance Joost Bats and Aerdt Houben, ‘Bank-Based Versus Market-Based Financing: Implications for Systemic Risk’ (2017) De Nederlandsche Bank Working Paper No 577 <http://dx.doi.org/10.2139/ssrn.3086504> accessed 21 May 2025.

<sup>14</sup> See fn 6. However, some constraints impact this efficiency: Andrei Shleifer and Robert W Vishny, ‘The Limits of Arbitrage’ (1997) 52(1) *Journal of Finance* 35; Dominik M Rösch, Avanihar Subrahmanyam and Mathijs A van Dijk, ‘The Dynamics of Market Efficiency’ (2017) 30(4) *Review of Financial Studies* 1115.

<sup>15</sup> *Ibid.*

<sup>16</sup> International Organization of Securities Commissions, *Objectives and Principles of Securities Regulation* (1998); John Armour and others, *Principles of Financial Regulation* (OUP 2016) ch 3 ‘The Goals and Strategies of Financial Regulation’ 51.

<sup>17</sup> fn 8.

<sup>18</sup> *Ibid.*

<sup>19</sup> See more p. 7.

The direct consequence of such a model is that, for the outside world, banks' assets have a certain level of opacity. This means that the information about the quality of these assets is asymmetric, as the bank knows much more about it than the market and the supervisor. This is in sharp contrast with what happens in capital markets, where the basic tenet for market efficiency is informational efficiency. This construction allows banks to efficiently intermediate finance between investors who seek liquidity and safety, such as depositors, and economic agents who need finance for long-term, illiquid and risky projects.<sup>20</sup> Through 'Qualitative Asset Transformation', banks provide essential financial intermediation, performing an essential societal function.<sup>21</sup>

At the same time, this makes banks inherently fragile, exposing them to runs.<sup>22</sup> Since bank assets are opaque, depositors do not worry about their quality in good time. However, upon adverse information about bank's assets, depositors could panic, worrying that banks may be unable to satisfy their demand for withdrawal. Since banks are required to satisfy withdrawal requests sequentially, this means that depositors want to be the first in line to withdraw their money as they expect that others will do the same – generating a run which could drive the collapse even of solvent banks.<sup>23</sup> This inherent vulnerability has long justified regulatory interventions to ensure stability.<sup>24</sup>

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<sup>20</sup> John Armour and others, *Principles of Financial Regulation* (OUP 2016) 292.

<sup>21</sup> Madalen Castells-Jauregui, Dmitry Kuvshinov, Björn Richter and Victoria Vanasco, 'Who Supplies and Demands Safe Assets – and Why It Matters' (2025) VoxEU <https://cepr.org/voxeu/columns/who-supplies-and-demands-safe-assets-and-why-it-matters> accessed 21 May 2025; Board of Governors of the Federal Reserve System, 'The Stability of Safe Asset Production' (2020) <https://www.federalreserve.gov/econres/notes/feds-notes/the-stability-of-safe-asset-production-20201109.html> accessed 21 May 2025.

<sup>22</sup> Douglas W Diamond and Philip H Dybvig, 'Bank Runs, Deposit Insurance, and Liquidity' (1983) 91(3) *Journal of Political Economy* 401.

<sup>23</sup> There are several examples of collapses of solvent banks caused by runs. See University of Washington School of Law, 'The Silicon Valley Bank Collapse Explained' (2023) <https://www.law.uw.edu/news-events/news/2023/svb-collapse> accessed 21 May 2025 or for WaMu and Wachovia - Jonathan D Rose, 'Old-Fashioned Deposit Runs' (2015) FEDS, Board of Governors of the Federal Reserve System 1.

<sup>24</sup> The most prominent is introduction of deposit insurance: Deniz Anginer and Asli Demirgüç-Kunt, 'Deposit Insurance, Bank Runs, and Moral Hazard' (2024) Center for Global Development <https://www.cgdev.org/blog/deposit-insurance-bank-runs-and-moral-hazard> accessed 21 May 2025. But aim to mitigate bank runs is also present in liquidity regulation or lender of last resort standards. See Suresh M Sundaresan and Kairong Xiao, 'Liquidity Regulation and Banks: Theory and Evidence' (2022) Columbia

It is important to underline that information generation and dissemination is at the core of both the positive role that bank intermediation plays in society and the financial stability risk banks pose. These mechanisms have always been at the core of bank activities as well as of bank regulation. Once again, information plays a crucial role in handling this conundrum both on the bank's and the State's sides.

Banks strive to keep the quality of their assets 'secret', preventing agents from producing costly private information about the real value of the assets backing short-term debt.<sup>25</sup> As long as short-term investors remain 'information insensitive', coordination problems potentially leading to a run are controlled; crucially, this is possible only if banks are allowed to deliberately limit disclosures about asset quality. However, if agents start believing that asset quality has declined and start having incentives to produce costly private information about the bank's assets, a crisis is triggered.<sup>26</sup>

This implies that the 'information insensitivity' construction is also fragile and, to be credible, requires to be sustained by public authorities. From these perspective, deposit insurance and, more generally, bail-out expectations are a way to shy agents away from producing costly information about the quality of bank's assets. However, these measures have unintended consequences. First, this allows banks to be overleveraged and able to easily attract cheap short term funding. This leverage dynamic provides bank with incentives towards excessive risk-taking, since they are limitedly exposed in case of a

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Business School Research Paper <https://ssrn.com/abstract=4020511> accessed 21 May 2025 ; Benoît Cœuré, 'Liquidity Regulation and Monetary Policy Implementation – From Theory to Practice' (Speech at the Toulouse School of Economics, Toulouse, 3 October 2013)

<https://www.ecb.europa.eu/press/key/date/2013/html/sp131003.en.html> accessed 21 May 2025; and Xavier Freixas and Bruno M Parigi, 'Lender of Last Resort and Bank Closure Policy: A Post-Crisis Perspective' in AN Berger, P Molyneux and JOS Wilson (eds), *The Oxford Handbook of Banking* (2nd edn, OUP 2014; online edn, 7 April 2015) 474–504.

<sup>25</sup> Tri Vi Dang, Gary Gorton, Bengt Holmström and Guillermo Ordoñez, 'Banks as Secret Keepers' (2017) 107(4) *American Economic Review* 1005.

<sup>26</sup> Tri Vi Dang, Gary B Gorton and Bengt R Holmström, 'The Information View of Financial Crises' (2019) NBER Working Paper No 26074 <https://www.nber.org/papers/w26074> accessed 21 May 2025.

crisis. Second, and relatedly, the expectation of bailouts—boosted by the political and economic importance of banking—reinforces incentives towards excessive risks-taking, as losses are externalised to tax payers.

These mechanisms are well known in the literature. However, their impact on the bank's low-carbon transition is often overlooked by the literature, especially when analysing the legal reforms whose aim it to facilitate and encourage such transition. Asset opacity has not been adequately problematised in the legal literature as a structural constraint on the enforceability of sustainability-oriented regulation. Where most reform proposals assume the feasibility of identifying and pricing climate-related risk, this paper questions that assumption.<sup>27</sup>

Unlike capital markets, where investors are supposed to price climate risks based on available disclosures, banks operate in an environment where such is, by design, limited. Banks assets must be – to an extent – opaque to ensure information insensitivity and such opacity is facilitated by the whole regulatory architecture. This makes the, already difficult, assessment of the 'green' quality of banks' assets intrinsically more complex than assets traded in capital markets. Adding to such complexity, high leverage and the sovereign implicit guarantee may make banks overly eager to take climate risks, as it can externalise some level of climate risk to society.

Before delving into the core analysis, it is worth to briefly discuss the key requirements applied to banks that attempt to limit the problematic consequences of excessive bank leverage, asset opacity and bailout expectations. In fact, most of the

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<sup>27</sup> For instance: Financial Stability Board, 'Assessment of Climate-related Vulnerabilities: Analytical Framework and Toolkit' (2025) <https://www.fsb.org/2025/01/assessment-of-climate-related-vulnerabilities-analytical-framework-and-toolkit/> accessed 21 May 2025; European Environment Agency, 'European Climate Risk Assessment' (EEA Report No 01/2024 2024); European Commission, 'Renewed Sustainable Finance Strategy and Implementation Action Plan: Financing Sustainable Growth' (2018) [https://finance.ec.europa.eu/publications/renewed-sustainable-finance-strategy-and-implementation-action-plan-financing-sustainable-growth\\_en](https://finance.ec.europa.eu/publications/renewed-sustainable-finance-strategy-and-implementation-action-plan-financing-sustainable-growth_en) accessed 21 May 2025.

literature related to sustainable banking regulation focuses on tweaking these prudential requirements to prompt the low-carbon transition.

Bank prudential regulation in its modern fashion derives from the national or regional implementation of the Basel Accords and are grouped in three Pillars.<sup>28</sup> First, Pillar I relates to capital regulation and limits the leverage that banks can operate with.<sup>29</sup> Capital regulation has two main goals. Ex post, capital regulation wants to make sure that banks have some buffers to absorb losses, limiting run incentives. Ex ante, capital regulation increases the ‘skin in the game’ of bank shareholders—in turn this should limit excessive risk taking incentives. The second goal is often underestimated in the legal literature, but it is arguably more relevant.<sup>30</sup> Climate-oriented ideas within the context of Pillar I involve adjusting risk weights based on the ‘greenness’ and ‘brownness’ of a given asset.<sup>31</sup>

Second, Pillar II powers complements Pillar I requirements empowering the (prudential) supervisory authority to monitor bank activities on an ongoing basis with the view to safeguard their sound and prudent management.<sup>32</sup> These powers want to limit bank opacity, at least vis-à-vis the supervisor which is, at least in principle, empowered to take early action to prevent bank distress. From an informational perspective, supervisors make use of specific tools, including asset quality review exercises and stress testing. Both tools are widely discussed in the scholarly and policy debate over bank sustainability transition.<sup>33</sup>

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<sup>28</sup> See for instance H-Y Chiu and Joanna Wilson, *Banking Law and Regulation* (1st edn, OUP 2019)

<sup>29</sup> Also liquidity requirements, but less relevant here.

<sup>30</sup> Capital has no use during a run.

<sup>31</sup> See more in 4 (A) (1) below. For regulatory proposal see Commission, ‘Action Plan: Financing Sustainable Growth’, (Communication) COM (2018) 97 final.

<sup>32</sup> Donato Masciandaro and Marc Quintyn, ‘The Evolution of Financial Supervision: the Continuing Search for the Holy Grail’ in Morten Balling and Ernest Gnan (eds), *50 Years of Money and Finance: Lessons and Challenges* (SUERF 50th Anniversary Volume Chapters, SUERF – The European Money and Finance Forum 2013)

<sup>33</sup> Patrizia Baudino and Jean-Philippe Svoronos, *Stress-testing Banks for Climate Change – A Comparison of Practices* (2021) FSI Insights on Policy Implementation No 34, Bank for International Settlements <https://www.bis.org/fsi/publ/insights34.htm> accessed 21 May 2025; F Bartsch and others, ‘Designing a

Third, Pillar III disclosure requirements aim to improve transparency towards the supervisor and, to an extent, towards the market—increasing market discipline.

Sustainability disclosure is among the most debated regulatory aspect in sustainable finance and, while disclosure in banking is less salient than in capital markets, disclosure reforms are discussed also for banks.<sup>34</sup>

The next section delves deeper into the specific characterisations of climate risk in banking, examining how misclassification of asset quality—whether deliberate or inadvertent—can lead to adverse selection. If banks have stronger incentives to disguise brown assets as green, a market for limes emerges, where genuinely sustainable investments are crowded out by misrepresented ones. Understanding and addressing these dynamics is crucial for designing effective regulatory tools that promote both financial stability and the transition to a low-carbon economy.

### *3. A Market for Limes*

The unobservability of bank asset quality represents the core challenge in regulating banks and, for what is more specifically at stake in this article, banks low-carbon transition. This problem is not incidental but foundational; however, it has been completely overlooked by the literature.

As explained in the previous section, banks' business model relies on gathering superior information about the assets they originate or hold, as compared to its creditors

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Macprudential Capital Buffer for Climate-Related Risks: An Application to Transition Risk' (2025) Climate Policy 1; Shradha Jain, Ashish Kumar, Ankit Dambhare and R K Mittal, 'Integration of Environmental, Social, and Governance (ESG) Factors in Bank Asset Quality Assessment: A Review' in *Proceedings of the 2nd International Conference on Emerging Technologies and Sustainable Business Practices-2024 (ICETSBP 2024)* (Atlantis Press 2024) [https://doi.org/10.2991/978-94-6463-544-7\\_41](https://doi.org/10.2991/978-94-6463-544-7_41) accessed 21 May 2025

<sup>34</sup> Lena Schreiner and Andreas Beyer, 'The Impact of ECB Banking Supervision on Climate Risk and Sustainable Finance' (2024) ECB Working Paper No 2024/2952 <https://ssrn.com/abstract=4902308> accessed 21 May 2025; Sara Longo, *Disclosure in Banking: The Role of Financial Reporting in Bank Behaviors and Investor Decision-Making* (Springer 2025)

and supervisors. To do so, a degree of opacity is essential to the functioning of banks for preserving depositor confidence and, consequently, financial stability. This very opacity makes it difficult to distinguish between high quality and low quality assets.<sup>35</sup> In the context of this article, distinguishing between assets that are green—contributing to the low-carbon transition—and those that are brown—increasing banks’ climate-related risks—becomes challenging.

The structural information asymmetry between banks and the outside world weakens the market discipline mechanisms through pricing or reputational effects, opening the doors to excessive risk-taking incentives.<sup>36</sup> Supervisors face parallel challenges: bank portfolios remain opaque and difficult to monitor.<sup>37</sup> Moreover, authorities face incentives to forebear—whether due to resource constraints, political pressure, or fear to trigger contagion—which undermines effective and prompt intervention.<sup>38</sup> The bank’s informational advantage thus becomes entrenched, limiting the effectiveness of both market-based and supervisory oversight.

This asymmetry clearly increases the possibility of banks to greenwash. However, this is not the most problematic issue at stake. The information asymmetry about asset quality can generate a dynamic of adverse selection which we label as ‘*market for limes*’. But before delving into limes, it is important to briefly explain lemons.

When external actors cannot reliably assess the quality of bank assets, banks have incentives to favour those assets that are cheaper or more profitable in the short term,

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<sup>35</sup> It can lead to adverse selection. For dangers of adverse selection or disclosure in this context see Carlos Corona and Lucas Mahieux, ‘Banks’ versus Regulators’ Disclosure Choices in the Presence of Adverse Selection and Runs’ (2024) <https://ssrn.com/abstract=4034747> accessed 21 May 2025

<sup>36</sup> Robert R Bliss, ‘Market Discipline in Financial Markets: Theory, Evidence, and Obstacles’ in Allen N Berger, Philip Molyneux and John OS Wilson (eds), *The Oxford Handbook of Banking* (2nd edn, OUP 2014; online edn, Oxford Academic, 2015).

<sup>37</sup> *Ibid.*

<sup>38</sup> J Gallemore, ‘Bank Financial Reporting Opacity and Regulatory Intervention’ (2023) 28 *Review of Accounting Studies* 1765.

regardless of their exposure to climate-related risks. Assets that are genuinely sustainable are crowded out by those that are merely presented as such. In his famous Nobel Prize contribution, George Akerlof described the problem of adverse selection through the market for used cars. This market is affected by a structural information asymmetry, because potential buyers cannot easily observe the quality of the second-hand car and they may end up buying a low-quality one—a lemon.<sup>39</sup> While this is problematic in and of itself, the dynamics it generates are even more troublesome. If the buyers fear to be tricked by the seller, they will not be willing to pay the price for high-quality used cars, averaging out the value of high- and low-quality cars. However the seller knows the quality of the car and will be unwilling to keep high quality cars in the market and nobody is willing to pay their full price. Out of the example, the key insights of the adverse selection mechanisms is that when the market is unable to observe the quality of goods and assets, low-quality ones displace high-quality ones.<sup>40</sup> The parallel between the ‘market for lemons’ and the ‘market for limes’ should now be clearer: in a world where the ‘brown’ and ‘green’ quality of banks’ assets is not easily observable, low-quality brown assets can crowd out high-quality green assets exposing the bank to increased climate risk and slowing down the low-carbon transition of the economy.

To illustrate this dynamic, consider a simplified investment choice.<sup>41</sup> A bank has the option to finance one of two projects that are identical in expected financial return, maturity, liquidity, and credit risk. The only relevant difference is that Project 1 is more exposed to climate-related risk which increases the volatility of the project, while Project 2 is comparatively resilient to climate risk and, accordingly, less volatile.<sup>42</sup> These risks are

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<sup>39</sup> Fn 12.

<sup>40</sup> Ibid.

<sup>41</sup> Marginal investment choice see fn 4.

<sup>42</sup> Brown assets are more volatile in this scenario, as more exposed to climate risk.

observable only to the bank while the projects appear equivalent to those who did not generate costly information about these projects. To fully appreciate the dynamic at play, first consider a scenario with no regulation at play. In such a setting, the bank faces no formal constraint in choosing either project and should be indifferent between the two investments. However, the high leverage and implicit bailout alters the standard prediction. The fact that climate-related losses may be absorbed, at least partially, by the public sector during a crisis diminishes the incentive to price such risks appropriately. The bank is thus incentivised to fund the project with higher hidden risks, as they are limitedly exposed to the potential downside losses of the project and, in any case, expects to be shielded from such losses by bailouts. This mechanism does not exclusively apply to climate risk issues, but more broadly to credit and counterparty risk, justifying regulatory intervention – especially capital requirements. Accordingly, it is reasonable to argue that this creates a specific case for regulatory intervention for climate-related risk.<sup>43</sup>

With specific regard to climate-related risk, this mechanism can be further complicated by the different policy goals that policy interventions may pursue. The first possible goal focuses on improving the measurement and management of climate risks, ensuring that banks internalize these risks properly, treating climate risk similarly to any other bank risk.<sup>44</sup> A different and more proactive aim is to tilt lending towards green assets by providing regulatory incentives favouring green over brown assets.<sup>45</sup> These two approaches have different ideological underpinnings and can be pursued through different

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<sup>43</sup> It may be covered already in traditional Pillar I and Pillar II regulation, but does not necessarily have to.

<sup>44</sup> Basel Committee on Banking Supervision, *Climate-related Financial Risks – Measurement Methodologies* (BIS 2021) <https://www.bis.org/bcbs/publ/d518.htm> accessed 21 May 2025

<sup>45</sup> Directorate-General for Financial Stability, Financial Services and Capital Markets Union, ‘Renewed Sustainable Finance Strategy and Implementation of the Action Plan on Financing Sustainable Growth’ (European Commission 8 March 2018) [https://finance.ec.europa.eu/publications/renewed-sustainable-finance-strategy-and-implementation-action-plan-financing-sustainable-growth\\_en](https://finance.ec.europa.eu/publications/renewed-sustainable-finance-strategy-and-implementation-action-plan-financing-sustainable-growth_en) accessed 21 May 2025

regulatory tools.<sup>46</sup> Proposing reforms to pursue one or the other goal makes a clear difference in terms of the necessary legal design; however, it does not make a remarkable difference with regards to the mechanism we are describing.

The pursuit of either strategy faces implementation challenges due to the underlying information asymmetries in banking, potentially generating a market for limes. In fact, the adverse selection problem persists regardless of the specific objective of regulation. Any attempt to favour green assets or penalise brown ones creates an incentive for banks to reclassify or present their assets in a more favourable light, without necessarily altering their real risk exposure. Greenwashing thus becomes a rational response and it is favoured by bank opacity and information insensitivity. Consequently, the effectiveness of the regulatory intervention is undermined and the likelihood of having unintended consequences which endanger the safe and sound management of individual banks or even the stability of the system increases.

Given this mechanism, we investigate which legal construction better prevents the rise of a market for limes. Section 4 provides a detailed analysis of a wide array of regulatory and legal tools. However, before delving into the details, it is useful to sketch possible solutions to adverse selection based on economic theory.

The key insight on which our attention should focus is the need to receive costly signals about the quality of the assets—in this case about the “green” quality of bank assets. In the standard model, usually both the buyers and the sellers are willing to invest in costly activities to solve adverse selection and enter into mutually beneficial activities. However, in the case we are analysing the situation is more entangled, as the interest to

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<sup>46</sup> Measuring and managing climate risks mostly through adjusting risk-oriented methodologies and management systems, whereas incentivizing towards green assets must encompass either a push to invest green, or a sort of punishment to invest brown.

discover the real quality of assets is diffuse. This has two implications. First, the bank contractual counterparty, such as SMEs or households, cannot be expected to act as monitors. Second, the supervisor should mimic what market forces would do in a perfect market, however it has constrained capacity and actions.<sup>47</sup>

Given these constraints, one can rely on: (1) the willingness of the bank to send costly signals about the green quality of its assets; (2) the ongoing monitoring of the supervisor; or (3) legal provisions requiring the bank to send costly signals about green the quality of its assets. These channels are not mutually exclusive but should be seen as complementary. Specifically, the third channel should complement both bank signalling and supervisory monitoring.

Among the costly signals that a bank can send in the area of sustainability, ESG certifications clearly stand out for their relevance in the policy and media debate.<sup>48</sup> However, relying on third party certification can have its own pitfalls, as certifiers may have conflicting interests and may not be perceived as trustworthy.<sup>49</sup> Moreover, the opacity of bank's assets also affects the ability of ESG rating agencies to correctly evaluate the green quality of the asset portfolio. To address these concerns, some jurisdictions, such as the EU, developed specific taxonomies to determine what is green and what is brown. The EU taxonomy has received several criticisms for the specific choices it made as well

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<sup>47</sup> This problem is visible especially in contributions attempting to compare market's and supervisor's accuracy of bank's performance assessment. See: Allen N Berger, Sally M Davies and Mark J Flannery, 'Comparing Market and Supervisory Assessments of Bank Performance: Who Knows What When?' (2000) 32 *Journal of Money, Credit and Banking* 641, page In terms of assessing the quality of assets, when supervisors are not supervising the companies it is even more problematic and biggest divergence in accuracy can be expected.

<sup>48</sup> Various types of ESG certifications are offered by many renowned institutions such as CFA Institute.

<sup>49</sup> For summary of flaws of ESG certifications see: OneStop ESG, 'Green Isn't Always Clean: The Dark Side of ESG Certifications' (OneStop ESG, 21 April 2025) <https://onestopesg.com/news/green-isn-t-always-clean-the-dark-side-of-esg-certifications-1745267561318> accessed 21 May 2025. On divergence in ESG ratings see Florian Berg, Julian F Kölbl and Roberto Rigobon, 'Aggregate Confusion: The Divergence of ESG Ratings' (2022) 26 *Review of Finance* 1315.

as for its complexity in implementation.<sup>50</sup> These complexities are magnified in banking due to asset opacity. Beyond the technical concerns, all these mechanisms reiterate and magnify the adverse selection concerns, as the third party verifier may still fail to correctly observe the (green) quality of banks assets while engendering a misplaced trust in the market. Therefore, in this domain, a market for limes thrives when (1) the legal categorization of ‘sustainable’ assets is imperfect; (2) the verifiability of the sustainability of assets against such legal characterization is imperfect. This has direct implications for the role of prudential regulation and transition planning which will be analyzed in Section 4.

Another possible approach is to set regulatory requirements whose compliance is able, in and of itself, to provide a costly signal on the (green) quality of their assets. The economic logic is straightforward: if only genuinely green assets can bear certain regulatory requirements or meet specific obligations at acceptable costs, then banks holding such assets will be willing to incur those costs. For instance one could think of mandatory insurance for climate-related exposures, which would be cheaper for green vis-à-vis brown assets.

This article departs from the emerging consensus that improved metrics or taxonomies will suffice; instead, it offers a regulatory typology built around enforceability under asymmetric information—a perspective largely absent from the legal debate. Accordingly, the next section explores a range of legal tools in detail and assesses their capacity to promote sustainable banking within the constraints imposed by information asymmetry.

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<sup>50</sup> Nicholas Garcia-Torea, Mercedes Luque-Vílchez, M., & Pablo Rodríguez-Gutiérrez, ‘The EU Taxonomy, sustainability reporting and financial institutions: understanding the elements driving regulatory uncertainty,’ (2024) *Accounting Forum*, 48(3), 427–454; Patrizia Tettamanzi, Riccardo Gotti Tedeschi, R. & Michael Murgolo, ‘The European Union (EU) green taxonomy: codifying sustainability to provide certainty to the markets,’ *Environment, Development and Sustainability* 26, 27111–27136 (2024).

## 4. Sustainable Banking Regulation

### A. Prudential Regulation

Most of the debate on sustainable banking regulation over the past years, both on the academic and the policy side, has focused on adjusting various elements of prudential regulation either to encourage banks to include in a rigorous way climate risk into their risk management or to tilt bank activities towards supporting the transition toward a low-carbon economy.<sup>51</sup> Albeit originally devised to safeguard financial stability and ensure sound and safe bank management, prudential regulation has increasingly been viewed as a potential instrument for promoting broader societal objectives such as sustainability.<sup>52</sup> Yet, historical experiences suggest that the pursuit motives ulterior to those proper of prudential regulation are exploited by banks for their private return, bringing about unintended consequences, potentially undermining the stability they seek to preserve.<sup>53</sup> Against this backdrop, this section critically evaluates key prudential tools that have been

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<sup>51</sup> Martin Oehmke and Marcus Opp, 'Green Capital Requirements' (2022) Swedish House of Finance Research Paper 22-16 <https://ssrn.com/abstract=4040098> accessed 21 May 2025 ; Yannis Dafermos and Maria Nikolaidi, 'How Can Green Differentiated Capital Requirements Affect Climate Risks? A Dynamic Macrofinancial Analysis' (2021) 54 *Journal of Financial Stability* 1; Florian Bartsch and others, 'Designing a Macroprudential Capital Buffer for Climate-Related Risks: An Application to Transition Risk' (2025) 26 *Climate Policy* 1, **page**; Lena Schreiner and Andreas Beyer, 'The Impact of ECB Banking Supervision on Climate Risk and Sustainable Finance' (2024) ECB Working Paper No 2024/2952 <https://ssrn.com/abstract=4902308> accessed 21 May 2025; Basel Committee on Banking Supervision, *The Effects of Climate Change-Related Risks on Banks: A Literature Review* (BIS 2023) <https://www.bis.org/bcbs/publ/wp40.htm> accessed 21 May 2025; Jens-Hinrich Binder, 'Prudential Requirements Framework and Sustainability' (2022) European Banking Institute Working Paper No 131, <https://ssrn.com/abstract=4276702> accessed 21 May 2025.

<sup>52</sup> Martin Oehmke and Marcus Opp, 'Green Capital Requirements' (2022) Swedish House of Finance Research Paper 22-16 <https://ssrn.com/abstract=4040098> accessed 21 May 2025 ; Natalya Martynova and Kartik Anand, 'Capital Regulation in the Presence of Climate Risk' (2024) Deutsche Bundesbank, Working Paper <https://ssrn.com/abstract=4898760> accessed 21 May 2025; Yannis Dafermos and Maria Nikolaidi, 'How Can Green Differentiated Capital Requirements Affect Climate Risks? A Dynamic Macrofinancial Analysis' (2021) 54 *Journal of Financial Stability* 1; Bartsch (n 33); Joel Michaels, 'Capital Regulation as Climate Policy' (2023) 59 *Idaho Law Review* 127 <https://ssrn.com/abstract=4363645> accessed 21 May 2025 . – for examples how risk-weights were used to boost housing market, are biased towards sovereign debt or otherwise impacted real estate market see also Michaels pp.155-170.

<sup>53</sup> Low risk-weights for residential mortgages contributed boosting the housing market and creating the bubble that triggered 2008 crisis. Similarly, banks found the way to reduce their risk exposure by means of securitization.

proposed to improve bank sustainability and evaluate their robustness against the market for limes dynamic described above. This analysis focuses on whether and how prudential tools can mitigate, rather than inadvertently exacerbate, adverse selection and informational asymmetry problems inherent in banking. The analysis starts with the quintessential prudential tool: Pillar I capital regulation which has also been at the forefront of the sustainable regulation debate and then moves to Pillar II supervisory powers.

(i) *Pillar 1 capital regulation*

Bank capital is crucial to allow for qualitative asset transformation.<sup>54</sup> The unborrowed money allows a bank to withstand losses incurred on assets and liquidity crises, under one condition – that there is enough of it.<sup>55</sup> As it is provided by shareholders, it also incentivizes owners and managers to oversee bank’s management and to limit excessive risk-taking.<sup>56</sup> However, as discussed in Section 2, bank capital is socially cheap but privately expensive, therefore banks would like to run on less capital compared to what is socially optimal.<sup>57</sup>

Accordingly, capital regulation represents the quintessential legal tool for prudential regulation since the first version of the Basel Accords, in 1988.<sup>58</sup> Originally, capital

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<sup>54</sup> Of “talismanic significance” Kern Alexander, ‘The Role of Capital in Supporting Banking Stability’ in Niamh Moloney, Eilís Ferran and Jennifer Payne (eds), *The Oxford Handbook of Financial Regulation* (Oxford University Press 2015; online edn, Oxford Academic, 2015) 334, 335.

<sup>55</sup> Anat Admati and Martin Hellwig, *The Bankers’ New Clothes: What’s Wrong with Banking and What to Do about It* (Princeton University Press 2013) 1, 6.

<sup>56</sup> Alexander (n 55) 334, 337.

<sup>57</sup> Anat R Admati, Peter M DeMarzo, Martin F Hellwig and Paul C Pfleiderer, ‘Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Socially Expensive’ (2013) Max Planck Institute for Research on Collective Goods Working Paper 2013/23, Rock Center for Corporate Governance at Stanford University Working Paper No 161, Stanford University Graduate School of Business Research Paper No 13-7, <https://ssrn.com/abstract=2349739> accessed 21 May 2025.

<sup>58</sup> Basel Committee on Banking Supervision, *International Convergence of Capital Measurement and Capital Standards* (BIS 1988) <https://www.bis.org/publ/bcbs04a.htm> accessed 21 May 2025.

regulation was only meant to ensure the safety and soundness of individual institutions.<sup>59</sup> This approach turned out to be misguided, as it overlooked the fact that banks do not exist in a vacuum. The externalities of their instability can bear an adverse impact on the banking system.<sup>60</sup> Capital regulation mandates the bank to hold a certain ratio of equity against its risk-weighted assets, performing a crucial role in handling bank credit risk. For the purpose of our analysis, it is crucial to underline that the legal set up of capital requirements shape the willingness of banks to borrow to specific sectors of the economy, as assets that are considered less risky require less capital to be held.<sup>61</sup> For instance, Basel I was criticized for this oversimplified approach. It incentivized banks to invest in assets with lower risk weights leaving those with higher risk weights at a disadvantage. As corporate loans fell into the latter category, Basel I was said to discourage lending to private companies.<sup>62</sup> Accordingly, the aim of Basel II was to adjust the capital adequacy system in a way that would not make borrowing more difficult for some entities, introducing a system of internally calculated risk weights, based on banks' historical data and internal model for credit risk assessment. This reform should be understood in the context of a general de-regulation trend, aiming at increasing the available credit to the economy, also to sub-prime borrowers.<sup>63</sup> This trend decoupled capital regulation from

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<sup>59</sup> Susan Burhouse, 'Basel & the Evolution of Capital Regulation Moving Forward Looking Back' (*Federal Deposit Insurance Corporation*, 14 January 2003) <https://elischolar.library.yale.edu/cgi/viewcontent.cgi?article=1144&context=yyps-documents> accessed 21 May 2025.

<sup>60</sup> Capital requirements were to 'act as a road hump to slow down the moral hazard of excessive risk taking'. Razeen Sappideen, 'The Regulation of Credit, Market and Operational Risk Management under the Basel Accords' (2004) *Journal of Business Law* 59,70

<sup>61</sup> First international standard regarding capital, Basel I encompassed five categories of risk weights reflecting various levels of risks for specific assets (for instance risk weight of cash was 0%, but for claims on the private sector 100%). Basel II introduced new method of calculating capital- internal ratings-based model- relying on bank's own risk measurements. Basel III, aiming to rectify mistakes of BII and reflecting lessons from Global Financial Crisis, returned to refining standardized approaches (and later even output floor), added new capital buffers and shifted focus to systemic importance.

<sup>62</sup> Iris H-Y Chiu and Joanna Wilson, *Banking Law and Regulation* (1st edn, OUP 2019) 341.

<sup>63</sup> Imad A Moosa, 'Basel II as a Casualty of the Global Financial Crisis' (2010) 11 *Journal of Financial Regulation and Compliance* 95.

mere prudential considerations, trying to use capital requirements as a tool to achieve further policy goals. Global Financial Crisis of 2008 (GFC) demonstrated how misplaced this strategy was.<sup>64</sup>

Against this background, the remainder of this Section wants to evaluate the desirability of reforming capital regulation explicitly incorporating climate-risk and prompt bank low-carbon transition.<sup>65</sup> This represents the perfect starting point to test the lime theory. In fact, it represents as the quintessential element of the debate over sustainable banking regulation, yet it also appears particularly vulnerable to the market for limes dynamic introduced in Section 3. In the current legal and economic literature, the arguments for and against this policy all rely on an underlying and often implicit assumption: information symmetry between the relevant players, including regulators.<sup>66</sup> However, as explained in the previous sections, banks act as delegated monitors have structurally superior information vis-à-vis the market and their regulators on the quality of the assets in their portfolio.<sup>67</sup>

Despite the various characterizations that policy and academic proposals bring forward, the basic idea is straightforward: banks that finance green projects should provision less capital than banks that finance brown ones.<sup>68</sup> Being capital privately (not socially) expensive, this should incentivize banks to prefer green projects.<sup>69</sup> At its core, the

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<sup>64</sup> Basel III constitutes an attempt to fix mistakes of Basel II and to address other problems uncovered during the GFC.

<sup>65</sup> For a high level legal discussion, see Jeremy C Kress, 'Banking's Climate Conundrum' (2022) 59 American Business Law Journal 679; Joel Michaels, 'Capital Regulation as Climate Policy' (2023) 59 Idaho L. Rev. 127. In the European domain, see Agnieszka Smoleńska and Jens van 't Klooster, 'A Risky Bet: Climate Change and the EU's Microprudential Framework for Banks' (2022) 8 Journal of Financial Regulation 51.

<sup>66</sup> Tri Vi Dang, Gary Gorton and Bengt Holmström, 'The Information View of Financial Crises' (2020) 12 Annual Review of Financial Economics 39.

<sup>67</sup> Douglas W Diamond, 'Financial Intermediation and Delegated Monitoring' (1984) 51 The Review of Economic Studies 393.

<sup>68</sup> Martin Oehmke and Marcus Opp, 'Green Capital Requirements' (2022) Swedish House of Finance Research Paper 22-16 <https://ssrn.com/abstract=4040098> accessed 21 May 2025

<sup>69</sup> Anat R Admati and Martin F Hellwig, 'The Parade of the Bankers' New Clothes Continues: 44 Flawed Claims Debunked' (2024) European Corporate Governance Institute – Finance Working Paper No 951/2024 <https://ssrn.com/abstract=2292229> accessed 21 May 2025.

proposals for ‘green capital requirements’ entail the adjustment of banks’ capital charges. Such adjustment depends on the sustainability characteristics of their assets. The adjustment can come in the form of a ‘Green Supporting Factor’—whereby lower capital charges attach to assets which are considered ‘sustainable’— or a ‘Brown Penalising Factor’—whereby higher capital requirements are imposed on assets which are considered as environmentally harmful.<sup>70</sup> Both measures should alter banks’ lending decisions, nudging towards low-carbon initiative in exchange for a comparatively lower capital requirements.

Despite the appealing simplicity of this solution, significant and structural challenges would lie ahead if this proposal were to be implemented. As discussed above, information asymmetry is pervasive in banking.<sup>71</sup> Banks act as delegated monitors and possess privileged, private knowledge about the quality of their assets, including their sustainability characteristics. This informational advantage makes the ex-ante identification and ex-post verification of asset quality particularly problematic for all others market participants, regulators and supervisors. Such complexity goes beyond the fact that sustainability characteristics are often intangible, complex, and contingent upon uncertain future developments, thus making objective verification inherently difficult. Rather, it is entrenched in the structure of the bank business model itself, where assets need to remain opaque to the outside to safeguard stability.<sup>72</sup>

Therefore, introducing ‘green capital requirements’, either in the form of green supporting factors or brown penalizing factors, can inadvertently bring about the problem

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<sup>70</sup> Maria Berenguer, Michel Cardona and Julie Evain, ‘Integrating Climate-related Risks into Banks’ Capital Requirements’ (*I4CE*, 11 March 2020 ) <https://www.i4ce.org/en/publication/integrating-climate-related-risks-into-banks-capital-requirements/> accessed 21 May 2025

<sup>71</sup> Steven A Sharpe, ‘Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationships’ (1990) 45 *Journal of Finance* 1069.

<sup>72</sup> It is visible for instance during attempts at rating banks and insurance companies. See Donald P Morgan, ‘Rating Banks: Risk and Uncertainty in an Opaque Industry’ (2002) 92 *American Economic Review* 874.

of adverse selection. Under these circumstances, banks have every incentive to misrepresent the quality of their asset holdings, portraying those as greener than they genuinely are to benefit from more favourable regulatory treatment, exploiting the structural unobservability and unverifiability of sustainability claims. In turn, genuine green investments might be displaced by superficially green or lower-quality assets—a classic manifestation of adverse selection. What is more, this also implies that banks, while not delivering sustainable outcomes, also comparatively increase their leverage, magnifying the perverse incentives discussed in Section 2.

Moreover, the implementation of sustainability-sensitive capital requirements would face relevant legal hurdles. Under the existing prudential framework, capital rely on observable, historically verifiable data, acting as a proxy for future risk, such as credit ratings or historical default data.<sup>73</sup> In contrast, sustainability factors are forward-looking, highly scenario-dependent, and inherently uncertain. Furthermore, increased auditing, more sophisticated disclosure standards, or enhanced taxonomies alone are unlikely to resolve the fundamental issue since they implicitly assume away, once again, the necessary opacity of banks' assets.

The introduction of these factors into Pillar I requirements would increase legal uncertainty and regulatory discretion. Regulators tend to abstain from utilizing their granted discretion. For instance, the International Lending Supervision Act of 1983 allowed federal bank regulatory agencies to set capital requirements for both individual institutions and categories of banks. In practice, authorities imposed common capital standards anyway.<sup>74</sup> The avoidance of discretionary powers is also evident in the

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<sup>73</sup> John Armour and others, *Principles of Financial Regulation* (Oxford University Press 2016) ch 14 Capital Regulation' 290.

<sup>74</sup> Michael S Barr, Howell E Jackson and Margaret E Tahyar, *Financial Regulation: Law and Policy* (2nd edn, Foundation Press 2018) 1, 268.

regulatory practice regarding global systemically important banks (G-SIBs), both at the international and regional (USA and EU) levels.<sup>75</sup> Regulators are granted discretionary competences in many areas, from systemic designations to Pillar II requirements, yet they still do not make use of them.<sup>76</sup>

The intention of ‘greening’ risk weights would inevitably trigger discussion about increasing the role of Internal Ratings Based methods of calculating capital. Banks would argue (and they would not be wrong) that they are best equipped to establish risk measurement systems in this context, precisely due to the information asymmetry analyzed in this paper. As demonstrated by the experiences of Basel II and the Global Financial Crisis, this would create room for even more arbitrage.<sup>77</sup> The potential for arbitrage is especially concerning, as risk assessment would require improving forward-looking modelling, due to the rather hypothetical character of environmental risks.<sup>78</sup>

One could argue that recent adjustments to capital calculation regime have been positively received. Specifically, the recent version of the Capital Requirements Regulation (CRR) includes an improved supporting factor for exposures to small and medium enterprises (SMEs).<sup>79</sup> The important difference is that this is merely a sectoral adjustment aimed at boosting lending to SMEs. Additionally, the definition of an SME for the purposes of the CRR is very specific and does not leave any room for interpretation or arbitrage.<sup>80</sup>

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<sup>75</sup> Katarzyna Parchimowicz, *The Regulation of Megabanks: Legal Frameworks of the USA and EU* (1st edn, Routledge 2022), section 4.2.2.

<sup>76</sup> Ibid.

<sup>77</sup> Imad A Moosa, ‘Basel II as a Casualty of the Global Financial Crisis’ (2010) 11 *Journal of Bank Regulation* 95.

<sup>78</sup> European Banking Authority, ‘The Role of Environmental Risk in the Prudential Framework’ Discussion Paper EBA/DP/2022/02 (2 May 2022).

<sup>79</sup> Single Rulebook Q&A, Question ID 2013\_257, Calculation of Capital Requirements for SME under Article 501 of CRR’ [https://www.eba.europa.eu/single-rule-book-qa/qna/view/publicId/2013\\_257](https://www.eba.europa.eu/single-rule-book-qa/qna/view/publicId/2013_257) accessed 21 May 2025.

<sup>80</sup> Art. 5(9) ‘small and medium-sized enterprise’ or ‘SME’ means a company, enterprise or undertaking which, according to its most recent consolidated accounts, has an annual turnover not exceeding EUR 50 000 000 ;

Beyond these legal complexities, the interplay of green capital requirements and the conundrum of bank incentives raises further concerns. Banks may strategically take advantage of the regulatory relief to increase their leverage rather than to genuinely reduce climate risk exposure, amplifying moral hazard incentives rooted in the implicit sovereign guarantees and bailout expectations. Taking the information view, green capital requirements could unintentionally exacerbate financial stability risk rather than promoting the low-carbon transition.

Departing from this critical observation, we can conclude that the current academic and policy literature examining green capital requirements appears insufficiently sensitive to the structural informational constraints identified here. Oehmke and Opp compare green capital requirements and carbon taxes.<sup>81</sup> Thakor takes a very general approach and focuses on various consequences of ‘credit allocation regulation’, rules introduced to steer lending into politically and socially favored initiatives.<sup>82</sup> Song and Thakor develop a model to assess the impact of penalizing brown lending. However, they rely on a no bailouts assumption, which makes the assessment less realistic.<sup>83</sup> Only Binder refers to the residual information problem, but while stressing the advantages of Pillar II solutions over Pillar I in this context.<sup>84</sup>

Similarly, the original proposal of the European Commission<sup>85</sup> introducing ‘green capital requirements’ as part of its Action Plan did not sufficiently address information asymmetry. It only stressed that ‘any recalibration of capital requirements, based on data

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<sup>81</sup> Martin Oehmke and Marcus Opp, ‘Green Capital Requirements’ (2022) Swedish House of Finance Research Paper 22-16 <https://ssrn.com/abstract=4040098> accessed 21 May 2025

<sup>82</sup> Anjan V Thakor, ‘Politics, Credit Allocation and Bank Capital Requirements’ (2021) 45 *Journal of Financial Intermediation* 1.

<sup>83</sup> Fenghua Song and Anjan V Thakor, ‘Banks, Markets, and the Color of Finance’ (2023) European Corporate Governance Institute – Finance Working Paper No 933 <https://ssrn.com/abstract=4581551> accessed 21 May 2025

<sup>84</sup> Jens-Hinrich Binder (n 52)

<sup>85</sup> European Commission, fn 31.

and the assessment of the prudential risk of banks' exposures, would need to rely on and be coherent with the future EU taxonomy on sustainable activities'.<sup>86</sup> The EU Taxonomy Regulation,<sup>87</sup> which entered into force in 2020, is supposed to provide clarity in this context. However, this framework is flawed<sup>88</sup> and misplaces incentives, giving the responsibility to assess 'greenness' to companies that would benefit from cheaper funding, thus opening the door to greenwashing.<sup>89</sup> The framework is also considered to be overly simplified and not able to follow the scientific developments in the area.<sup>90</sup> Exclusion of the SMEs also constitutes a loophole in the regime.<sup>91</sup>

Difficulties with grasping the true environmental nature of an asset are visible in the efforts by both companies and external rating agencies. As for the former, a 2023 report by Institute and Faculty of Actuaries and University of Exeter showed, that financial institutions do not understand the models that they are using to measure climate risk and so they underestimate it heavily.<sup>92</sup> Rating agencies are also struggling with accuracy of calculating ESG ratings. It has been demonstrated that ESG ratings from various agencies show significant divergence.<sup>93</sup> Some even abandon scoring systems and turn to textual analysis, which makes it even more vague.<sup>94</sup> Probably rightly so, as research shows that

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<sup>86</sup> Ibid, 3.3.

<sup>87</sup> Jens-Hinrich Binder (n 52)

<sup>88</sup> See for instance Garcia-Torea et al (n 51).

<sup>89</sup> Andreas Hoepner, 'Too good to be true: the greenwashers' box of tricks' *The Financial Times*, 6 May 2024.

<sup>90</sup> Garcia-Torea et al (n 51).

<sup>91</sup> Seán O'Reilly et al, Implementing the European Union Green Taxonomy: implications for small- and medium-sized enterprises. *Accounting Forum*, 48(3), 401–426.

<sup>92</sup> Alex Morrison, 'Climate Scenario Models in Financial Services Significantly Underestimate Climate Risk' *University of Exeter News* (4 July 2023) <https://news.exeter.ac.uk/research/climate-scenario-models-in-financial-services-significantly-underestimate-climate-risk/> accessed 21 May 2025 ; Camilla Hodgson, 'Financial Models on Climate Risk "Implausible", Say Actuaries' *Financial Times* (1 September 2023) <https://www.ft.com/content/a5027391-41a4-4e21-a72d-f8189d6a7b71> accessed 21 May 2025

<sup>93</sup> Florian Berg, Julian F Kölbl and Roberto Rigobon, 'Aggregate Confusion: The Divergence of ESG Ratings' (2022) 26 *Review of Finance* 1315.

<sup>94</sup> Patrick Temple-West, 'S&P drops ESG scores from debt ratings amid scrutiny', *The Financial Times*, 8 August 2023.

the ESG ratings reflect how companies want to be perceived, and not what they actually do.<sup>95</sup>

In contrast, our analysis challenges the underlying assumption of informational symmetry, showing how the ways in which information is generated and disseminated in banking represents a structural impediment to the successful implementation of effective green capital requirements. Given these arguments, green capital requirements under Pillar 1 appear unlikely to deliver on their promised environmental objectives while they bear the potential to bring about unintended prudential risks.

Nevertheless, one could think of limited sectors in which green capital requirements in the form of ‘brown penalizing factors’ could be successfully implemented. This is the case of blatantly unsustainable investments bringing about considerable physical and transition risks—such as financing for newly established oil extraction ventures. In these extreme cases, a market for limes is unlikely to arise since the misclassifying these blatant ‘brown’ investments as ‘green’ goes even beyond what bank opacity can deliver. In these cases, a brown penalising factor looks adequate. However, this brings about a second order problem, that is fixing the limit between what is beyond any potential lime problem and what is not. Accordingly, relying too much on this ‘special cases’ approach could bring back the problem that we ruled out when approaching green capital requirements as a generally applying tool. Besides these limited cases, general Pillar 1 adjustments are an unwarranted tool to advance bank transition to a low-carbon economy as these are unlikely to deliver their sustainability promises while have the potential to bring about severe unintended consequences.

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<sup>95</sup> Manuel C Kathan and others, ‘What you see is not what you get: ESG scores and greenwashing risk’ (2025) 74 Finance Research Letters 1.

(ii) *Pillar 2 supervisory powers*

The basic tenet of Pillar 2 supervisory oversight is to focus institution-specific issues based on dynamic assessments of banks' risk profiles, imposing further tailor-made requirement if necessary.<sup>96</sup> This approach contrasts and complements the one-size-fit-all approach of Pillar 1 capital rules. This flexibility offers clear theoretical advantages in the context of climate risk: it enables authorities to adapt their expectations and interventions to bank-specific risk exposures, taking into account the evolving scientific evidence and specific sectoral vulnerabilities.

Accordingly, several supervisory practices to embed climate risks within Pillar 2 processes are emerging. Supervisors across leading jurisdictions—including the ECB, Bank of England, and Swiss FINMA<sup>97</sup>—engaged in drafting qualitative expectations, specifying governance standards and internal processes for climate-risk management. Governance requirements typically demand banks to embed climate considerations into their decision-making arrangement and reporting lines, supported by climate-specific risk management policies.<sup>98</sup>

However, also supervisory operations are affected by information asymmetry. Supervisors necessarily depend on banks' internal models, data, and transition plans. As discussed earlier, banks possess structural informational advantages and incentives to portray their portfolios as less risky, generating a second-order asymmetry: supervisors,

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<sup>96</sup> Claudia Buch, 'Reviewing the Pillar 2 requirement methodology' (*The Supervision Blog, European Central Bank Banking Supervision*, 11 March 2025) <https://www.bankingsupervision.europa.eu/press/blog/2025/html/ssm.blog20250310~0a07f5d777.en.html> accessed 21 May 2025; Basel Committee on Banking Supervision, *Overview of Pillar 2 supervisory review practices and approaches* (BIS 2019)

<sup>97</sup> For EBC see Buch (n95); BoE see Bank of England, 'Report on climate-related risks and the regulatory capital frameworks' (2023); Swiss Financial Market Supervisory Authority FINMA, 'Integrating nature risks into supervisory practice' (Dossier on Sustainable Finance, FINMA, 2025) <https://www.finma.ch/en/documentation/dossier/dossier-sustainable-finance/integration-der-naturrisiken-in-die-aufsicht/> accessed 21 May 2025

<sup>98</sup> Basel Committee on Banking Supervision, *Principles for the effective management and supervision of climate-related financial risks* (BIS, 2022) <https://www.bis.org/bcbs/publ/d532.pdf> accessed 21 May 2025

even when aware of climate risks, must infer their significance from information and narratives controlled by the banks themselves. The problem is exacerbated by the nature of climate risk, which is characterised by scientific uncertainty with regard to physical risk (eg: limited historical loss data, uncertain time horizons) and transition risk (eg: evolving policy scenarios).<sup>99</sup> Such factors grant banks significant discretion in defining and representing their climate exposures, and also supervisors may struggle to differentiate genuinely prudent banks from those engaging primarily in formal compliance or outright ‘greenwashing’.<sup>100</sup>

The cases of greenwashing are regularly emerging, proving that it is not just a theoretical concern. For instance Barclays is under scrutiny for marking financial instruments as sustainable when the financed company, oil mogul Eni, planned to expand oil and gas production.<sup>101</sup> Canadian banks were accused of misleading investors by exaggerating the positive impact of their sustainable finance activities.<sup>102</sup> Lloyds and HSBC issued ads promoting their environmental initiatives, without mentioning their engagement in financing fossil fuels industry. Both ads were banned by the relevant UK watchdog.<sup>103</sup>

These issues are specific to climate risk. However, they also intersects structural limitations of banking supervision. In fact, even when supervisors posses the relevant

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<sup>99</sup> For in depth analysis of this uncertainty see Anindita Sarkar, Nairwita Bandyopadhyay, Shipra Singh and Ruchi Sachan (eds), *Risk, Uncertainty and Maladaptation to Climate Change: Policy, Practice and Case Studies* (Disaster Risk Reduction, Springer Singapore 2024)

<sup>100</sup> For general overview of the topic see Simona Galletta, Sebastiano Mazzù, Valeria Naciti and Andrea Paltrinieri, ‘A PRISMA systematic review of greenwashing in the banking industry: A call for action’ (2024) 69 *Research in International Business and Finance* 1.

<sup>101</sup> Natasha Ion and Wil Crisp, ‘Barclays accused of greenwashing over financing for Italian oil company’ *The Guardian* (London, 26 April 2024) <https://www.theguardian.com/business/2024/apr/26/barclays-accused-of-greenwashing-over-financing-for-italian-oil-company> accessed 21 May 2025

<sup>102</sup> Reuters, ‘Activists file complaint against Canadian banks over green-finance claims’ *Reuters* (9 January 2024) <https://www.reuters.com/sustainability/sustainable-finance-reporting/climate-activist-group-targets-major-canadian-lenders-over-green-finance-claims-2024-01-09/> accessed 21 May 2025

<sup>103</sup> Annabelle Liang, ‘HSBC climate change adverts banned by UK watchdog’ *BBC News* (London, 19 October 2022) <https://www.bbc.com/news/business-63309878> accessed 21 May 2025

information, they may shy away from taking decisive actions, fearing potential adverse reactions from the market.<sup>104</sup> In this context, the risk of supervisory forbearance emerges clearly: supervisors might hesitate to impose stringent corrective actions—even when warranted by underlying climate vulnerabilities.<sup>105</sup> Under these conditions, supervisory discretion risks becoming a pathway to inertia, undermining the very rationale for employing Pillar 2 as a flexible, responsive regulatory tool. What is more, the supervisor may not have an explicit mandate in primary legislation to embed climate risk in its activities. While the detailed analysis of supervisory mandates in various jurisdictions is beyond the scope of this contribution, the lack or even just the ambiguity of the mandate would exacerbate all the problems discussed so far.

Despite these constraints, supervisory oversight has the potential to play a positive role in prompting bank low-carbon transition when its activities are carefully calibrated to address the structural limitations posed by bank asset opacity. In this respect, sustainability stress tests are emerging as a key tool to complement these qualitative expectations by offering forward-looking assessments of banks' exposure to both transition and physical risks.<sup>106</sup> These sustainability exercises are not necessarily designed to prompt immediate regulatory or supervisory actions. Rather, they serve primarily as informational tools, creating a basis for supervisory dialogue on strategic resilience and risk governance.<sup>107</sup>

Climate testing frameworks can play a critical role—limiting banks' scope for strategic asset misrepresentation. Stress test exercises offer supervisors valuable insights into banks' relative climate resilience, allowing them to categorise institutions according to

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<sup>104</sup> Martino & Perotti 2025

<sup>105</sup> Reuters, 'Activists file complaint against Canadian banks over green-finance claims' (9 January 2024) <https://www.reuters.com/sustainability/sustainable-finance-reporting/climate-activist-group-targets-major-canadian-lenders-over-green-finance-claims-2024-01-09/> accessed 21 May 2025

<sup>106</sup> Viral V Acharya and others, 'Climate Stress Testing' (2023) 15 Annual Review of Financial Economics 291.

<sup>107</sup> Ibid

their exposure levels, albeit some level of uncertainty and unobservability remains. From a legal perspective, linking cogent and direct consequences to the outcome of stress test is delicate, as these rest on a number of assumptions to ensure tractability. However, banking supervisor often use the result of a stress test, especially if negative, to issue more stringent guidance to the supervisee. Something similar could be done explicitly with climate stress tests.

In this regards, one interesting policy options which is, to the best of our knowledge, disregarded by the existing literature, would be to issue climate-related capital guidance based on the result of stress tests.<sup>108</sup> Based on stress-test outcomes, supervisors could assign banks to differentiated ‘buckets’, each corresponding to a graduated level of capital guidance. Less climate-exposed banks would receive milder guidance, whereas more vulnerable institutions would face more rigorous supervisory expectations. This capital guidance would not operate as a mandatory capital requirement, as Pillar 1 capital requirements. Accordingly, its breach would not trigger immediate legal consequences. Rather it would represent a tools to nudge banks toward building excess capacity before climate risk materialises, without exposing banks to public scrutiny.

This nuanced, bucket-based approach is more resilient to the market for limes but, admittedly, it does not eliminate adverse selection outright. However, Pillar 2 climate capital guidance can mitigates the worst effects of the market for limes for two key reasons, one prudential and one informational. First, it does not attach a ‘bounty’ to the successful misrepresentaiton of ‘brown’ into ‘green’ assets in the form of lower capital requirements. Best (or worst) case scenario, banks will have milder non-binding and not publicly disclosed guidances. Second, the stress test excerses is still based on data reported

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<sup>108</sup> Similar to what the ECB does for solvency stress tests and Pillar 2 Guidance.

by the bank, suffering from the structural opacity that we already discussed several times across this article. However, the stressed scenario is controlled by the supervisor and not by the bank providing the data, so that the information asymmetry is, at least in part, mitigated.

The indirect and ‘soft’ enforcement strategy avoids unrealistic expectations regarding supervisory capabilities, focusing instead on relational on-going supervision rather than on daring prompt corrective actions. Such a relational strategy aligns closely with the existing supervisory cultures, whereby informal pressures and expectations often prove more effective than explicit penalties.<sup>109</sup>

This section showed how Pillar 2 supervisory powers are better suited than Pillar 1 capital charges to prompt banks low-carbon transition without triggering unintended consequences, especially in relation to the raise of a market for limes. Nevertheless, also supervisory oversight remains fundamentally constrained by their dependence on bank-generated information, forbearance incentives and weak (or ambiguous) legal anchoring—especially regarding their mandate to consider climate risks explicitly. As such, Pillar 2 supervision should not be relied upon as a standalone solution, but as the prudential leg of a broader regulatory ecosystem. Section 4B explores the potential of mandating specific private law requirements as an effective complement to ongoing supervisory oversight.

### *B. Regulatory Private Law*

The analysis of prudential tools carried out in the previous section highlighted that, with different merit and pitfall, prudential regulation is not suited to prompt banks’ low-carbon

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<sup>109</sup> For analysis of supervisory approaches see Julia Black, ‘Regulatory Styles and Supervisory Strategies’ in Niamh Moloney, Eilís Ferran and Jennifer Payne (eds), *The Oxford Handbook of Financial Regulation* (2015; online edn, Oxford Academic, 2015) 218.

transition, chiefly because of their reliance on (un)verifiable information and structural superiority of the bank on the (sustainability) quality of banks' assets. In contrast, this Section argues that using private law tools could circumvent this informational problem impacting on the bank-borrower relationship and addressing climate externalities directly.

Loan contracts and collateral arrangements can be required to embed specific clauses whose burden weights differently for 'green' and 'brown' assets. If this is possible, it would mean that the regulator can make brown lending comparatively more costly for banks without the need to possess all the relevant sustainability-related information about banks' assets. This approach borrows from a growing body of literature studying private law as a set of tools for supervisors in the financial sector.<sup>110</sup> To the best of our knowledge, this approach has never been adapted to the study of sustainable banking regulation. This section explores this novel approach and discussed key legal constructions which could prompt the low-carbon transition of bank in the presence of structural asymmetric information.

While often viewed as the domain of bilateral contracting and commercial freedom, private law can be mobilised to serve public regulatory objectives. This is not in and of itself a novel approach. At least in civil law jurisdiction, contracts are null and void if they are contrary to mandatory rules and, more importantly for our argument, can be automatically integrated by legally binding provisions. This basic contract law principle has only attracted the attention of financial and banking scholars for the narrow purpose of studying bank contracts, often in relation to the protection of bank clients.<sup>111</sup> However, this

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<sup>110</sup> Olha O Cherednychenko, 'Public Supervision over Private Relationships: Towards European Supervision Private Law?' (2014) 22 *European Review of Private Law* 37.

<sup>111</sup> Danny Busch and Matthias Lehmann (eds), *Unfair Terms in Banking and Financial Contracts* (Oxford EU Financial Regulation vol 1, 2023; online edn, Oxford Law Pro).

has rarely been approached as a way to achieve further and wider policy goals, complementing prudential regulation.

Loan contracts, covenants, representations and warranties can be used to elicit information, constrain behaviour, or seek for third party intervention. If structured properly, they can function as sorting mechanisms: clauses that are comparatively less costly for green borrowers to accept, and disproportionately burdensome for brown ones, including the exposure to legal liability and potential climate litigation. Therefore, private law holds the potential to become a channel for climate risk internalisation under conditions of asset opacity and quality unobservability.

However, to achieve such an ambitious goal, the use of private law cannot be left to unconstrained market dynamics.<sup>112</sup> Banks, acting individually as profit maximisers, would have little incentive to impose and, even worse, enforce clauses which makes brown borrowing less profitable for them. In fact, the mitigation of climate-related risk benefits society at large, generating a positive externality whose benefits are only partly reaped by banks in the form of superior (climate) risk management.<sup>113</sup> It follows that regulators and supervisors should identify the suitable private law tools and mandate them to individual bank.

Banks must be required by regulators to incorporate them into credit agreements, and supervisor must oversee their implementation and enforcement. This approach can be quite costly for supervisors and regulators, as it requires them a much more granular oversight of micro data. However, such effort is focused on very specific elements, allowing for specialization and economies of scale. Crucially, the supervisor is not tasked

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<sup>112</sup> In stark contraposition with the arguments proposed by Sarah E Light and Christina P Skinner, ‘Banks and Climate Governance’ (2021) 121 CLR 1895.

<sup>113</sup> These side benefits are dubbed as ‘co-benefits’ and are often overlooked. See Sebastian Chastin and others, ‘Co-benefits of climate change mitigation and adaptation actions’ (COP26 Universities Network Briefing, 2021).

with any evaluative task about the sustainability characteristics of banks assets. The supervision over the implementation and enforcement of these contractual requirements is crucial. The same information asymmetry that undermines capital regulation also threatens to vitiate contract enforcement if banks are permitted to ignore or waive the remedies associated with breach. A borrower may accept a climate-related covenant or transition obligation ex ante, but if the bank has no intention to monitor it, or to act upon a breach, the clause becomes an empty signal, turning into a fig leaf for greenwashing—allowing the appearance of compliance without meaningful constraint.<sup>114</sup>

Therefore, an effective regime must target the contract design as well as the enforcement architecture. On the latter, an effective enforcement should include several complementary tools. First, banks should be tasked with specific mandatory reporting requirements towards the supervisor. Moreover, one could think of limiting the waivability of contractual rights. Regulators could require that events of default triggered by climate covenant breaches must be reported and justified to the supervisor, even if not acted upon. In high-risk sectors, standardised clause templates may be developed to improve enforceability. In any case, the enforcement cannot be left to bilateral discretion, but must be backed by supervisory scrutiny. Finally, the implementation of these ‘sustainable private law’ tools should be included in the asset quality review process of the supervisor. Once again, this does not eliminate the adverse selection risk, but aims to minimize it and keep it under control.

On contract design, several specific private law instruments can be deployed. First and foremost, bank borrowers should be required to include mandatory insurance or

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<sup>114</sup> Bo Becker and Victoria Ivashina, ‘Covenant-Light Contracts and Creditor Coordination’ (2016) Swedish House of Finance Research Paper 16-09 <https://ssrn.com/abstract=2871887> accessed 21 May 2025; [https://www.paulweiss.com/media/3978887/goodison\\_wagner\\_practicallaw\\_aug2019\\_update.pdf](https://www.paulweiss.com/media/3978887/goodison_wagner_practicallaw_aug2019_update.pdf); Dominique C Badoer, Mustafa Emin and Christopher M James, ‘Contracting Costs, Covenant-Lite Lending, and Reputational Capital’ (2024) 59 *Journal of Financial and Quantitative Analysis* 3376.

hedge against climate-related hazards, such as flood and fire, to their assets. This transfers part of the information revelation function to the insurance market, which is better suited to correctly evaluate such risk.<sup>115</sup> Mandatory insurance has three key advantages. First, it limits bank exposure to climate risk, especially physical risk, improving climate-related risk management. Second, if the insurance market works properly, it should be more burdensome for brown than for green assets, *de facto* favoring green lending. Third, it includes one additional player whose interests are not aligned with those of the bank and of the borrower. This will prove crucial for the effectiveness of enforcement. To this end, it is crucial that the insurer is truly a third party, and not only figuratively so. Therefore, the insurance should come from an entity outside of the banking group or the conglomerate.

Moving to the specific contractual clauses, environmental covenants are the most obvious tool. These clauses oblige borrowers to perform or refrain from specific conduct in relation to environmental practices. Their strength lies in their *ex ante* clarity and *ex post* enforceability. A covenant requiring adherence to measurable emissions thresholds, or compliance with sectoral environmental standards, allows lenders to monitor a borrower's climate performance over time. Yet if left vague—requiring only "best efforts" or general compliance—they risk becoming little more than symbolic. Their breach should have contractual consequences, whether pricing adjustments, collateral calls, or accelerated repayment.

Representations and warranties could also play a positive role and complement climate covenants. These are statements of fact or assurance made by the borrower at the time of contracting. In our context, these statements should pertain the borrowers'

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<sup>115</sup> Patrick Cleary, et al, 'Turning up the heat – climate risk assessment in the insurance sector,' FSI Insights on policy implementation No 20, November 2019; Hailey Ross, 'Climate risks for insurers: Why the industry needs to act now to address climate risk on both sides of the balance sheet' (*S&P Global*, 27 August 2021) <https://www.spglobal.com/esg/insights/climate-risks-for-insurers-why-the-industry-needs-to-act-now-to-address-climate-risk-on-both-sides-of-the-balance-sheet> accessed 21 May 2025

environmental credentials, carbon footprint, or alignment with recognised sustainability frameworks. Their function is not behavioural but informational as they shift the burden of proofing misrepresentation related to these statements to the borrowers. If a bank later discovers that the borrower misrepresented its transition risk, or falsely declared compliance with taxonomy-aligned investment criteria, it gains a legal basis for termination or damages. To serve their regulatory function, these representations must be standardised, subject to due diligence, and actively monitored.

Transition plan obligations could also be included in this discussion, at least when it comes to complex operation involving large players—for instance in syndacated deals.<sup>116</sup> Borrowers may be required to develop, submit, and periodically update decarbonisation strategies consistent with their sector’s net zero pathway. Banks can use these plans to assess exposure to transition risk and to condition loan terms accordingly. But again, the risk of symbolic compliance is high.<sup>117</sup> Supervisors could require that transition plan clauses be backed by verifiable milestones and contingency clauses.

The problem arising in the context of any contractual tool, be it a covenant, warranty or representation, as well as regarding transitions plans, is enforcement. As briefly mentioned above, banks focused on profit maximization, would be reluctant to enforce the covenants, as doing so would make brown borrowing less profitable for them and more costly for the borrowers. Forebearance in this area can render contractual clauses meaningless in practice and undermine their goal to foster a green transition.

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<sup>116</sup> For a proposal on transition plans as a regulatory instrument, see Simon Dikau and others, ‘Prudential Net Zero Transition Plans: The Potential of a New Regulatory Instrument’ (2024) 26 *Journal of Banking Regulation* 85. However, early evidence on transition plans are highlighting persistent greenwashing. See Parinitha R Sastry, Emil Verner and David Marques Ibanez, ‘Business as Usual: Bank Net Zero Commitments, Lending, and Engagement’ (2024) National Bureau of Economic Research <https://ssrn.com/abstract=4663933> accessed 21 May 2025.

<sup>117</sup> Ibid.

The solution would be to introduce a third party that would benefit from enforcing such clauses, and not in a forward-looking making-the-world-greener sense. The insurer brought to the relation by mandatory insurance could play a role of this third party. Should any of the climate-related risks materialize due to the borrower's non-compliance with covenants or misrepresentation, the insurer would pay the bank and have recourse to the borrower. The insurer would subrogate the bank's rights to enforce the covenants or hold the borrower responsible for their misrepresentation. Either way, the insurer would be determined to uncover non-compliance or misrepresentation in order to shift the financial burden and recover the amount paid.

From a regulatory standpoint, replacing the bank in its role as an enforcer of the contract could be included in conduct of business requirements for the insurance industry, to inform clients/borrowers of this possibility.

#### Another option/third party role?

As such a contractual set up would increase the cost of bank lending, two consequences are inevitable. First, it could lead to a race to the bottom by national regulators aiming to create the most profitable version of this approach for banks and attract them to their jurisdictions. As sustainability movement is currently under strain due changes in US policy, regulatory arbitrage is more than likely. The second issue pertains to the tendency to search for alternatives to bank financing. Rising costs of bank lending could make brown firms turn to market financing, potentially disadvantaging green firms in the markets.<sup>118</sup> Another consequence is migration to unregulated sectors when both bank and market financing become costly. Prudential regulation focused on the traditional banking sector and the resulting decrease in profitability led to the rise of shadow banking

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<sup>118</sup> Song (n 85).

in the aftermath of the Global Financial Crisis.<sup>119</sup> Not only investors seek for alternatives, but financial institutions also attempt to circumvent regulation, often trading their safety for profitability.<sup>120</sup>

However, both the race to the bottom and the search for alternative sources of funding constitute typical consequences of any effective regulatory approach.<sup>121</sup> As Goodhart and Lastra rightly point out ‘cross-border [meaning both geographical borders and regulated/unregulated sectors – K.P.] business transfers are generic and the regulator or supervisor will just have to monitor and, up to a point, to live with them.’<sup>122</sup>

## 5. *Concluding Remarks*

We developed a regulatory theory of sustainable banking well grounded on the theory of banking and specifically on its informational dynamics. From this perspective, we re-examined the logic of sustainable banking regulation and showed that the assumption of observable and verifiable asset quality give rise to a ‘market for limes’.

Our analysis shows that incorporating environmental objectives into capital regulation—especially through green supporting or brown penalising factors—risks exacerbating adverse selection. The opacity inherent in banking, and the informational advantage enjoyed by banks over supervisors and markets, enables the misclassification of brown assets as green, potentially undermining both prudential soundness and climate

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<sup>119</sup> Katarzyna Parchimowicz and Ross Spence, ‘Basel IV Postponed: A Chance to Regulate Shadow Banking?’ (2020) 13 *Erasmus Law Review* 1.

<sup>120</sup> Charles Goodhart, *The Future of Finance: The LSE Report* (London School of Economics and Political Science 2010) ch 5 ‘How Should We Regulate the Financial Sector’ 153–76.

<sup>121</sup> Song (n 85); Alvin K Klevorick, ‘The Race to the Bottom in a Federal System: Lessons from the World of Trade Policy’ (1996) 14 *Yale L & Pol’y Rev* 177.

<sup>122</sup> Charles AE Goodhart and Rosa M Lastra, ‘Border Problems’ (2010) 13 *Journal of International Economic Law* 705.

goals. We argued that supervisory powers under Pillar 2 offer greater flexibility and better alignment with the realities of asset opacity. Yet, these powers remain constrained by institutional incentives, the absence of clear mandates in some jurisdictions, and supervisors' reliance on bank-controlled narratives. To be effective, supervision must operate relationally—using soft instruments such as climate stress tests and bucket-based capital guidance—rather than through direct enforcement.

Against this backdrop, we propose to use of regulatory private law as a targeted response to informational asymmetry in sustainable banking. We argued that when mandated through regulation and backed by supervisory oversight, borrower-facing contractual clauses—such as environmental covenants, use-of-proceeds conditions, and transition plan obligations—can function as sorting devices. These instruments are less susceptible to manipulation because they shift the burden of disclosure and compliance onto borrowers, allowing banks to signal asset quality more credibly and reducing the scope for greenwashing.