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DOI

[10.23941/ejpe.v16i1.745](https://doi.org/10.23941/ejpe.v16i1.745)

Publication date

2023

Document Version

Final published version

Published in

Erasmus Journal for Philosophy and Economics

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Citation for published version (APA):

van 't Klooster, J. (2023). Reflections on the 2022 Nobel Memorial Prize Awarded to Ben Bernanke, Douglas Diamond, and Philip Dybvig. *Erasmus Journal for Philosophy and Economics*, 16(1), 97-118. <https://doi.org/10.23941/ejpe.v16i1.745>

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Reflections on the 2022 Nobel Memorial Prize Awarded to Ben Bernanke, Douglas Diamond, and Philip Dybvig

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Our early 21st-century lifestyles will have bleak consequences for humanity, with future generations facing ever more deadly heatwaves, droughts, floods, extreme precipitation, species extinction, and the collapse of ecosystems (Pörtner et al. 2022). As large parts of the planet become less habitable, knock-on effects include mass migration, famines, civil unrest, wars, and societal collapse. As António Guterres, the UN secretary general, described the IPCC's ongoing sixth assessment cycle, it offers “an atlas of human suffering and a damning indictment of failed climate leadership” (UN 2022). To avert the worst consequences of climatic disruption and environmental degradation, the global economy will need to go through a dramatic transformation. However, if such a transition is forthcoming, we are certainly only in its earliest stages.

Around the world, financial policymakers have made progress in meeting this epochal challenge by acknowledging that climate change is real and, hence, creates new risks for the stability of the banking system (NGFS 2019; BCBS 2021; NGFS-INSPIRE 2022). Banks and other financial institutions are dramatically misaligned with planetary boundaries, which exposes them to trillions in losses (ECB 2021; RAN 2022; Semieniuk et al. 2022). In 2015, Mark Carney's Tragedy of the Horizon speech set out a project of developing voluntary disclosure standards that allows investors to better screen risk. A Taskforce for Climate-Related Financial Disclosures (TCFD) was set up that year. In 2017, the recognition that climate and environment-related risks are crucial for prudential policy became the founding commitment of a new Network for Greening the Financial System (NGFS 2019). By reorienting policy efforts towards aligning the financial system with climate and environmental policy, policymakers now pursue two objectives. They contribute to financial stability while

also supporting governments in pushing forward a major economic transition of the 21st century. These policymakers did not receive the 2022 Nobel Prize for research on banks and financial crises, nor, for that matter, is any of their work mentioned.

Established in 1969, the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel (henceforth ‘the Prize’) has turned into the most prestigious prize awarded for human progress in the realm of social thought. Initially a project to promote the Riksbank’s vision for managing the Swedish economy, the Prize lends societal legitimacy and prestige to a specific “economic” way of addressing contemporary policy challenges. Who receives the Prize, and who does not, has a profound impact on research and teaching (Offer and Söderberg 2016).

Awarded this year to Ben Bernanke, Douglas Diamond, and Philip Dybvig, commentators have already noted that the choice and justifications put forward by the Committee for the Prize in Economic Science (CPES) goes against the grain of financial policy since the 2007–2008 financial crisis. Adam Tooze wrote that this year’s award:

Has the effrontery actually to celebrate one of the weakest dimensions of modern macroeconomic thinking—its extraordinarily limited ability to grasp the macrofinancial instability of modern capitalism. Rather than challenging the dogged refusal of the economics mainstream to take seriously thinkers who face the essential important of finance and its dangers for the modern world head on, it flaunts the tendency of the mainstream to ignore them. (Tooze 2022; cf. Mehrling 2022)

I argue in the following that the Prize Committee has largely failed to take account of the more profound lessons learned after the crisis. In its scientific background study “Financial Intermediation and the Economy”, the CPES promotes an account of the financial system and the sort of policies that it needs, which is out of sync with recent progress in financial policy. The Committee finds in the work of the laureates a vision of an economy where individual lenders promote prosperity and economic growth. Although the financial system is mostly assumed to achieve an efficient allocation of resources, policymakers intervene to prevent self-enforcing bank runs. Climate change, and in fact most societal problems, can be solved through Pigouvian taxes and redistributive transfers. In re-

cent years, however, policymakers have started to doubt this narrow conception of the objectives and instruments of financial policy, increasingly moving beyond the pivotal role assigned to individual investors by the CPES.

After the 2007 and 2008 bank crisis, financial policymakers have acquired a 'macroprudential' outlook that is less sanguine about the self-regulation of financial markets. The core assumption of this outlook is that individual investors are often unable to accurately price financial risk because the probabilities of such risks materializing are unknown. This is particularly the case for events that are infrequent or new, but highly impactful. From 2015 onwards, policymakers have come to study Climate and Environment-Related risk (C&E risk) against the background of these ideas. It has become increasingly clear that C&E risk resists conventional prudential approaches. Not only are widely used techniques for estimating financial risk oriented towards the past and, at best, effective over a short time horizon, the information that is needed for these techniques to work is inherently unavailable on the level of individual investors and firms. In the context of a rapid environmental transition, the vision set out by the Committee fails to account for the profound epistemic obstacles that individual lenders face in navigating these types of risk. Where policymakers have increasingly recognized that the Anthropocene raises profound challenges for financial regulation, the 2022 Prize continues to promote moribund ideas.

My reflections are structured as follows. First, I review the existing literature on the political role of the prize in promoting academics who favour market-based solutions to societal problems. Next, I turn to the Committee's scientific background study to identify the vision of the financial system that informs the 2022 prize. As I illustrate, however, these ideas have become largely obsolete. This sets the stage for discussing how financial policy has also been shaped by a profound rethinking of human-nature relations in the 'Anthropocene'. First, I set out how the academic disciplines of economics and finance continue to lag behind recent developments in the broader social sciences. Then, I discuss how regulators have rethought their approach to the environment in recent years.

THE POLITICS OF THE NOBEL MEMORIAL PRIZE

In line with Alfred Nobel's testament, Nobel Prizes are awarded "to those who, during the preceding year, have conferred the greatest benefit to humankind" (NobelPrize.org 2023a). Prizes for physics, chemistry, and

medicine are awarded based on scientific progress (the “biggest discovery”), the Literature Prize goes to “the most outstanding work in an idealistic direction”, and the Peace Prize goes to the person who does the most to advance peace between nations (NobelPrize.org 2023a). The Prize for economics, a bit more opaquely stated, is awarded to “a person who has written a work on economic sciences of the eminent significance expressed in the will of Alfred Nobel drawn up on 27 November 1895” (NobelPrize.org 2023b).

The Prize awards specific ways of conceptualizing the economy and often singles out policy implications that increase the value of the researcher’s work. Considering policy relevance is not specific to this prize, as recent prizes for medical advances and climate science demonstrate. What is more striking about the prize is that recipients often take policy positions that are controversial within the scientific field itself. Science prizes tend to go either to topics with a narrow epistemic interest (this year’s prize for medicine went to sequencing the genome of Neanderthals), or to findings with relatively uncontroversial uses (this year’s physics prize went to findings relevant for producing quantum computers, quantum networks, and cryptography).

What the other science prizes do much less frequently (although the prizes awarded for nuclear science come to mind), is reward findings whose practical relevance and societal value is itself a topic of scientific contestation. Climate policy may not be entirely uncontroversial within society, but it is so within earth sciences. Economics, in contrast, features pervasive disagreement over competing notions of efficiency, equity, private autonomy, and well-being. Economists, rightly, take positions on these issues, because that is a requirement to make their ideas policy relevant. However, it also comes with unavoidable partisanship, which any prize awarded to economic findings inherits by conferring prestige and authority to work premised on such an outlook. It is for this reason that Friedrich Hayek (1974) famously noted on accepting it that the Prize:

Confers on an individual an authority which in economics no man ought to possess. This does not matter in the natural sciences. Here the influence exercised by an individual is chiefly an influence on his fellow experts; and they will soon cut him down to size if he exceeds his competence. But the influence of the economist that mainly matters is an influence over laymen: politicians, journalists, civil servants and the public generally.

In their 2016 book *The Nobel Factor: The Prize in Economics, Social Democracy, and the Market Turn*, Avner Offer and Gabriel Söderberg seek to characterize the political role of the Riksbank's prize. As they argue, the prize was set up by the central bank of Sweden as part of its efforts to promote more market-oriented economic policies domestically. By endowing a specific way of doing academic research with the scientific prestige of the Nobel Prize, the central bank raises the profile of economics relative to other social sciences. Offer and Söderberg approvingly cite Alfred Nobel's great-great nephew, who notes, "The Economics prize [...] is awarded as if it were a Nobel Prize. But it is a PR coup by economists to improve their reputation" (Offer and Söderberg 2016, 103). In promoting a specific subset of the social sciences, the central bank of Sweden seeks to promote a pro-market vision of its domestic economy that has, until then, failed to garner favour with the ruling Social Democratic Party.

Beyond the specific domestic context of Sweden, Offer and Söderberg situate the politics of the Prize in its promotion of the price mechanism as a way of solving societal problems. In their survey of the policy implications of the laureates' research programmes, they show that roughly two-thirds of the prizes have been awarded to economists whose methodological approach assumes that market allocations are socially desirable (Offer and Söderberg 2016, 121-24). Some of the recipients, most famously Hayek and Milton Friedman, use a theoretical perspective according to which "actual market outcomes could be regarded for practical purposes as being close enough to the optimal" (Offer and Söderberg 2016, 121). A second type of pro-market approach is that of "neoclassical Keynesian economists", broadly capturing the orientation of this year's laureates:

These economists generally embrace the axioms of neoclassical economics which specify rational agents operating with complete knowledge. They also seek an efficient market equilibrium, but they identify circumstances in which markets can fail. (Offer and Söderberg 2016, 122)

This research programme is typically associated with US coastal universities, and indeed Bernanke earned a PhD from MIT in 1979, having been

supervised by the central banker Stanley Fischer, while Diamond and Dybvig were graduate students at Yale in the late 70s and both were supervised by the financial economist Stephen Ross.

Although the academy is only one site of reflection on economic policy, recipients of this prize always hail from an academic career. Notably, even Ben Bernanke, former Chairman of the Fed, received the Prize for his academic work. Moreover, amongst academics, the Prize has favoured US- and UK-based research by male academics in traditional economics departments, with the prize to Elinor Ostrom being the first time it was awarded to a political scientist. Deep understanding of the economy, this year's Prize again demonstrates, does not consist in the ability to make good policy, but rather in setting out a formal model that starts with the behaviour of individual agents:

When the work of Diamond and Dybvig appeared in the early 1980s, the role of financial intermediaries had been discussed for a long time. [...] Diamond and Dybvig's research provided logically consistent mathematical models, where the existence and structure of banks were derived rather than assumed. By providing formal models based on microeconomic foundations, the key assumptions and economic mechanisms were laid bare. (CPES 2022, 6)

In light of its societal stakes, I focus on the political significance of this year's Prize by considering what vision of the economy the Prize Committee puts forward as worthy of science's highest esteem. I have little to say about the narrow scientific contribution of this year's laureates, or, in fact, about their broader work and achievements. Their academic work may have been original and contributed to shaping financial economics in the 1980s. Still, the political significance of this prize suggests that we ought to ask, first and foremost, whether their ideas should inform research and teaching today.

THE PRIZE'S OUTDATED VISION OF THE FINANCIAL SYSTEM

The Committee awarded this year's Prize for what it considers three foundational insights into the social purpose of banks: maturity transformation, delegated monitoring, and the social cost of banking crises. The vision that the Committee promotes, by focusing on these three achievements, is profoundly at odds with the macroprudential turn in financial policy of the past decade.

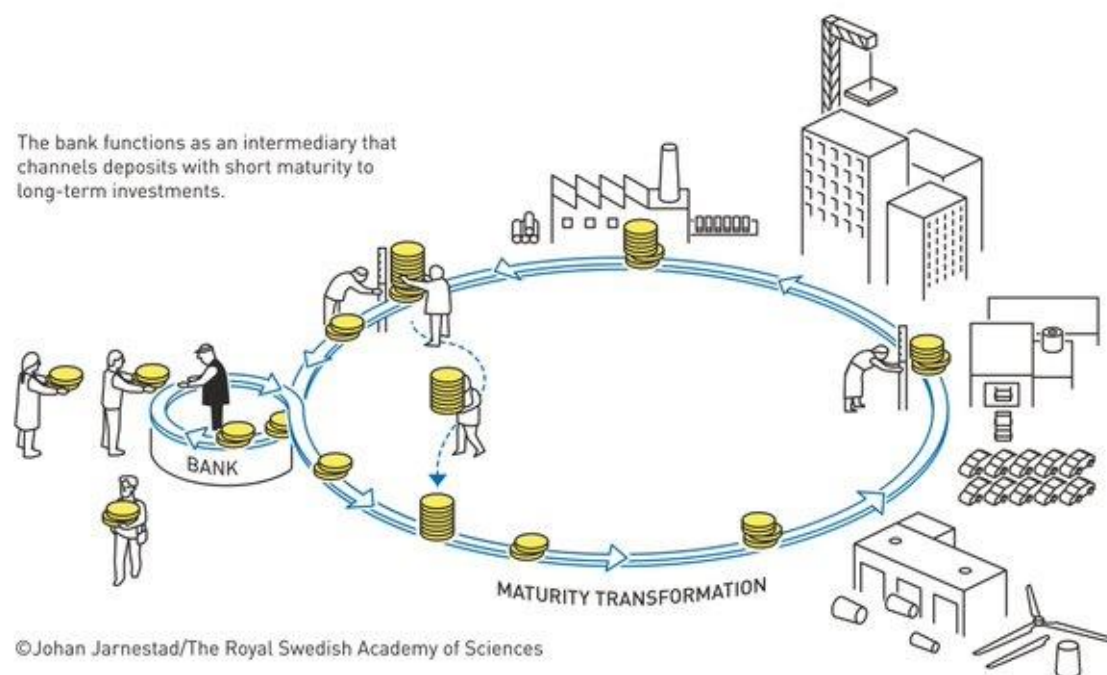


Figure 1: The societal role of banks according to the 2022 Prize Committee.

First, the Committee credits Diamond and Dybvig (1983) for discovering the unique contribution that banks make to the economy in terms of maturity transformation.¹ The Committee finds in their work a vision, illustrated in the accompanying cartoon, where banks collect deposits from customers and channel them towards productive investments (see Figure 1).² In this way, the CPES suggests banks serve an important social purpose, promoting efficiency and economic growth (cf. Zingales 2015;

¹ This attribution is contestable as a matter of intellectual history. To name just one example, James Tobin, who won the prize in 1981, sets out these ideas as the “new view” in 1963: “the essential function of financial intermediaries, including commercial banks, is to satisfy simultaneously the portfolio preferences of two types of individuals or firms. One on side are borrowers, who wish to expand their holdings of real assets—inventories, residential real estate, productive plant and equipment—beyond the limits of their own net worth. On the other side are lenders, who wish to hold part or all of their net worth in asset of stable money with negligible risk of default” (5f). Of course, Tobin is also wrong to call this view new since even academically it goes back at least to 18th century monetary thought (Arnon 2010). More fundamentally, it is hard to imagine a society with banks but without this basic insight into their function.

² A mischaracterization that policymakers have in the past years turned away from (Braun 2016). There is nothing wrong with the cartoon itself, which more or less accurately represents the vision set out by the Committee.

Bezemer et al. 2021). That role, however, is conceptualised without assigning a role to banks in creating money. Instead, the defining feature of banks is maturity transformation.

The role of banks is to aggregate the savings of investors and invest in long-term projects. Only a fraction of investors will actually need to exercise their option to withdraw their savings early, since only a fraction of investors will be subject to short-term liquidity needs. This makes it possible for the bank to meet the liquidity needs of short-term investors, while investing their savings in productive long-term projects. (CPES 2022, 19)

As the Committee takes Diamond and Dybvig to show, the bank's role in providing customers with the ability to make payments on demand also comes with a risk, namely that all customers withdraw their savings at the same time. This dynamic can set into motion a panic:

The more agents that are patient start withdrawing their deposits at $TT = 1$, the less long-term investment will be left, and since the bank does not have enough resources at that time to pay everyone, nothing is eventually left for agents who wait until $TT = 2$: the belief is self-fulfilling, so it is in everyone's interest to withdraw early. (CPES 2022, 24)³

On this account, irrespective of how prudently they lend and how rational their customers, banks are at risk of self-fulfilling beliefs bringing about their demise.

Second, the Prize Committee credits Diamond (1984) with setting out a model that explains the social purpose of banks in terms of delegated monitoring. This second model introduces a production cost for gathering information about future cashflows of borrowers (K) and monitoring their behaviour (D). All lenders can produce K and D , but this is relatively costly for lenders who invest smaller sums. Lenders can also delegate the production of K and D to banks, who then invest on their behalf. By pooling funds, banks benefit from economies of scale, which allow them to do risk screening on behalf of lenders while also diversifying risk by lending to a large number of firms. Again, the Committee emphasizes the specific

³ See Ricks (2016) for a critical discussion of the model.

vision of the economy implicit in the model. It has no direct policy implications, but rather sets out a financial system that is self-organizing, where banks produce value by gathering information. Market discipline ultimately incentivizes banks to do risk screening well:

As long as the intermediary performs its monitoring properly, it will always be able to cover its monitoring cost and give savers their required return, so deposits become risk-free. And the intermediary has the incentive to honor its obligations in order to avoid costly bankruptcy. (CPES 2022, 31)

The upshot here is that accurate information is crucial for the financial system to work properly. Financial intermediaries should be able to screen firms based on accurate information. The intermediary's customers, in turn, should be able to assess risk and return from their investment. If that information is accurately disclosed, this theoretical perspective suggests that markets can realize an optimal allocation of credit without further involvement from policymakers. Policymakers who want to change the allocation of capital in the economy can do so by imposing taxes and providing subsidies to entrepreneurs directly.

Finally, the Prize Committee credits Bernanke (1983) with further demonstrating the societal importance of banks by bringing out the damage caused by a banking crisis:⁴

Financial intermediaries perform a valuable service by channelling savings to productive investments [...] by disrupting these services, the banking panics in the early 1930s was precisely what generated such a long and deep recession at the time. (CPES 2022, 33)

These insights again have clear policy implications, but the specific twist that the Prize Committee gives to them is almost identical to guiding objectives of the pre-2008 Basel II framework: to balance the economic cost of financial regulation against the potential output loss of a banking crisis (Tarullo 2008).

⁴ See Sullivan (2022) for a critical assessment of Bernanke's academic contribution.

NEGLECTING THE MACROPRUDENTIAL TURN

The work of the laureates provides insights into the working of financial markets. That progress, however, is primarily one of realism relative to what is assumed as an intellectual baseline throughout the Committee's text: the self-regulation of markets. The possibility of a liquidity crisis requires explanation in terms of rational actors if investors are assumed to be rational. Financial intermediation requires explanation if investors are assumed to be omniscient. In this regard, it is probably true that "their discoveries improved how society deals with financial crises" (NobelPrize.org 2023c, 1). However, as Charles Kindleberger wrote to Bernanke in 1982, "[t]he necessity to demonstrate that financial crisis can be deleterious to production arises only in the scholastic precincts of the Chicago school" (Mehrling 2022). Bernanke more or less conceded that in 1983, writing that Kindleberger and Hyman Minsky had "in several places argued for the internal instability of the financial system," but justified his own contribution in stating that "in doing so have had to depart from the assumption of rational economic behavior" (Bernanke 1983, 258).

From today's vantage point, the vision of the economy that emanates from the Prize looks quaint. Its optimistic assumption about investors formed the intellectual background of the Basel II framework, where financial regulators imposed capital requirements to prevent excessive risk-taking, but otherwise assumed the efficiency of a market based-allocation of credit. By simply presenting the ideas as the state of the art in financial economics, the Committee assigns undue prestige to this outdated vision of financial markets. In fact, the sanguine approach to finance of that framework can easily be cast as an important cause of the 2007-2008 collapse (Bezemer 2010; Turner et al. 2010; FCIC 2011) and has since been slowly displaced by a new set of ideas typically described as "macroprudential" (Borio 2011; Baker 2018; Thiemann 2019; Stellinga 2020). Namedropped on page 57 of the CPES (2022) text, that approach is not accurately presented as continuous with the Committee's vision of the financial system, nor is it, unlike Basel II, simply "aimed at striking a balance between the negative consequences of disrupted credit networks emphasized in Bernanke (1983) and the various costs of intervention".

In a very general outline, the macroprudential turn is about risks to financial stability and the broader economy that result from the inability of individual investors to estimate risk accurately. The perspective is rooted in John Maynard Keynes's writing on radical uncertainty and the

work on financial markets of Minsky and Kindleberger (Keynes 1937; Minsky 2008; Kindleberger and Aliber 2015).⁵ Alongside this academic heritage, very similar ideas can also be found among financial market practitioners and financial policymakers, although in these contexts often without these authors' more pessimistic assessment of market-based finance (Baker 2020).

The core macroprudential belief is that individual investors are often unable to estimate certain types of financial risk, in particular those tied to infrequent or new but highly impactful events. The reason for this is that investors are neither rational nor particularly well-informed. Instead, when estimating risks and rewards, investors take the recent past as their reference point, which means that the likelihood of gains and losses is assumed to persist into the indefinite future. A period of relative financial stability (the pre-2008 'great moderation' providing a case in point) leads to more leverage and increasingly vulnerable investment strategies. Evolving, path-dependent expectations explain not only why investment strategies adjust, but also why new money-like assets can emerge, and regulation becomes less strict. Since there is at best a limited rational basis for financial market valuation, expectations can shift suddenly. A small event can tip the system from mania into panic; at this point the ability to create new forms of money turns out to be a crucial driver of crises. A depression ensues where investor pessimism takes hold, again with only a limited rational basis, but devastating nonetheless.

It is these ideas that have shaped global financial policymaking after 2008. These ideas, as we will now see, also have important implications for the role of the financial system in the transition to net zero.

CLIMATE CHANGE AND ACADEMIC ECONOMICS

The term 'Anthropocene', coined by the 1995 Nobel Prize for Chemistry laureate Paul Crutzen, marks the recognition of the fact that human civilization, including the past centuries of industrialization, took shape within a period of exceptional climatic stability (Crutzen 2006). Even for advanced capitalist societies, their social and economic processes remain deeply reliant on natural conditions and finite resources. A major insight of 20th century science is that the Earth system can be shifted into new states that are much less favourable to human civilization (Steffen et al.

⁵ Minsky and Kindleberger briefly show up on page 48 but it seems the ideas that the Committee ascribes to them are actually Irving Fisher (1933)'s theory of debt deflation.

2015). Growing greenhouse gas emissions, nitrogen deposition, biodiversity loss, the introduction of novel entities, and other major perturbations are pushing Earth out of its current state, permanently damaging the system's ability to accommodate human life. The European social sciences evolved taking these environmental conditions as given, theorizing society as developing against the background of unchanging natural conditions. Recognition of these fundamental environmental blind spots of academic research has set into motion a profound rethinking of research and teaching (Bonneuil and Fressoz 2017; Malhi 2017; Charbonnier 2021).

The discipline of economics has been slow to take these broader developments on board and its engagement with the earth sciences and their implications remains superficial. Academic economists have typically theorized environmental impact as an externality and prescribed taxation of greenhouse gas emissions as a sufficient instrument for addressing it.⁶ Infamously, William Nordhaus received the 2018 Economics Prize in part for work from 2017, according to which an optimal carbon tax should steer the world towards 3.5°C of warming (CPES 2018, 37; cf. Kelleher 2019). Nicholas Stern, who worked since the mid-2000s to demonstrate the empirical and normative limitations of these ideas, did not receive the prize.

Setting aside these extreme positions, the attitude of the academic discipline to climate change is best characterized as indifferent. Until 2022, the most-cited journal in the field, *Quarterly Journal of Economics*, had not published a single article on the topic (cf. Stern and Oswald 2019).⁷ Similarly, a study of 21 leading finance journals finds that between January 1998 and June 2015:

Only 12 articles (0.06%) are related in some way to climate finance. The three elite finance journals (*Journal of Finance*, *Journal of Financial Economics*, and *Review of Financial Studies*) did not publish a single article related to climate finance over the 17.5-year period. (Diaz-Rainey, Robertson, and Wilson 2017, 243; cf. Kouwenberg and Zheng 2023).

⁶ Although the efficacy of such taxes remain debated, the case for a just transition premised solely on a fixed price per kilo of CO₂ emitted looks shaky (Tank 2020; Känzig 2021; Huwe and Frick 2022) as does the political feasibility of such a policy (Jenkins 2014; Breetz, Mildenerger, and Stokes 2018; Mildenerger et al. 2022).

⁷ It did publish an article on "Climatic Change and Agricultural Exhaustion as Elements in the Fall of Rome" (Huntington 1917).

These attitudes to climate change reflect a milder form of climate denial in the sense that even those alarmed by impending catastrophe may go about their daily work as if they are irrelevant to their concerns (Jonas 1984; Purdy 2015; Latour 2017).

This year's Prize again reflects the discipline's negligent attitude towards climate and the environment, topics which remain undiscussed in the 60 pages of the scientific background study drafted by the Committee (CPES 2022).⁸ This insouciant attitude contrasts starkly with the progress made by financial policymakers.

MACROPRUDENTIAL POLICY AND CLIMATE CHANGE

Policymakers, particularly in Europe, have increasingly recognized the pivotal significance of the climate and the environment for their work. In a way that defies justification through simple microeconomic models, at once opaque and pragmatic, financial regulation today combines a prudential concern with a more direct consideration of environmental impact. It is this development, and organizations like the Network for Greening the Financial System promoting it, that should have received a 2022 Nobel Prize awarded 'for research on banks and financial crises'.

In 2011, the NGO Carbon Tracker published the study "Unburnable Carbon: Are the world's financial markets carrying a carbon bubble?" (Campanale, Leggett, and Leaton 2011). The report begins by reviewing the climate science concerning the levels of CO₂ emissions that are compatible with warming below 2°C. The report uses this information to calculate a carbon budget for the planet. It then points out that financial institutions and governments owned fossil fuel reserves which, if burned, would amount to over five times the possible emissions. A sudden write-down of these assets would result in huge losses, losses in fact much greater than those which brought down Lehman Brothers. Financial regulators, the report argues, should act to ensure the relevant financial risks are adequately monitored:

The recent financial crisis has shown that capital markets were not self-regulating and required unprecedented intervention; regulators were not monitoring the biggest systemic risks and so missed key intervention points. (Campanale, Leggett, and Leaton 2011, 3)

⁸ This is particularly surprising as two committee members, John Hassler and Per Strömberg, have published extensively on these topics.

In framing the challenge of climate change in terms of a gradual build-up of risk in the system, the 2012 Carbon Tracker report explicitly links environmental concerns to macroprudential objectives.

The report set into motion a gradual process of institutional learning within the financial policy community (Quorning 2023). In 2015, Mark Carney (2015) distinguished two ways in which climate change and the environment expose the financial system to potential losses not adequately monitored at the time (so-called C&E risks). First, the physical consequences of pushing the earth into a new systemic state might cause large losses to financial institutions due to floods, droughts, extreme weather, and the like. To avert these catastrophic effects, policy action would need to shift the economy dramatically towards a net zero carbon emissions economy. In turn, such a shift means that financial institutions should anticipate how their investments will be impacted by government intervention as a consequence of climate policy.

The idea that climate change is a source of financial risk introduces the Anthropocene into economic thinking but does so in a way that speaks to regulators raised on Diamond and Dybvig. For one, its starting point is that action to prevent climate change should focus on accurately pricing financial risk and avoiding moral hazard. Banks today, this account suggests, take on risk because their creditors are not sufficiently informed about the risks they are taking. Consequently, basic facts that are well-established in the earth sciences have direct implications for financial policymakers, even within the existing legal framework. Moreover, this framing orients solutions towards improving market functioning. Although it implores financial policymakers to act rather than just wait for a carbon tax to do its work, their interventions are limited to market-correcting methods.

Can investors, properly incentivized to screen risk, ensure that the financial system serves our present needs? If the financial system does indeed work like the Prize Committee suggests, that seems plausible. Banks would be lending to fossil fuel companies because there is either insufficient information or climate policy is simply not credible but banks themselves would not be part of the problem. Despite increasingly ambitious climate targets, improved disclosures, and regulatory guidance, however, banks remain deeply locked into the financing of new fossil fuel infrastructure. Even the banks that are part of Glasgow Financial Alliance

for Net Zero (GFANZ), which implies a commitment to complete decarbonization by 2050, have lent \$269 billion to 102 major fossil fuel companies (McCully 2022). As the ECB observed in 2020, the European Union's (EU) largest banks "do not have the tools to assess the impact of climate-related and environmental risks on their balance sheet" and "only a small number of institutions have fully incorporated climate-related and environmental risks into their risk management framework" (14).

Below the surface of the orthodox account, regulators are increasingly acknowledging the limitations of an approach focused on individual investors and adequate disclosures (Bolton et al. 2020; Ameli, Kothari, and Grubb 2021; Dennis 2022; Oman, Salin, and Svartzman 2022). In this regard, how regulators see their task has been profoundly shaped by the macroprudential perspective (Klooster 2022; Quorning 2023). Against the background of a more realistic understanding of investors as geared to the near past and subject to fads and manias in view, it became clear that the financial system itself can be an obstacle to decarbonization and adaptation. From a macroprudential perspective, there are three reasons to doubt the role of individual investors in producing K and D for C&E risk, even if they are made subject to more market discipline (Dikau et al. 2022).

First, as a category of losses that have not historically occurred, the potential consequences of climate and environmental risk are not of the kind that individual investors can accurately estimate. There is no historical precedent for the climate transition and the catastrophic physical consequences we are facing, placing profound limits to the objective basis for risk estimates (Lenton et al. 2019; Sharpe and Lenton 2021). The regulatory approach in which individual investors could be entrusted to screen risk is premised on essentially *backward-looking methods* for estimating risk. The risk management techniques that banks and global banking regulation have come to rely on from the 1990s onwards, relies on historical data to estimate probabilities of default (Lockwood 2015). Key obstacles for applying such methods to C&E risks include the complexity and interconnectedness of financial institutions, the evolving economic environment and government policy, as well as the importance of the non-linear impact of tipping points in the climate system itself, as well as the policy transition.

Second, concerning the *time horizon* of C&E risks, potential losses from investments made today often only materialize years into the future, far beyond the business, credit, and policy cycles that guide behaviour of

individual investors. For this reason, supervisors are trying to move beyond the typical prudential time frame of three to five years and work towards a time frame of at least ten years (e.g., EBA 2020). The reason that prudential supervision focuses on that short time frame, however, is that going far beyond it is simply not possible for individual investors. To align the financial system with such longer time frames, policymakers need to set out the type of future that investors should plan for. It is for this reason that supervisory practice is increasingly gravitating towards stress testing, scenario analysis and, more recently, has resulted in European Union and United Kingdom efforts to introduce transition planning into their prudential framework (Elderson 2021).

This brings up a third challenge, which takes on a much more severe form than the risk-frame suggests, namely that the assessment of C&E risk is hampered by the *availability of data* (EBA 2020; BCBS 2021; TCFD 2021). On a basic level, simple metrics such as scope 3 emissions and energy performance certificates provide some guidance for risks. The extent of alignment of most investments depends, however, on what other actors do. Sustainability is a feature of an economic system, not of an individual investment or firm (Krahé 2021). For example, decisions made in the allocation of capital within the energy sector have profound implications for other sectors. Similarly, a successful transition in the transportation sector is crucial for production to remain organized on a global scale. Even the most sophisticated models require strong assumptions concerning the speeds of transition, the types of policies enacted, the willingness of consumers to change their lifestyles, and the effectiveness of carbon capture technologies (Monasterolo, Nieto, and Schets 2023).

In the face of these big unknowns, individual investors and firms are unable to produce the information needed to identify financial risk, let alone decide what allocation of investment is optimal. As a proxy for unmeasurable C&E risk, regulators have turned to setting financial policy based on a criterion of double materiality (Boissinot et al. 2022). Policymakers no longer focus solely on often unmeasurable expected losses (single materiality), but also consider the ways investments impact the environment (Smoleńska and van 't Klooster 2022).

CONCLUSION

The 2022 Prize rewards defunct ideas on the financial system and its regulations. It celebrates a centuries old vision of the financial system where financial intermediaries, nudged forward by gentle regulation, channel

savings towards productive investments. The role that the Committee ascribes to policymakers is limited to preventing self-enforcing bank runs, while allowing investment to be guided by the profit motive. From the perspective of the macroprudential turn, these ideas look outdated. This perspective also allows us to see that individual investors and firms are not able to set out the direction of travel for a fast-paced environmental transition. That is not to say that investors and firms have no role to play or that there are no big open questions concerning where to situate the benefits of market-based coordination. These questions should be at the forefront of academic research, and they quickly lead into the broader topic of economic growth and its pursuit through a market-based allocation of resources. Beyond climate change and the environment, the organisation of a financial system is also crucial for tackling problems like economic inequality, tax evasion, and market concentration, which should come together into what is still nebulously referred to as a rapid and just transition (Wang and Lo 2021; Newell, Geels, and Sovacool 2022). In the face of humanity's towering challenges, the Prize Committee fails to acknowledge most issues that are high on today's policy agenda. It is hard to see how this year's prize in the memory of Alfred Nobel matches the eminent significance expressed in his will.

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