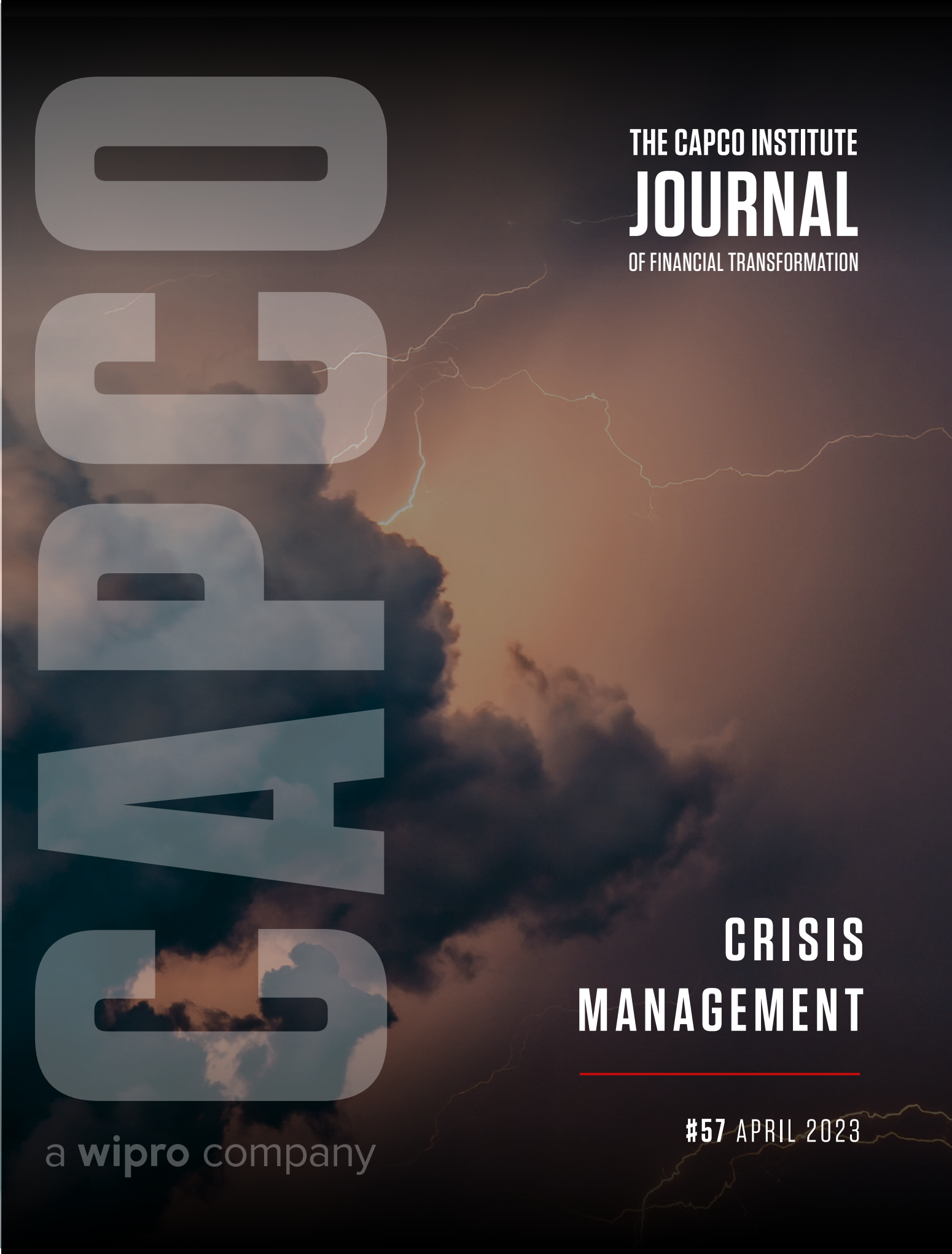

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JOURNAL

OF FINANCIAL TRANSFORMATION

CRISIS MANAGEMENT

#57 APRIL 2023

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JOURNAL OF FINANCIAL TRANSFORMATION

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DEAR READER,

Recent events in the U.S. banking sector, and broader concerns around instability and contagion within the global financial services industry, have meant that crisis management is once more front of mind for many institutions.

In addition, the world of business and finance is facing broader geopolitical and socioeconomic challenges, ranging from conflict, climate change, inflationary pressures, and precarious energy resources. Factor in heightened regulatory and competitive pressures, and it becomes clear that financial institutions must prioritize risk management, within their own organizations and with their counterparties.

The papers in this edition of the Journal address the theme of crisis management through various lenses, including regulatory compliance and traditional risk management, as well ESG, the low carbon economy, and sustainable finance. Our authors also explore topics such as the impact of social change on the world of finance, the rise of artificial intelligence and virtual reality technologies, and cybersecurity.

Contributions in this edition come from a range of world-class experts across industry and academia, and showcase some of the very best expertise, independent thinking, and strategic insights within the financial services sector.

As ever, I hope that you find the latest edition of the Capco Journal to be engaging and informative. Thank you to all our contributors, and thank you for reading.

Lance Levy, **Capco CEO**

FINANCIAL

MANAGING THE UNCERTAINTIES OF CYBERSECURITY[1]

MARTIJN DEKKER | Visiting Professor of Information Security, University of Amsterdam,
Global Chief Information Security Officer, ABN AMRO Bank N.V.

ABSTRACT

Companies and organizations need, more than ever, to control their digitalization efforts. This is due to the increasing importance of digitalization to their business models and due to the increased IT spend levels. In the current threat landscape, digitalization can also lead to significant operational risk events. Managing these events requires an approach that incorporates the growing uncertainty in the probability and impact of these events. This article highlights how corporate and information security executives can improve the way they communicate with each other in order to manage these events.

1. INTRODUCTION

As digitalization has become a top priority for almost all industries nowadays, it has led to information security also becoming one of the top concerns for companies, their boards, and their stakeholders. The European Union is tracking the level of digitalization on a yearly basis[2] and although there are differences between countries, a steady increase in digitalization is obvious. This holds true for larger enterprises as well as smaller companies consisting of only 10 people or more. In those smaller companies, technology is usually used via managed services or cloud providers. This shows that technology is increasingly becoming essential for the daily operations of any company.

There are three important reasons why digitalization is a priority for decision-makers. First, business leaders should pay attention to technology, and in particular the use of data, because it is creating both new opportunities and new, sometimes disrupting, business models. This makes digitalization clearly of strategic importance.

To illustrate the operational relevance of IT to companies, we can look at IT spend. In the Flexera state of tech 2022 report,[3] the results of their survey amongst 501 companies worldwide concerning IT spend and priorities are published. One of the conclusions is that IT spend is on average 8 percent of the total revenue of companies. A vast majority of the respondents (71 percent) expect that their IT budgets will increase next year. This financial view is the second reason why executives should be paying attention to it.

Finally, the third reason that technology is a priority that requires board level attention is the fact that it gives rise to significant and even existential operational risks. We will discuss the implications of the need to manage those risks and, in particular, information security risks.

2. UNDERSTANDING INFORMATION SECURITY RISK

Managing risks is what boards and leaders are used to doing. Having to decide between scenarios without perfect information is also something executives are used to. Yet,

[1] This article is based on earlier blogs by the author and reflects solely the views of the author, not necessarily those of ABN AMRO Bank N.V.
[2] Eurostat, "How digitalised are the EU's enterprises?" August, https://bit.ly/3kKNhVc
[3] Flexera, 2022, "Flexera state of tech 2022," https://bit.ly/3lAkgDI

managing information security risks requires knowledge and skills that many boards are not yet familiar with. Given the role of technology in businesses, and its implications for operational risks, it becomes imperative for boards to become used to managing technology and information security risks.

Risks[4] are potential events that can occur with a probability p and with an impact i. The magnitude of the risk is usually expressed as $R = p \times i$. Risk management is then about estimating the p and i to implement controls that reduce the risk to a level that is deemed to be acceptable. Risks become uncertainties when the p or the i are unknown or not well understood.

This seems a rather straightforward task, but assessing these probabilities and impacts is increasingly difficult in the complex world that businesses now need to navigate. In the technology domain, this is compounded by two additional factors.

The first factor is the complexity of the technology landscape. In large enterprises, that landscape can consists of hundreds or even thousands of applications and services, hosted in multiple data centers and by multiple (cloud) providers. This can also be spread over multiple countries and jurisdictions, adding legal and regulatory complexities. In smaller companies, the technology is usually outsourced to multiple providers, which is complex too. In general, we see a lengthening of supply chains in all industries, which has inherent operational risks. These risks manifested themselves, for example, during the COVID-19 pandemic and subsequent lockdown measures across the world that impacted those supply chains. These impacts were often unexpected. Hence, to assess impacts, one needs to consider not only sources of risk within one's own data center or in-house managed IT landscape, but also sources of risk within supply chains, value chains, or technology chains. The complexity of the technology landscape supporting the business makes it hard to determine the impact (i) of a potential event.

A striking example of this was the vulnerability discovered in the widely used Citrix software. On December 17, 2019, Citrix published on their website the discovery of a vulnerability in some of their software products. The vulnerability would allow hackers to intrude networks. Although Citrix provided guidance on how to deal with this issue, a solution was not immediately available and in January 2020, the Dutch National Cyber Security Center issued an urgent advice to the general public and Dutch corporations to switch off their Citrix installations. This shows how a software vulnerability in a third-party developed and maintained piece of software translated into an unavailability risk for thousands of companies worldwide (some sources estimated that 80,000 companies were affected).[5] Depending on the usage of the software within a company, this risk can be high and even critical. It turned out that many companies were not able to assess the risks arising from this vulnerability and, therefore, had to simply turn it off, often causing business continuity issues. For example, their employees could no longer access their systems to do their work.

The second factor is the fact that the threat landscape has become extremely volatile, with many highly connected and motivated threat actors. Some information security risks happen by accident and can be modeled by pretty well-known probabilities and impacts, for example, the risk of a server shutting down because of a hardware failure. But there is a growing category of information security risks caused by motivated adversaries. The behavior of these actors is not random but targeted, organized, and hard to predict. The fact that adversaries change their attack patterns based on the defensive controls they encounter in a particular target, impacts the defender's ability to assess the probability. This human behavior creates uncertainty in the probability distribution (the p) of a risk. A more extensive description of this inherent uncertainty in the domain of information security can be found in Dekker (2022).[6]

As stated, uncertainty and risk (p times i) are different notions. Any risk is an uncertainty, but an uncertainty is a potential event with probabilities or impacts that are unknown or are uncertain. The extension of the domain of risk management to also include uncertainties is a relative new development. It started with a new definition of risk in ISO31000:2009. In that framework, a risk is defined as the "effect of uncertainty on business outcomes." Although this would imply that risks and uncertainties are related, only in ISO27000:2018 this more general definition of risk was adopted in the cybersecurity context.[7] Currently, many risk assessment methodologies that are in actual use still apply the "$p \times i$" model as an approximation of risk.

[4] In this article we will always define "risk" in this strict sense, even though in ISO31000 a more general definition is used. This will help us better distinguish uncertainties from risks.
[5] Townsend, K., 2019, "Citrix vulnerability leaves 80,000 companies at risk," Security Week, December 23, https://bit.ly/3kDm5l1
[6] Dekker, M., 2022, "Managing information security if managing uncertainty," March 19, https://bit.ly/3y1n9sj
[7] ISO/IEC 27000:2018, https://bit.ly/3SET1fS

In the cybersecurity domain, the level of uncertainty (lack of calculability) in both the p and the i is growing. We believe, therefore, that distinguishing between uncertainty (events with an unknown probability distribution and hard-to-predict impacts) and risks ($p \times i$) matters in cybersecurity. It matters as it leads to different strategies for managing cybersecurity. One of the reasons is the fact that we tend to treat risks and uncertainties differently when making decisions, as is illustrated by the Ellsberg paradox.

The Ellsberg paradox, popularized by Daniel Ellsberg in 1961, is described as a paradox in which people's decisions are inconsistent with subjective expected utility theory.[8] It is generally taken to be evidence of ambiguity aversion, in which a person tends to prefer choices with quantifiable risks over those with unknown, incalculable risks.

Ellsberg's findings indicate that choices with an underlying level of risk are favored in instances where the probability of risk is clear, rather than instances in which the probability of risk is unknown. A decision-maker will overwhelmingly favor a choice with a transparent probability of risk, even in instances where the unknown alternative will likely produce greater utility. When offered choices with varying risks, people prefer choices with calculable risks, even when they have less utility.

Hence, we see that the amount of uncertainty influences decision-making and, as we have argued, the domain of cybersecurity has inherent high levels of uncertainty due to the interplay between defenders and attackers and because of the non-randomness of attacker behavior. There are two other sources of uncertainty that we will now briefly discuss. The first is the agency problem that arises from the highly specialized knowledge involved in the cybersecurity domain. This information needs to be understood by non-technical decision-makers and stakeholders. The second source of uncertainty stems from the different rates of change, for example, between regulation (and other mandatory requirements) and technological developments. Another example is the slow process of control testing compared to the fast changes in the threat landscape. These create pacing problems, which complicate decision-making.

3. AGENCY PROBLEMS AND PACING PROBLEMS

As already mentioned, executive leaders are increasingly required to consider cybersecurity as an element of their business decision-making. Whether it is about business decisions like opening a branch in another country, moving data into the cloud, or launching a new product, security and data protection need to be reviewed and assessed and properly managed. In addition, daily operations and business continuity are increasingly impacted by cybersecurity and many stakeholders (not only customers but also shareholders and others) are demanding more transparency about the cybersecurity posture of a company. Business leaders are, therefore, spending more time on reviewing their security setup. As a result, more security leaders are requested to inform their managing boards about the status of security on a regular basis.

Due to the very technical nature of the topic, information security reports are often hard to understand for the non-technical reader. This is compounded by the sheer volume of management information available. In any larger IT estate, the number of security controls implemented can easily be dozens or more. All these controls need to be tested regularly for operational effectiveness. The resulting reports of the hundreds of instances of controls, their operational effectiveness, and the value of the assets they are supporting, need to be evaluated to enable risk-based decision-making. This is complex, but it is even more complex because some of the controls can compensate others, which is hard to consider without a deep understanding of the control objectives. But even more importantly, one should compare the operational effectiveness to the current threat level. If there is currently no threat that would exploit a failing control, the resulting risk can be low. This brings in the threat perspective, which is as hard as the control perspective. This creates an agency problem between the security specialists and the decision-makers and other stakeholders.[9] Security leaders are facing the challenge of presenting a security posture to the decision-makers that is comprehensible in order to ensure that the business leaders do not overestimate the risk (because they do not understand it) or underestimate it (because they, for example, simply trust the security department to do it right).

[8] Ellberg's paradox, https://bit.ly/3lNDZ34; Ellsberg, D., 1961, "Risk, ambiguity, and the Savage Axioms," Quarterly Journal of Economics 75:4, 643-669
[9] Kiesow Cortez, E., and M. Dekker, 2022, "A corporate governance approach to cybersecurity risk disclosure," European Journal of Risk Regulation 13:3, 443-463

One of the compounding problems is the fact that it takes time to test all the security controls. Companies that are doing this on a quarterly basis are doing it fast; many companies are slower. This means that the situational awareness derived from periodic control testing is often at least three to six months old. Given the high volatility of the threat landscape, this creates a pacing problem. Pacing problems arise when two processes of very different rates of change interact. The notion of a pacing problem was first introduced in Downes (2009)[10] in the context of regulations lagging technology developments. In information security there are many pacing problems, for example, the difference in pacing of discovery of vulnerabilities and implementation of patches, fast growing needs for employees and the slow training of new talent, etc. Another important pacing problem is the one arising from the relatively slow policymaking process and the relatively fast developments of technology. This creates regulatory uncertainty for decision-makers, which is particularly relevant in the cybersecurity domain as regulations in this domain often include liability for executives. As argued above, adopting new technologies for new or updated business models is high on the agenda of many managing boards, but the slower regulatory developments and the liabilities associated with regulations can cause boards to adopt a cautious strategy, as it can be unclear what regulatory risks are or will be.

To summarize, we have increased IT complexity due to interconnectedness and growing supply and technology chains. We see a highly dynamic cyber-threat landscape with diverse groups of adversaries with very differing motivations. This uncertainty is now inherent in information security management. It increases the gap between uncertainty management and risk management. Next to that, we have a growing number of security controls being implemented, each producing operational data and data on operational effectiveness. All this data needs to be reconciled into a concise security posture for business leaders to make informed decisions on strategy, resource allocations, or investments, etc. This is complex and hence creates agency problems. Slow control testing in a volatile threat landscape plus regulatory risks arising from the regulation pacing problem adds even more uncertainty.

> *"Executive leaders are increasingly required to consider cybersecurity as an element of their business decision-making."*

4. A WAY FORWARD

Currently, there is no easy solution to this situation. However, there are relevant developments that could provide a way forward. In general, strategies to cope with uncertainty include activities to gather new information as soon as possible and the ability to quickly course-correct earlier decisions and directions.

In the information security domain, this calls for a shift in thinking. Historically, information security started out with a focus on preventative controls and being compliant. When things got more complicated, the field moved towards a risk-based approach. And now that the uncertainty is growing, the field should move to a threat-based approach. A key element of this approach is a good security foundation. This means that the overall security framework is operating above a certain operational effectiveness level. And on top of that, specific controls and specific assets have stronger security controls in place. The decision about which controls and which assets need enhanced attention is threat-based. The volatility of the threat landscape implies that the organization must be able to make timely shifts in prioritization and have the ability to quickly respond to new information.

Consequently, a threat-based security strategy requires, like any security strategy, a mature security baseline, including a complete overview of the assets that need to be protected, and an up-to-date knowledge of the threat landscape. Threat intelligence gathering is, therefore, a key capability. This is also why information sharing is a top priority for security leaders and a central notion in almost all cybersecurity regulations.

[10] Downes, L., 2009, The laws of disruption, Basic Books

Addressing the inherent uncertainty can also be done via Bayes' theorem and threat intel driven approaches allow for actions that reduce uncertainty. This is also the very essence of Bayes' formula: it allows us to adjust probability distributions when new information comes in. In that sense, Bayes' formula makes uncertainty reduction very precise (Dekker and Alevizos (2023)[11] provide a more detailed description of how this can work).

Seiersen (2022) provides a data driven approach to information security that is very well suited to a threat-based security approach.[12] His BOOM framework provides five baselines for managing information security. BOOM is his abbreviation for "Baseline Objectives and Optimization Measurements". These are baselines of metrics that, in our view, allow security professionals to define measurable goals for their security strategies without resorting to $p \times i$ approximations. The metrics also help with communicating with non-technical decision-makers about how well the security strategy is performing. This can help address the agency problem.

To illustrate how cybersecurity status and progress can be measured and discussed with business leaders, we will summarize the BOOM framework. The BOOM framework consists of the following five baselines: survival analysis, burn-down metrics, arrival rates, wait times, and escape rates. These baselines require some maturity in organizational and technical setups. They often articulate security agility and ability to absorb new information. These are, as we argued above, important elements of a security strategy that is aimed at uncertainty reduction.

4.1 Survival analysis

The first baseline is about measuring the survival time of events. By understanding how long events (like vulnerabilities or other risk causes) survive in your environment, and how that depends on the type or severity of events, you are reducing the uncertainty about your risk exposure. An example of this baseline is: "50 percent of critical vulnerabilities live for 48 hours or longer." You need to avoid using averages over clusters of types of events and gather as much fine-grained data as possible.

4.2 Burn-down metrics

The second baseline is concerned with the ratio of removed risks (in a certain timeframe) against the total number of new risks that are out there. It measures whether you are mitigating risk faster or slower than the growth of risk. For example: if in the last month you had 100 new vulnerabilities, and your team was able to remove 60, the burn-down rate is 60 percent. Although this is lower than 100 percent, and hence risk is increasing, if the burn-down rate was 50 percent the month before, you still know you are improving. This is a very useful performance metric that developer teams can use to measure their own performance. CISOs can also use them to compare teams to decide on which team to focus on to make the biggest impact on security in the coming period.

4.3 Arrival rates

Burn-down metrics measure how fast you are removing risks, the third baseline is measuring the rate at which risks emerge. Predicting what will happen tomorrow is difficult, but by leveraging intel-feeds and historical data (for your environment) you can build probability curves that show the chances of a vulnerability for one of your technology stacks being reported on in the coming month. Of course, you need to constantly update those probability curves. Arrival rates are useful to know because the arrival of a new vulnerability defines work for your team. This baseline, therefore, helps you make decisions on resource allocation.

4.4 Wait times

The fourth baseline, wait times, is a well-known measurement in operations management. It is measuring the time between arrivals of risk causes, like vulnerabilities. Knowing this metric helps you optimize your security operations teams. However, it should also be used as a leading indicator for risk: if wait times are decreasing, risk is increasing.

4.5 Escape rates

The last baseline is measuring how risks migrate across your environment. In particular, it measures the rate at which risk-causes move from an environment with one state of control to an environment with a lesser state of control. For example,

[11] Dekker, M., and L. Alevizos, "A threat-intelligence driven methodology to incorporate uncertainty in cyber risk analysis and enhance decision making," arXiv.org, February 25, https://bit.ly/3kGomCs

[12] Seiersen, R., 2022, The metrics manifesto, Wiley

it measures the rate at which risks are moving from your development environment to the production environment. In other words, the rate at which those risks “escape”. Modern software development teams are increasing their release velocity. This would increase the escape rate too, unless your security program is able to reduce escape rates without reducing release velocity.

These baselines are relatively easy to explain, do not require deep technical knowledge, and hence facilitate a meaningful conversation with executives and business leaders. It also provides five easy questions business leaders should ask their security teams to find out about their security strategy and progress towards set goals. The nature of these baselines fit the volatility of the threat landscape and incorporate the resulting uncertainty in risk calculations.

5. CONCLUSION

Information security is a highly complex and technical domain. Given the growing role of IT and digitalization in companies and organizations, decision-makers are required to consider the opportunities of IT for the business strategy, the financial risks of the increased IT spend, and the operational risks arising from cybersecurity. Together with the leadership in their company, information security leaders need to overcome the agency and pacing problems and have a meaningful conversation in order to agree and monitor the execution of a security strategy that is aimed at uncertainty reduction. By adopting a threat-based approach combined with metrics that measure security agility they can navigate the volatile environment, reduce uncertainty, and improve the quality of information security decision-making. This helps in moving beyond a risk-based approach towards an uncertainty-based approach in information security decision-making.

FINANCE IN REVOLUTIONARY TIMES

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ABSTRACT

The structural changes of the fourth industrial revolution are considerable. In the financial services sector there is, inevitably, a lot of focus on the technological changes and their impact on financial markets. However, finance has a long history of adapting to technological innovation. Instead, it is consequences of social change that are likely to present the biggest challenge for finance over the next twenty years.

1. INTRODUCTION

The global economy is in the midst of a dramatic structural change, which the World Economic Forum has branded the "fourth industrial revolution". Automation, robotics, digitalization, and communication are driving the upheaval. Indeed, a case can be made that the current wave of change represents the most significant economic and social restructuring in the two-and-a-half centuries that have passed since the first industrial revolution. These changes have dramatic implications for international finance.

The inclination in any period of upheaval is to focus on the technological changes. Technology is the shiny new toy that naturally captivates our attention. But technology is just the starting point for the waves of change that ripple out to wash over every aspect of our lives. To use one obvious example: the combination of internet and laptop has facilitated the flexible working practices that have become especially common since the pandemic. That has immediate and obvious consequences for real estate demand (and thus asset valuations), along with the direction and profitability of the construction sector. For the first time since the original industrial revolution, urban living has become a lifestyle choice rather than an economic necessity for many. That change in real estate use leads to changing patterns of demand for transport infrastructure, food distribution, and service industries. It breaks down the distinction between investment and consumer spending (who is paying for the office desk today?). It arguably alters how members of a society interact with one another. It might even change dating patterns (the number of people finding partners in the workplace has fallen in recent years). This is about much, much more than the latest iteration of a smartphone or the fumbling steps towards artificial intelligence.

In the world of finance there is a similar tendency to focus on the technology as the disruptive influence. Financial market commentators are just as easily seduced by the luster of technology as anyone else – perhaps, considering the dotcom bubble, financial markets are even more at risk of being captivated by the novelty of technology. Certainly, financial technology does have the potential to change many aspects of finance, but finance is an industry that has constantly been disrupted by new technology. Double-entry bookkeeping, the telegraph, and the mainframe computers of the 1970s all revolutionized finance. Banks and other institutions are likely to adapt, just as they have done over the centuries. Just being animated (or scared) by the possibilities of blockchain or artificial intelligence is too narrow a perspective. Finance needs to consider the broader state of the world in which it operates. The challenges for finance from the wider social changes are certain to be more important than the nefarious world of crypto, or automated investment advice. These wider changes will disrupt employment, the global financial model, and raise questions about the allocation of financial capital.

2. EMPLOYMENT, PREJUDICE POLITICS, AND FINANCE

As with previous industrial revolutions, the economic and social changes that arise mean that the relative economic and social positions of individuals will alter. Some people will gain, often dramatically. At a time of innovation, the luck of having the right idea or optimal skills that are suddenly in demand can catapult an individual to higher levels of wealth and social status. At the same time, skills that previously conferred income and status can either be downgraded, or become obsolete. The legal clerk, increasingly automated into a low-status role, may well look with incomprehension and growing resentment at the rise of a social media influencer with a talent for livestreaming their computer gaming skills.

From an individual's perspective, this change in their position in the hierarchy can be hard to comprehend. Someone who is good at their job and diligent in applying themselves to work suddenly finds that their relative economic and social position has deteriorated rapidly. The causes of this relative social shift are complex, but people who are suffering rarely want to hear about complexity. As the world becomes more complex, people naturally crave simplicity. Simplicity is reassuring when the world is hard to comprehend. All too often, this is a situation that encourages scapegoat economics. The simplicity of blaming the personal loss on a minority group can be very appealing: "It is not my fault I lost my job, immigration took it away".

The world is already moving towards scapegoat economics, and the natural political response of prejudice politics ("Vote for me, we will build a wall and keep them out"). The so-called culture wars evident in several democracies are one example, where groups in society are demonized as being unnatural, unfair in their behavior, or in some other way worth "less than" the majority. To someone who has lost social and economic status as a result of the changing world, there is a perverse desire in seeing another group as being "beneath" you. In parts of the world, culture wars can produce deadly consequences.

Prejudice politics is a serious threat to democratic societies. It is also a disproportionate threat in the world of finance. The financial services sector depends, more than most parts of the economy, on what economists so clinically refer to as "human capital". From the relationships of wealth management to the ingenuity of financial engineering it is the quality of the people that matters. Finance requires having the right person, in the right job, at the right time. In a world of prejudice politics, irrational barriers may prevent the right person from being in the right job. These barriers may be formal, with regulation or laws that otherwise create obstacles to movement. Restrictions on immigration are a challenge for a global, skills-based industry like the financial services sector. Just as worrying, these barriers may be the insidious obstacles created by unconscious bias in a society where prejudice is more pervasive and irrelevant personal characteristics take precedence over merit.

> *"The challenges for finance from the wider social changes are certain to be more important than the nefarious world of crypto, or automated investment advice."*

Modern finance requires a high degree of labor flexibility, both geographical and between different roles in the workplace. It is possible that geographical mobility becomes less important in the future as flexible working grows, but the regulation of the financial services sector rather argues against this. Regulators tend to want financial professionals where they can see them, even if there is no actual justification for locating someone in a specific geography. The European Central Bank's insistence that financial personnel move to Frankfurt in the wake of the E.U.-U.K. divorce is a telling example.

Moreover, the financial services sector is a part of the economy that very clearly benefits from diversity amongst its decision-makers. Research in the U.S. shows that workers in financial services firms are paid around 30 percent more than those in less diverse firms. This performance premium reflects the benefits of challenging opinions and examining opportunities and risks from multiple perspectives. A monoculture of thinking is a risk in any economic environment. In a period of structural change, a monoculture of thinking with a tendency to extrapolate from past experience is likely to be a blueprint for failure. The potential for failing to identify new opportunities is obvious. More concerning is that a lack of diversity will obscure serious risks for the financial services sector.

2.1 What prejudice politics means for finance

The financial services sector is not a passive player in the process of structural change. As society reshapes itself, the labor force on which the financial services sector depends will be reshaped. This matters more to finance than to other sectors, because finance is more dependent on the talent of its people. Technology is not going to lessen that dependence on human talent and diverse opinions – if anything it is going to increase it.

3. GLOBALIZATION, DEGLOBALIZATION, AND FINANCE

Finance is still very much a global industry. While the global financial crisis triggered a retreat from globalization into regionalization (or, indeed, bankruptcy) for some, many banks and asset managers continued to operate in a global sphere. Today's economic revolution offers a threat to this global financial model with an increase in economic and general nationalism. Global firms, in any sector, become targets for such nationalism. The tendency is to see this through the lens of government regulation – sanctions, tariffs, and similar measures. That is certainly a threat to the global financial model. But the threat extends beyond just political gestures.

Prejudice politics lends itself to economic nationalism. "It's all the fault of the foreigner" is an argument that has been a politician's excuse for economic problems for centuries. The 1436 bestseller "Libelle of Englyshe Polycye" firmly laid blame for all England's economic woes on the Italians. Economic nationalism can be wielded against all sorts of companies, of course, but the global nature of financial markets renders firms in this sector particularly vulnerable to barriers being imposed. Because the financial services sector is heavily regulated, regulatory barriers to operating globally are a particularly difficult problem. Regulations in different countries do not have to sympathize with each other, and while governments no doubt aim to achieve financial stability in their regulatory regimes it would be naïve to suppose that national interest is not also going to shape the rules that are in place.

These factors mean that an increase in economic nationalism is likely to have financial firms in scope, particularly in the application of non-tariff barriers to trade.

A further challenge from economic nationalism for the financial services sector is the specific field of financial research. Economic nationalism aligns to pure nationalism – and raises potential tensions for a global financial institution. Financial firms have a duty to provide their clients with

objective research. Inevitably that research will be critical of an economy from time to time. Such criticism may fall foul of economic or general nationalism. Certain governments do not like their policies being criticized. Instinctively, this resistance to criticism is attributed to authoritarian regimes, but it can also apply in democracies (where a government's political opponents may seize on research from the financial services sector to further their own agenda). The risk is that by providing independent research for the benefit of their clients, a firm may be subject to barriers to doing business in a country. This can range from exclusion from government deals, to the more serious persecution of a financial firm's employees within the country.

The choice for a financial firm cannot (or should not) be between independent research and research that follows a "party line". But the choice may have to be between independent research that may threaten the conduct of business in a specific country, and not publishing any research on that country. If financial services firms fall silent on parts of the global economy (at least from the perspective of their clients), it diminishes the benefits of being a global financial institution.

While it is easy to characterize nationalism in terms of the nation state, it is worth remembering that economic nationalism may also be practiced by customers of a financial institution. If the world fragments further into nationally motivated spheres of influence, it can become more difficult for financial firms to operate globally. The idea of global values or a global culture within a firm is important, especially in an industry that is so dependent on human capital. But this immediately throws up a challenge – the values of a firm may win the support of its employees and be consistent with the best arguments of economic efficiency, but still be viewed as a challenge to the nationalism of certain groups. For example, support for LGBTQ+ rights is likely to be in the interest of a financial services firm that wants its employees (including the 10 percent or so who will be LGBTQ+) to be as productive as possible and able to work wherever they can contribute most to the firm. At the same time, this stance will be attacked, or even illegal, in certain countries around the world. Indeed, this can extend to sub-nationalism, as the attacks on the values represented by sustainable investment by individual states in the U.S. have demonstrated.

It might be tempting to suggest that financial services firms should simply adopt a neutral stance in the face of such threats. This is not practical, however. Shareholders, employees, and clients increasingly require firms (particularly global firms) to have clearly elaborated principles. Neutrality is increasingly treated as opposition to one's own view, especially when run through the binary filter that social media so often represents.

3.1 What challenging globalization means for finance

Finance remains a global industry, at a time when global firms are being increasingly challenged. The acceptance of a higher regulatory requirement in finance renders the sector peculiarly vulnerable to deglobalization forces, as regulation is often used as a cover for economic nationalism. Like other global entities, financial services firms face the challenge of consistently applying basic human values to a complex global environment.

4. CAPITAL CONTROLS AND FINANCE

While deglobalization threatens financial services firms as global entities, challenging global capital flows threatens the instruments by which financial services firms make money. Perversely, this attack can work on both capital outflows and capital inflows.

Attacking capital outflows is nothing new. Hoarding capital in the domestic economy was a well-established trend of the mercantile era before the 20th century, and indeed has lingered on in several parts of the world into the 21st century. Economic nationalism naturally lends itself to this policy of hoarding. The idea is simple – money should be invested domestically, because that is what should be prioritized. "America First", a policy slogan with a history dating back over a century, is a recurring instance of the idea of hoarding capital. As an idea, it is far from unique to the U.S.

Attacks on capital outflow have extra resonance when they are tied to the movement of production, and thus employment. This circles back to the scapegoat economics arguments.

At the same time, economic nationalism can impose restrictions on capital inflows. Here, the focus is ownership of "our" assets (generally using a very imprecise idea of what "ownership" actually constitutes). The U.S. was very critical

of Japanese purchases of U.S. assets in the 1980s. Today there are wider global concerns about Chinese purchases of overseas assets. A range of reasons are offered – state support for the purchasing investor and national security are often cited. Infamously, the French government considered yoghurt to be a strategic national asset, to prevent foreign capital acquiring dairy firms.

Attacks on both capital outflows and capital inflows are most common in the government sphere. There can even be outright prohibitions on capital flows (most common under the national security excuse). There may also be capital controls, tax penalties, or, of course, disproportionate tax incentives to keep the money at home.

There is also a non-government role around capital flows. Media and public opinion can do damage to a company's brand reputation if the company's investment strategy is cast in a sufficiently negative light. Retail investors tend to have a "home country" bias in their personal investment strategies, and that can enhance the parochialism of popular opinion when it comes to capital flows.

Obviously, attacking the flow on which the financial services sector depends is something that adds a risk to financial firms. Contingency plans need to be in place to deal with the threat. Firms need to be agile enough to deal with sudden restrictions, and to be able to adapt their business to the risk of irrational limits on capital transactions. Investment firms, in particular, need to be prepared to explain and defend their international investment decisions to both a domestic and an international audience.

4.1 What capital restrictions mean for finance

Restrictions on global capital flows is a policy that comes in and out of fashion in financial markets. It certainly seems likely that the risk of restrictions will increase as economic nationalism takes hold. In these circumstances, financial services firms face increased uncertainty about where and how they can undertake business, and will have to adapt their strategies accordingly.

5. CONCLUSION: FINANCE IN REVOLUTIONARY TIMES

While the glamour of fintech is seductive, it is unlikely to be financial services sector technology that is the most disruptive aspect of the fourth industrial revolution. The financial services sector needs to consider the real-world changes and how the social and political response to those changes will shift the risks that surround finance.

Obstacles to employment are increasing between countries, and indeed within countries as groups in society are demonized. Global firms of any nature are subject to attack, and the financial services sector may face increased struggles in the face of economic nationalism. The capital flow that is the raison d'être of the financial services sector is also subject to specific attack, whichever way it is flowing.

How can financial firms respond to this? There are two obvious approaches. The first is to make the economic case for sensible policy responses. Financial services firms are particularly damaged by prejudice politics, and it is appropriate for them to take a stance. Explaining the negative economic consequences of economic nationalism and increased uncertainty can help sway the arguments in favor of a more rational course of action. As the consequences of social policy bleed into economics, it may well become necessary for financial services firms to specifically opine on social issues.

It could be argued that in acting in this fashion, the financial services sector is tackling the symptoms of the problem, not the cause. This is true, but the symptoms are sufficiently corrosive as to warrant urgent treatment. More controversially, the financial services sector might consider attempts to tackle the root causes of the problem. This is not to stand like modern day Luddites in defiance of technological progress. Rather, the financial services sector can look at ways to mobilize capital to have a wider impact in society. There are economic arguments for investing beyond the mechanical output-based approach that is represented by gross domestic product and similar measures. Mobilizing and directing capital in a way that helps maximize the benefits and minimizes the costs of the fourth industrial revolution so as to generate the most beneficial impact for society may be the most important consequence for the financial services sector of these revolutionary times.

FOSTERING DIGITAL OPERATIONAL RESILIENCE IN THE FINANCIAL SERVICES SECTOR IN EUROPE (DORA COMPLIANCE)

ALEXANDRE VANDEPUT | Principal Consultant, Capco

ABSTRACT

The European Union (E.U.) wants to position itself as a world leader in digital innovation in the financial services industry. Subsequent to the digitalization of the provision of financial services to European consumers and businesses, new kinds of digital risks have emerged. To reach that set objective, the E.U. must make sure those key risks are properly controlled. DORA, which stands for Digital Operational Resilience Act, is the answer from the E.U. to the increasing use of ICT systems and third parties for financial institutions' critical operations. This paper explores the key actions that financial institutions will have to undertake to comply with DORA guidelines. The emerging risks will require mitigations such as an appropriate ICT risk management framework, a robust incident management process including classification and reporting, a digital operational resilience testing program, as well as an end-to-end third-party management control framework.

1. THE E.U. DIGITAL FINANCE STRATEGY

The digital finance strategy sets out general guidelines on how Europe can support the digital transformation of finance in the coming years, while regulating its risks. The strategy sets out four main priorities: removing fragmentation in the "digital single market", adapting the E.U. regulatory framework to facilitate digital innovation, promoting data-driven finance, and addressing the challenges and risks associated with digital transformation, including the digital operational resilience enhancement of the financial system.

Embracing digital finance would unleash European innovation and create opportunities to develop better financial products for consumers, including for people currently unable to access financial services. Boosting digital finance would, therefore, support Europe's broader economic transformation.

As digital finance speeds up cross-border operations, it also has the potential to enhance financial market integration in the banking and the capital markets sectors, and thereby strengthening Europe's economic and monetary union.

A strong and vibrant European digital finance sector would strengthen Europe's ability to reinforce its open strategic autonomy in financial services and, by extension, its capacity to regulate and supervise the financial system to protect Europe's financial stability and values.

The fourth priority of the "digital finance strategy" for the E.U. is to address new challenges and risks associated with the digital transformation.

Europe and its financial services sector must embrace all the opportunities offered by the digital revolution. Europe must drive digital finance with strong European market players in the lead. The aim is to make the benefits of digital finance available to European consumers and businesses. And finally, Europe should promote digital finance based on European values and a sound regulation of risks.

At the same time, innovation is changing market structures. Europe is home to many successful fintech startups. Incumbent firms are fundamentally overhauling their business models, often in cooperation with those fintech companies. Technology companies both large (bigtech) and small are increasingly active in financial services. These developments are not only changing the nature of risks to consumers, users, and financial stability, but may also have a significant impact on competition in financial services.

Financial services migrate to digital environments with fragmented ecosystems, comprising interconnected digital service providers falling partially outside financial regulation and supervision. Digital finance may, therefore, make it more challenging for the existing regulatory and supervisory frameworks to safeguard financial stability, consumer protection, market integrity, fair competition, and security. These risks must be addressed to ensure that digital finance enables better financial products for consumers and businesses. The E.U. will, therefore, pay particular attention to the principle of "same activity, same risk, same rules", not least to safeguard the level playing field between existing financial institutions and new market participants. This principle will also apply to another key category of controlled entities, the "critical third-party providers" (CTPPs), which will be controlled as any other financial institution.

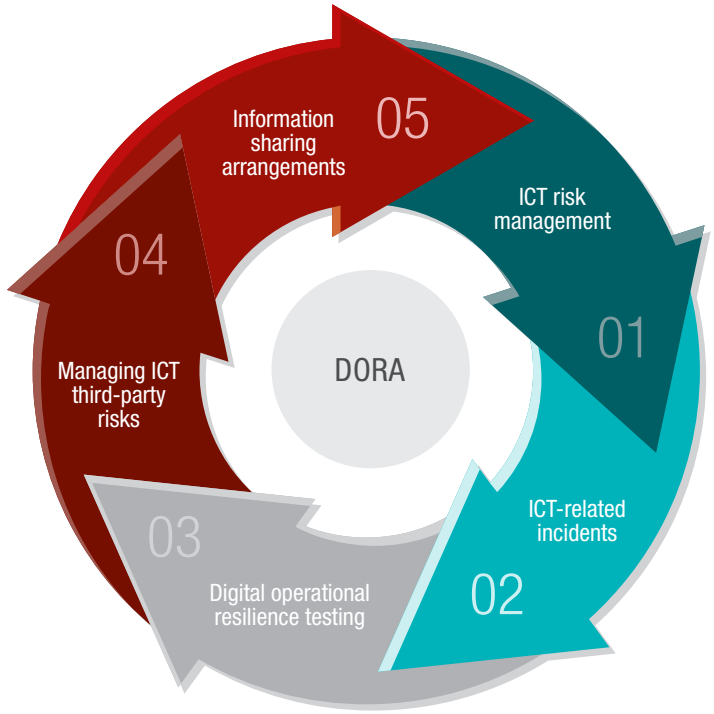
By setting up the Digital Operational Resilience Act (DORA) initiative, the E.U. wants to remediate the current situation:

- the heterogeneity and disparity of ICT (information and communication technologies) security rules out of operational resilience requirements across the E.U. financial services legislation
- the absence of requirements or a multiplication of obligations on the reporting of the same ICT incident to different authorities
- a diversity of digital operational resilience testing frameworks
- a lack of coherent oversight over the activities of third-party providers to financial sector entities.

In response, the E.U. has defined the following five pillars of DORA:

1. ICT risk management
2. ICT incident reporting
3. Digital operational resilience testing
4. ICT third-party risk management
5. Information and intelligence sharing.

Figure 1: DORA five key pillars



2. MAIN PRACTICAL REQUIREMENTS OF DORA

Digital operational resilience is the ability to build, ensure, and test the technological operational integrity of an organization. It ensures that an organization can continue to guarantee the continuity and quality of its services in the face of ICT operational disruptions.

The regulation delivered by the E.U. focuses on harmonizing national rules around operational resilience and cybersecurity. DORA establishes uniform requirements for the security of network and information systems of companies active in the financial services industry as well as critical third parties that provide services related to ICT, such as cloud platforms and data analytics services. DORA creates a regulatory framework in digital operational resilience whereby all in-scope companies will have to make sure they can withstand, respond, and recover from all types of ICT-related disruptions and threats.

DORA will apply to financial entities including credit, payment, and e-money institutions, investment firms, crypto asset service providers and issuers of asset-referenced tokens, central securities depositories, central counterparties, trading venues, trade repositories, managers of alternative investment funds and management companies, data reporting service providers, insurance and reinsurance undertakings, insurance intermediaries, reinsurance intermediaries and ancillary insurance intermediaries, institutions for occupational retirements pensions, credit rating agencies that administrate critical benchmarks, crowdfunding service providers, and securitization repositories. DORA will also apply to ICT third-party service providers designated as "critical" ICT services providers to financial entities (called "critical ICT third-party providers", or CTTPs) through a newly created established oversight framework. The criticality of those third parties will be a function of different parameters: their systemic impact on the stability, continuity, and quality of financial services in the event of a failure, the systemic character of financial institutions relying on them, the degree of reliance of those financial institutions in relation to "critical or important functions" (CIFs) of those institutions, and finally, the degree of substitutability of the ICT third-party provider.

The regulation imposes new requirements divided into five domains or pillars. Some of the requirements imposed by DORA, such as for ICT risk management, are already reflected to a certain extent in existing E.U. guidance; for example, the EBA Guidelines on ICT and security risk management.

It is well understood that the principle of proportionality fully applies to DORA requirements. The degree of applicability of those requirements to the financial institutions will be a function of risks and needs applicable to their specific characteristics in terms of their size and business profiles. The proportionality principle is embedded in the rules of each DORA pillar.

In addition, there are many reasons why the E.U. has opted for a regulation instead of a directive, including the fact that the use of a regulation reduces the regulatory complexity by fostering supervisory convergence – it increases legal certainty while limiting compliance costs. This reduces competitive distortions overall. Consequently, a regulation appears to be the ideal compromise to guarantee a homogeneous and coherent application of all components of the ICT risk management guidelines applied to the E.U. financial sector.

DORA is Lex Specialis with regards to another interrelated Directive focusing on cybersecurity, NIS2.[1] Both entered into force at the end of December 2022, but NIS2 will be applicable three months before DORA. NIS2 is a horizontal legislation, focusing on critical sectors like transport, water distribution, telecom, and healthcare, as well as banking, while DORA is a vertical legislation focusing on financial services only. There are some overlaps between the two legislations, but DORA being Lex Specialis will get priority over NIS2 in cases where both set of rules would regulate the same topic.

As already mentioned, DORA regulation is divided into five pillars, which are described in more detail below.

2.1 Pillar I – ICT risk management

All in all, the key focus of the first pillar is to identify the crown jewels, or critical assets of a financial services firm, and putting in place the necessary ICT risk controls framework to make sure they are properly, and always, protected against all kinds of digital risks.

[1] Network and Information Security Directive (NIS2) is the second set of measures for a high common level of cybersecurity across the Union.

Consequently, firms must identify their "critical or important functions" (CIFs) and map their assets and dependencies, as well as the data that flow through those assets. Firms will need to conduct "business impact analyses" (BIAs) to identify their exposure to severe business disruptions. As a prerequisite, firms will need to set risk tolerances for ICT disruptions supported by key performance indicators and risk metrics.

Alongside this framework, entities will have to use and maintain ICT systems that meet requirements so as to promptly detect anomalous activities, identify all sources of ICT risks on a continuous basis, design and implement security and threat-prevention measures, and promptly activate response and recovery measures. On top of that, there will be a need to identify useful data, through incident reporting, post incidents reviews, and active monitoring, to understand the evolution of cyber risks and support management to shape digital resilience strategies.

Financial institutions are required to create and maintain a sound, comprehensive, and well-documented ICT risk management framework. This must include a dedicated and comprehensive business continuity policy, disaster recovery plan, and communication policy. Institutions shall implement an "information security management system" (ISMS) based on recognized international standards.

At the communication level, it will be required to establish a communication strategy and related planning to actively inform European supervisory authorities[2] (ESAs), clients, and counterparties, as well as the public, on matters related to their cyber threats and incidents.

2.2 Pillar II – ICT-related incidents

DORA will harmonize and streamline the reporting of ICT-related incidents. This obligation is split in three main requirements. The first is to make sure that financial institutions establish and implement a management process to monitor and log ICT-related incidents, as well as implementing early warning indicators. Secondly, financial institutions will have to classify ICT-related incidents and report "significant" ICT-related incidents to a central E.U. hub. Only ICT-related incidents that are deemed major must be reported to the competent authorities. Finally, financial institutions should submit initial, intermediate, and final reports to the competent authorities, and must inform their users and clients where the incident has, or may have an impact on their financial interests. Cyber threats will be reported on a voluntary basis only. There will be a need to assess the effectiveness of the post-incident review and thematic analysis capabilities to learn from disruptions and to anticipate and avoid future incidents.

2.3 Pillar III – Digital operational resilience testing

Two types of testing will have to be implemented. The first will apply to all financial institutions and will cover a full range of tests, including vulnerability assessments and scans, open-source analyses, network security assessments, gap analyses, physical security reviews, questionnaires and scanning software solutions, source code reviews, scenario-based tests, compatibility testings, performance testings, and end-to-end testings or penetration testings.

The second type will apply to financial entities identified as "significant" or "systemic" by the competent authorities. Those tests will be based on the "threat-led penetration testing" (TLPT) model, will have to happen every three years, will need to be delivered by an external entity, and their results will be formalized in an attestation.

Financial institutions will be required to conduct regular digital operational resilience testings by independent internal or external parties. This comprehensive digital operational resilience testing program will be done in consideration of the proportionality principle. Hence, no internal tester will be allowed for systemic institutions, the threat intelligence will always be delivered by an external party. This program should include a range of assessments, tests, methodologies, practices and tools, procedures, and policies to prioritize, classify, and remedy defects and ensure all are fully addressed. Threat-led penetration testing should be developed in line with the ECB's existing TIBER-E.U. framework.[3]

TIBER-E.U. framework is the current framework that delivers a controlled, bespoke, intelligence-led red team test of entities' critical live production systems. Intelligence-led red team tests mimic the "tactics, techniques, and procedures" (TTPs) of real-life threat actors who, on the basis of threat intelligence, are perceived as posing a genuine threat to these entities. An intelligence-led red team test involves the use of a variety of

[2] European Banking Authority (EBA), European Insurance and Occupational Pensions Authority (EIPOA), and European Securities and Markets Authority (ESMA)
[3] European framework for threat intelligence-based ethical red-teaming.

techniques to simulate an attack on an entity's critical and important functions and underlying systems, meaning its people, processes, and technologies. It helps an entity assess its protection, detection, and response capabilities.

A test completion attestation will be issued, together with a summary of the relevant findings and remediation plans. There is a possibility for pooled TLPT for ICT critical TPP (CTPPs) providing the same service is provided to several financial institutions.

2.4 Pillar IV – Managing third-party risks

DORA will prescribe strict content requirements for contracts between financial entities and ICT third-party service providers.

These elements cover minimum aspects deemed crucial to enable complete monitoring by the financial institution of ICT third-party risk throughout the conclusion, performance, termination, and post-contractual stages of their relationship.

Here, key building blocks of third-party or supply chain management framework are described.

There is a need to develop a structured third-party engagements register. Financial institutions can start by leveraging their actual outsourcing register, as this was already needed to comply with the EBA Guidelines on Outsourcing, which came into force in September 2019, while making sure that the relevant fields are added in order to reflect DORA compliance scope. Indeed, the scope now includes not only intra- and extra-group outsourcing engagements but also all third parties, which is a much broader scope.

The focus of DORA is not outsourcing versus non-outsourcing but on the level of materiality, or criticality of the supplier, instead. This exercise is done through the lens of the service receiver, and the register needs to be considered from a legal entity standpoint. Furthermore, financial institutions will need to make sure that all critical sub-contractors are properly identified. More specifically, entities are to engage in an in-depth analysis of sub-contracting arrangements, especially when concluded with ICT third-party providers established in a third country.

For critical or important functions, financial institutions must assess whether and how potentially long or complex chains of subcontracting may impact their ability to fully monitor the contracted functions, and the competent authority's ability to effectively supervise the institution. The only contractual requirements relating to subcontracting set out in DORA are for the contract to specify whether subcontracting is allowed, the conditions thereof, and the locations of subcontracting functions, services, and data processing activities.

On the contractual side, DORA sets out several requirements for contracts between financial institutions and ICT third-party suppliers. These will impact existing and new contracts. There will be more extensive requirements applying to those contracts that support critical or important functions. Again, the contractual requirements are closely aligned to the EBA Guidelines on outsourcing arrangements. Financial institutions will have to ensure that those contractual agreements include the locations where data is processed, as well as the service level descriptions accompanied by qualitative and quantitative performance targets, the reporting obligations, the rights of audit and access, and the circumstances in which such contracts must be terminated.

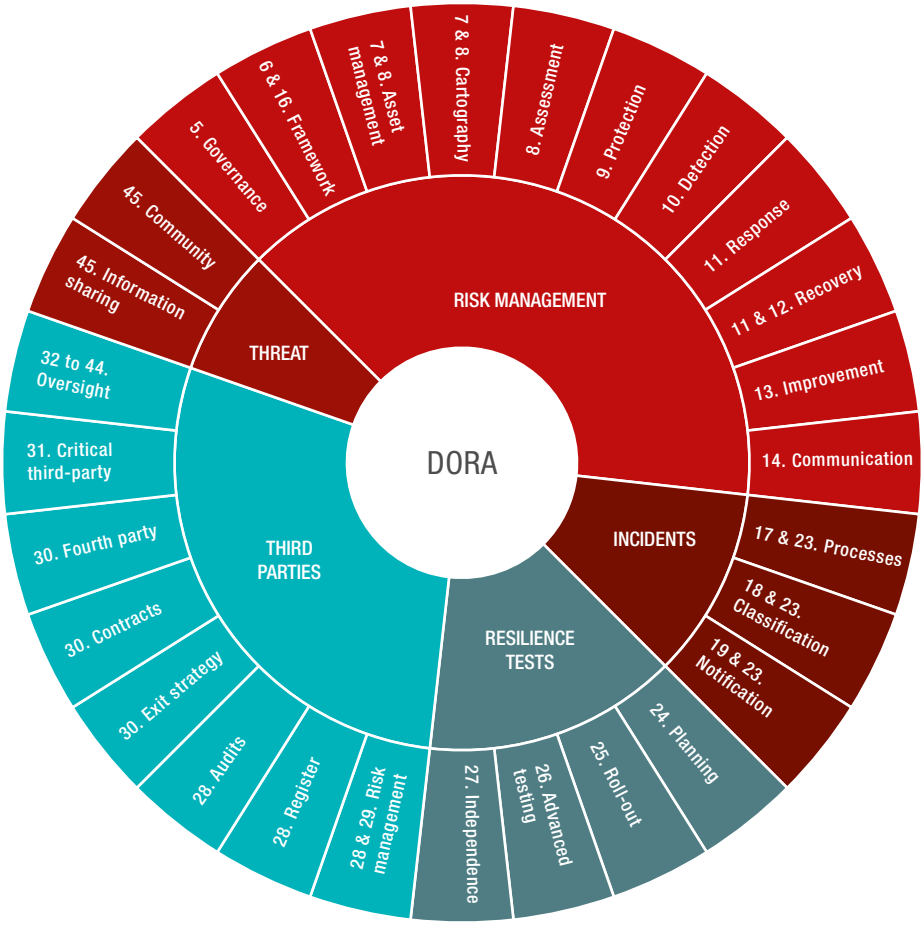
Contracts with third parties will need to include personal data-related provisions on accessibility, availability, integrity, security, and protection of personal data, and guarantees for access, recover, and return in the case of failures of the ICT third-party service provider, as well as clear termination rights and dedicated exit strategies.

As a preliminary assessment, firms will have to conduct concentration risk assessments of all contracts with ICT third parties that support the delivery of critical or important functions (CIFs). This will be based on a substitutability assessment, as well as taking into account multiple contractual agreements in relation to the provision of services with the same ICT third-party provider or with closely connected ones. On that note, the adoption of a multi-vendor approach is considered as recommended, but optional, in order to demonstrate a credible resilience framework.

The regulation seeks convergence on supervisory approach regarding ICT third-party risk in the financial services sector by subjecting critical ICT third-party service providers (CTTPs) to an E.U. oversight framework. To that end, the E.U. has developed a new harmonized legislative framework that will grant new and substantial supervisory powers to newly designated ESA as "lead overseer" in order to adequately monitor critical third parties at a pan-European scale.

CTTPs that do not as yet have a subsidiary in the E.U. will have 12 months to do so in one of the member states.

Figure 2: Main DORA topics and articles applying to financial institutions



2.5 Pillar IV – Information sharing agreement

DORA will allow financial institutions to exchange cyber-threat information and intelligence among themselves and with the ESAs. The key focus here will be to raise awareness about ICT risk in the financial services sector and to minimize the impact of ongoing and upcoming threats. The principle will be a voluntary exchange amongst financial institutions of cyber-threat information and intelligence in trusted communities. Elements that could be reported are indicators of compromise, tactics and techniques, and cybersecurity alerts.

3. ENFORCEMENT

The proposal has passed through the E.U.'s ordinary legislative procedure. The draft law adopted by the European Commission on September 24th, 2020, was submitted to the European Parliament for review and approval on November 10th, 2022. The final version of the text was finally approved by the Council on December 14th, 2022. The text was then published in the Official Journal of the European Union on December 27th, 2022. Finally, after 20 calendar days, DORA entered into force on January 16th, 2023. DORA will, therefore, apply as of January 17th, 2025, after the transitional period of 24 months. Regulatory Technical Standards (RTSs) and Implementation Technical Standards (ITSs) guidelines will be issued subsequently.

4. NEXT STEPS

Financial institutions that currently fall within the scope of the European Commission should assess the gaps between their operating models and the expanded regulations and should then start to plan accordingly to adapt to the upcoming changes.

To be prepared, we recommend that organizations take the following steps:

1. **Act now to improve your operational resilience awareness:** involve general staff and senior management. This is not a tick-box exercise, as it needs to focus on the full scope of DORA and encompassing its organizational, technology, and processes impacts.

2. **Follow-up on level 2 texts that will define RTSs and ITSs:** those elements will be delivered jointly by all involved ESAs[4] in a time period spanning 12 to 24 months after the effect date of DORA. Of course, one should not wait for the full disclosure to take place, as there are still a lot of requirements that are clearly defined. Additionally, financial institutions will have some kind of flexibility to leverage existing capabilities. For instance, financial institutions can start leveraging the ongoing work on consolidated and sub-consolidated registers of information for all ICT third-party providers, as well as material subcontractors, as it is currently imposed by the EBA guidelines on outsourcing. Another example is the process of ICT incident management that can be fully harmonized with already existing processes dedicated to PSD2 or GDPR incident reporting.

3. **Perform a maturity assessment against DORA requirements:** with associated gap analysis and mitigation plans related to policies, procedures, processes, and capabilities to reach compliance. Gap analysis needs be done for the five pillars of DORA. First and foremost, at the ICT risk management level, where the overall existing governance, the organization, and the ICT risk control framework will be mapped against the obligations as set forth in DORA. Then, there is a need to have a thorough look at the detection, management, and classification of ICT-related incidents and potential cyber threats, as institutions will have the possibility to report them on a voluntary basis. On that level, the need is to assess the impact and root causes of those incidents, as well as defining the communication plan. The resilience testing program will be analyzed, where a risk-based approach will be adopted, taking into account the proportionality principle and adequate consideration of evolving ICT risk landscape, the criticality of assets, and services provided. Firms will define the range of assessments, test scenarios, methodologies, practices, tools, and external parties needed to support digital operational resilience testing programs. At the level of third-party management, there is a need to have a close look at the strategy and policies to put in place, the assessment practices, the exit strategies and plans, as well as the contractual terms. And finally, when working on the information and intelligence sharing model to put in place, the confidentiality and data protection aspects will be key.

4. **Make provisions for budgetary planning:** in accordance with the proportionality of the estimated efforts needed to apply the required changes. As those budgetary cycles are quite often long, it is important to start aligning early with the required stakeholders able to define the best delivery approach. At that stage, alignment will be needed with the IT and transformation teams on a transversal and end-to-end perspective. However, before doing this, we recommend working on a clear and robust DORA compliance implementation roadmap. This exercise should include a project plan and the necessary capacity planning.

5. **Adopt one standard to assess your controls maturity:** if we take a step back, one should consider the full scope of compliance that any financial institution is currently facing. We previously mentioned NIS2, which has also come into force.[5] From an information security risk framework, entities are often applying different standards according to their risk appetite, risk perimeter, and risk culture. Our approach is to encapsulate all controls into the prominent ISO 27000 set of standards. We noticed that financial institutions are facing multiple regulatory obligations: they need to comply with different standards (PCI-DSS[6] for payments-related activities, for example) and they are facing a number of binding guidelines, such as EBA's on outsourcing and on ICT and security risk. We advise firms to consider all those and formalize the right level of control into the ISO 27002 controls set. Any remaining requirements need to be taken care of separately. For example, the digital operational resilience testing requirements cannot fit into this framework. Consequently, they need to be considered independently.

[4] European Supervisory Authorities, composed of the EBA, the ESMA, and the EIOPA.
[5] NIS2 will be transposed into national laws in October 2024
[6] Payment Card Industry – Data Security Standard

6. **Ensure your current controls are properly implemented:** based on our observations, lots of key ICT-related controls can still be further improved and integrated into the overall ICT risk management framework of financial institutions. For example, building and maintaining core IT competences could be necessary, also at the board level. The management of ICT risks may still be underestimated and poorly applied, like on roles and responsibilities or in terms of risk treatment and monitoring levels. The classification of IT assets, including related data, and configuration management is too often neglected. There is often no clear alignment with IT security best practices, like on monitoring and detection capabilities, prevention of data loss, system hardening, end-of-life systems management, privileged access management, segregation of duties, or exit plans. Furthermore, we see too many end-user computing applications that require close attention and can generate data leakage issues. There is quite often inadequate experience with IT continuity and security testing, which requires a complete and end-to-end view on prior identification of impacted systems chains.

5. CONCLUSION

The E.U., with its "digital finance package", wants to foster competition and innovation in the financial services sector, by giving consumers access to innovative financial products while ensuring consumer protection and financial stability. One of the main priorities of the digital finance strategy is enhancement of the digital operational resilience of the financial system. DORA was designed to mitigate risks arising out of the ever-increasing dependency of the financial services sector on software and digital processes. In this paper, we extensively explained what the key focus areas of this regulation are, by describing the key actions that banks and other financial institutions need to implement from an ICT risk management framework, incident and testing management, as well as how they will manage third parties in the future. Just as importantly, how they will share information among themselves to make the E.U. a more secure place, where competition and innovation can grow in a controlled and positive environment, for all.

DO AI+VR SURVEILLANCE TECHNOLOGIES IMPROVE INCLUSION OR MAKE US BOILING FROGS?[1]

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ABSTRACT

The title of the article references the story of the boiling frog, a metaphor that warns people of the danger of not noticing gradual changes and suffering consequences for it. In both our work and personal life, artificial intelligence (AI) and augmented reality (AR) surveillance is becoming more common at a gradual pace, and less obvious in its intrusive nature due to convenient wearables and lifestyle choices. Without consent, surveillance is a violation of our basic human right to liberty and the right to freedom of opinion and expression. In this article, we explore how to use AI+VR productively, with a neurodiverse and ability inclusive mindset, to benefit people and businesses. Similar to surveillance in the workplace, we advocate that gamers should be informed of the type of surveillance that has been put in place to track them and potentially influencing their behavior. They should have full access to their diagnostics if eye tracking or other motion detection technologies are used in assessing their "health status", and such applications should be based on free, prior, and informed consent (FPIC).

1. INTRODUCTION

New technologies demand societal conversations about how they should be used – and how they should not.

In general, no one wants their behavior to be monitored and scored without consent. They certainly do not want to be manipulated. However, whether we like it or not, society will be increasingly exposed to the risk of hidden manipulation through surveillance technologies, often involving artificial intelligence (AI) and/or virtual or augmented reality (VR and AR) or a combination of them.

Without consent, surveillance is a violation of our basic human right to liberty and the right to freedom of opinion and expression. However, with free, prior, and informed consent (FPIC), the story could be completely different. There are many examples. One example is healthcare apps, which when used appropriately, can improve the timeliness, accessibility, and affordability of health advice. Another would be training in a virtual environment – neurodiversity and inclusion improve when individuals can make active decisions on privacy or optimize an environment that best suits their needs.

[1] We would like to thank Karin Halliday, ESG Investment Specialist – Australia, Ida Choy, U.S. national fencing competitor, and Pascal Knowles, student at the University of Chicago, for their comments in this article.

> *"The boiling frog story is often used as a metaphor for the inability of people to react to significant changes that occur gradually or to events that have become commonplace."*

Source: https://bit.ly/3KGPCeK

2. IN TECHNOLOGY WE TRUST

Without more information about the surveillance capability that is built into the technologies we use, it would be difficult to decide what type and what level of surveillance is acceptable.

Emerging use cases continue to demand our attention. The purpose of this article is to highlight specific use cases using artificial intelligence (AI) and virtual reality (VR) surveillance at work, in training, and at leisure.

At work, how should employees respond where the digital tools they use have increased surveillance capabilities? What if there is the potential for data to be collected every time employees respond to a Teams chat or give a thumbs up? What should employees or investors expect of companies that use workplace surveillance technologies?

In training, what types of skills can benefit most from AI+VR enabled surveillance?

At leisure, how should we fight virtual reality (VR) and augmented reality (AR) entertainment activities that are prone to making users addicted? Is this a topic that responsible investors should engage with companies? How should we go about it?

3. SURVEILLANCE AT WORK

The use of people analytics – defined by Harvard Business Review (HBR)[2] as "statistical insights from employee data to make talent management decisions" – accelerated during COVID-19.

When the pandemic's lockdowns and social distancing measures forced workplace interactions to be conducted remotely, communication became more digital and electronic. While these formats allow for the convenience of recording and re-watching meetings and webinars, it also allows for them to be analyzed by AI algorithms.

Companies that use eyeball and gesture tracking technologies to measure attention spans and sentiment may suggest the data will be used to strengthen corporate culture. Everyone with a decent amount of screen time could potentially be given a score. But how does it really work and could scores be contested or validated by those being measured?

There are different types of people analytics. Some are used to strengthen culture by analyzing relationships, measuring the quality and intensity of interactions between individuals and groups. Some measure silos within an organization. They identify clusters of closed loop interactions. Others measure productivity and efficiencies, which are increasingly being used as an input factor to determine employee compensation. Unsurprisingly, the big bosses are identified as key "influencers" as many employees flocked to "like" any posts from their top executives. This is one example where "what gets measured gets managed" fails as the only thing that seems to be managed here is the ego of the influencer.

A recent U.K. government inquiry into artificial intelligence (AI) at work led to the publication of the report in November 2021, entitled: The New Frontier: Artificial Intelligence at Work.[3] The report finds that AI offers invaluable opportunities to create new work and improve the quality of work if it is designed and deployed with this as an objective. However, we find that this potential has not as yet been fully utilized. Instead, a growing body of evidence points to significant negative impacts on the conditions and quality of work across the U.K.

[2] https://bit.ly/2RjLKB6
[3] https://bit.ly/3k5CuVe

Pervasive monitoring and target setting technologies, in particular, are associated with pronounced negative impacts on mental and physical wellbeing as workers experience the extreme pressure of constant, real-time micro-management and automated assessment. A core source of anxiety is a pronounced sense of unfairness and lack of agency around automated decisions that determine access or fundamental aspects of work. The challenges identified lie between data protection, labor, and equality laws. Even with best intentions, such as surveillance aimed at safeguarding mental health and safety, with early identification of suicidal inclination, the approach could still be criticized for violating privacy.[4]

Taking an empirical approach, the Workforce Disclosure Initiative (WDI) of ShareAction, a non-governmental organization that promotes responsible investment, introduced a new question in the 2021 version of its workforce survey, asking companies to "describe any workforce surveillance measures used to monitor workers, and how the company ensures this does not have a disproportionate impact on workers' right to privacy." The results are shared in the "Investors' expectations on ethical AI in human capital management" white paper.[5]

Some interesting facts:

1. 60 percent of the 173 companies that responded to the survey answered this newly added question in 2021.
2. Companies did not use the most intrusive forms of surveillance, such as home video surveillance and screen recording, potentially suggesting some level of consideration for the privacy impacts of these measures.
3. Lack of free, prior, and informed (FPIC) consent: however, too few companies are involving workers in their surveillance measures. Levels of worker engagement were considerably lower than general considerations around data protections and workers' right to privacy, with just 11 percent of companies providing data on this. Without free, prior, and informed consent (FPIC), workplace surveillance does not meet investors' expectations on situations where basic human rights need to be protected.

Addressing human rights risks in the supply chain

The nature of online-offline jobs may at times require human rights impact assessments. For example, it has long been recognized that social media content moderators who may be able to work from home and work flexible hours are prone to mental health risks.[6] In such circumstances, companies should have in place proper monitoring of its supply chain to ensure that adequate support is provided for contractors and employees up the chain. This is aligned with the compliance of the U.K. Modern Slavery Act, French Duty of Vigilance, German Supply Chain Law, Hong Kong Modern Slavery Bill, and California Transparency in Supply Chain Act, amongst others.

Investors should expect companies to have in place programs that measure and disclose the effectiveness of grievance mechanisms. Access to remedy programs should also be put in place so that investors can evaluate if salient human rights risks are adequately addressed according to the three-pillar model of the U.N. Guiding Principles for Business and Human Rights.

Despite potential risks, there are potential benefits, such as:

1. **Improve work access:** online chat customer services open up the economy, creating jobs. Many websites now have a surveillance function that measures response time for tasks, such as filling in a form. Technologies are able to identify situations where users get stuck and prompt the use of live chat functions for help.
2. **Improve inclusion:** virtual on-boarding and virtual reality (VR) technologies help to mask certain characteristics by choice of the employee and make the experience more positive for the individual. There are hardware issues that need to be overcome for VR to be inclusive for everyone.

[4] Apple Podcasts, 2022, "Who watches AI watching students?" In machines we trust, https://apple.co/3W1aTBv
[5] https://bit.ly/3Iz6bYD; page 41
[6] https://bit.ly/2GzT2Lf

The most obvious one being supporting users who are blind, visually impaired, or have speech difficulties. The questions we ask companies include: how will Braille be incorporated? Or maybe a talk back functionality?

3. **Level the playing field:** the use of VR in a work setting can be used as a tool to level the playing field and remove bias. It should foster equality where people will be judged more by actions rather than by physical appearance.

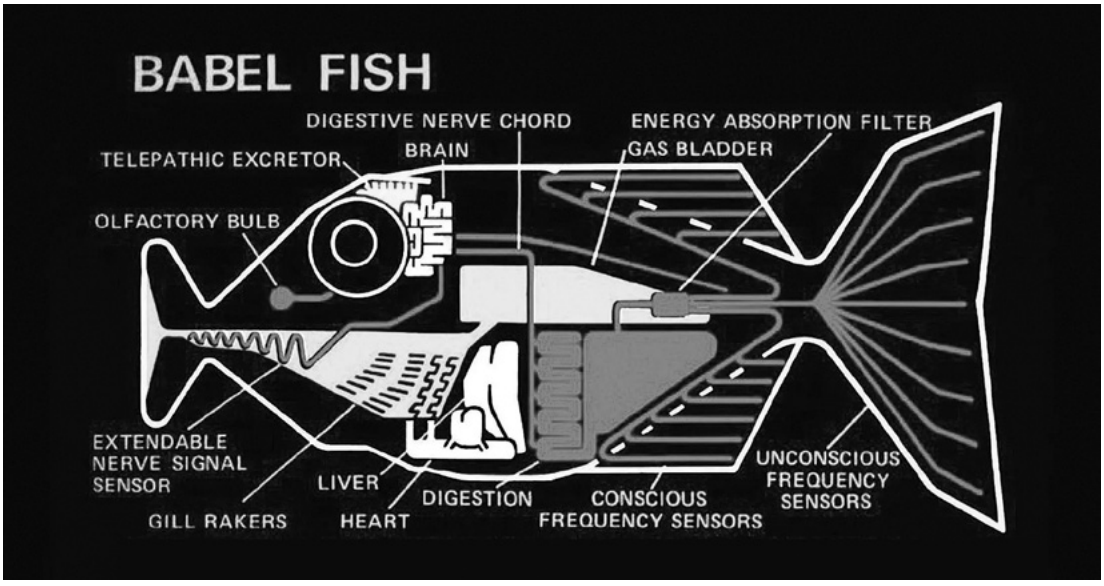
4. **Customization to optimize personal environment:** augmented reality (AR) full immersion – companies could offer hybrid workers more choices in environments that they work in. If the office lights and noises are too loud and bright, with AR these environmental settings can be adjusted to the users' own preferences based on how they work best.

5. **Break down language barriers:** conversing with colleagues in overseas offices is often conducted in one shared language, but that can exclude others and hinder progress. With advancements in VR and AR, translation can be done in real-time, such as using Google's AR glasses[7] – similar to the Babel Fish, the universal translator from Douglas Adams's 1979 novel, The Hitchhiker's Guide to the Galaxy (Figure 1).

4. THE BENEFITS OF VR AND NEURODIVERSITY

As we learn more about neurodiversity and embrace the valuable benefits that thinking differently can bring to an organization, the role of VR could make it easier to create a more equitable working environment. Those who are neurodiverse continue to be largely misunderstood, misdiagnosed, and misrepresented and yet neurodiversity is more common than you might think. Estimates vary across geographies and age groups, but a recent study by Deloitte, suggest that roughly 10 to 20 percent of the global population is considered to be neurodivergent.[8] VR can provide a greater immersive experience and allow the workplace to address the different needs that many neurodiverse individuals require. This could be addressing the issues around sensory overload, for example, that workplaces can often bring. These new

Figure 1: The Babel fish, the universal translator



Source: https://bit.ly/3mbdJld

[7] https://futureiot.tech/googles-new-ar-glasses-translate-language-in-real-time/
[8] Mahto, M., S. Hatfield, B. Sniderman, and S. K. Hogan, 2022, "A rising tide lifts all boats: Creating a better work environment for all by embracing neurodiversity, Deloitte Insights, https://bit.ly/3QrhNPx

immersive environments bring together colleagues, whether they are neurotypical or not, to operate at their best and be as productive as they can.

Hutson (2022)[9] looked at how VR could be used to level the proverbial "playing field" and allow an equal footing for a more inclusive audience when it came to training and education. How those that are considered to be unable to operate within social norms could leverage the technology of VR. On a practical level, using VR could open a talent pool that is under-utilized and underrepresented in today's workforce. In the U.S., for example, it is estimated that 85 percent of people on the autism spectrum are unemployed, compared to 4.2 percent of the overall population.[10]

4.1 Surveillance in training

Another use case is training – with FPIC, it is aimed at improving performance of those knowingly being measured. What types of skills would benefit most from virtual environment training? Some training can be difficult to organize, logistically complicated, and costly, such as medical surgery. VR training is scalable, provides a greater degree of freedom to create and control virtual environments, isolating factors of influence for targeted improvement.

In an early study, surgeons who received Minimally Invasive Surgical Trainer – Virtual Reality (MIST-VR) training on laparoscopic procedures performed surgery significantly faster than the control group, which received traditional training without the VR component. The study concludes that VR training allows repeated practice of realistically complicated maneuvers, and hence improves psychomotor skills. However, it does not necessarily improve specific procedural knowledge, anatomy and decision-making abilities, and performance may plateau when it achieves maximum efficiency.[11]

This suggests that there may be limits to VR training for "open" skills – defined as skills performing in a variable environment – compared to "closed"' skills, which occur in a stable and predictable environment, where the timing of the skill is self-paced and, to a large extent, the performer determines the place where the skill will be performed.

4.2 Surveillance in leisure

According to Fortune Business Insights, the global gaming market is projected to grow from U.S.$229.16 billion in 2021 to U.S.$545.98 billion in 2028.[12] Metaverse, defined as a collective virtual open space, created by the convergence of virtually enhanced physical and digital reality,[13] is expected to not only make games more engaging through AR and VR, but also lead to a more personalized experience and monetization.

The metaverse is to be powered by AI, including the use of Generative Pre-trained Transformer (GPT) for machine storytelling, e.g., Promethean AI; gesture recognition to improve real life and computer interface; and natural language processing (NLP), including real-time sentiment analysis, emotion analysis, and text classification to enhance user-directed experience. Algorithms are expected to become more accurate at predicting outcomes based on user responses without being explicitly programmed to do so.

Many observers expect the role of the metaverse to move beyond just gaming and to impact many parts of society and the global economy. From industrial use cases of creating digital twins to healthcare settings, the metaverse is creating new channels for the delivery of healthcare. Just recently, the government of Dubai presented more detail about its own metaverse strategy and how it envisions the sector supporting as many as 40,000 additional virtual jobs and adding U.S.$4billion to the city's GDP in five years.[14]

[9] Hutson, J., 2022, "Social virtual reality: neurodivergence and inclusivity in the metaverse," Societies, https://bit.ly/3CxTN7w

[10] Deloitte analysis; Centers for Disease Control and Prevention, "Data & statistics on Autism Spectrum Disorder," https://bit.ly/3QnGPz5; The Yale Center for Dyslexia & Creativity, "Dyslexia FAQ," https://bit.ly/3Gq7kiE; Dyslexia Association of India, "Dyslexia," https://bit.ly/3IziLHr; Gov.uk, "Research and analysis: Simone: dyslexic user," https://bit.ly/3GOUYIt; Pesce, N. L., 2019, "Most college grads with autism can't find jobs. This group is fixing that," MarketWatch, April 2, https://on.mktw.net/2NdCaCW

[11] Grantcharov, T. P., V. B. Kristiansen, J. Bendix, J. Bardram, J. Rosenberg, and P. Funch-Jensen, 2003, "Randomized clinical trial of virtual reality simulation for laparoscopic skills training," British Journal of Surgery 91:2, 146–150

[12] https://bit.ly/3ZkWAuE

[13] https://gtnr.it/3Zn4Mub

[14] https://bit.ly/3WYbPYI

Whatever it will be used for, issues around human rights need to be grappled with just like the physical world.

As users, how do we address the issue that when we enter these virtual worlds, we do not really have autonomy of what we do? Every time we do anything it can be at the discretion of the corporation that has created that environment. The software will know everything we do and can analyze our movements. By knowing what we do, where we look, what we say, we will be under constant surveillance. Just like how our clicks on websites are tracked and analyzed, will our interactions be recorded and analyzed in these virtual environments? Moreover, the identities we create in there are often pre-ordained by the host on the environment. Users select their features, the items they wear, and all stored on a central database, tracked and controlled by the host. These are the issues that many people associate with the Web 2.0. For many believers, Web3 potentially partially solves some of these issues, as our identities are removed from these hosts and instead kept and controlled by the user as we move around these different virtual worlds.

However, being analyzed and tracked is not limited to being in these virtual worlds, we need to think about the devices that we will be using in both the physical and the virtual worlds. Devices such as glasses, headsets, hand-held and other haptic devices, and finally brain connected devices. In many instances, one can imagine them being used to track our eye movements, how our pulse quickens, the changes in our gait, or how our brain waves change as we note something of interest. All of these can offer valuable data to relevant organizations – advertisers, retailers, and insurance companies, to name a few.

A question we need to ask ourselves is whether society will tolerate forward facing cameras being fitted in augmented reality glasses, giving them the ability to watch our every move. Certainly, this was an issue with the early endeavors of Google Glass,[15] to the point where a bar in Seattle banned their use due to privacy issues.[16] What information is recorded by these devices needs to be understood and clear boundaries set. More sinister activities can be imagined through the hijacking of these devices by nefarious actors. Security will, therefore, be paramount, as it is with all internet of things (IoT) devices.

Some of these are surveillance technologies, which have been retired due to privacy concerns. For example, Microsoft recently decided to retire emotion recognition, an outcome of adhering to their own updated responsible AI standards.[17] Would blocking the use of detected emotional states make it harder to learn about gaming addiction warning signs? If so, it would be harder to learn users' patterns and know when to intervene. More broadly, should all types of emotion detections be retired?

Studies of eye movement have become an essential tool for basic neuroscience research. It is built on over a decade of scientific research into how eye tracing could detect anxiety and depression,[18] because eye movements of patients with mental disorders differ from those with healthy controls.[19]

Research into gaming disorder[20] and the user-avatar relationship suggest that idealized avatars increase avatar identification, which increases the risk of gaming addiction.[21] If eye tracking technologies can be used in parallel to identify early addiction, anxiety, and mental health issues, companies have an opportunity to amplify the opportunities of responsible gaming and manage the downside risks.

The World Health Organization (WHO) added "gaming disorder" to its medical reference book, International Classification of Diseases. The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5) lists

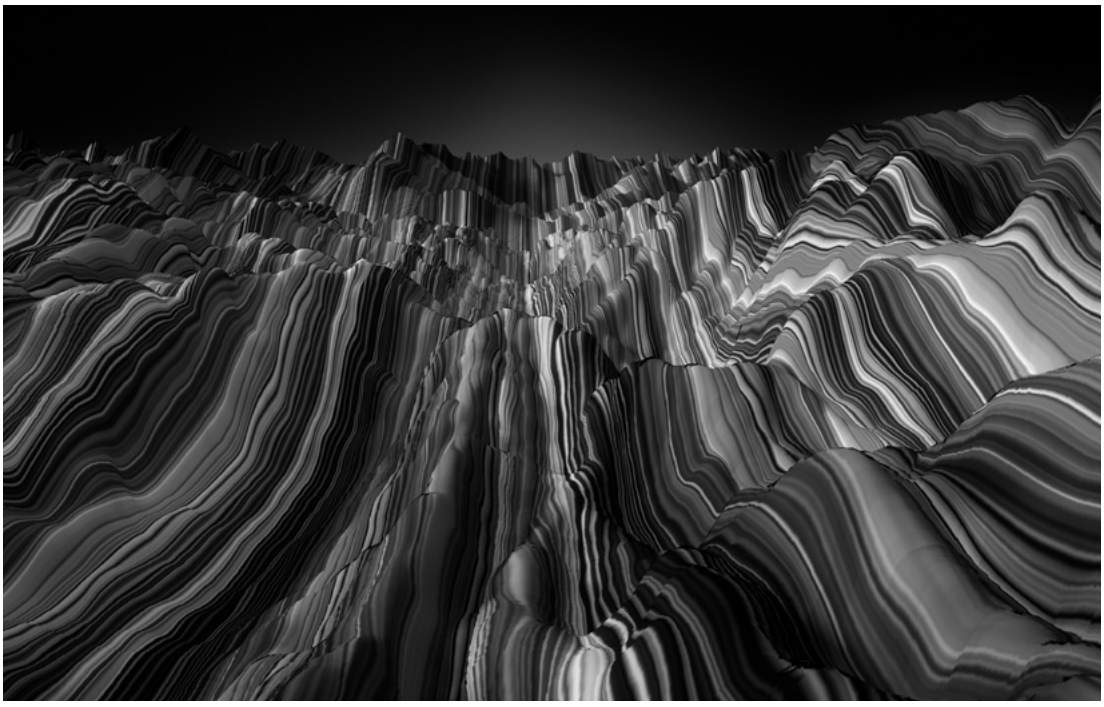
[15] https://bit.ly/2RYXXvN
[16] https://bit.ly/3ZjsHL7
[17] https://bit.ly/3GsPviS
[18] Armstrong, T., and B. Olatunji, 2012, "Eye tracking of attention in the affective disorders: a meta-analytic review and synthesis," Clinical Psychology Review 32:8, 704-723
[19] Shishido, E., S. Ogawa, S. Miyata, M. Yamamoto, T. Inada, and N. Ozaki, 2019, "Application of eye trackers for understanding mental disorders: cases for schizophrenia and autism spectrum disorder," Neuropsychopharmacology Reports 2019; 39: 72-77
[20] Gaming disorder is defined in the 11th Revision of the International Classification of Diseases (ICD-11) as a pattern of gaming behavior ("digital-gaming" or "video-gaming") characterized by impaired control over gaming, increasing priority given to gaming over other activities to the extent that gaming takes precedence over other interests and daily activities, and continuation or escalation of gaming despite the occurrence of negative consequences. https://bit.ly/3GpRdBS
[21] Tiziana, M., C. Imperato, and F. Sibilla, 2019, "Does avatar's character and emotional bond expose to gaming addiction? Two studies on virtual self-discrepancy, avatar identification and gaming addiction in massively multiplayer online role-playing game player," Computers in Human Behaviour 92, 297-395. Szolin, K., D. Kuss, F. Nuyens, and M. Griffiths, 2022, "Gaming disorder: a systematic review exploring the user-avatar relationship in videogames," Computers in Human Behaviour 128, 107-124.
[22] https://bit.ly/2HTDL8V

"internet gaming disorder" as a proposed condition.[22] Gaming disorder or addiction is, therefore, considered a possible mental health issue[23] and requires the attention of those concerned about the right to health, or SDG3: good health and wellbeing.

According to U.K. Rehab[24] – part of an international non-profit organization providing health and social care, training and education, rehabilitation, employment, and commercial services – diagnoses of gaming addiction identify the compulsive playing of video games to the extent to which such behavior causes physical and/or mental harm, or other detrimental effects, to the gamer.

Although a survey, which leveraged the Reddit and Amazon platforms, conducted in December 2021 shows that 77 percent respondents believe that the Metaverse could cause harm to modern society due to addiction to a simulated reality, the survey also highlighted that we should not rule out the potential benefits, such as new business opportunities, increasing creativity and imagination, and introducing new experiences and improving experiences without taking extreme risks.[25]

Similar to surveillance in the workplace, gamers should be informed of the type of surveillance that has been put in place to track them and potentially influencing their behavior. Gamers should have full access to their diagnostics if eye tracking or other motion detection technologies are used in assessing their "health status", and such applications should be based on FPIC.



[23] Gkasionis, I., D. J. Kuss, M. D. Griffiths, 2021, "Where does the field of gaming addiction studies need to go next?" Journal of Concurrent Disorders 3:3, 187-192
[24] https://bit.ly/3GRf9Q3
[25] https://bit.ly/3lAkOLA

5. CONCLUSION

The title of the article references the story of the boiling frog, a metaphor that warns people of the danger of not noticing gradual changes and suffering consequences for it. In both our work and personal lives, AI+VR surveillance is becoming more common at a gradual pace, and less obvious in its intrusive nature due to convenient wearables and lifestyle choices.

Our eyes can be blinded by the benefits that come with convenience without adequately considering the risks. However, we should be careful not to discount these benefits without considering the alternative outcomes without them.

There are no good or bad technologies, it depends on how they are used. Besides assessing the business model, product quality, and use cases, investors should also consider product governance, the quality and thoughtfulness of business implementation, and how human impacts are measured when making decisions.

Investors should also engage with companies to ensure accountability and transparency of technology, for without appropriate disclosure and explanation, subjects being "measured", such as employees and gamers, could become victims of rapidly advancing technology by suffering from lacking in agency. This will not be considered as good governance from the company's perspective or adequate stewardship from an investor's perspective.

PERSONAL IDENTITY INSURANCE: COVERAGE AND PRICING IN THE U.S.[1]

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ABSTRACT

Personal identity theft occurs when a criminal uses stolen personal identifiers to manipulate third parties into taking actions under the false belief they are communicating with the individual whose identity has been stolen. A typical example is the criminal taking a loan out under the stolen identity. A market for personal identity insurance has emerged to mitigate the associated harms. We extract 34 personal identity insurance products that were uniquely filed with regulators in the U.S. We conduct a content analysis on the policy wordings and actuarial tables. Analyzing the policy wordings reveals that personal identity theft causes a number of costs in terms of monitoring credit records, lost income and travel expenses, attorney fees, and even mental health counseling. Our analysis shows there are few exclusions related to moral hazard. This suggests identity theft is largely outside the control of individuals. We extract actuarial calculations, which reveal financial impacts ranging from a few hundred to a few thousand dollars. Finally, insurers provide support services that are believed to reduce out of pocket expenses by over 90 percent.

1. INTRODUCTION

There is a risk of identity theft whenever third parties use personal identifiers to decide who to send funds to. For example, loans are typically extended to a specific individual, but this assumes the loanee can be reliably authenticated. Historically debt was issued by a member of the local community who could authenticate an individual via natural identifiers like face, voice, gait, and so on [Graeber (2012)]. Such identifiers are not available for online banking in which credit is extended to individuals in distant parts of the country or even abroad.

To solve this problem, lenders authenticate applicants via personal identifiers like passport details, social security numbers, address, and so on. These identifiers are presumed to be known by the individual alone. This assumption is flawed because billions of personal records have been lost in corporate data breaches over the last three decades [Edwards et al. (2016), Maochao et al. (2018)]. Criminals can use the stolen data to trick lenders into sending the loan payment to the criminal. The individual whose data was stolen, still unaware the loan was taken out, will then be pursued by the bank for repayment and their credit score will be damaged by missed repayments. The impacts include psychological harms (stress and anxiety), time spent resolving the theft, financial costs (increased interest rates due to lowered credit score), and more.

The Federal Bureau of Investigation's (FBI) Internet Crime Complaint Center received over fifty thousand reports of identity theft in 2021, which is 300 percent higher than in 2019 [FBI (2021)]. The total economic cost in 2021 is estimated to be U.S.$278 million, which amounts to over $5000 per incident [FBI (2021)]. Typical individuals will suffer an identity theft every 10 to 100 years, with the exact estimate varying based on the crime survey's methodology and target population [Woods and Walter (2022), Figure 11].

[1] This project was supported by the Willis Towers Watson Research Network. This research is supported by REPHRAIN: The National Research Centre on Privacy, Harm Reduction and Adversarial Influence Online (UKRI grant: EP/V011189/1).

The economic costs of identity theft raise the possibility that individuals may wish to insure against the consequences of identity theft. We collect a sample of 34 policies from a regulatory database covering U.S. states. We conduct an inductive content analysis of the policy documents and pricing algorithms, which allows us to answer the following:

RQ1: Which harms are covered by personal identity insurance?

RQ2: What is the implied likelihood and severity of each harm?

RQ3: How do insurers justify the scope and pricing of coverage?

The insights could help individuals to manage privacy risk by evaluating the effectiveness of transferring the consequences to an insurer. Individuals may be further supported by the risk-reduction services that are often provided along-side insurance [Thoyts (2010)]. Thus, one could consider privacy insurance as a form of privacy enhancing technology (PET), despite being a financial product that diverges considerably from the usual technical approach (PETs) [Heurix et al. (2015)]. The study also sheds light on an emerging field of technology insurance that covers cyberattacks [Romanosky et al. (2019)], crypto assets [Zuckerman (2021)], cyber bullying [Kshetri and Voas (2019)] and artificial intelligence liability [Lior (2022)].

Section 2 describes how we collect and analyze the empirical data, Section 3 presents the results, Section 4 discusses how these relate to cyber risk and insurance, and Section 5 offers a conclusion.

2. METHODS

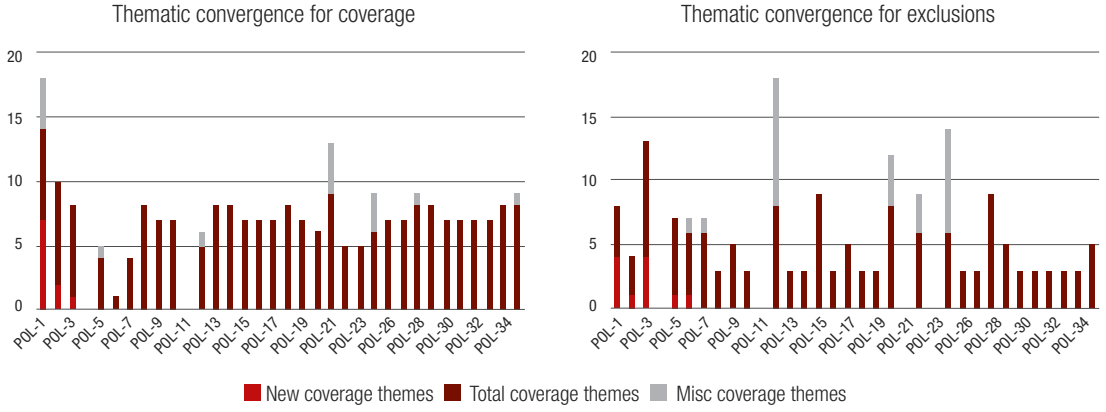
We adopt the high-level approach that was used by Romaonsky et al. (2019) to understand corporate cyber insurance. This involves sampling insurance regulatory filings from the SERFF database of the National Association of Insurance Commissioners (NAIC) until saturation is reached in terms of coverage [Campbell et al. (2020)]. Coverage themes are identified via an inductive content analysis [Elo and Kyngas (2008)]. We also map quantitative risk estimates to themes.

2.1 Sampling

We searched each state's filing system using the keyword "identity" and provided no further limitations on the search. We found identity insurance products filed under both commercial crime and homeowner insurance lines. Following the aforementioned study [Romanosky et al. (2019)], we only collected approved filings. We focused on the four largest states (California, Texas, Florida, and New York), as the greater market size provides more potential for thematic variation.

This resulted in 86 regulatory filings with meta-data including: state, submission date, companies, product name, and insurance line. We grouped filings to ensure each unit of analysis contained the policy wording, rating manual, and rating justification.[2] This resulted in 34 unique personal identity insurance filings. We did not double count when multiple insurance companies (often subsidiaries) filed together and did not count updated wordings as distinct insurance products, although we did track these changes. We stopped collecting policies when we stopped deriving new coverage themes [Campbell et al. (2020)].

Figure 1: The content analysis converged faster and more reliably for coverage than for exclusions, in part because some policies including long lists of seemingly irrelevant exclusions



[2] Some companies filed these components in separately.

2.2 Analysis

We analyzed the policy wordings for RQ1 (i.e., which harms are covered by personal identity insurance?). We first read the document to identify high-level questions like who the policy was for and whether a help line was offered. We then extracted the sections describing what was covered and under which circumstances. These consisted of a list of contractual terms. We extracted each item as a unit of analysis.

We then mapped each unit of analysis to a theme. Themes had to be derived inductively due to the lack of prior research [Elo and Kyngas (2008)]. We created a theme for each unit that could not be classified under an existing theme. After analyzing 10 policies, we consolidated themes to ensure they were comprehensive and mutually exclusive [Stemler (2000)] and used the resulting codebook for the entire analysis. Figure 1 highlights how we quickly reached saturation in coverage but required more policies to do so for exclusions.

To answer RQ2 (i.e., what is the implied likelihood and severity of each harm?), we extracted all quantitative risk estimates from the rate schedules. Due to the simplicity of the pricing schemes, estimates can be classified into the following categories: likelihood and severity of the harm, pure premium (risk = likelihood severity), and market premium that includes the insurer's expenses and profit.

To understand how coverage and pricing were derived (RQ3), we read any documents that justified pricing algorithms. We also included selective quotes from insurer's justifications.

3. RESULTS

Section 3.1 describes what is covered and excluded by personal identity insurance. Section 3.2 identifies quantitative estimates and justifications.

3.1 Coverage and exclusions

Our inductive analysis identified nine specific categories of coverage and classified the remaining 14 coverage items into a miscellaneous category. The resulting analysis is summarized in Table 1. The core coverage consists of different costs associated with correcting official records related to the policyholder's identity. The costs of credit services (Theme #1), like reports or monitoring, was mostly covered by the policies, with those offered in the early years limiting the number of reports. Almost all policies indemnify the cost of refiling loan applications (Theme #2) and communications costs (Theme #3), like long distance phone calls or notarizing documents incurred to "amend or rectify records as to your true name or identity". The costs of traveling to do so (Theme #4) was occasionally included. The time lost while traveling is commonly indemnified as lost income (Theme #5) and/or alternative care arrangements (Theme #6). Another common cost was attorney fees and court costs (Theme #7) resulting from the defense of a civil suit, civil judgment, or criminal charges brought against the policyholder.

Displaying the policies longitudinally captures how identity insurance expanded coverage over time. For example, mental health counseling (Theme #9) did not appear until 2014, after which it was included in the majority of policies. Policies also began to include clauses offering to cover all reasonable costs "to recover control over his or her personal identity" (Theme #10), although this clause usually explicitly excludes coverage for lost or stolen money. The only area of coverage retraction is the cost of hiring professionals to help investigate and manage personal identity thefts (Theme #8), which were only included in the early years. Such services may now be "free", meaning they do not count towards coverage limits.

It is worth unpacking the coverage items classified as miscellaneous. POL-1 and POL-21 were introduced by the same insurance company in different states and they included coverage for: liabilities resulting from fraudulent transactions using existing accounts or accounts opened in the policyholder's name, any costs "incurred by a financial institution or credit issuer," and the deductible payment for any other personal identity insurance. POL-12 and POL-25 included a clause covering "credit freeze, credit thaw costs, transcript costs, appeal bond, court filing fees, expert witness or courier fees." POL-25 also covered the costs of replacing "identification cards" and "ordering medical records" (as did POL-28), although both of these items likely overlap with the communication cost's theme. Finally, POL-35 explicitly included "costs approved by us, for providing periodic reports on changes to, and inquiries about the information contained in the insured's credit reports or public databases (including, but not limited to credit monitoring services)," which is likely to mainly consist of credit services (Theme #1).

Turning to the exclusions, Table 2 displays the exclusions discovered in the sample. All but one of the policies exclude losses due to business identity theft, which confirms these

Table 1: The coverage offered by each policy ordered by date of filing

DATE	POL	CREDIT SERVICES	APPLICATION COSTS	COMMUNICATION COSTS	TRAVEL COSTS	LOST INCOME	CARE EXPENSES	ATTORNEY FEES	PROFESSIONAL SERVICES	COUNSELING	REASONABLE COSTS	MISCELLANEOUS
11/07/05	5	6	✓	✓				✓				
06/21/06	7	12	✓	✓				✓				
03/26/07	6								✓			
01/08/08	20		✓	✓		✓	✓	✓	✓			
05/13/08	1	4	✓	✓		✓	✓	✓				4
08/24/08	21	4	✓	✓		✓	✓	✓	✓			4
04/20/10	29	✓	✓	✓		✓	✓	✓	✓		✓	
03/10/11	31	✓	✓	✓		✓	✓	✓			✓	
07/11/11	22	✓	✓	✓		✓		✓				
02/12/13	32	✓	✓	✓		✓	✓	✓			✓	
03/13/14	27	✓	✓	✓		✓	✓	✓			✓	
05/01/14	25	✓	✓	✓		✓	✓					3
05/16/14	14	✓	✓	✓		✓	✓	✓		✓	✓	
05/29/14	2	✓	✓	✓		✓	✓	✓		✓	✓	
07/01/14	26	✓	✓	✓		✓	✓	✓			✓	
09/24/14	35	✓	✓	✓	✓	✓	✓	✓				1
02/26/15	13	✓	✓	✓		✓	✓	✓		✓	✓	
03/06/15	8	✓	✓	✓		✓	✓	✓		✓	✓	
04/04/15	18	✓	✓	✓		✓	✓	✓		✓	✓	
06/30/15	34	✓	✓	✓		✓	✓	✓		✓	✓	
08/07/15	16	✓	✓	✓		✓	✓			✓	✓	
08/07/15	19	✓	✓	✓		✓	✓			✓	✓	
08/27/15	30	✓	✓	✓		✓	✓			✓	✓	
09/15/15	12		✓	✓		✓		✓				1
12/30/15	10	✓	✓	✓		✓	✓			✓	✓	
12/31/15	3		✓	✓	✓	✓	✓	✓		✓		
01/08/16	15		✓	✓	✓	✓	✓	✓		✓		
01/19/16	28		✓	✓	✓	✓	✓	✓		✓		1
09/09/16	33	✓	✓	✓		✓	✓	✓			✓	
09/15/16	23		✓	✓	✓	✓		✓				
02/03/20	9	12	✓	✓		✓	✓	✓			✓	
02/03/20	17	12	✓	✓		✓	✓	✓			✓	

Integers denote the maximum number of credit reports in the credit services column and the number of coverage items in the miscellaneous column.

policies are intended to cover losses suffered by individuals. Most policies include reporting requirements, such as filing a police report or notifying within 30-120 days. Many of the exclusions are included in other insurance policies, such as not covering losses when the policyholder had prior knowledge of the loss or when the loss is incorrectly reported. The fraud exclusion denies coverage for events caused by the insured or an acquaintance with the insured's knowledge, but a handful of policies also excluded losses committed by close acquaintances without the insured's knowledge, a form of insider threat.

Some of the exclusions are unlikely to cause or constitute personal identity harms. For example, the conflict/political column includes exclusions for losses due to war and political actions, the disaster column includes both natural and nuclear incidents, and bodily injury covers physical harm to a person. Neither war, nuclear accidents, or bodily harm are likely causes of or outcomes from personal identity theft. The miscellaneous exclusions are similarly tenuous, such as "loss from games of chance" (POL-25) and "loss of valuable papers, valuable documents, jewelry, silverware and other personal property..." (POL-12). Corporate cyber insurance policies have been shown to also include a wide range of seemingly irrelevant excluded events [Woods and Weinkle (2020)].

Insurance theory predicts policies will exclude activities that increase risk, known as moral hazard [Baker (1996)]. In addition to not lying (Fraud theme) and reporting swiftly and to the police (Reporting theme), the computer security theme captures such exclusions. This typically covered voluntary disclosure, which POL-3 defined as "disclosure of any code or other security information that can be used to gain access to any of your accounts...this exclusion will not apply if such disclosure was made when you were under duress or the victim of fraud." Thus, the most salient moral hazard is that a policyholder willingly discloses information. Notably, only one of the policies (POL-7) from 2006 required the insured to maintain security software: "It is the responsibility of each "identity recovery insured" to use and maintain his or her computer system security, including personal firewalls, anti-virus software, and proper disposal of used hard drives."

One interpretation is that insurers learned that personal identity harm was rarely caused by the insured not following information security procedures.

3.2 Pricing and justifications

Table 3 displays our data about pricing and actuarial justifications. Notably, there is more missing data than in the previous section. Many of the filings missed actuarial justifications and some did not even report the premium. A study of corporate cyber insurance also found that policy wordings were more consistently included than pricing and actuarial data [Romanosky et al. (2019)].

The first column describes the annual price of personal identity insurance per insured entity, which ranges from U.S.$0.25 to over U.S.$100. This variance is not well explained by the amount of coverage, described in the next two columns displaying the associated limit (maximum insurance pay-out) and deductible (the first part of loss paid by the policyholder). Sometimes this was because the policy contained more coverage. For example, some of the higher prices result from bundling personal identity insurance with "$50,000 of Named Malware, and $5,000 of Public Relations Services" (e.g., POL-2, 14, and 26). Some of the lowest priced policies (e.g., POL-12 and 25) were intended to be sold in bulk (the bulk discount column) so that one organization purchases insurance for multiple individuals. The possibility that organizations purchase personal identity insurance on behalf of individuals explains the risk rated column, which contains a tick if different rates apply based on the insured's characteristics (e.g., the organization's industry).

The likelihood and impact column are purely based on actuarial expectations, unlike the premium that also reflects the insurer's business model, such as expense costs or investment income [Thoyts (2010)]. The estimates of frequency were more variable than the estimates of the impact. The lower frequency estimates resulted from normalizing the number of data fraud cases reported to the FBI by the U.S. population, whereas the higher values (e.g., 3.7 percent) came from normalizing the number of data fraud cases by the sample size of an FTC survey. Such disparities may result from the difficulties surveying rare and emotionally salient phenomena [Florencio and Herley (2013)].

Some policies even delimit the frequency and impact estimate for coverage themes identified in the previous sub-section. For example, POL-3 references data obtained from their reinsurer to estimate the frequency of: replacement of documents (0.05 percent), travel expenses (0.035 percent), loss of income (0.035 percent), child and elderly care

Table 2: The exclusions included in each policy ordered by date of filing

DATE	POL	BUSINESS IDENTITY	BODILY INJURY	CONFLICT/POLITICAL	FRAUD	PRIOR KNOWLEDGE	REPORTING	DISASTER	NON-IDENTITY	INSIDER THREAT	COMPUTER SECURITY	MISCELLANEOUS
11/07/05	5	✓			✓	✓	✓		✓	✓		
06/21/06	7	✓			✓	✓	✓		✓		✓	
03/26/07	6	✓			✓	✓	✓					1
01/08/08	20	✓	✓		✓	✓			✓	✓	✓	4
05/13/08	1	✓	✓	✓	✓							
04/20/10	29	✓		✓	✓		✓	✓				
03/10/11	31	✓			✓		✓					
07/11/11	22	✓			✓	✓			✓	✓		3
02/12/13	32	✓			✓		✓					
03/13/14	27	✓			✓		✓					
05/01/14	25	✓	✓		✓	✓		✓	✓		✓	8
05/16/14	14	✓			✓		✓					
05/29/14	2	✓			✓		✓					
07/01/14	26	✓			✓		✓					
09/24/14	35		✓	✓	✓		✓	✓				
02/26/15	13	✓			✓		✓					
03/06/15	8	✓			✓		✓					
04/04/15	18	✓			✓		✓					
06/30/15	34	✓			✓		✓					
08/07/15	16	✓			✓		✓					
08/07/15	19	✓			✓		✓					
08/27/15	30	✓			✓		✓					
09/15/15	12	✓	✓		✓	✓		✓	✓		✓	10
12/30/15	10	✓			✓		✓					
12/31/15	3	✓	✓	✓	✓	✓	✓	✓		✓	✓	
01/08/16	15	✓	✓	✓	✓	✓	✓	✓		✓	✓	
01/19/16	28	✓	✓	✓	✓	✓	✓	✓		✓	✓	
09/09/16	33	✓			✓		✓					
02/03/20	9	✓		✓			✓	✓			✓	
02/03/20	17	✓		✓			✓	✓			✓	

The final column displays the number of coverage items classified as miscellaneous.

Table 3: Pricing and actuarial information available for each regulatory filing

DATE	POL	PREMIUM ($)	LIMIT ($)	DEDUCTIBLE ($)	RISK RATED	BULK DISCOUNT	FREQUENCY	IMPACT ($)
11/07/05	5		15000					
06/21/06	7	100					1%	3000
03/26/07	6							
01/08/08	20	126.25						
05/13/08	1	60	15000				2%	1369
08/24/08	21	126	20000					422
09/30/09	4	15	10000			✓		
04/20/10	29							
03/10/11	31	19	25000	100				
07/11/11	22							
08/24/11	11							
02/12/13	32	20	15000	250				
03/13/14	27	28	15000				0.05%	1603
05/01/14	25	1.08	10000			✓		
05/16/14	14	81-299*	50000	2500	✓			
05/29/14	2	81-299*	50000	2500	✓			
07/01/14	26	81-299*	50000	2500	✓			
09/24/14	35							
02/26/15	13							
03/06/15	8	10	15000					
04/04/15	18	10	15000	100				
06/30/15	34	10	15000	100			0.01%	3015
08/07/15	16	10	15000	100			3.70%	1200
08/07/15	19	10	15000	100				
08/27/15	30	10	15000	100				
09/15/15	12	0.24	25000		✓	✓		
12/30/15	10	10	15000	100			3.70%	1200
12/31/15	3	1.54	25000				0.05%	1603
01/08/16	15							
01/19/16	28	2.93	25000					
09/09/16	33	16						
09/15/16	23	2.44	1000000				0.05%	3541
02/03/20	9	15	25000		✓	✓		
02/03/20	17	15	25000		✓	✓	3.81%	365

Empty fields should not be interpreted as anything other than missing data.

* = price for a bundle including additional coverage

(0.011 percent), reimbursement of fraudulent withdrawals (0.0250 percent), legal costs (0.03 percent), remediation service costs (0.05 percent), and case management service costs (0.075 percent). We advise that the relative frequencies are perhaps the main takeaway. For example, the child and elderly care costs are incurred less frequently than those to hire response services.

To provide a flavor of the actuarial reasoning, we quote the following from POL-10 extract in full: "According to a recent study commissioned by the Federal Trade Commission, 90% of "All ID Theft" out of pocket expenses are $1,200 or less. While we do not have significant experience with this coverage, we believe that the availability of case management restoration services will reduce this severity to approximately $81. The same FTC-commissioned report suggests a frequency of 3.7 percent. Thus, our loss content is expected to be approximately $3.00. Loss-related expenses (toll-free help-line and case management service) are expected to be $3.50. Thus our total loss cost is $6.50."

The most notable aspect is that case management services reduce out of pocket expenses by over 90 percent. Other data sources for actuarial justifications include: the Bureau of Labor Statistics, Ponemon group, Javelin's surveys, competitor analysis, and the FBI.

4. DISCUSSION

This section discusses the implications of our results, and then links these to related work.

4.1 Implications

The existence of personal identity insurance suggests individuals anticipate privacy harms that are not sufficiently remedied by the legal system. The following, which was included in multiple insurer's filings, summarizes the gap: "While many financial institutions provide protections to consumers for the actual fraud loss, most individuals have no help for the time and expense required to restore their personal identities."

The impact column of Table 3 suggests actuaries estimate the associated time and expenses to be around U.S.$3,000.

Interestingly, POL-10 believed post-theft services paid by the insurer could reduce such expenses by over 90 percent. This mirrors corporate cyber insurance in which policies pay for a team of consultants spanning law, IT, and public relations to respond to cyber incidents [Franke (2017), Woods and Bohme (2021a)]. More generally, scholars have observed insurers positively influencing risk management practices of insureds across a range of insurance lines, known as insurance as governance [Ericson et al. (2003), Ben-Shahar and Logue (2012)].

A provocative question to ask is whether governments could do more to help individuals recover from identity theft, after all, many thefts exploit state provided identifiers like social security numbers that cannot be easily replaced due to the government's architectural design choices. The bulk discounts in some policies suggests that these costs display considerable economies of scale. The equivalent post-incident services are provided publicly for fire, and were originally provided by insurers [Carlson (2005)].

In terms of the identifying new harms, the costs covered in Table 1 are driven by the complexity of bureaucracies. Coverage items include re-filing applications that were rejected due to identity theft, the cost of notarizing documents, lost income, or additional care expenses due to the time invested that individuals are normally expected to cover. A different kind of cost is mental health counseling, which was not offered until 2014 after which it was included in the majority of policies. Its inclusion suggests the insurance industry recognizes the psychological harm of victims of identity theft. It seems reasonable that anticipation of a U.S.$3,000 impact following a data breach might lead to anxiety, as argued by privacy scholars [Solove and Citron (2017)].

The actuarial estimates confirm that the impact of identity theft is relatively low but also relatively common. This diffuseness of harm has been identified as a reason why courts dismiss data breach lawsuits [Calo (2014), Citron and Solove (2022)]. The source of quantitative estimates is interesting in that actuarial justifications relied on public data collection (e.g., FTC surveys or FBI crime reports). One might ask whether governments collecting and releasing similar aggregate data for other privacy harms could help bootstrap private insurance markets. Or perhaps academics could reflect on what would be required for their surveys to be used for the same purpose.

More generally, our search was relatively narrow in that we used a small number of search terms. Future work could explore other lines of insurance related to privacy harms. It could also expand our analysis beyond the four largest states. We suspect the results will be similar as we detected few differences across states in terms of the content of policies or actuarial estimates, although the regulatory reports did differ.

4.2 Related work

The study also contributes to an emerging body of work investigating technology insurance products that cover cyber-attacks against firms [Romanosky et al. (2019)] and individuals, crypto assets [Zuckerman (2021)], cyber bullying [Kshetri and Voas (2019)] and artificial intelligence liability [Lior (2022)]. So far, corporate cyber insurance is the only technology insurance product with a developed body of literature.

Research into corporate cyber insurance has studied the processes to assess and manage cyber risk. Insurers collect information about the security practices of applicants for corporate cyber insurance [Woods et al. (2017), Nurse (2020)], (inconsistently) incorporate information into pricing [Romanosky et al. (2019), Talesh and Cunningham (2021)], and provide a range of post-incident support services [Wolff and Lehr (2018), Woods and Bohme (2021b)]. For comparison, identity insurance applicants are not required to reveal security practices. However, it does provide access to post-incident services, which this study did not explore.

Research into cyber insurance has also considered whether it improves social welfare and how this motivates different regulatory strategies [Lemnitzer (2021), Baker and Shortland (2022)]. These questions typically turn on whether insurers improve risk management processes. More research is required to answer whether personal identity insurance does so, although we have argued identity theft is largely outside the individuals' control. Another question is how insurance products evolve over time [Baker (2019)]. Identity insurance has broadened to include psychological support, but it does not cover many types of cybercrime identified in surveys [Woods and Walter (2022)]. It is unclear whether it will absorb such crimes in the future, or whether a novel insurance product will displace identity insurance.

5. CONCLUSION

The following extract, which was included word-for-word in multiple regulatory filings, provides a concise summary of our study: "While there are ways to reduce one's exposure to identity theft, it is a crime that can strike anyone. Those who are victims of this crime need to make identity recovery a top priority, because otherwise:

- Credit rating can be ruined
- Arrest warrants can be issued against the victim
- Liens can be applied against the victim's assets

While many financial institutions provide protections to consumers for the actual fraud loss, most individuals have no help for the time and expense required to restore their personal identities."

While the extract suggests there are "ways" of reducing exposure, Table 2 shows insurers do not push policyholders towards implementing them. One explanation is that identity theft risk reduction is too ineffective or too onerous to ask of policyholders. This supports a narrative in which consumers are powerless to prevent privacy harms resulting from personal identity theft. The corresponding insurance coverage reflects a need for ex-post response solutions to both reduce privacy harms and indemnify the financial cost.

Our study confirms one aspect of the privacy harm literature. Legal systems fail to recognize and remedy privacy harms [Citron and Solove (2022)] as evidenced by the emergence of a private market covering the harms associated with identity theft incidents. We provide an additional contribution, namely that the lack of support services leads individuals to suffer more harm. For example, one insurer anticipates case management services to lead to a 90 percent reduction in the cost of an identity theft incident. Thus, policymakers could reflect on whether the impacts of identity theft and the expertise to remedy are fairly distributed across society. The status quo in which financial smoothing and risk reduction services are privately provided undoubtedly skews towards affluent consumers.

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REGULATION

SUSTAINABLE FINANCE REGULATION – AUTHORITATIVE GOVERNANCE OR MARKET-BASED GOVERNANCE FOR FUND MANAGEMENT?

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ABSTRACT

An innovative form of governance for sustainable investment products has been introduced in the E.U. in order to address the fears of investment mis-selling, as well as to actively steer sustainable investment allocations towards defined causes of sustainability, in particular, environmental sustainability. The E.U.'s sustainable regulation framework is discussed in this paper as an "authoritative" form of governance without being authoritarian. Investment allocation is a matter of market choice but regulation intends to achieve clarity in relation to sustainable costs and achievements in order to influence investor choice. The U.S. and U.K. are also developing reforms in sustainable finance regulation, but are more narrowly focused on anti-mis-selling and investor protection. This paper discusses their approaches as fundamentally market-based, in contrast to the E.U.'s, as the industry and investors remain in control of defining sustainability goals, if any, in investment. The paper critically discusses the prospects of market mobilization under these different approaches and what may entail from their regulatory competition.

1. INTRODUCTION

Investment fund products labeled "socially responsible" (SRI), or taking into account environment, social, and governance concerns (ESG), have existed in the market for some time [Puashunder (2016)], without specifically being regulated in relation to their claims or labels. General mandatory disclosures (pre- and post-sale) for investor protection focus on financial information and do not specifically guard against "greenwashing". There is a trend towards heightened demand for investment products with ESG characteristics [Apostolakis et al. (2018), Delsen and Lehr (2019)], but also increasing concern regarding "greenwashing" or "social-washing", where investment products labeled with certain characteristics may obscure other harmful ESG effects, or are disingenuous but inscrutable.[1] Further, policymakers are interested in mobilizing mainstream finance to play a part in: (a) changing corporate behavior in relation to unsustainable or externality-producing economic activities [Sakhel (2017), Ahlström (2019)]; and (b) financing economic activities that help achieve climate transition and social development goals[2] for a sustainable future (HLEG (2018), European Commission (2020), Adamowicz (2022)].

The E.U. has introduced a suite of sustainable financial regulations, with more to come, in order to embed financial regulatory policy into broader economic policy for a green and sustainable European future. The embedded nature of sustainable finance regulation results in a form of regulatory governance that is poised to be authoritative for steering investment market behavior. E.U. sustainable financial regulation has characteristics of authoritative steering but still working with choice in the market. The U.S. and U.K. have, however, chosen to deal more narrowly with investor

[1] https://bit.ly/3GdFvde
[2] UNSDGs, https://bit.ly/3VG4StV

protection needs, targeting "greenwashing" or "social-washing" as forms of mis-selling. In this manner, the impact of financial regulation on broader economic agendas may be limited in terms of what sustainable finance ultimately does for economic and social outcomes.

Section 2 discusses the new authoritative governance in E.U. sustainable finance regulations. There are promises as well as weaknesses in this ambitious project, which gives rise to opportunities for regulatory competition. If viewed from the competitive lens, it can be argued that the market-based governance in the U.S. and U.K.'s proposed reforms, discussed in Section 3, may be easier for market adoption. That is, unless the market discriminates against these reforms, in light of the potentially higher-quality investment products governed by the E.U. regime. The jury is out and Section 4 briefly concludes.

2. AUTHORITATIVE GOVERNANCE IN E.U. SUSTAINABLE FINANCE REGULATION

The background policy papers for the E.U.'s pioneering Sustainable Finance Disclosure Regulation (2019) (SFDR) and Taxonomy Regulation (2020) refer to the need to mobilize public and private sector finance towards sustainable economic activities, enabling a just and green transition for European economies [European Commission (2020)]. In this manner, sustainable finance is part of "regulatory capitalism" [Levi-Faur (2005)], as policymakers influence the steer of financial allocations and productivity. The use of regulatory policy to achieve broader economic purposes is not new to the E.U. Much of the E.U. Single Market is built upon harmonizing regulations for ease of cross-border movement of business and capital [discussions and citations in Chiu (2008)]. Furthermore, after the global financial crisis 2007-9, E.U. regulatory policy is designed to achieve public interest goods rather than simply addressing market failures. As market participants are often not incentivized to act in the collective interests of "financial stability" and instead take chaotic or disruptive actions [Schwarcz (2008), Pistor (2013)], regulatory policy can be justified for collective action needs, as well as in the case of promoting sustainable economic activities [Arber and Waygood (2020)].

Sustainable finance regulation is also rooted in the Capital Markets Union project since 2015.[3] This is the "opportunity"-based perspective for the E.U. in governing the sustainable finance market. Emerging from dealing with the COVID-19 pandemic, the E.U. could proactively build up a competitive sustainable finance capital market that meets the long-term needs of European businesses in a transitioning environment. The first Commission Capital Markets Union action plan in 2015 sees economic growth as dependent upon broadening the sources of funding for all sizes of business and economic activities in the E.U., chiefly, by expanding capital markets.[4] There is a perceived need to reduce reliance on bank funding, whose lending to smaller businesses has, after the global financial crisis, shrunk [Paulet et al. (2014), Paulet (2018)]. In this light, sustainable finance regulation is an instrumental part of a policy agenda to enlarge the E.U.'s capital markets. With capital markets in the E.U. still in need of development, the extensive sustainable finance reforms are strategic in nature to redefine the terms of competition in global capital markets. Regulation plays an enabling role to attract domestic and foreign capital raising with the support of credible frameworks and standards in sustainable finance. Such regulatory policy may fulfill the E.U.'s desire to build up deep and competitive capital markets in hugely popular sustainable finance investments, in its bid against the established capital markets in the U.S. and U.K.

The E.U.'s sustainable finance reforms first focused on investment fund providers, managers, and their products. These, however, contain basic building blocks that support further "policy spread". The reforms crucially define sustainability cost and opportunities, and compel these to be embedded into investment fund designs. We anticipate that successes in implementing sustainable finance reforms for investment funds in the E.U. would likely pave the way for "policy spread" to other areas of financial regulation, such as bank regulation. The "elephant in the room" with regard to sustainable finance reforms in the E.U. is bank regulation, as much of the E.U. economy is bank-financed. Hence, choosing to launch fundamental regulatory reform for capital markets seems odd in relation to compelling behavioral change, when banks, as the main financiers for most economic activities, can pull more weight. However, if the new definitions of sustainability cost and opportunities are implemented in capital markets, and bed down with the anticipated development of more mature data and metrics standardization, these would ultimately support bank regulation reform [Smits (2021), Esposito et al. (2021)] and even central bank policies for asset purchases

[3] Updated 2020, https://bit.ly/3Z8c6Kn

[4] "Despite the progress that has been made over the past 50 years, Europe's capital markets are still relatively underdeveloped and fragmented. The European economy is as big as the American one, but Europe's equity markets are less than half the size, its debt markets less than a third." [European Commission (2015)].

[Alexander and Fisher (2020)].[5] The potential "policy spread" would establish a new authoritative governance for financial allocation more broadly. But this can be seen to rescue, not destroy, the institutions of market-led economic governance that neoliberal economies cherish [Faroohar (2022)]. However, the jury is out on whether the reforms are able to "remake" markets in respects currently regarded to be dysfunctional.

2.1 Resetting norms in investment fund management

Securities products are ultimately the building blocks for investment funds. Investor choice and fund allocation have the potential to influence investee companies and their activities, hopefully minimizing their adverse sustainability impacts or achieving positive sustainability outcomes [Pilaj (2017)].[6] The "financial lever" [MacNeil and Esser (2022)], however, works if the "investment chain" of intermediaries and ultimate beneficiaries operate on a common language of sustainability in finance in order for coherent actions to be taken in respect of investee companies in investment portfolios. The E.U. takes leadership over defining what "adverse sustainability impacts" and "positive sustainability outcomes" are, and these are the fundamental building blocks for investible economic assets to be judged, whether they are companies, real estate, infrastructure, or others.

E.U. policy leadership eclipses an approach where investors are left to "make sense" of investment product labels and guestimate their ultimate connection to influencing sustainable corporate behavior. In the hitherto self-regulatory market for socially responsible investments (SRI), ESG, or ethical investment products, market-based governance for sustainable economic activities seems, to date, lackluster [Dupré (2020), Grewal et al. (2016), Wagemans et al. (2018), Michelon and Rodrigues (2015)]. The E.U. is engaging in regulatory competition by a race to the top, so that domestic and foreign financial intermediaries may be attracted to be bound by a new form of norm-setting in the definition of investible economic assets through the lens of sustainability.

The Sustainable Finance Disclosure Regulation (SFDR) makes two significant regulatory contributions. First, it reframes the universe of investment fund products through the lens of their "adverse sustainability impacts" and "positive sustainability outcomes". These definitional reforms are crucial in compelling the investment markets to count the cost of sustainability risks or price the opportunities relating to these accordingly. These are "market-resetting" measures [Schoenmaker (2017)] designed to shape price formation and allocation by funds, that are significant holders of corporate equities and other alternative assets in the E.U. Before we turn to these in detail, the SFDR also intervenes into the fiduciary aspect of investment management conduct.

The SFDR now imposes an across-the-board obligation for all fund providers and managers to make disclosure, at entity level, of their policies in relation to "integration of sustainability risks". This indirectly compels all fund providers and managers to regard sustainability risks as not optional in investment management, whether or not they currently offer products that may be SRI, ESG, or ethical. All retail mutual fund (UCITs) managers, as well as hedge and private equity fund managers regulated in the E.U. must integrate sustainability risks within their strategic, organizational, and risk management.

"Sustainability risk" is defined as an environmental, social, or governance risk that is financially material to investment performance. Arguably, the SFDR seems uncontroversial – there is now less resistance to acknowledging that the modern law of fiduciary duty in asset and portfolio management includes consideration of material ESG risks [UNEPFI and the Generation Foundation (2021), Jansson and Biel (2014)]. However, the SFDR establishes the normative expectation that fund management integrates material ESG risks for the European market. This changes fund managers' rubric of legal risk as well as establishes boundaries for the European investment market. Is this authoritarian for the market, as it is not definitive that a fund's investment performance is affected by ESG matters[7] [see citations in Bianchi and Drew (2012), Bassan et al. (2018), and Ielasi et al. (2018) on

[5] Existing bank regulation extends to entity-level mandatory disclosure for climate risks (i.e., the U.K.'s mandatory Task Force on Climate-Related Financial Disclosures (TCFD) reporting for banks, insurers, and regulated investment firms; European regulation for banks to make mandatory disclosure of ESG risks more broadly under Art 449a, Capital Requirements Regulation 2013, 2021, as well as European Banking Authority, Final draft implementing technical standards on prudential disclosures on ESG risks in accordance with Article 449a CRR (Jan 2022). Discussed in Bruno and Lagasio (2021) and Smoleńska & van 't Klooster (2021).

[6] The literature on investor influence on corporate strategy is mixed [Inigo et al. (2017)]. While investors may mobilize specific actions, such as the appointment of two climate conscious directors onto the board of Exxon Mobil, companies are influenced by various opportunity, strategic, cost and stakeholder factors [Dentchev et al. (2018), Fellnhofer (2017); see, however, discussions on impediments that are unrelated to the financial lever: Przychodzen and Przychodzen (2018)].

[7] There is empirical evidence on superior returns of funds that employ techniques to exclude "sin stocks" [to an extent until diversification losses bite, see Peylo and Schaltegger (2014), or that select stocks based on "ESG" performance, see for example, Habermann (2021)].

underperformance of ESG funds]? This regulatory recalibration of fund managers' legal duty in fiduciary management is significant, and underscores the reforms in fund design and labeling that now revolve around new definitions of sustainability cost and opportunities.

More importantly, the SFDR puts an end to the self-regulation of investment fund product labeling and marketing. Empirical evidence has uncovered "greenwashing" [Micilotta (2020)], that is, fund products with certain labels being substantively no different from other mainstream products [Nitsche and Shröder (2018), Arribas et al. (2019)]. This can amount to mis-selling since certain labeled fund products entail higher fund management fees on the basis of "expertise" in curating the fund. The SFDR now compels all products to account for sustainability cost and/or achievements in a more comparable manner [Kuhn (2022)]. Narrowly, this is a bid to weed out greenwashing in self-regulated fund products. However, it may be argued that greenwashing can be addressed by enhancing disclosure supervision (see the U.S. and U.K.'s reforms shortly) and empowering mis-selling litigation. The SFDR has, however, opted for a beyond-minimalist approach of combatting market failure. A fundamental overhaul of not only product disclosure, but product classification, is introduced.

The SFDR's product classification is based on a spectrum of concern for ESG or sustainability matters. The market is, therefore, reoriented to view fund products in this manner. This product classification and mandatory disclosure system has the potential to introduce information correction mechanisms into the market, therefore guiding choice and price formation, allowing institutional and retail investors to allocate optimally. It makes major interventions into how all fund products are designed,[8] managed, and offered, to both institutional and retail investors. The SFDR's reforms are indeed akin to a form of product regulation, although regulators do not merit-vet products and approve them.

Investment fund products fall within one of the three buckets of regulatory classification, as explained below. Global asset managers selling into the European market will be affected. The SFDR covers all of the collective investment (or funds) market in the E.U., applying to all providers and managers of pension funds, insurance products with investment features, retail, alternative, and other E.U.-regulated funds, as well as institutions that provide portfolio management services (including banks).

Under the SFDR, investment fund products may be "Article 6", "Article 8", or "Article 9" products. The regulatory implications for all three classifications are vast, and give rise to needs for connecting policies to be developed. This will ultimately form a comprehensive and significant system of E.U. governance.

2.2 Norm-setting 1 in Article 6: Counting the cost of principal adverse impacts in investible economic assets

All fund providers and managers in scope are subject to mandatory disclosure to declare if they consider "principal adverse impacts" (PAIs) to investment decisions as a matter of investment policy, and eventually at a product level. This measure intends to make all fund managers reveal to investors how they count the sustainability cost of their investments. In this way, investors can assess fund managers' strategies and products with reference to their concerns for sustainability cost and negative impacts. Crucially, the efficacy of such disclosure lies in whether the investors can obtain the cost and externality information in such a way that easily feeds into investment considerations. The design of disclosure currently leaves something to be desired but is a sound starting point.

Where fund providers and managers consider PAIs in their investment policies, they need to disclose their due diligence policies in accounting for PAIs. Fund managers can choose not to consider PAIs, and need to disclose this and why PAIs do not matter. In sum, what may otherwise be regarded as "mainstream" products (that do not fall within niche SRI, ESG, or ethical strategies), would be reframed as Article 6 products that must all elucidate either their PAI footprints or their agnosticism to PAIs. Large fund providers or managers (or their parent companies) with an average number of 500 employees during the financial year must publish due diligence policies on PAIs, making it not an option for them to be agnostic to PAIs. This reflects a normative expectation that larger investment houses should take the lead in "counting the cost" of their investment impacts on the environment and society.

The design of this mandatory disclosure first disincentivizes Article 6 products from agnosticism to PAIs, although small fund houses can so declare. This is because agnosticism to PAIs raises the question whether the standard of fiduciary management discussed above is met. In this way, most investment fund products would unlikely declare agnosticism and have to publish PAI due diligence policies. This regulation

[8] The coverage is comprehensive but packaged retail products including an investment element, i.e., packaged retail investment and insurance products (PRIIPs), still need including, see https://bit.ly/3IkOIbV, para 3.10.

> *"The E.U.'s authoritative governance builds upon market-based governance by introducing a greater extent of the visible hand to connect sustainable finance to defined sustainability goals."*

addresses the fund industry's (as well as the market's) present dysfunctional lack in counting the environmental and social cost of investment allocations.

The disclosure of PAI due diligence is not selective, as policymakers prescribe a list of PAI indicators that all fund managers must disclose in their due diligence policies.[9] However, the identification of PAI indicators does not necessarily lead to clarity "what PAI measurements actually are" for each fund or investee company included in the fund. Due diligence policies discuss how fund managers "count", but do not provide investors with "the results of the count", which is what investors need for their decisions. It is arguably unreasonable to impose on fund managers the responsibility to count PAIs of economic assets, as there must be significant reliance on corporate data, which is not yet available [La Torre et al. (2020)], as well as costly internal or external research. It is also inherently challenging for fund providers and managers to carry out due diligence on a range of investee companies that may themselves face due diligence challenges [Schilling-Vacaflor and Lenschow (2021)], such as in relation to auditing human rights impacts in their supply chains [Smit et al. (2021), Ventura (2021)] or conflict minerals [Silva and Schaltegger (2019)].

The mandatory qualitative corporate disclosures that have been introduced so far for E.U. listed companies [the E.U.'s non-financial reporting Directive 2014, see Stewart (2020), Mähönen (2020), Ohnsorge and Rogge (2021), and Ahern (2016)] are unlikely to meet the enhanced data and disclosure needs in sustainable finance reforms. Nevertheless, issuers' reporting obligations are in development under the proposed Corporate Sustainability Reporting Directive. Spurred on by the sustainable finance reforms, supporting policy and market developments are accelerated, such as standardized accounting measures for ESG and sustainability risks. This landscape has already seen much innovation, such as the Global Reporting Initiative (GRI),[10] Integrated Reporting,[11] TaskForce for Climate-related Financial Disclosures (TCFD),[12] and Sustainability Accounting Standards Board (SASB)[13] standards, and towards their consolidation and rationalization [Betti et al. (2018), Giner and Luque-Vilchez (2022)]. The International Sustainability Standards Board (ISSB)[14] is poised to lead a set of consolidated standards for global capital markets. But the European Financial Reporting Advisory Group (EFRAG)[15] would generate a set of European non-financial disclosure standards adhering to double materiality, through closely studying the Global Reporting Initiative (GRI), TCFD, and other current initiatives. Standardized corporate disclosures relating to economic assets and activities are imminently in development.

The default classification of all investment funds into Article 6 products (unless Article 8 or 9 also applies, see below) is an important first step to incorporating externality costs into investment design and disclosure. This financial lever operates throughout the investment chain. Institutional investors dealing with asset managers consider the due diligence disclosures for PAIs, and in turn are subject to their beneficiaries in explaining their choice of asset managers and investment strategies [European Shareholders' Rights Directive (2017),[16] Birkmose (2023)]. Retail investors are able to obtain investment advice in relation to their concerns for externalities, by expressing "sustainability preferences", defined as including the consideration of PAIs. Investors' preferences must be implemented by investment advisers as a matter of their investment objectives [Mezzanote (2021)], or else the adviser may be in breach of its advisory duty.

[9] Https://bit.ly/3Cem036, including scope 1, 2, and 3 greenhouse gas emissions, energy performance, other environmental indicators referenced by policies of underlying investee companies (such as with regard to biodiversity preservation, waste management, water risk, deforestation, etc.), and social indicators referenced by underlying investee companies' adherence to international standards such as for labor, human rights due diligence, as well as policies in relation to gender diversity in the workplace, pay disparity, etc.
[10] Global Reporting Initiative, https://www.globalreporting.org
[11] Integrated Reporting Framework, https://www.integratedreporting.org/resource/international-ir-framework
[12] TaskForce for Climate-related Financial Disclosures, developed by the Financial Stability Board, https://bit.ly/3InKZoJ
[13] Sustainability Accounting Standards Board, which has now merged into the International Financial Reporting Standards (IFRS) Foundation
[14] International Sustainability Standards Board, part of the IFRS Foundation
[15] https://bit.ly/3VDSSsP
[16] https://bit.ly/2uu7X6q

Investment advisers face a compliance hazard as they can only rely on disclosed PAI due diligence policies that do not form conclusions for PAI measurements as such. However, retail investors may be under the impression that advisers have a clear view of sustainability costs and can make product recommendations accordingly. The limits of PAI due diligence policies should be clarified for now, while policymakers continue to develop policies towards standardized accounting for sustainability matters (EFRAG, ISSB).

2.3 Norm-setting 2: Reframing Article 8 products and implications for further policy development

Next, as the investment landscape is already replete with self-regulatory SRI, ESG, or ethical products, the E.U.'s reforms need to address how these would be treated. The E.U. does not outlaw these products in the market-based investment economy but they are classified as "Article 8" products, subject to regulatory standards. What is required is that product claims be explained according to regulatory standards designed for investor accountability and protection, in order to address the greenwashing fears that have been articulated [van Dijk-de Groot & Nijhof (2015)]. In this manner, the U.S. and U.K. reforms are similar in nature.

The standards for claim explanation are relatively demanding. This also implicates further development for supporting policies. With many supporting policies not yet in place, policymakers subtly incentivize product providers and managers to consider switching to Article 9 products. As explained below, these are subject to regulatory definitions and standards of sustainability achievements perceived to be more consistent and clearly understood [Becker et al. (2022)].[17]

Article 8 products are those that promote some form of environmental or social characteristics, good governance practices, or a mixture of them. These would correspond to the current universe of SRI, ESG, or other similarly labeled products. Product providers and managers need to disclose at product level how the claimed characteristics are achieved, and if the fund adheres to a passive strategy, how a selected reference benchmark is consistent with promoting the claimed characteristics by the fund. Further European guidelines are in progress to require a minimum 80 percent allocation of assets by funds to meet the claimed characteristics.[18]

Fund providers and managers need to justify that claimed characteristics are met by reference to specific indicators

[17] Early evidence of supply-side "switching" into Article 9 products is observed, https://on.ft.com/3i6qdiu
[18] https://bit.ly/3jN3mZG

on the part of investee companies.[19] Funds make these justifications by way of transparency of their due diligence policies and methodologies, acknowledging clearly where data gaps remain. In this manner, active fund providers and managers would have to disclose in-house research methodologies and data gaps to be subject to regulatory and market scrutiny, and whether they rely on third-party ESG ratings or other research providers.

It is well-known that rating and research providers do not use common methodologies. Their assumptions, weightings, and aggregations vary [Sipiczki (2022), Eccles and Stroehle (2019), Esty and Cort (2017), Eccles et al. (2015)]. One implication from this reform is that the fund industry could add to pressures for ESG research and rating providers to be subject to regulatory standards and oversight, in order to reduce the fund industry's legal risks for reliance. The possibility for such policy development is high in the E.U. [Chiu (2022)], given that credit rating agencies and benchmark providers have become subject to regulation.[20] Verifiers for European green bonds would also be subject to regulatory standards under the proposed Green Bonds Regulation. Commentators are, however, concerned that regulation may dampen the useful competition amongst ESG rating and research providers who innovate on different methodologies and meet different investment demand needs [Nedopil et al. (2021)]. That said, the E.U.'s credit rating agency regulation has paved the way for smaller competitors to "break into" the oligopolistic market dominated by Standard & Poor's, Moody's, and Fitch. Hence, the effects of regulation and competition need to be studied, but adverse effects to the latter should not be assumed.

For passively-managed products, fund providers and managers cannot blithely rely on an index/benchmark provided in the market but must be able to explain the choice of the index/benchmark and its consistency with claimed ESG characteristics.[21] This policy could compel index/benchmark providers to "up their game" in order to meet their buyers' needs. In particular, buyers of index/benchmark products for investment funds may put pressure on index/benchmark providers to make their methodologies less opaque, although there are competitive pressures that disincentivize such transparency [Arribas et al. (2019), Coeslier et al. (2016)]. Further, as many indices/benchmarks are carbon intensive [Cosemans and Schoenmaker (2022)], the E.U. reforms may play a role in compelling index/benchmark designs to be revisited. There is information asymmetry between index/benchmark providers and their buyers in a highly lucrative market [Harris (2020)], hence, policymakers should consider whether they wish to leave it to market discipline to influence index/benchmark designs and their accountability, or introduce regulatory standards for such indices/benchmarks. Existing E.U. benchmark regulation currently provides a relatively light regulatory regime for securities index/benchmark providers, being initially designed to regulate interest-rate benchmark providers after the LIBOR and EURIBOR scandals. This policy needs revisiting.

Where securities indices/benchmarks are "not significant", i.e., being used to reference investments under €50 bln, the regulatory regime is fairly "meta-level" and process-based. Benchmark providers need to make annual disclosure of their key methodologies, and processes, and are subject to regulatory standards regarding reliability and robustness of their methodologies. But these can be fairly general in nature, and non-significant benchmark providers are unlikely to be subject to regular supervision. The latter may become largely self-regulating in relation to their governance processes and product quality. Significant benchmarks are in theory subject to more regulatory supervision, but their supervised status may help them dominate market share, as buyers perceive lower legal risk relying on these benchmarks. Existing regulation is arguably insufficient to cater for the new sustainable finance needs in passive investing. There is also a need to visit the competition effects of benchmark regulation that distinguishes between significant and non-significant benchmarks.

Nevertheless, E.U. policy provides for Paris-aligned or Climate Transition benchmarks meeting certain minimum standards in asset allocation.[22] Underlying assets' emissions profiles have to be consistent with maintaining the 1.5°C degree goal or to achieve a level of transition decarbonization as prescribed. Investment funds could seek to be benchmarked against one of these indices/benchmarks instead of self-regulatory ones in the market. Mandatory disclosures for benchmark providers claiming to offer such benchmarks are also more intense in

[19] Such as the use of proceeds in relation to debt securities, e.g., the environmental ratings of real estate assets or infrastructure.
[20] The U.K. intends to extend regulatory oversight to ESG data and rating providers, building upon a voluntary code the industry will first develop, https://bit.ly/3VFNS72.
[21] ESG-aligned benchmarked passive products do not necessarily outperform, although they may be more cost effective [Schmutz et al. (2020)].
[22] https://bit.ly/3liBIOt

nature,[23] consequently reducing legal risks for buyers/adopters of such indices/benchmarks. The introduction of Paris-aligned or Climate Transition benchmark standards does not, however, relieve the need for benchmark regulation in general to be revisited. Article 8 products can be benchmarked against social development goals or other sustainable objectives, and the market remains in need of innovations that provide robust benchmarks for passive investing.

At present, policies for ESG infomediaries and indices/benchmarks are lacking to support Article 8 product disclosures. This lacuna could play strategically in steering the investment market towards Article 9 products, preferred by policymakers. Article 9 products are tied to defined sustainability goals, instead of industry's choice of such goals in Article 8 products. However, it is not yet clear if the onus for Article 8 products to explain themselves is too high. If investors do not select against these products, and the risks of regulatory or private enforcement are low, the compliance environment may be no less conducive.

2.4 Norm-setting 3: Article 9 products and new "sustainable investment" and "taxonomy" norms

E.U. sustainable finance reforms offer an optional gold standard for investment fund products. The term "sustainable" becomes a legal term of art connoting the meeting of those standards by investment funds. This authoritative governance is intended to be voluntary but market-attractive, mobilizing markets to prefer this gold standard to self-labeled products (Article 8). Where investment products are labeled as having a "sustainable investment" objective, they are required to demonstrate that: "investment[s] [are made] in … economic activit[ies] that contribute to an environmental objective, as measured, for example, by key resource efficiency indicators on the use of energy, renewable energy, raw materials, water and land, on the production of waste, and greenhouse gas emissions, or on its impact on biodiversity and the circular economy, or … investment in ... economic activit[ies] that contribute to a social objective, in particular an investment that contributes to tackling inequality or that fosters social cohesion, social integration and labour relations, or an investment in human capital or economically or socially disadvantaged communities, provided that such investments do not significantly harm any of those objectives and that the investee companies follow good governance practices, in particular with respect to sound management structures, employee relations, remuneration of staff and tax compliance."

Article 9 investment products are meant to (a) track sustainable performance of a non-financial objective selected by the respective fund, and in so doing also (b) ensure investee companies abide by good governance practices and (c) overall "do not significantly harm" other sustainable objectives.[24] The holistic nature of sustainable investment is meant to counter criticisms that ESG-labeled investment products can be selective in nature, claiming alignment with one or more ESG characteristics, such as "E", while undermining other aspects such as "S" [Stichele (2020), Wood (2015)].

In relation to environmental sustainability, Article 9 products would "substantially contribute" to one or more of the six environmentally sustainable objectives defined in the Taxonomy Regulation 2020. These objectives are scientifically agreed to contribute to environmental sustainability, i.e., objectives for climate change mitigation and adaptation, preservation of biodiversity, water and marine conservation, anti-pollution, and transition to a circular economy. The Taxonomy establishes the six-fold classification of environmentally sustainable objectives under each of which further technical screening criteria would apply to determine if particular economic activities "substantially contribute" to any of the six objectives. A cross-sectoral platform on sustainable finance including public, private, and expert actors has been constituted to advise on the appropriate technical screening criteria (including quantitative or qualitative indicators, certifications, etc.) of economic activities for Taxonomy qualification.

Supporting regulation also provides incentives for fund providers and managers to offer Article 9 products. Under the E.U.'s proposed Green Bonds (GB) Regulation, the "E.U. GB" is a product that must dedicate all proceeds to Taxonomy-compliant economic activities pertaining to one or more of the six objectives. Such green bonds are envisaged to be of higher quality than market-based standards at present [Berensmann et al. (2018), Park (2018)]. The E.U. GB regulation is further supported by standards for issuers in terms of management and accountability for use of proceeds and subsequent performance, investor monitoring, and gatekeepers' roles such as third-party verifiers for the credibility of E.U. green bonds. In this manner, E.U. GB issuers are supported by a regulatory gold standard to appeal to markets and may enjoy a greenium in raising funds. Investment funds invested in such E.U. GBs can also be labeled "sustainable".

[23] https://bit.ly/3lhawzG
[24] More on the meaning of this shortly.

Next, the Taxonomy Regulation requires listed companies in the E.U. to make mandatory disclosure in relation to the proportions of their turnover, operating and capital expenditures that are Taxonomy-compliant.[25] Ahead of general corporate reporting reforms, Taxonomy-based reporting by listed issuers would shed light on their transition and adoption of sustainability-oriented business opportunities, so that competition for capital is based on such terms [Nipper et al. (2022)]. These disclosures support the curation of Article 9 funds. Further, investment demand for Article 9 products may increase due to reforms made to investment advice regulation. Investment advisers have to ask investors for "sustainability preferences", which are defined in relation to Taxonomy-compliant or "sustainable investment"-compliant products, or where PAIs matter. Investors are nudged towards perceiving Article 9 products as "sustainable" while Article 8 products would not meet this threshold and are not included in advisory diligence.

The E.U.'s definition of "sustainable investment" is an ambitious and authoritative form of governance that ultimately links investment funds' claims to identifiable sustainable activities, requiring accountability for such links.[26] Such accountability goes beyond combatting greenwashing or mis-selling, and intends to establish credibility for markets that claim to be funding sustainability [Pacces (2022)]. The authoritative definitions reorient market perceptions and pricing, as commentators observe that Taxonomy definitions influence other financial transactions, such as loan pricing for listed companies [Beerbaum (2022), Chrzan and Pott (2021), Sautner et al. (2022)]. In this manner, the out-competitiveness of the Article 9 product is supported by mandatory disclosures put in place ahead of those needed more generally for PAIs and Article 8 products. Indeed, Zetzsche and Bodellini (2022) argue that supporting regulatory frameworks for Article 8 products lag behind product classification, and this mis-timing of reforms can jeopardize the viability of Article 8 products.

There are, moreover, some pitfalls that could result in a lack of market adoption for Article 9 products. First, the E.U.'s inclusion of gas and nuclear energy in its technical screening criteria for environmentally sustainable activities likely attracts criticism regarding the credibility of the Taxonomy.[27] Further, competing taxonomies in the international arena for fundraising may already confuse investors and pose hazards to credibility [OECD (2020)]. How activities are included in a taxonomy can be subject to immense debate. Where too many activities are included, the credibility of the taxonomy is jeopardized. The E.U. taxonomy is already criticized for including too many transitioning and enabling activities [Schütz and Stede (2020)]. Insufficient inclusion can, however, lead to difficulties for curating Article 9 funds or funds may become insufficiently diversified, which affects financial performance. Further, taxonomies must be regularly updated with admissible activities and able to keep up with innovations for sustainability.

Since the Taxonomy has only dealt with the definitions for environmental sustainability, there is a universe of social objectives that can be accepted as sustainable under the SFDR without further detail. There is no social taxonomy in sight, as social objectives are entangled with difficult socio-political choices. The definition of social performance as well as pertinent data and research capabilities are all in their emergence [EBA (2022)]. Compliance "leakage" could take place in relation to Article 9 products purported to be socially sustainable. Current market offerings such as corporate social bonds [Lenzi (2021)] or impact bonds [Agnew (2016), Mendell and Barbosa (2013)] are already defining what social performance they intend to achieve for investors. Sustainability-linked bonds take a similar approach of defining a precise performance target, failing which would result in increased coupon being paid.[28] Policy clarification for these products in relation to Article 9, and the prevention of leakage of standards, would be important for attracting more mainstream investors.[29]

Finally, there may be disincentives for product providers and managers to offer Article 9 products if the compliance costs are too high, or significantly in excess of Article 8 products. Product providers and managers are faced not only with ascertaining Taxonomy-compliance, but also adherence to the "do no significant harm" (DNSH) principle, and consistency with good governance practices. This is where Article 9 product claims may be costly for product providers and managers. It may not be difficult to ascertain companies' adherence to codes of corporate governance, but ascertaining that DNSH is substantively met seems more hazardous. The DNSH principle involves incorporating PAI disclosures, but

[25] Article 8

[26] In terms of explaining asset allocation in funds, the identified sustainability objective and proportion of investments meeting the objective, as well as the explanation of monitoring sustainable performance by use of methodologies, data, and indicators, while providing insight as to the estimates or limits of this, see proposed Commission delegated regulation 2022, https://bit.ly/3WKVExV.

[27] https://bit.ly/3Z8OTHE

[28] ICMA's sustainability-linked bonds principles, https://bit.ly/3VNRfsY

[29] Pension funds have been risk averse towards impact investing [Brandsetter and Lehner (2015)].

corporate sustainability reporting is not yet in place, hence product providers and managers may not have the necessary data for determining DNSH. Further, DNSH includes checking, as "minimum safeguards", for adherence to the U.N. Guiding Principles for Human Rights, the ILO convention for labor rights, and the International Bill of Rights.[30] Policy articulations by investee companies do not necessarily mean satisfactory compliance with these standards, and it is uncertain how far investment research must go. The DNSH principle is not limited to the two matters above, and its open-ended nature can create legal risk for product providers and managers in terms of what other negative impacts ought to be looked into, and how far down a supply chain of an investee company one must look. The disincentives relating to DNSH may move the industry to focus on Article 8 compliance in order to capture the ESG market, rather than race to the top. If the ideal thresholds for product definitions are impracticable to meet, the E.U.'s authoritative governance risks being disengaged from market mobilization and adoption.

We turn to the U.S. and U.K.'s approaches for reforming product labeling that rely more heavily on market-based governance. These approaches are real contenders in regulatory competition.

3. MARKET-BASED GOVERNANCE FOR SUSTAINABLE FINANCE IN THE U.S. AND U.K.

The U.S.[31] and U.K.[32] have, at the time of writing, issued consultations on disclosure and labeling for ESG or sustainable investment funds in May and October 2022 respectively. There are significant similarities between the two proposals, but overall, both jurisdictions take a stronger market-reliant approach where (a) market choice is promoted within regulatory governance for investor protection, but I argue that (b) there is no authoritative steer in relation to product design and meeting certain sustainability outcomes.

As a baseline, both the U.S. and U.K. would like to introduce certain general disclosures for investment advisers and fund managers in terms of how they consider ESG risk factors in investment policies. The UK regime requires all regulated investment funds and firms to prepare a TCFD-compliant report,[33] which discusses how climate risks are being identified, measured, and managed, and the strategic and governance policies on the part of fund managers and investment firms. The TCFD-compliant report is intended to be upgraded to encompass more ESG factors in due course, to become a "sustainability report". In this manner, the U.K. approach edges closer to the SFDR in making material climate risks a mandatory part of fiduciary investment management, and in due course, material sustainability risks more broadly. The U.S. regime provides for voluntary disclosure, as only investment advisers who consider themselves as integrating ESG considerations need to make relevant disclosure of their strategic investment policies and conflict of interest management policies.

The U.S. and U.K. would also introduce product labeling and minimum standards for investment funds, but arguably, these reforms do not go as far as the E.U.'s in reorienting market classifications of fund products. Fundamentally, this is because the E.U. pursues double materiality [Chiu (2022)] while the U.S. and U.K. seem content with single materiality and limited notions of double materiality. "Double materiality" refers to the concurrent attainment of investment performance and performance in sustainability or ESG objectives that the investment product is concerned with. In the E.U., the lack of connection to doubly material outcomes is itself disingenuous. However, in the U.S. and U.K., product labeling regulation chiefly facilitates market choice and investors' doubly material preferences, if any, would be a matter for market discipline. Product labels would be optional for the U.K. and U.S. markets, and the industry determines whether to adopt them. Further, neither the U.K. nor U.S. are providing definitions for the underlying economic activities/investible assets that would qualify as ESG or sustainable, hence relying on the market to select and define these activities, subject to explanation and transparency to investors.

The SEC proposes to tackle greenwashing and disingenuity in self-regulatory ESG investment labels. It recommends three ESG-oriented product labels with minimum standards in order to steer investors by the "right" signals. The "Integration Fund" is an investment product that considers ESG factors or risks alongside non-ESG factors in investment strategies and performance. The "ESG-focused Fund" adopts a more precise strategy that selects investments or conducts engagement based on ESG factors. The "ESG Impact Fund" seeks overtly to achieve one or more ESG impacts or performance. Different disclosure requirements apply to each of the three labels, and the industry can decide whether to choose to apply such

[30] Art 18, and https://bit.ly/3WMtpiA
[31] https://bit.ly/3WHA0uz
[32] https://bit.ly/3VHfatZ
[33] https://bit.ly/3Vzh1ko

labels. The incentive for choosing a label governed by SEC standards is to appeal to investors that funds' disclosures are subject to potential discipline if in breach of those standards. Ultimately, there is no compulsion to adopt such labeling.

The "Integration Fund" covers a broad scope of investment strategies. It is envisaged that many funds would consider some manner of material ESG risks, making them eligible for the 'Integration Fund' label. The burdens for taking on such labeling are not onerous, as the SEC envisages only general disclosure of how certain ESG factors are taken into account for investment management. However, where the fund considers climate risks in particular, it must disclose the levels of scope 1, 2, and 3 greenhouse gas emissions in its portfolio. Integration Funds seem to be free to select what ESG risks it considers, and whether or not these are for materiality purposes. Disclosures by Integration Funds do not necessarily make it convenient for investors to compare their ESG-relevance or what the fund may achieve with its ESG strategy. In this manner, it is uncertain how the Integration Fund label improves the market for investors in terms of choice and credibility.

Where the U.K. is concerned, there is also express freedom for funds not to opt into one of its three voluntary labels: "sustainable focus", "sustainable improver", or "sustainable impact". The "sustainable focus" product is designed to select allocations based on certain ESG factors, and resemble the U.S.'s "ESG-focused" fund. The "sustainable improver" fund does not meet the requirements of the "sustainable focus" label but is intended to deploy allocation and facilitate engagement so as to achieve improvement in portfolio companies' ESG performance. The "sustainable impact" fund, similar to the U.S. counterpart, would be dedicated to achieving particular ESG impact(s). Funds would choose whether to meet the minimum standards of the Financial Conduct Authority (FCA's) labels, which can be perceived to appeal to investors. The FCA also intends to introduce a baseline against greenwashing, and that is to ban the use of terms "sustainable", "ESG", "climate", "impact", and other specified terms that a fund may adopt for self-labeling, where a fund does not meet any of the three labels governed by the FCA's standards. This prevents the industry from undermining the FCA's labels with creative language. The U.S. has a similar "names rule", which compels funds to maintain 80 percent of assets consistent with its label, with proposed extensive application to a range of names beyond ESG.[34]

The U.S.'s "ESG focused" fund and the U.K.'s "sustainable focus" fund are those that incorporate current investment strategies in terms of exclusion, positive and negative screening, best-in-class stock-picking, and passive benchmarked strategies to ESG indices. In the U.S., the label "ESG-focused" pertains to investment strategies, not ESG/sustainability outcomes as such. There is no indication as to whether the ESG or sustainability-focused strategies have anything to do with single or double materiality. In this manner, the ESG-focused label is governed in terms of disclosure of strategy and processes, and it is up to the investors to discern what outcomes follow from these strategies and processes.

The FCA's "sustainable focus" fund, however, resembles the Article 8 product discussed above. Fund providers and managers need to identify what ESG characteristics they adopt for the fund's focus, the evaluative criteria and metrics for those characteristics, and their methodologies for ensuring that the ESG or sustainability objective(s) are met. Where third-party information, ratings, or analysis is used, fund managers' own due diligence should still be evidenced. Although disclosure-based, funds are required to demonstrate post-sale achievements beyond strategic and procedural disclosures. However, it is queried to what extent the supporting frameworks required for Article 8 products would also be needed in the U.K. The U.K. would need to develop corporate reporting of ESG and sustainability impacts and achievements, audit requirements for such reports, and regulatory standards for informediaries such as analysis and ratings providers and index providers. These are important for fund managers who would incur legal risk in labeling a "sustainable focus fund".

The FCA also proposes that "sustainable focus" funds should have at least 70 percent of their allocation in assets that meet an environmental or social sustainability standard but it is uncertain what certification standards would be acceptable. Further, would these certification standards suffice for fund managers' demonstration of their evaluation that claimed ESG/sustainability characteristics are met? There are varying degrees of credibility in relation to industry-based or quasi-regulatory certifications for various economic activities [Partiti (2022), Moser and Leipold (2021)]. The "sustainable focus" fund, like the Article 8 product, is potentially an unattractive label in view of the needs for robust compliance. However, fund managers may not be significantly affected by legal risk

[34] https://bit.ly/3WXcycr

if the market cannot precisely discern the degree of accuracy of fund managers' claims. The market for the sustainable focus fund or Article 8 product would in part depend on future developments in investor litigation for mis-selling.[35]

The FCA's "sustainable improver" and "sustainable impact" funds, as well as the SEC's "ESG Impact" funds, are underpinned by more prescribed disclosures. There is a need to account for what the improver fund has achieved in terms of ESG improvement, as well as what the respective impact funds have achieved in terms of the relevant sustainable/ESG outcomes.

The FCA's sustainable improver fund leaves some ambiguity in terms of whether precise improvement must be shown, or whether funds can disclose "procedural", not substantive, achievements in terms of their engagement and activist efforts for such changes. The U.S. and U.K. impact fund products require clear identification of the impact sought to be achieved and the key performance indicators applied to ascertain achievement. These labels serve doubly material investment expectations. They also consolidate and recognize market developments in impact investing [Fox (2011), Brandstetter and Lehner (2016)]. By introducing the impact fund labels, the SEC and FCA support and work with market developments, and could mobilize the investment fund industry to develop such products for mainstream investors. Although the nature and type of impact is self-determined, there is a benefit to allowing investors to fund various impact outcomes, instead of being confined to a taxonomy. Self-regulatory definitions of impact, however, risk being self-serving or disingenuous.

Under the U.S. and U.K. proposals, the fund industry remains in control of what ESG/sustainable matters they incorporate, to what extent, and for what purposes. This approach recognizes the achievements of market developments, such as in impact investing or ESG-improvement engagement. Regulation facilitates and mobilizes investor discipline for the veracity of claims. The reforms are, however, incomplete without addressing how investor discipline would be supported. We need to address the discipline of institutional investors by their beneficiaries, and improving investor litigation for mis-selling, including clarifying the standing to sue in the investment chain.

4. CONCLUSION

Whether policymakers adopt market-based governance for sustainable finance or the E.U.'s authoritative governance, they share a common baseline of needing to work with investment markets. The market-based governance of sustainable finance ultimately leaves the industry to define ESG or sustainable goals even if they have to justify what they define/claim. But the E.U. disagrees with merely leaving to markets to define sustainability/ESG goals as well as evaluating if they are achieved. Narrowly focusing on "investor protection" may sit comfortably within the SEC's and FCA's mandates but an opportunity is missed for interrogating the relationship between financial regulation and broader sustainability objectives. The E.U.'s authoritative governance builds upon market-based governance by introducing a greater extent of the visible hand to connect sustainable finance to defined sustainability goals (Article 9 products) and to assist investors in judging if those connections are made. In this manner, the market is incentivized to consider the appeal of authoritative governance as an extension of investor protection, and such governance is not authoritarian in nature. However, with regulatory competition from the U.S. and U.K., the fund industry may converge upon Article 8 products which the ESG-focused or "sustainable focus" fund resembles. These could be preferred over the Article 9 product as they may be globally offered with one set of regulatory costs. Regulatory competition may set the stage for the potential winning out by market-based governance, as the E.U.'s authoritative standards are ultimately subject to market choice.

[35] At worst, investors can opportunistically sue a fund manager for mis-selling when the financial performance is also disappointing, making Article 8 disclosures hazardous for opportunistic litigation.

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THE DANGER OF LINEAR THINKING IN REGULATORY OVERSIGHT: FINANCIAL REGULATORS MUST IMPROVE RISK-DETECTION SYSTEMS AMID DIGITAL TRANSFORMATION

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ABSTRACT

In a much-covered speech in Washington D.C. in the fall of 2022,[2] Federal Board Vice Chair for Supervision Michael S. Barr drew parallels between the risks that accumulated before the 2008-2010 mortgage meltdown and the more recent explosion in financial innovation. Barr noted that innovation "supported by new technologies can disrupt traditional providers by spurring competition, creating products that better meet customer needs, and extending the reach of financial services and products to those typically underserved." But to achieve those outcomes, he warned, "we need to manage the relevant risks." At the tail end of the financial crisis, Barr was an official in the Obama administration's Treasury Department, and a central figure in the drafting of the post-housing-crisis regulatory restructuring known as the Dodd-Frank Act. That law reshaped much of how U.S. financial institutions are supervised and was mirrored by other nations that enacted their own reforms. The changes aimed to allow regulators to detect colossal risks before it was too late to prevent a future crisis of similar proportions. "We have seen through history that excitement over innovative financial products can lead to a pace of adoption that overwhelms our ability to assess and manage underlying vulnerabilities," Barr said in October 2022. "As we saw in the lead up to the global financial crisis, innovative financial products can mask emerging risks, resulting in significant harms to businesses and households and ultimately undermining financial stability." Unfortunately, the early-defense systems established by the U.S. and other countries were meant for the financial system of 2010. Nearly thirteen years later, financial innovation precipitated by digital technologies such as artificial intelligence and the blockchain is leading to a continual transformation of how we move, manage and exchange money, making this equation starkly different from what regulators encountered in the financial crisis.

1. INTRODUCTION: NEW FINANCIAL TECHNOLOGIES, NEW RISKS

Among regulators, the potential for risks resulting from more recent financial innovation[3] – both to consumers and financial stability – going undetected overshadows the benefits promised by these new technologies. This is because regulators, while making progress to understand and adapt to digital transformation, are still not equipped to manage and oversee exponential change.[4]

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[2] https://bit.ly/3KDQKj7

[3] https://bit.ly/3ElfbrH

[4] https://bit.ly/3SyjFa4

Like other congressional overhauls, Dodd-Frank targeted risks seen as responsible for the preceding crisis,[5] including low capital levels, systemic contagion, and regulatory blind spots. But 13 years after its passage, the financial services and technology landscapes look wildly different.

The landmark law has in many respects become outdated.[6] It made some strides in narrowing the regulatory playing field between banks and certain nonbanks, but the industry is dotted with a whole array of unregulated providers that did not exist when Dodd-Frank was passed. A new generation of nonbank lenders, payment providers, cryptocurrency firms, and other nontraditional financial players now rival traditional banks.

While financial innovation offers hope of greater efficiency, inclusiveness, and fairness, there are also concerns that consumers are not adequately safeguarded against abuse by providers that are either unregulated or subject to lighter supervision than banks. There is also concern that private data is increasingly vulnerable to hacking and other misuse, and that new financial instruments are untested and susceptible to massive losses.

1.1 Racing to catch up to exponential change

Recent high-profile collapses of crypto companies such as FTX have already demonstrated the price to be paid when firms lack adequate risk management and internal controls.[7] Such episodes have only had a limited impact on financial stability to date, but risks will continue to grow as innovators introduce new financial services channels through the metaverse and Web 3.0, crypto sheds its growing pains and seeps more into the mainstream, companies increasingly adopt artificial intelligence and machine learning, and the line blurs between bigtech and the financial services sector. Unlike linear processes, technology innovation advances exponentially.[8] As different as the environment looks today compared to when Dodd-Frank passed, changes will likely take shape even faster tomorrow.

If the past is any guide, policymakers are unlikely to pass new laws to address risks before crises happen. Consequently, it is imperative for the regulators to move aggressively on their own to assess and adapt to the digital landscape. This means incorporating cutting-edge supervisory technology (suptech)[9] powered by customized AI, which will allow them to analyze mountains of data. But the agencies themselves are still powered by technology stacks that are largely analog, making it very difficult for them to keep pace with the digital transformation of the industry that they oversee.[10]

Unless regulatory agencies can close the gap by more aggressively adopting technological tools and embracing a digital-native foundation, it is unlikely that the emerging risks from a new generation of financial products can be contained before a new crisis emerges.

2. THE REGULATORY SYSTEM IS RESPONSIVE, NOT PROACTIVE

Throughout history, public figures from John F. Kennedy to Rahm Emanuel have often labeled difficult crises as potential opportunities to trigger massive reforms. When he was still a senator, in 1960, Kennedy noted in a speech that the Chinese translation of the word "'crisis' is composed of two characters – one representing danger and one representing opportunity."[11] In 2008, with the mortgage system cratering, Emanuel famously said after being named President Obama's chief of staff: "Never allow a good crisis go to waste. It's an opportunity to do the things you once thought were impossible."[12]

Emanuel's words presaged the passage two years later of Dodd-Frank, the most sweeping overhaul of the U.S. financial regulatory system in a generation. The European Union also embarked on its own post-crisis regulatory overhaul,[13] and the Basel Committee on Banking Supervision went back to the drawing board on crafting international capital rules,[14] after the crisis proved that the previous capital accord was insufficient.

[5] https://bit.ly/3ZIOINW
[6] https://bit.ly/3Z4xRKs
[7] https://on.mktw.net/41zbbDK
[8] https://bit.ly/3lZiNbt
[9] https://bit.ly/3KEx2DX
[10] https://bit.ly/3lYEEja
[11] https://bit.ly/3ZoXdCK
[12] https://wapo.st/3mcE2h6
[13] https://bit.ly/3mdvCWR
[14] https://bit.ly/41txgnb

The 2008 crisis was not the first dislocation of the financial markets to spur a ramp-up in policy activity. Indeed, policymakers have proven that they are adept at responding to crises – more perhaps than they are at identifying approaching risks and establishing mechanisms beforehand, during relative calm, to prevent potential crises from occurring in the first place.

Much of the U.S. financial policy framework grew out of the 1930s era of the Great Depression, including the creation of the Federal Deposit Insurance Corporation (FDIC),[15] Fannie Mae,[16] Federal Housing Administration (FHA),[17] and other agencies. Further reforms followed the savings and loan crises of the late eighties and early nineties.[18] In 2002, the U.S. Congress passed the Sarbanes-Oxley Act,[19] overhauling accounting regulations in the wake of the scandals that brought down companies such as Enron and WorldCom.

2.1 Successes of traditional regulation

This responsive approach to combating risks has had some successes. With some exceptions – namely the statutory changes during the thrift crises – post-crisis reforms have been followed by a period of calm. The creation of the FDIC greatly reduced the deposit runs that defined banking crises during the Depression,[20] while Fannie Mae and the FHA provided stability to the U.S. mortgage system.[21] In the two decades since Sarbanes-Oxley, accountants and auditors are better positioned to sound the alarm about inflated assets. Dodd-Frank could be deemed successful by the same metric – that is, no crisis comparable to 2008-2010 has occurred in the years since its passage.

The law is often criticized on the left for not going far enough, and on the right for worsening regulatory burden. Yet, Dodd-Frank's prudential reforms resulted in significantly higher capital levels at the largest U.S. banks, which some commentators argue helped them weather the economic effects of the COVID-19 pandemic.[22]

2.2 How traditional financial institutions are protected from erratic markets

Regulators' success at combating risks is sometimes measured by how well traditional financial institutions are protected by their FDIC safety net from the failures of unregulated firms. The 1930s-era Glass-Steagall Act erected firewalls between commercial banking and other financial activities, which were removed during the deregulation of the 1990s.

Following the financial crisis, Dodd-Frank did not reinstate those firewalls.[23] However, supporters of the law point to certain provisions that they say provide an added layer of protection for traditional financial institutions against uncertainty in more erratic markets, such as that for the shadow banks. For example, the Volcker Rule prohibited banks from using FDIC-backed deposits to engage in proprietary trading and was seen by supporters as a defense against systemic shocks resulting from nonbank losses.[24]

In 2015, then-Securities and Exchange Commission member Kara M. Stein gave a speech saying that "the Volcker Rule has a critical role to play in promoting financial system resilience – or the ability of the financial system to withstand stress."[25] "Specifically, by limiting the ability of banks to take large and risky bets on behalf of their own bank, the Volcker Rule acts to limit the correlation between our largest dealer-banks and the markets they serve," Stein said. "This, in turn, provides a buffer when markets behave in ways even the best models do not predict. This is especially important in U.S. markets, where dealer-banks play a large role in credit intermediation."

2.3 Our fragile stability

Despite the track record of legislators and regulators to be crisis responders, they have performed less well at preparing regulatory systems for new business models and risks that plant the seeds of future crises. In his speech last year, Barr noted that financial innovations can have negative results if not combined with consumer protections and other safeguards: "These products can leave consumers vulnerable if they are not coupled with meaningful disclosures and basic protections

[15] https://bit.ly/3Zoge8f
[16] https://bit.ly/2MKtO1W
[17] https://bit.ly/3Z4Gu83
[18] https://bit.ly/3EJWggm
[19] https://bit.ly/3mdBgYX
[20] https://bit.ly/3Y57Nha
[21] https://bit.ly/2ERX2co
[22] https://bit.ly/3J1CvU9
[23] https://bit.ly/3Z7GUui
[24] It was named after the former Federal Reserve Board Chair Paul Volcker, who first proposed the ban.
[25] https://bit.ly/3Zly5wu

against abusive practices," he said. "Innovation can lead to disruptions of existing markets, which may be beneficial, but may also generate new systemic risks."

The most visible test currently of financial markets' capacity to withstand risks is in how they weather the high-profile failures of several crypto firms, most notably FTX. However, a full-blown crisis is still at bay. The broader financial system's exposure to the recent crypto storm is still relatively limited,[26] given that the crypto industry is still seen as a niche part of the global financial markets.[27] In September 2022, the Basel Committee on Banking Supervision reported that fewer than 20 banks worldwide held crypto assets.[28]

Yet, if Dodd-Frank initiated a period of stability, that stability has become fragile as the financial sector becomes transformed by digital technology. With the emergence of new startups, the financial services ambitions of bigtech firms,[29] and rapid development of AI,[30] the industry looks quite different than it did 13 years ago. The bigger test for the regulators is how they establish mechanisms to deal with the less visible risks borne of the exponential growth of new technologies in the financial services arena.

2.4 Unforeseen risks

In 2020, the academics Robert S. Kaplan, Herman B. Leonard, and Anette Mikes published an article in the Harvard Business Review,[31] in which they said that standard risk management systems cannot account for risks that they cannot foresee. "Risks come in many forms and flavors. Companies can manage the ones they know about and anticipate," they wrote. "But novel risks – those that emerge completely out of the blue – will arise either from complex combinations of seemingly routine events or from unprecedentedly massive events."

As digital innovation reshapes the world of finance, such novel risks will likely start appearing faster than regulators can respond to them. What is required to avert the next financial crisis is a full-fledged effort by the regulatory community to understand and adapt to new technologies.

3. THE DANGER OF LINEAR THINKING

The futurist Ray Kurzweil famously said: "Our intuition about the future is linear. But the reality of information technology is exponential, and that makes a profound difference. If I take 30 steps linearly, I get to 30. If I take 30 steps exponentially, I get to a billion."[32]

The biggest obstacle for regulators to adapt to digital change is that the traditional analog rails that they have used – along with traditional finance – to improve processes over time just do not apply in the digital world. That is because technology evolves exponentially.

Policymakers attempt ambitious reforms of regulatory processes about once every few decades. Following the financial crisis, Dodd-Frank seemed pretty momentous for a legal statute, and it remains the last important structural reform to this day. It is perhaps significant that, before Congress was consumed by writing this law spanning over 2,300 pages, Bitcoin was already born. It was just a year old,[33] in its infancy; not even on the lawmakers' radar. Now compare that with how fast technology changes. For the entire 20th century, copyrighted music was represented by physical copies of vinyl records, cassette tapes, and compact discs. Digital files for music entered the mainstream with Apple's introduction of the iPod in 2001. Just two decades later, iPods seem[34] like a relic and we are all telling Alexa and Siri to play our favorite songs. Apple recently announced it would stop producing the iPod.[35]

3.1 Closing the digital gap with financial technology

In financial technology, this example can be seen in payments tools. In 2014, the U.S. had yet to implement chip-enabled credit cards.[36] Today, just eight years later, carrying a credit card is becoming passé, as smartphones, smartwatches, and even biometrics allow users to purchase goods.[37] Over time, technologies such as the blockchain, Web 3.0, metaverse, AI, and quantum computing will continue to reshape financial services.

[26] https://bit.ly/3Y5GxiC
[27] https://bit.ly/3YYuEMx
[28] https://bit.ly/3mdZGBL
[29] https://bit.ly/2VmrP6b
[30] https://bit.ly/3EJ9Pwn
[31] https://bit.ly/3lWI2Ls
[32] https://bit.ly/3SyCr18
[33] https://bit.ly/3Z4LxW3
[34] https://bit.ly/3SC3f0z
[35] https://nyti.ms/3kDFgRV
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[37] https://bit.ly/41vws1f

Regulators have made notable progress in recent years to establish innovation-focused units, hire technology experts, and issue guidance to their regulated institutions about the risks of working with newer types of financial entities such as crypto firms. But the rate at which digital technology is accelerating continues to be many degrees faster.[38]

For agencies to close the digital gap, they will need to replace their tendency to think linearly with newfound strategies to combat the risks arising from exponential change in the technology and the financial services sector. The first step is to modernize the technology – the industry's and their own – to digitize as much information as possible and to make it accessible in full volumes and in real time. Regulators still largely oversee financial firms using analog data that is difficult to manipulate to detect risks.

Much of the data in the system is stranded in isolated, hard-to-access databases. Bank examiners still draw samples of files to search for signs of problems and extrapolate potential risks. Bank regulators still rely on the quarterly Call Report to evaluate risks. This is fundamental information scarcity. It consigns regulators to looking backward rather than forward, and to working with fragments of information that represent an ever-shrinking piece of the total picture of risk in the system.

In a digital environment, where the amount of data often exceeds its utility, analog systems make it difficult to identify safety and soundness threats, potential consumer compliance violations, and financial crimes such as money laundering. By contrast, the industry has moved much faster to digitize, instituting automated lending systems, faster delivery vehicles, robotic processing, and distributed ledgers.

3.2 Digital innovation accelerated during the pandemic era

In 2020, as the COVID-19 pandemic continued to spread, the Alliance for Innovative Regulation (AIR) published its seminal paper "A Regtech Manifesto",[39] providing a blueprint for how the regulatory system can begin to close the digital gap.

The paper included a prediction that digital technology in the financial services sector will continue to advance at exponential speed, and that this will lead to new risks (as well as opportunities) if regulators do not move at similar speed to supplant their analog models with new digital-focused approaches.

Thirty months later, it is not hard to argue that that prediction was 100 percent accurate. In fact, the Manifesto did not even reference some of the biggest innovations of the past two years: non-fungible tokens (NFTs), decentralized autonomous organizations (DAOs), decentralized finance (DeFi), Web3, and the metaverse.[40]

3.3 The gap is widening

The digitalization of finance accelerated at a fever pace in part because of the pandemic. Consumers had at their disposal ample digital financial services options that precluded the need to leave their homes, similar to e-commerce.

During this age of crisis, many financial regulators made substantial progress establishing offsite examination capabilities in response to quarantine measures.[41] They have moved more aggressively than in years past to educate their personnel across the board about digital finance concepts and developments. Most U.S. financial regulatory bodies have created innovation offices, some of which include a focus on supervisory technology, known as suptech.

The Federal Reserve System appointed its first ever Chief Innovation Officer,[42] Sunayna Tuteja, with a mandate to modernize the central bank's own technology. The G-20 held its first ever regulatory TechSprint in 2020, seeking suptech solutions for challenges facing large numbers of financial supervisory agencies.[43] The Bank for International Settlements has established innovation labs throughout the world. In some notable cases involving emerging-markets regulators,[44] government agencies have made enormous strides in adopting digital-native regulatory designs to monitor digital products capable of expanding financial inclusion.

However, the regulatory sector is still moving too cautiously and deliberately to meet this moment. The gap between the industry's digital development[45] and that of key government agencies is still widening. Heightened risk coupled with a continued analog-focused approach by regulators has not yet resulted in a crisis. But regulators need to pick up the pace to forestall such a crisis in the future.

[38] https://bit.ly/3kyGVbv
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[42] https://bit.ly/3lZ9xEh
[43] https://bit.ly/41qhOIF
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4. WHAT NEEDS TO CHANGE

Some members of the U.S. Congress have attempted to modernize certain aspects of the federal regulatory regime to keep pace with technological change. This includes an array of legislative proposals to create a formal regulatory framework for crypto,[46] with more clearly established powers for agencies such as the Securities and Exchange Commission (SEC) and Commodity Futures Trading Commission (CFTC), restrictions for stablecoin providers, a study on energy consumption by digital asset companies, and more. In addition, House Financial Services Committee Chair Patrick McHenry, R-N.C., has sponsored a bill to require the formation of a Financial Services Innovation Office (FSIO) at each regulatory agency.[47]

But with a divided Congress, lawmakers are unlikely to come to agreement on major legislation. And, as has been mentioned earlier in this article, the historical precedent does not favor the legislative branch acting to combat risk in the financial services sector before a crisis occurs.

A September 2022 paper by the International Monetary Fund called on regulators "to use all existing tools at their disposal to address rising local risks" associated with crypto assets.[48] The IMF said that: "The growing systemic implications of crypto assets may warrant immediate regulatory actions, particularly in some emerging markets and developing economies. Regulators should use existing regulatory powers, guided by the applicable international standards, and should focus on areas of vulnerability, such as hosted wallets, centralized exchanges, and financial institutions' exposures. Actions can range from user education and industry guidance to targeted restrictions.

Authorities should ensure that any short-term approach is flexible enough to be adjusted in the future, in line with market developments and future international standards."

4.1 A new paradigm for financial regulation

Ultimately, regulators need a new toolbox. Their largely paper-based, analog systems for gathering and analyzing data, assessing financial companies' risk management processes, and combating threats should over time be supplanted by a digital-native design. Greater synergy between financial regulators and technology leaders would lead to the acceleration of digital tools tailored specifically for financial regulators.

The challenge for regulators in detecting and combating the risks that will lead to the next economic crisis is no longer just looking for a needle in the haystack. It is looking for a needle in 10,000 or 100,000 or a million haystacks.

4.2 "Data is the new oil"

In 2006, the British mathematician, Clive Humby, declared that: "Data is the new oil."[49] But without adapting to the pace of digital innovation, regulators may view the explosion of information – powered by technology – about potential money laundering threats, customer onboarding, fair-lending concerns, and more that is available as raw data as too much of a good thing.

They lack the tools to effectively analyze all the data. Former Bank of England Governor, Mark Carney, once noted that the bank gets 65 billion pieces of data annually from companies under its watch. Reviewing it all, he said, would be like "each supervisor reading the complete works of Shakespeare twice a week, every week of the year."[50]

The answer to this conundrum is to fight fire with fire. Just as the industry is using AI to speed up processes for customer onboarding loan applications, regulatory compliance, and more, regulators should explore how AI and machine learning can make their monitoring more precise and effective.

4.3 Innovation blueprint

The following steps should be a priority for regulators and other policymakers to begin to close the gap with the financial services industry's digital transformation:

- **Create the "innovation office 2.0":** most regulatory agencies have established innovation offices that allow companies experimenting with technology to seek advice on compliance with regulatory mandates. Regulators should build on this foundation by establishing a more central role in the agency organizational chart for the teams of technology experts. They should strengthen lines of communication between innovation units and agency heads so that digital technology efforts rise to the level of top-of-the-agenda items. Agencies should consider

[46] https://bit.ly/41zxZU7
[47] https://bit.ly/3Z8Ke8g
[48] https://bit.ly/3IDUFtG
[49] https://bit.ly/3KlnYO7
[50] https://bit.ly/3Z7Ompe

establishing a new position – in addition to CIO/CTO – of Chief Innovation Officer (a step that has been taken, for example, by the Federal Reserve Board).

- **Prioritize suptech and regtech:** most agency innovation initiatives are outward-facing, focused mainly on understanding and interacting with fintech innovation by the industry. These should be expanded or supplemented to address supervisory technology – or suptech – for use by the regulator itself. Regulators should also develop a strong focus on regtech, the compliance and risk management technology used by the industry. The roles of the regulator and the industry compliance functions are intertwined in that both are about assessing and managing risks at regulated firms.
- **Update procurement protocols and purchase best-in-class technology:** many regulatory bodies are using IT systems that are decades old and that, despite updates and patches, are not adequate in today's environment. Agencies should assess their tech systems and plan for conversion to digital-native infrastructure. For most regulators, this process will require revisiting procurement protocols. A common phenomenon at agencies is to engage consulting firms to build bespoke technology systems, because the process for procuring better technology is onerous and legally risky. This pattern can consign agencies to perpetual underperformance in technology.
- **Migrate to cloud computing:** operating a digital organization requires migration from on-premises mainframe systems to cloud environments that enable flexible and efficient use of computing power that can be readily updated as technology evolves. Some agencies are already in full or partial cloud environments (e.g., Financial Industry Regulatory Authority (FINRA), the Municipal Securities Rulemaking Board, and parts of the Consumer Financial Protection Bureau (CFPB)), but most are not.
- **Leverage open-source technology:** modern technology operations rely on widespread use of open-source software, which, if properly managed, offers great advantages in security, efficiency, and interoperability. Some agencies already use open-source tools and contribute software to open-source systems, but most do not. This shift should be accelerated. In particular, agencies should work toward creating common open-source tech layers that will enable high interoperability with other regulators and with regulated firms.
- **Modernize third-party risk rules:** regulators must maintain stringent requirements for banks to manage risks generated by vendors and partners. At the same time, most banks will need to work with third parties in order to keep up with the pace of technology change. Regulators should be sure that third-party risk rules do not inadvertently discourage the industry from adopting new, superior technology.
- **Raise standards for bank technology:** regulators should jointly undertake an initiative to upgrade the industry's technology, including risk management technology, over the next five years or so. They should be agnostic regarding specific vendors and technology types, but they should communicate expectations that outcomes need to improve. Regarding safety and soundness, they may want to begin criticizing technology infrastructure that weakens a banks' capacity to compete. Regulators should assess their own internal processes for encouraging and furthering digital-native financial solutions in the industry that expand financial inclusion, strengthen risk controls, and ensure positive outcomes for low- and moderate-income consumers. The key question at the heart of a digital-native regulatory design: is the result a fair, safer, and more inclusive financial system for everyone?
- **Adopt "digital regulatory reporting" (DRR) and level regulatory burden:** agencies should transition to use of digital regulatory reporting to replace traditional reporting by regulated firms. Putting reporting in digital form will equip agencies with more information, more timely information, and greater ability to analyze information, because it will come in digital form. Today, the industry has very uneven capacity to report information in digital form, so these reforms should be introduced over time. Agencies can consider making DRR voluntary for some period, so that firms can opt for either traditional reporting or the new format. A gradual transition would likely see younger firms with no legacy technology, including fintechs, opting in before traditional banks. This transition period will give regulators experience in building the DRR processes before confronting a full industry conversion. Moving to a DRR format will, over time, help address the disproportionate regulatory burden carried by small institutions, and could lower compliance costs for the whole system while simultaneously strengthening regulatory outcomes. For regulators that oversee both banks and nonbank financial firms, such as financial supervisors at the state level, taking these steps can eventually also level the regulatory costs and burdens between banks and nonbanks.

- **Educate personnel:** most agencies need expanded technology education for their personnel. All employees should be trained in basic technology concepts, and many should have specialized education in new technology-driven financial products and emerging risks.
- **Hire more technologists:** government hiring policies make it difficult for agencies to recruit people from the tech world. Most agencies need more data scientists, as well as software engineers and designers. They would also benefit from people with skills in human-centered design. Agencies should assess options for recruiting outreach to tech experts, the potential for adjusting pay scales, using short-term rotations, and revisiting conflict-of-interest rules relating to employees holding stock.
- **Adopt agile workflow:** agencies should transition key functions away from traditional "waterfall" work patterns to "agile" environments. In the latter, cross-functional teams work together intensively in real time on initiatives, rather than having work flow in a linear manner from one group to the next.
- **Build innovative cultures:** agencies must prioritize opportunities to build innovative cultures. Practical steps include holding TechSprints, building labs to incubate new regulatory tools, and fostering closer engagement with the community of technologists, developers, and programmers.
- **Prioritize AI:** agencies should commit more resources to take better advantage of continually evolving AI, including machine learning (ML) models and natural language processing (NLP), to strengthen their supervision of fair-lending compliance, anti-money laundering (AML) efforts, loan quality, and balance sheets, as well as their analysis of systemic trends. They should also evaluate and address risks that may be arising in AI systems. One priority should be to assess the potential impact of ChatGPT by financial firms.
- **Explore design thinking and behavioral economics:** these fields of knowledge can be potential linchpins for designing regulatory processes aimed at enhancing the fairness and accessibility of financial services for consumers, including underserved and unserved market segments. They can also enhance agencies' effectiveness in monitoring the system.
- **Evaluate fair-lending policies and other compliance processes:** regulators should determine if these processes are resulting in check-the-box exercises or bearing solutions that truly and effectively mitigate redlining and other predatory and discriminatory practices.

5. CONCLUSION

There is no denying that the financial services industry is moving ahead at lightspeed to embrace a fully digitized future. The technologically advanced innovations that have reshaped how consumers manage their money, obtain credit, invest in the economy, and more, are worlds away from how financial services looked just a little over a decade ago, when policymakers were crafting the regulatory response to the financial crisis. It is just as likely that the financial system 13 years from now will look exponentially different than it does today.

This digital transformation has resulted in both benefits and drawbacks for the average financial services consumer and the broader economy. Financial innovators have achieved success in expanding access for consumers who were left out of the traditional banking system. In key areas, digital technology has reduced costs, improved efficiency, encouraged experimentation and competition, and enabled consumers to build wealth.

But the pace of change has left many observers wondering whether this digital transformation is moving too fast. The emergence of new types of financial players, products, algorithms, and whole paradigms has left the financial system awash in new risks that financial regulators are ill-equipped to manage.

The U.S. regulatory framework, last revised to a significant degree by the 2010 Dodd-Frank Act, has helped keep the financial system safe from a full-blown crisis since the 2008-era mortgage debacle and market implosion. But that framework is still meant for an analog regulatory structure; one that operates in a linear fashion and responds to linear change in an industry that is more analog than today's financial services sector.

This misalignment not only makes consumer safety and financial stability vulnerable, but also risks undermining the benefits of financial innovation. Regulators and other public-sector officials need a renewed focus on narrowing this gap before the risks inherent in digital-native financial products propel a full-blown crisis.

UNDERSTANDING BENEFICIAL OWNERSHIP DISCLOSURE

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ABSTRACT

Beneficial ownership disclosure remains a contentious issue for government regulators, the financial sector, and business professionals. Corporate transparency campaigners and other advocates argue that the proper disclosure of beneficial ownership is crucial to maintaining a fair and strong global financial system. It enhances the transparency of tax affairs and other corporate dealings, and prevents illicit activities, such as money laundering and tax evasion. However, enhanced beneficial ownership transparency relies on an effective system involving accurate company disclosure of beneficial ownership, robust verification procedures, and ongoing monitoring. The process of identifying the real beneficial owner of company assets can also prove onerous and costly for those obligated to carry out proper customer due diligence under anti-money laundering rules. This paper provides an insight into the global efforts to enhance corporate transparency through the disclosure of beneficial ownership. It explores the role of company registers, examines the process of customer due diligence, and considers what the proper disclosure of beneficial ownership means for the regulated financial sector and the business community.

1. INTRODUCTION: WHAT IS BENEFICIAL OWNERSHIP?

The beneficial owner is the natural person(s) who ultimately owns or controls a legal entity or arrangement (such as a company or trust arrangement) on whose behalf a transaction or activity is being conducted [FATF (2014)]. It is the individual who stands to benefit or enjoy an asset – not necessarily the same person listed as the legal or official owner of the asset [Thorpe (2021)]. Consequently, beneficial ownership recognizes the fundamental separation of the legal and rightful owner of assets or other property. As a concept historically derived from trust law, beneficial ownership determines the equitable interest in property through the principle of equity, a remedial measure that seeks to overcome injustice caused by the strict application of common law rules. Beneficial ownership underpins many competitive markets, legitimate corporate dealings, commercial transactions, and uses; for example, trust arrangements, shell companies, company mergers and acquisitions, etc. [Gillis (2019)].

The term "beneficial owner" also features in the OECD's Model Tax Convention (on income and on capital), originally published in 1977 [da Silva (2017)]. This convention provides tax advice for countries engaged in bilateral negotiations with the aim of preventing businesses paying tax again on the same source of earned income when trading across jurisdictions [a principle known as double taxation; OECD (2016)]. The Model Tax Convention emphasizes that the person who has the "right to use and enjoy" passive income (meaning dividends, interests, or royalties) is considered the beneficial owner. It also notes that the beneficial owner is not compelled by law or through contract to pass that income onto another person [da Silva (2017)]. The inclusion of the phrase "beneficial owner" was intended to offer clarity to the notion of beneficial ownership and was done against the background of the Model Tax Convention's aim of preventing double taxation, tax avoidance, and evasion [Elliffe (2009), IBFD (2011)].

In the case of commercial entities, many jurisdictions stipulate beneficial ownership via a percentage threshold in which to quantify the benefit attributable to a real person behind a corporation. For example, the U.K. defines a beneficial owner

as those holding more than 25 percent of shares or voting rights in a legal entity [Subashi (2014)]. The U.S. Treasury Department's Financial Crimes Enforcement Network (FinCEN) Final Rule also applies this percentage threshold. However, in Bangladesh and Pakistan, the threshold is 10 percent, and as low as 5 percent in the Philippines [OECD (2016)]. Exceeding these thresholds requires a person to be disclosed as a company's beneficial owner on a centrally held register [Hook (2018)]. An exception to this rule is Mongolia, where no such disclosure threshold exists; beneficial ownership disclosure is only demanded for entities licensed to provide custodian services, and only as and when their circumstances change [OECD (2016). Beneficial ownership transparency is intended to prevent companies' owners from operating in secrecy and has become an important policy tool for governments in the fight against crime.

2. WHY DISCLOSE BENEFICIAL OWNERSHIP?

2.1. Beneficial ownership transparency

Many would argue that beneficial ownership transparency is vital to preventing money laundering, tax evasion, and other criminal activities. It helps to uncover corrupt wealth, aiding the authorities to identify, evidence, and recover stolen assets [Gilmour (2020, 2022a), Radon and Achuthan (2017)]. Recent exposés surrounding corporate transparency have increased pressure on governments globally to clamp down on immoral and criminal activities that abuse the financial system and undermine public trust in fair democracies.

In recent years, public scrutiny surrounding the transparency of corporates and their offshore business dealings has intensified due to successive high-profile data leaks [Radon and Achuthan (2017)]. In 2016, over 11 million leaked documents from Panama-based law firm, Mossack Fonseca, uncovered the widespread abuse of the financial system, which involved individuals concealing company beneficial ownership. This exposé became known as the "Panama Papers" and was followed by a similar leak known as the "Paradise Papers" a year later, which involved Bermudan law firm, Appleby [Gilmour (2020)]. Global transparency campaigners have justifiably been critical of strong tax avoidance schemes that benefit large multinational companies, the wealthy, or political elite.

Recent discourse has also emphasized the associated role of offshore jurisdictions in facilitating shady business dealings and illicit activities, like corruption and money laundering [Gilmour (2020), Thomas-James (2022)]. The "Pandora Papers" leaks of 2021 served to reaffirm public concerns around secretive offshore practices. An offshore financial center (OFC) is stereotypically viewed as a remote and idyllic small tropical island and developing microstate in the Caribbean. Yet, a significant number of jurisdictions within, or linked to, more developed Western economies have also appeared in the transparency spotlight. For instance, major financial hubs, like Singapore, Switzerland, U.K., Hong Kong, and the U.S. have, to varying extents, often supported fiscal policies based on stricter secrecy laws or client-confidentiality rules, favorable custom arrangements, and free trade zones with lower taxation in order to attract overseas investment [Young (2013), Thomas-James (2021)]. Indeed, much overseas wealth that is tied up within the U.K.'s property market has originated because of secrecy in beneficial ownership. Concerns surrounding the source of suspicious wealth in the U.K.'s property market has even led some to declare the City of London as "The money laundering capital of the world," [Raphael (2016), Transparency International UK (2017)]. Consequently, understanding the particulars of offshore finance has become key to governments' beneficial ownership transparency agendas.

As a result, many governments have committed to international standards on enhanced corporate transparency centered on the disclosure of beneficial owners [Cruz (2020)]. This has led to stronger anti-money laundering (AML) frameworks and customer due diligence procedures to curb money laundering and tax evasion, and to ensure they are seen by the wider AML community to be complying with relevant AML recommendations set by the Financial Action Task Force (FATF). The disclosure of beneficial ownership allows for a more transparent, accountable, and fairer financial system. It results in a more competitive business environment and improved investor confidence in financial markets [Cruz (2020), Vermeulen (2013)]. Transparency of beneficial ownership is also needed to ensure the automatic exchange of information on beneficial owners and so intergovernmental cooperative efforts can operate effectively [Konovalova et al. (2022)]. The next section discusses the risks associated with beneficial ownership obscurity.

2.2. Risks associated with a lack of beneficial ownership transparency

The risks associated with obscured beneficial ownership are diverse. Obscurity in beneficial ownership acts to undermine the political, legal, and financial systems and upsets social order [Niyetullayev and Almond (2014)]. Individuals can conceal beneficial ownership in various ways [Gilmour (2020, 2022a), Radon and Achuthan (2017), Thomas-James (2021), van der Does de Willebois et al. (2011)]. One example is through anonymous shell companies. Shell companies are

legal entities that ostensibly function through a registered address but generate little or no inherent value. It is important to note that beneficial ownership is hidden for legitimate commercial reasons. Anonymous shell companies are used to legitimately hold corporate stock, support company mergers, and enable the transfer of finance across jurisdictions. However, anonymous shell companies have become useful vehicles for facilitating illicit activities through obscuring beneficial ownership [Konovalova et al. (2022)]. Shell companies can also be registered anonymously, at low cost, and with little oversight from regulators.

Furthermore, criminals can layer company ownership using nominee shareholders and professional intermediaries (for instance, lawyers, accountants, and trust and company service providers) and through multiple corporations registered in offshore jurisdictions [Bieler (2022)]. Many legal entities, intermediaries, and people can operate in different ways across multiple levels within the broader corporate structure to affect how each entity within is controlled in determining the ultimate beneficial owner [FATF (2018)]. Elaborate arrangements like these make identifying the beneficial owner difficult for authorities. Criminals seek to exploit corporate beneficial ownership to distance the registered or legal owner of illicit assets from the source of criminality and ultimately obscure the real beneficiary of criminal proceeds [Gillis (2019), Pacini and Wadlinger (2018)]. Figure 1 represents the complexity of corporate structures and demonstrates how elaborate corporate structures can obscure the beneficial owner of assets.

As illustrated in Figure 1, suppose corporate entities registered in various jurisdictions are controlled by several people, each having a different role in the entities' control. Assets are held in a bank account located in one country, despite the account holder being in the name of Company A, registered in another jurisdiction. Company B holds shares in Company A, yet the legal owner of Company A is Company C, located elsewhere. A professional intermediary acting as trustee for Company C is used to incorporate Company C and Company E on behalf of another, based in another offshore jurisdiction. A person located in another country physically holds the bearer share certificate relating to Company D, which manages Company B. This person also acts as settlor in dividing assets of Company E to a trustee and acts as the legal owner of Company F, which is registered overseas. Yet, the layering of beneficial ownership through complex corporate structures also means that individuals can simply circumvent any legal disclosure requirement by ensuring no one person holds more shares or interest in any one company than the disclosure threshold defined by national laws (Figure 2).

Layering company ownership helps to conceal the real beneficial owner of criminal assets. Existing disclosure thresholds determine whether a person is required to be disclosed as a company's beneficial owner (for example, more

Figure 1: The complexity of corporate structures

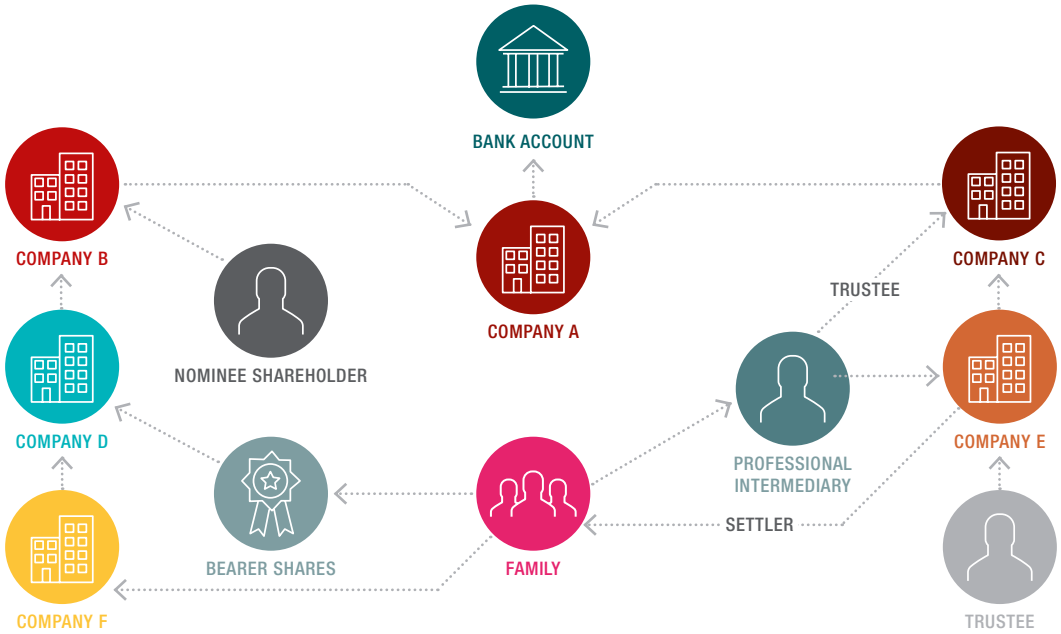
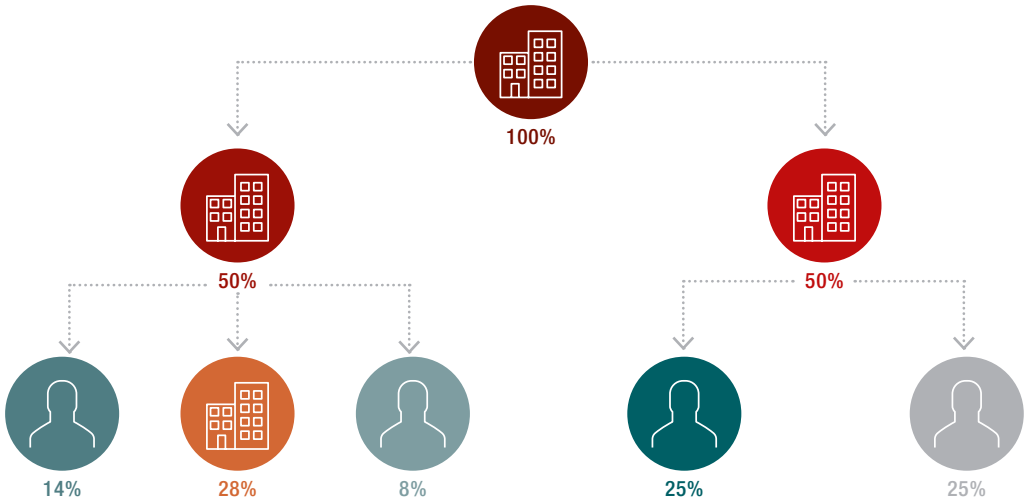


Figure 2: Layering company ownership



than 25 percent of shares or voting rights in a legal entity, as is the case in the U.K.). However, these thresholds could be viewed as meaningless. For example, the U.K.'s threshold can be circumvented by structuring company ownership to ensure no person holds more than 25 percent of shares or voting rights in a company. Otherwise, a company formation agent might be listed as a legal owner. Yet, despite corporate structures often being complex as illustrated by these examples, there is always a natural person behind the various companies involved [Riccardi (2013)].

2.3. PEPs and other high-risk entities

Further risks associated with beneficial ownership obscurity center on the role of politically exposed persons (PEPs) and other high-risk entities. PEPs are individuals that may be more susceptible to corruption due to their public profile, status, or influence in government, the judiciary, or other state or corporate functions. According to FATF (2013) guidelines, they include several high-ranking and powerful roles – and their relations and associates – for example, politicians, supreme court officials, senior military, state ambassadors, and high-profile international company directors. Notably, they do not include middle- or lower-ranked officials [Menz (2021), Suntura et al. (2021)], though there are some inconsistencies in how PEPs are defined with various interpretations across international AML and financial sector bodies [Menz (2021)]. Furthermore, the U.K.'s Criminal Finances Act 2017 deems a PEP to also encompass anyone otherwise connected with someone who is already defined as a PEP – and would include a vast array of individuals involved in doing business with a PEP or merely associating with them. Such a wide scope underlines the recognition of the potential money-laundering and corruption risks that PEPs present [Menz (2021)].

PEPs and corporate entities associated with states having insecure or undemocratic governments can also present higher money-laundering and corruption risks. High-risk countries may feature on the FATF's published "grey list", which represents those countries having strategic deficiencies in their regimes to counter money laundering, terrorist financing, and proliferation and are, therefore, subject to increased monitoring [FATF (2022)]. Such countries work with the FATF to resolve shortcomings in their regimes within a set timeframe or risk being placed on the more punitive "blacklist". The blacklist includes countries considered uncooperative when dealing with authorities seeking to investigate money laundering or failing to comply with AML guidance. Blacklisting aims to "name and shame" and stigmatize countries featured on the list, and any country or organization associated with them; therefore, placing them under international pressure to cooperate with AML regimes. Failure to do so can cause financial costs and reputational damage to those involved [Gilmour (2020)]. Only North Korea and Iran currently feature on FATF's blacklist, whereas over twenty nations appear on the grey list and are subject to periodic change depending on ongoing in-country mutual evaluations of their AML and countering terrorism financing frameworks and procedures [FATF (2022)]. The next section discusses what the disclosure of beneficial ownership means in practice.

3. REGISTERS OF BENEFICIAL OWNERS

Many countries have established some form of beneficial ownership register or are in the process of doing so, but beyond the U.K. and some E.U. member states, fully public registers are not universally implemented. The E.U. has largely adhered to FATF's Recommendations 24 and 25 concerning the transparency and beneficial ownership of legal persons, and legal arrangements respectively, which advocate for nations to establish registers of beneficial owners. The E.U.'s 4th Anti-Money Laundering Directive [Council Directive (2015/849EU)][1] required E.U. member states to introduce their own national registers of beneficial owners. Notably, Article 30(5) of 4AMLD stated that information held on such a register must be made accessible in all cases to:

a. competent authorities and [financial intelligence units], without any restriction,

b. obliged entities, within the framework of customer due diligence […],

c. any person or organization that can demonstrate a legitimate interest.

Importantly, point c) of Article 30(5) was subsequently amended via the 5th Anti-Money Laundering Directive (Council Directive 2018/843EU) to: "any member of the general public … [is] permitted to access at least the name, the month and year of birth and the country of residence and nationality of the beneficial owner as well as the nature and extent of the beneficial interest held" [Council Directive (2018/843EU)].[2]

However, 2022's landmark ruling by the Court of Justice of the European Union (CJEU) confirmed that fully public registers on beneficial ownership within the E.U. conflict with the fundamental rights to privacy and represents a setback for transparency advocates. The CJEU considered a joint case brought against the Luxembourg Business Registers by two companies trying to restrict access to information held on their beneficial owners. The Court ruled that access to beneficial ownership information was "neither limited to what is strictly necessary nor proportionate to the objective pursued" and that allowing full access to the "general public" to information on beneficial owners interfered with the rights guaranteed in Articles 7 and 8 of the Charter of Fundamental Rights of the European Union (WM and Sovim SA v. Luxembourg Business Registers).[3] This ruling, in essence, invalidated the provision under Article 30(5) as amended by the 5AMLD that guaranteed full transparency of beneficial ownership.

Nonetheless, E.U. member states are still offered discretion as to how national registers are implemented domestically. For example, the U.K. established a fully public "persons of significant control" (PSC) register prior to leaving E.U. membership. The PSC register is held by the U.K.'s executive agency and registrar of companies, Companies House. Beneficial ownership information is freely available except in circumstances that might expose individuals to harm or otherwise present a safety concern. Despite a move towards increased transparency, the U.K.'s register of beneficial ownership of trusts is only available to those demonstrating a legitimate interest to this information, for example, law enforcement [Gilmour (2020)]. The U.K.'s register of trusts is maintained by His Majesty Revenue and Customs via the Trusts Registration Service. It now covers all U.K. trusts and some non-U.K. trusts set up on or after 6 October 2020. It excludes several types of trust arrangements, such as charitable trusts, pensions, will trusts, and trusts valued under £100 established prior to October 6, 2020. Trustees must disclose information concerning trustee(s), settlor, and beneficiaries of their arrangements. Similarly, HMRC can decline access in circumstances that might expose the beneficial owner to risk of being victim of fraud, blackmail, or suffer from any other harm [Morgan (2022)].

The U.K. has recently introduced a register of overseas entities that own or control U.K. property, via the recent Economic Crime (Transparency and Enforcement) Act 2022. This suggests that the U.K. government recognizes the money-laundering risks inherent within the U.K.'s real estate sector and is continuing to make efforts to enhance beneficial ownership transparency. Beneficial ownership information of U.K. freehold properties, or leases of over seven years issued on or after 1 January 1999 must now be disclosed [The Law Society of England and Wales (2022)]. Further reforms to Companies House are underway, including providing Companies House with the mandate to verify information on beneficial owners submitted to their registers. It remains to be seen how the U.K. will implement future FATF's recommendations or consider future updates to the E.U.'s AMLDs, now that it is outside the membership of the E.U.

[1] Council Directive 2015/849/EU of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) 2012/648 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC, (2015), Official Journal of the European Union, L141, 73-117.

[2] Council Directive 2018/843/EU of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU, (2018), Official Journal of the European Union, L156, 43-57.

[3] WM and Sovim SA v. Luxembourg Business Registers. Court of Justice of the European Union (2022), https://bit.ly/3WFeGWo

Elsewhere, the U.S. has established a central register of beneficial owners through the Corporate Transparency Act. Here, beneficial ownership information of certain corporates must be disclosed to Financial Crimes Enforcement Network (FinCEN). However, it should be noted that information on beneficial owners is not publicly available and is secured by the Secretary of the Treasury within a non-public database only accessible by law enforcement and defined "covered" financial institutions [Gilmour (2022b)]. Covered financial institutions can only access such data to help their customer due diligence compliance duties and only then with their clients' permission. Furthermore, companies having more than twenty full-time employees, publicly listed on the stock market, or with a physical office within the U.S. are exempt from disclosing their beneficial owners. This then understandably raises doubts as to whether the new Corporate Transparency Act promotes a truly transparent beneficial ownership regime.

Global attempts to strengthen beneficial ownership transparency entails challenges for governments and regulated sectors to overcome. Not only must legal frameworks adhere with fundamental rights to privacy in safeguarding individual freedoms, proper infrastructures and processes must also be implemented to support the accurate verification of beneficial ownership information held within registers. Key to this is ensuring that companies and regulated professionals understand their duties surrounding customer due diligence compliance, which is crucial to the know your customer (KYC) principle. The following section discusses this in further detail.

4. CUSTOMER DUE DILIGENCE

It is vital for regulated professionals and other obliged entities to undertake consistent and methodological customer due diligence (CDD) processes to ensure compliance with anti-money laundering regulations in preventing and detecting illicit activity. As part of this process, banks, law firms, and other regulated sectors should support four key aspects integral to the KYC principle:

a. identify and verify the identity of customers,
b. identify and verify beneficial ownership of companies and other legal entity customers,
c. understand the nature and purpose of their clients' transactions and customer relationships, and
d. conduct ongoing monitoring to maintain and update customer information and to identify and report suspicious transactions [Zali and Maulidi (2018)].

Yet, verifying information on beneficial owners can prove difficult when beneficial ownership is obscured through offshore, layered, or otherwise complicated ownership structures. Uncovering beneficial ownership often involves more stringent checks and enhanced CDD processes, beyond the simple checks whereby limited customer information is obtained and less rigorous verification is made – as might be the case for onboarding low-risk clients. Enhanced CDD may involve authenticating beneficial owners' source of wealth through the sharing of financial information between financial institutions, checking information held on company registers, investigating links with associated third parties and transactions, or requiring the customer to provide additional information from a wide variety of sources. Undertaking enhanced CDD will also be appropriate in cases of a perceived higher money-laundering risk, such as for PEPs or clients with links to high-risk countries.

5. DISCLOSING BENEFICIAL OWNERSHIP

Similarly, it is important that company directors and executives understand what information and the circumstances in which information on beneficial owners must be disclosed to the relevant authorities. In the U.S., the U.S. Corporate Transparency Act defines a "reporting company" as a corporation, LLC, or "other similar entity" registered with the U.S. Secretary of State or created overseas and registered to do business in the U.S. The reporting company is required, upon formation and every year thereafter, to file "personally identifiable information" of its beneficial owners to FinCEN. Confusingly, "a similar entity" defined as a reporting company may include a limited partnership or limited liability limited partnership but may not cover law trusts and general partnerships [Shepherd and Manigault (2021)]. Disclosable data include the full name, date of birth, address, and an identification number gained from an official document or unique identifier assigned by FinCEN. There are also many exceptions to disclosure requirements.

In the U.K., the requirements around beneficial ownership disclosure of U.K. companies are centered on private, unlisted entities, as aligned with the provisions of Part 21A of the Companies Act 2006 and the Companies Act 2006 amended by the Small Business, Enterprise and Employment Act 2015. U.K. publicly listed entities, including wholly-owned subsidiaries of publicly listed entities, are not required to disclose information on their beneficial owners. Disclosable information includes the persons of significant control (PSC's) name, date of birth, nationality, home region and country,

service address, residential address, the nature of their control over the company, and the date they became its beneficial owner [Gilmour (2020)]. Paragraph 6 of Schedule 2 to the Economic Crime (Transparency and Enforcement) Act 2022 outlines that a beneficial owner of an overseas entity or other legal entity constitutes someone who:

- holds, directly or indirectly, more than 25 percent of the shares in the overseas entity
- holds, directly or indirectly, more than 25 percent of the voting rights in the overseas entity
- holds the right, directly or indirectly, to appoint or remove a majority of the board of directors of the overseas entity
- has the right to exercise, or actually exercises, significant influence or control over the overseas entity.

Varying disclosure requirements will exist depending on relevant domestic rules, company or legal entity status, and circumstances. It is important, therefore, to check and understand the legal obligations on disclosing beneficial ownership and the mechanisms for disclosure for any given jurisdiction. Many governments are now requiring companies to disclose beneficial ownership information through a central register or amending domestic company laws to enhance the transparency of beneficial ownership. Notably, India updated its company law in 2018 to define "significant beneficial owner" as someone having at least 10 percent ownership of a company, under section 89(10) of the Companies Act, 2013 as amended in rule 2(e) of Companies (Significant Beneficial Owners) Rule 2018. Meanwhile, companies registered in Kenya are now obliged to keep a registry of their beneficial owners and to file this with the state Registrar of Companies [Coste and Meunier (2021), World Bank (2018)]. Such measures highlight the continued efforts governments worldwide are implementing to curb illicit activities and demonstrates the global consensus for ensuring the improved transparency of beneficial ownership.

6. CONCLUSION

This article examines the disclosure of beneficial ownership by exploring the role of company registers and the process of customer due diligence. It demonstrates that beneficial ownership disclosure remains a controversial topic but important policy tool for governments. Companies can serve as effective vehicles in which criminals can evade tax and launder money by masking the identity of the natural person – or beneficial owner – who ultimately controls company assets or activities. Meanwhile, beneficial ownership is crucial for many perfectly legitimate business dealings, like settling trust arrangements, employing shell companies, or facilitating company mergers and acquisitions [Gillis (2019)]. Proper disclosure of beneficial ownership as part of a broader compliance process helps prevent abuses within the corporate and financial sectors and stem corrupt practices, like money laundering and tax evasion. An effective customer due diligence compliance system relies on information on beneficial owners of companies being accurately disclosed, robustly verified, and continuously monitored. Although proper disclosure of beneficial ownership can be arduous, costly, and pose privacy and legal challenges, it is vital in strengthening the transparency of corporate dealings and for maintaining reputational trust in political, institutional, and financial systems.

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REGULATORY REPORTING – THE ROAD AHEAD

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ABSTRACT

The financial services industry continues to face a challenging regulatory environment, most notably within trade and transaction reporting requirements. In fact, given recent market developments, including the acquisition of a troubled European bank and failure of a U.S. commercial bank, firms may witness another wave of changes to further strengthen the resiliency of the global banking infrastructure and monitor potential market abuse. There are a number of key drivers behind regulatory reporting change programs, such as new and updated reporting rules, findings and fines from supervisory authorities, and internal initiatives to address operational inefficiencies. Given the increased focus on cost reduction and tight change budgets in the current environment, market participants should seek to adopt a strategic approach to regulatory reporting transformation with the aim of strengthening compliance while simultaneously reducing long-term costs. This includes adopting a hybrid operating model, establishing a mature data strategy, reducing manual processes by increasing automation, and leveraging third-party regtech products to deliver reporting solutions.

1. INTRODUCTION

Given the current macroeconomic environment, financial services firms are under considerable pressure to lower costs and manage spend, while continuing to address an ever-increasing list of regulatory requirements. As a result, a number of discretionary programs are being paused or delayed in order to free up already stretched budgets to deliver on mandatory change initiatives. While regulatory transformation programs typically dominate a lion's share of the overall budget, their non-discretionary nature continues to position them as a key item on firms' change agenda.

This paper focuses on trade and transaction reporting requirements, exploring key drivers for regulatory change across global regulatory regimes. It also outlines pragmatic recommendations on how firms can best prepare to achieve a favorable return on their regulatory investments while maintaining global compliance, but ultimately driving down long-term costs.

2. KEY DRIVERS FOR REGULATORY CHANGE

Across the financial services industry, different firms are at varying levels of maturity on their strategic regulatory reporting journey. As such, there is a huge variety of regulatory change programs underway across market participants with differences in associated costs, resourcing strategies, and overall complexity. Drilling down further into the key objectives of these programs, however, it is possible to identify three common themes that drive the bulk of regulatory change for most firms.

2.1 New and updated regulatory regimes

From a regulatory compliance standpoint, a number of global reporting regimes are going to see significant updates over the next 12 to 24 months. This includes additional changes to reporting requirements for the U.S. Commodity Futures Trading Commission (CFTC) and the Canadian Securities Administrators (CSA), which include the introduction of a "unique product identifier" (UPI) as well as revised reconciliation requirements for impacted firms. In the E.U.

and U.K., European Market Infrastructure Regulation (EMIR) Refit remains a key priority area for impacted firms. This is in addition to the U.K. wholesale markets reforms package, which continues to evolve as an attempt to differentiate the U.K. from the E.U. post-Brexit. In the APAC region, various regulators, including the Monetary Authority of Singapore (MAS), Australian Securities and Investments Commission (ASIC), Hong Kong Monetary Authority (HKMA), and Japan Financial Services Agency (JFSA), are introducing revised reporting requirements to promote global standardization and harmonization.

2.1.1 CFTC AND CSA REPORTING

The Commodity Futures Trading Commission (CFTC) has updated its reporting requirements with an aim to standardize reported trade data:

Phase 1:

- Go-live December 5, 2022.
- Updated requirements adopt 71 percent of the critical data elements (CDE) outlined by the Committee on Payments and Market Infrastructures and the International Organization of Securities Commissions (CPMI-IOSCO).
- Revised rules also introduce requirements to report collateral valuation and adopt "unique transaction identifiers" (UTIs).
- Other important changes include new and updated validation rules as well as revised reconciliation requirements.
- A particularly notable update is a new requirement for reporting parties to correct any errors or omissions in their reports within seven business days, in the absence of which they will need to notify the CFTC's Division of Market Oversight and include a remediation plan.

Phase 2:

- Planned go-live January 2024.
- Additional requirements to adopt a "unique product identifier" (UPI) to classify derivatives at a level higher than International Securities Identification Numbering (ISIN) but lower than Classification of Financial Instrument (CFI) code.
- Once live, trade data reports across jurisdictions are expected to all link to a single reference data library for product data, simplifying supervisors' efforts in accurately monitoring derivative trades.
- The Derivatives Service Bureau (DSB), which already maintains the ISIN library for over-the-counter (OTC) derivatives instruments, is also responsible for the development and implementation of the UPI reference data system.

Following updated U.S. CFTC requirements, the Canadian CSA is also expected to align its reporting requirements to a large extent with an aim to ensure harmonization of CDE, UTI, and UPI rules.

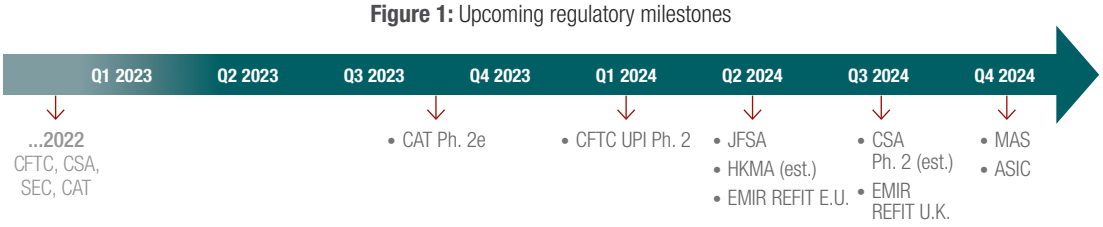
2.1.2 EMIR REFIT

The European Market Infrastructure Regulation (EMIR) introduced clearing and bilateral risk-management requirements for OTC derivatives, reporting requirements for OTC and exchange-traded derivatives, as well as uniform requirements for central counterparties (CCPs) and trade repositories. It also established definitive clearing thresholds for non-financial counterparties (NFCs).

Recent updates to this regulation, commonly referred to as EMIR Refit, cover a number of changes to these requirements:

- Updated requirements to determine when non-financial counterparties (NFCs) and financial counterparties (FCs) are subject to the clearing obligation.
- Expanded scope of FCs to include more entities that are deemed to potentially pose a significant risk to the financial system, e.g., alternative investment fund managers (AIFMs).
- Creation of a new category of "small financial counterparties" (SFCs) that are exempt from the clearing obligations but remain subject to risk mitigation obligations, including margin requirements.
- Updated reporting schemas in line with global standards, including adoption of ISO 20022 methodology, expansion of reportable data elements increasing from 129 in EMIR to over 200 under EMIR Refit, introduction of additional

Figure 1: Upcoming regulatory milestones



event types resulting in a total of 33 reportable action/event types, and adoption of a harmonized approach to CDE, UPI, and UTI.

- Backloading obligation for all live contracts entered into within a period of six months prior to go-live date.

2.1.3 U.K. REGULATORY REGIME

Leaving the European Union (E.U.) has presented the U.K. with the opportunity to adapt the overall wholesale markets regulatory regime, and MiFID II (Markets in Financial Instruments Directive and Regulation) in particular, to ensure that U.K. markets remain fair, transparent, and competitive for global investors. As such, a number of initiatives are underway to help shape the future regulatory framework, such as the Financial Services and Markets (FSM) Bill and the "Edinburgh Reforms" announced by the Chancellor of the Exchequer in December 2022. Collectively, these measures aim to drive growth and competitiveness in the financial services sector by seeking to repeal and reform retained E.U. law, including the highly complex MiFID II regulation.

MiFID II

- Acute awareness of the complexity and administrative burdens of some regulatory provisions
- Apparent that not every requirement has had the desired consequences of improving transparency or enhancing investor protection
- Share trading obligation (STO) and double volume cap (DVC) already removed
- Proposals underway to simplify the transparency and Systematic Internaliser (SI) regime.

Accelerated settlement

- Consultation underway to explore accelerated post-trade settlement
- Potential transition from T+2 to T+1 settlement
- Initial report expected by end of 2023.

Consolidated tape

- Proposals to outline regulatory regime for U.K. consolidated tape (CTP)
- Expect increased emphasis on reporting data quality, including trades, transactions, and instrument reference data.

While these updates clearly mark the beginning of the U.K.'s divergence from the E.U. regulatory regime, they will certainly not be the only changes to come out of the U.K.'s Wholesale Markets Reform package. Being outside the E.U. legislative framework will allow the U.K. to move faster with some of these reforms, but they are expected to continue close monitoring of the E.U.'s approach to ensure they remain suitably aligned where necessary while still maintaining differentiation and ensuring U.K. markets remain open and attractive to global firms and investors. Additionally, measures such as the U.K. CTP, removal of STO and DVC, and proposed T+1 settlement increasingly indicate further alignment with the U.S. regulatory framework as opposed to the E.U.

2.1.4 ASIA PACIFIC

Regulators are undertaking significant updates to current transaction reporting regimes in APAC, with rewrites expected in Australia, Hong Kong, Japan, and Singapore. Though each of these regimes will have specific obligations that will need to be considered on a case-by-case basis, there are some clear common themes across all of these:

- Globally harmonized approach to reportable data and event types, including updated CDE
- Adoption of UPI and UTI
- Incorporation of ISO 20022 XML reporting standards
- Australian Securities and Investments Commission (ASIC) reporting deadline updated to T+2, but revised rules remove delegated reporting safe harbor
- Japan Financial Services Agency (JFSA) to approve reporting to independent trade repositories rather than directly to the FSA.

2.2 Regulatory findings and remediation

Global supervisors are increasingly focused on completeness, accuracy, and timeliness of transaction reporting. In its recent MarketWatch, the U.K. Financial Conduct Authority (FCA) observed that a number of firms are still not conducting sufficient data quality checks or end-to-end reconciliations. They have again reiterated the importance of transaction reports in enabling them to provide effective market oversight, combat market abuse, and support conduct supervision.

There is also a clear upward trend to global regulatory sanctions and fines issued over the past few years. This is not limited to the total amount of fines levied but also the number of supervisors and NCAs (national competent authorities) who have been issuing these fines.

In addition to supervisory findings, firms are also dealing with a considerable remediation backlog. These represent open reporting issues that need to be addressed at the root cause level with impacted transactions potentially needing to be re-reported to the relevant authorities.

2.3 Operational inefficiencies

Given the sheer volume of reporting requirements that firms have had to implement over the past five to ten years, it comes as no surprise that the majority of firms are now facing considerable technical debt and operational inefficiencies in their reporting and controls infrastructure. This not only drives up compliance costs, it also makes further change implementation incredibly complex, expensive, and cumbersome. Moreover, there is significant scarcity of regulatory skillsets and expertise globally. With ever-increasing demand and a highly-competitive market for regulatory reporting experts, talent sourcing and retention is a key challenge across the industry.

As a result, a number of firms are opting to leverage the overall alignment of global regulatory reporting requirements as an opportunity to also significantly streamline their existing reporting architecture and associated operating model. This includes reconsidering resourcing and location strategies to ensure appropriate staffing is in place to fully support regulatory reporting and monitoring across all entities, businesses, and reporting jurisdictions. Measures such as these will significantly enhance governance and reduce regulatory risk, ultimately driving down the overall cost of achieving and maintaining compliance on an ongoing basis.

3. STRATEGIC RESPONSE TO REGULATORY CHANGE

Impacted firms will need to adopt a strategic approach to navigate the extensive and complex regulatory landscape they are currently facing if they are to streamline and, ultimately, reduce the volume of change they are facing over the longer term. This should include significant uplift of existing operating models to move towards a centralized, federated, or hybrid framework. In addition, deployment of a mature data strategy, establishing a robust control framework, increased automation, and adopting cutting-edge regtech tooling will all go a long way in positioning firms to ultimately reduce the overall burden of regulatory change.

3.1 Operating model, horizon scanning, and governance

Deployment of a sophisticated, scalable, and flexible global operating model will be a critical element of successfully achieving and maintaining regulatory compliance. While this may be fully federated or fully centralized, most firms would typically opt for a combination of the two. In any case, it is essential to clearly define the scope, roles, and responsibilities for various global regulatory operations teams to ensure end-to-end coverage of all applicable reporting obligations. This should be supplemented with continuous training and upskilling of relevant resources to ensure they are well positioned to support continuously evolving and overlapping global regimes.

Another key component of the operating model is establishing a comprehensive horizon scanning capability to ensure any regulatory updates are reviewed and assessed in a

Figure 2: Strategic response to regulatory change

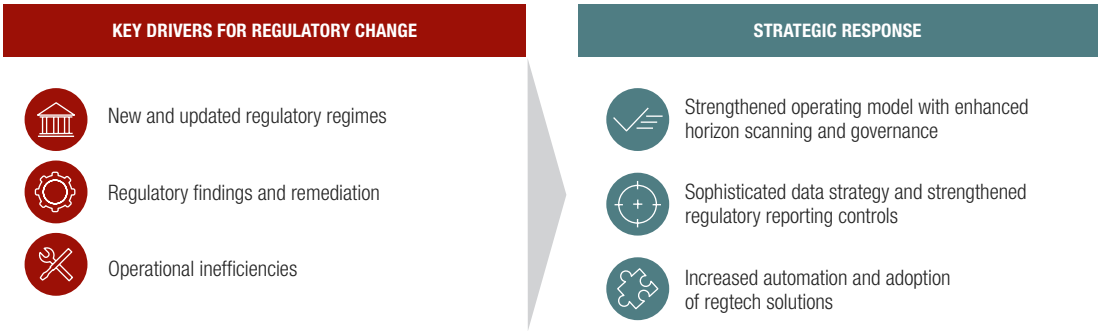
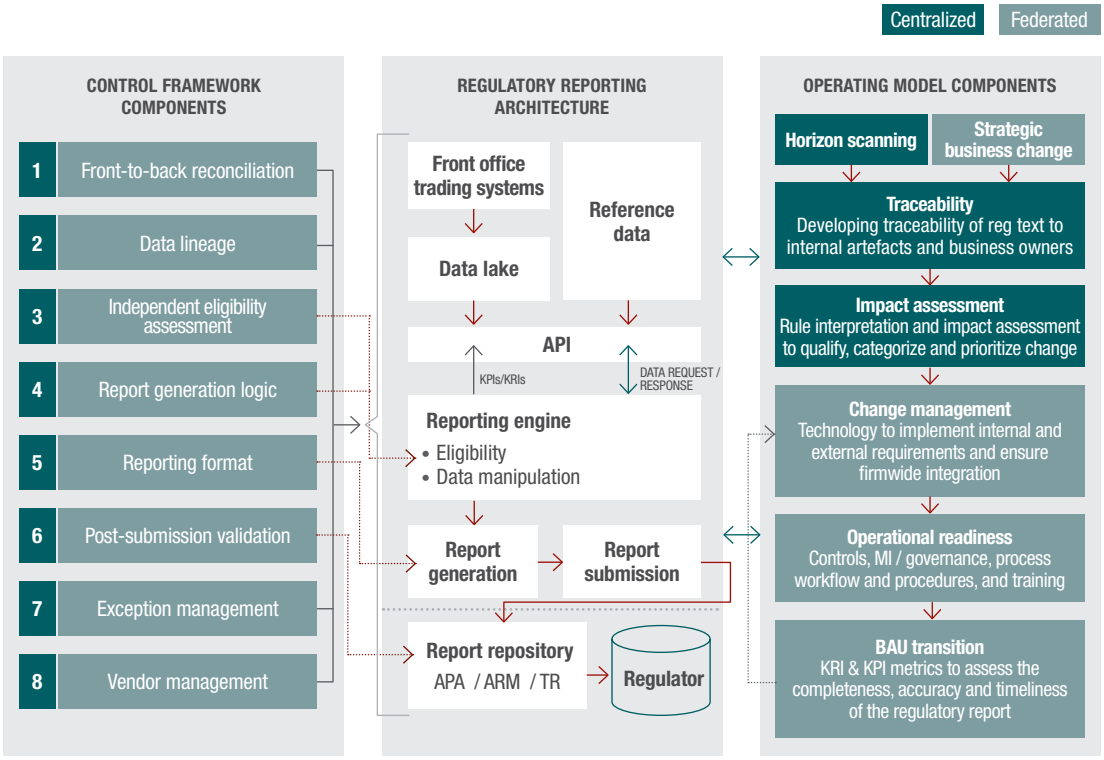


Figure 3: Reporting architecture and operating model (representative example)



timely manner. The assessment would typically cover rule interpretation and applicability assessment followed by a front-to-back impact assessment for applicable rules and in-scope entities, products, and lines of business. Defining end-to-end traceability back to regulatory text will allow impacted firms to demonstrate compliance with new or updated rules. Complementing this with a mature change management capability will facilitate appropriate definition and prioritization of implementation changes across people, processes, data, and technology, which will determine the associated delivery roadmap and go-live timelines.

Firms will also need to establish robust governance and management information (MI) reporting, including clearly outlined ownership and accountability as well as defined escalation mechanisms in case of reporting issues. A key component of this governance structure is regular engagement with relevant regulatory authorities to ensure continuous alignment on supervisory expectations as well as timely notifications of any reporting breaches.

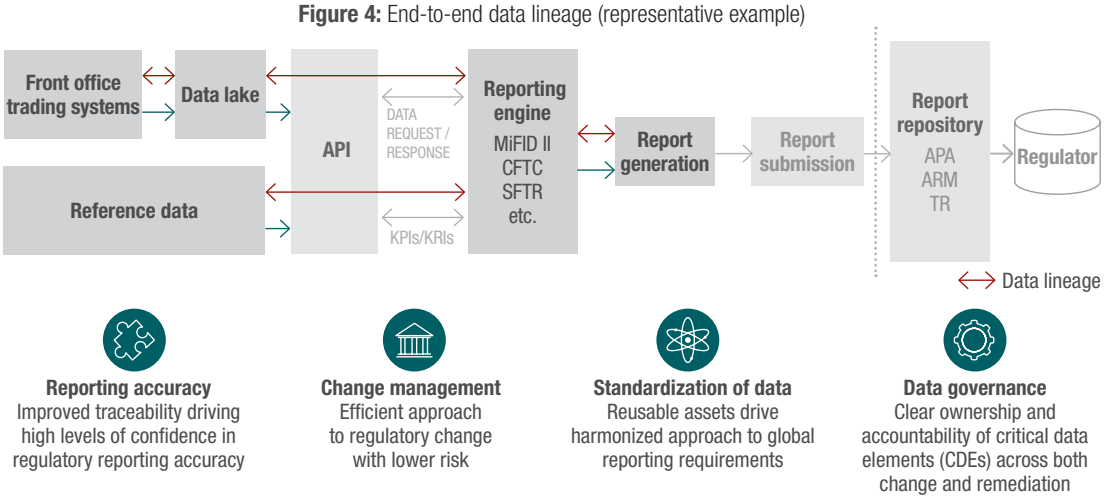
3.2 Data strategy and control framework

Given the strong correlation between accuracy of regulatory reporting and that of underlying data, it should come as no surprise that a mature data strategy is absolutely crucial to overall regulatory compliance. Yet, a number of market participants continue to underinvest in their data capabilities, which in turn results in significant overheads when it comes to root cause analysis and remediation of reporting issues.

As such, defining centralized authorized data sources that should be used consistently across the firm, whether this is for pricing, risk management, or regulatory reporting, would help achieve front-to-back standardization and harmonization. In addition, developing and maintaining end-to-end lineage for critical data elements (CDEs) will significantly reduce the effort required for root-cause analysis, remediation, as well as change implementation. This will need to be accompanied by a robust data governance framework that outlines the roles and responsibilities, processes, and policies to successfully manage enterprise data.

Firms should also uplift existing control frameworks to ensure these are well placed to support global compliance monitoring. This should include pre-submission checks, reporting format checks, post-submission validations, as well as end-to-end reconciliation from front-office trading systems all the way through to report submission engines. In fact, the U.K.'s FCA has again reiterated that reconciliations should not be limited to certain fields, or to data samples that do not adequately

Figure 4: End-to-end data lineage (representative example)



reflect the trading scenarios and asset classes traded by a firm. Ultimately, the implementation and operationalization of regulatory controls will need to accompany any regulatory change implementation, whether this is for new reporting rules or updates to existing ones. This is especially critical to help firms evidence intent when notifying regulators of reporting breaches, should these still occur.

3.3 Automation and regtech

In an attempt to transition from siloed implementation to a more strategic global reporting framework, a number of firms are now undertaking a front-to-back review of their regulatory reporting architecture and associated controls and operating models. This would help identify re-platforming and workflow automation opportunities, thereby reducing manual intervention, enhancing operational efficiency, and lowering overall regulatory risk.

To achieve these gains, a majority of firms are turning towards third-party regulatory technology (regtech) products as reliable alternatives to investing in in-house solutions. In fact, the regtech landscape has significantly evolved in recent years, thus presenting firms with a variety of third-party products that could align with their specific regulatory requirements, technology capabilities, and cultural fit. A number of these solutions offer improved performance and reliability, potentially boosting the efficiency of in-house solutions or, in some cases, replacing them entirely. Moreover, the increasing maturity of regtech solutions has made pricing more competitive, rendering in-house implementation as a high-cost alternative with limited benefits. In addition, a well-established regtech solution can offer accelerated deployment, reduced implementation effort, alignment with industry standard approach, as well as ongoing support, all of which make the overall commercial offering even more attractive.

Recently, a number of global supervisors, including the U.K.'s FCA, the E.U.'s ESMA, and the U.S. Fed have all increased their interest in regtech solutions. Many are working together with vendors in "regulatory innovation sandboxes", to find more optimal ways of achieving and maintaining compliance. This has provided an additional layer of trust, thus boosting mass adoption of third-party solutions. Moreover, firms that are deemed to be on the cutting edge of digital technology are more likely to invite a wider range of clients, as well as internal talent. The current landscape, therefore, presents a huge opportunity for organizations to leverage adoption of cutting-edge regtech as a platform for driving regulatory innovation. This would help improve brand perception, enhance automation, reduce regulatory risk, and ultimately drive improved business outcomes.

4. CONCLUSION

The financial services industry continues to grapple with complex and continuously evolving reporting regimes. Combined with an ever-increasing focus on compliance from supervisory authorities and significant pressure to reduce costs, these challenges will continue to perplex even the most sophisticated market participants. It is, therefore, increasingly important for firms to transition towards a strategic approach to global regulatory reporting by overhauling their current operating models and enterprise-wide data strategy. This should be complemented with upfront investment in reporting architecture and processes including increased automation and adoption of market-leading regtech tooling. This will help deliver innovative and efficient reporting solutions, thereby strengthening global compliance while driving down regulatory risk and overall costs.

DID INSURERS BECOME RISK-LOVING DURING "LOW-FOR-LONG"? THE ROLE OF RETURNS, RATINGS, AND REGULATION

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ABSTRACT

European life insurance companies are important bond investors and had traditionally played a stabilizing role in financial markets by pursuing "buy-and-hold" investment strategies. However, since the onset of the ultra-low interest rates era in 2008, observers noted a decline in the credit quality of insurers' bond portfolios. The commonly-held explanation for this deterioration is that low returns pushed insurers to take on more risk. Using data from 56 European life insurers from several countries, this paper examines whether the declining credit quality of insurers' bond portfolios during the low interest rate period after 2008 was driven by investing in riskier assets or due to other factors. We argue that other factors – such as surging rating downgrades, bond revaluations, and regulatory changes – also played a key role. We estimate that rating changes, revaluations, and search for yield each account for about one-third of the total deterioration in credit quality. This result has important policy implications as it reestablishes the view that insurers' investment behavior tends to be passive through the cycle, rather than risk-seeking.

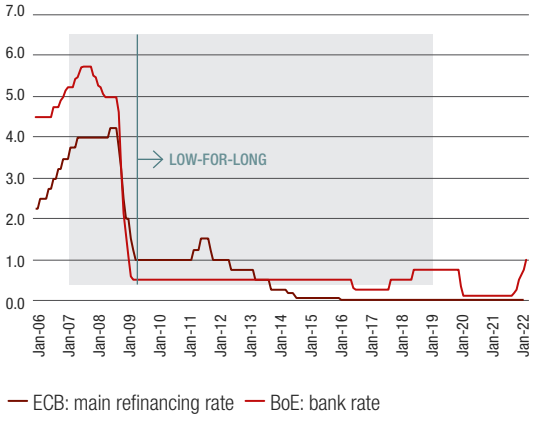
1. INTRODUCTION

European interest rates were considerably reduced in late 2008 in response to the unfolding global financial crisis of 2008-09, and then again between 2011 and 2014 on the back of the European debt crisis. The severity of these crises meant, however, that even these historically ultra-low policy rates of less than 1 percent proved insufficient to spur economic and credit growth, forcing central banks to usher in a period of unconventional monetary policies; most notably via large acquisitions of sovereign and corporate bonds. These purchase programs compressed interest rates even further and for a long time, giving rise to the period now known as the "low-for-long" era (Figure 1).

Confronted with anemic returns, institutional investors sought to boost their profits by venturing into increasingly riskier and less liquid asset classes. At the time, such behavior was suspected among all types of investors, including traditionally conservative ones like life insurance firms and pension funds.

[1] We are indebted to Pete Dattels, Matthew Jones, Fabio Natalucci, Ranjit Singh, Nobu Sugimoto, and Nicola Pierri for numerous comments and suggestions on earlier drafts. All remaining errors are the responsibility of the authors. This article first appeared as IMF Working Paper number WP/22/202, and as such the article is copyrighted by the IMF and it should not be published without permission (all rights reserved); however, the views expressed herein are those of the author(s) and do not necessarily represent the views of the IMF (including its Executive Board and its management), nor De Nederlandsche Bank or the European Stability Mechanism (ESM), where the authors currently work.

Figure 1: Policy rates (in percent)



Source: Haver Analytics

In fact, several observers documented an increase in insurers' investments into riskier bonds – hunting for yield [IMF (2015 and 2017)] – and a lengthening of the duration of these investments – hunting for duration [Domanski et al. (2017)].[2]

Consequently, it became commonly accepted that the principal reason behind the worsening quality of insurers' bond portfolios during the low-for-long was a more aggressive search for yield. On the back of this perception, life insurers ceased to be viewed as a stable investor class and became the focus of sector-wide stress tests [e.g., EIOPA (2014 and 2016)], quantifications of the potential impact that their distress could have on financial stability [Joyce et al. (2014), ESRB (2015)], as well as studies on insurers' trading behavior [EIOPA (2020)].

However, there were other developments during this period that could also explain the changes in insurers' portfolios. First, the global financial and European debt crises led to a multi-year surge in the number of corporate and sovereign rating downgrades, which would, in turn, worsen the overall credit quality of existing portfolios even if insurers had not acquired more lower-quality assets. Second, falling interest rates would lead to an upwards revaluation of bond holdings (again without the need to acquire new bonds). And third, the regulatory framework and its incentives were fundamentally transformed around 2014 when preparations began for the introduction of Solvency II in 2016. The forthcoming regulatory changes may have affected portfolio decisions even if insurers did not intend to alter their risk profile.[3]

Considering the elements above, it becomes plain that what is missing in the literature is an analysis that tracks insurers' bond investments through the entire period (from before the low-for-long until recently) and allows for factors besides the hunt for yield to affect insurers' bond portfolios. Only with such longer timespan and quantification of the impact of each element – rating migrations, bond revaluations, and hunt for yield/regulatory incentives – can one assess whether life insurers did become more risk seeking. This is the main contribution of this paper.[4]

2. THE CHANGING CREDIT QUALITY OF INSURERS' BOND PORTFOLIOS, 2005-2021

The first step in our inquiry is to quantify the changes to the credit quality of insurers' bond portfolios between 2005 and 2021. To do this, we collected data on 56 European life insurance firms from Belgium (1), Finland (1), France (3), Germany (9), Italy (4), Netherlands (2), Norway (5), Portugal (2), Spain (2), Sweden (5), Switzerland (6), and the U.K. (15). Our sample covers around three-quarters of assets of the total European life insurance sector.[5]

Figure 2 shows that the credit quality of insurers portfolios has been on a steady decline since 2005, mostly driven by the replacement of top-rated AAA bonds with BBB paper. The share of AAA bonds dropped from 43 percent of total bond holdings in 2005 to 15 percent in 2021, while holdings of BBB paper increased from around 5 to 6 percent in 2005-08 to 22 percent of the entire bond portfolio in recent years.

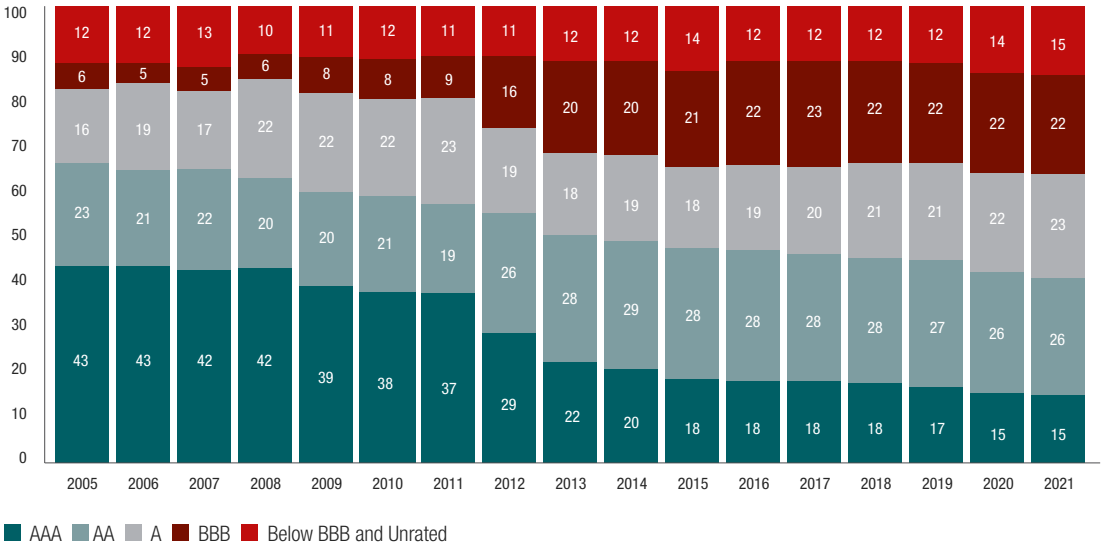
[2] It is important to remark here that, to our knowledge, evidence of hunt for duration has only been provided for German life insurers by Domanski et al. (2017). EIOPA (2014 and 2018) show that on average, between 2014 and 2018, European insurers slightly decreased the duration of sovereign bond investments while slightly increasing the duration of corporate bond investments (see Section 3.1 for a further discussion). We believe, therefore, that it is not possible to claim that the hunt for duration was an industry-wide trend. On the other hand, this paper provides evidence that the deterioration in the credit quality of insurers' bond portfolios has been an industry-wide phenomenon.

[3] Although Solvency II came into effect on January 1, 2016, this date had been pushed back many times and its rules and requirements started to be prospectively applied by European insurers, rating agencies, and industry analysts well before 2016. For instance, the 2011 EIOPA stress test was based on the draft Solvency II framework. See also Domanski et al. (2017, p. 8) on this point, who argue that "the forthcoming introduction of the Solvency II regulatory framework might already have made the portfolio decisions of insurance firms more sensitive to the lower long-term interest rates."

[4] EIOPA (2021) is a useful step in this direction, looking at insurers' trading activities in response to bond downgrades. However, their analysis is limited to the period Q1-2019 to Q2-2020, thus excluding the period over which most of the deterioration in credit quality occurred: 2008 to 2015 (as will be documented in the next section).

[5] The insurers were selected based on the public availability (S&P Capital IQ) of credit quality of their bond portfolios during the years 2005-2021.

Figure 2: European life insurers' bond rating allocation (in percent of total bond holdings)



Source: S&P Capital IQ and authors' calculations

Although this deterioration in credit quality proceeded slowly in 2006-2011, it accelerated markedly in 2012 and 2013, and stabilized thereafter. Interestingly, the variation of AA, A, and sub-BBB and unrated bonds has been much smaller.

So, what has driven the substitution of AAA bonds for BBB bonds?

As discussed above, a widely accepted explanation is that ultra-low policy rates implemented since 2008 pushed insurers to hunt for higher returns in riskier assets.[6] This explanation is often accepted as the single – or at least the most important – driver of the changes in credit quality through this period. However, three other factors may have also contributed to the decline in portfolio quality. Namely, rating downgrades, bond revaluations (as interest rates fell), and changes to regulatory incentives due to the introduction of Solvency II in 2016. We discuss each of these factors below.

Rating downgrades for corporate and sovereign bonds increased in the aftermath of the global financial and European debt crises in the years 2009 to 2012.[7] Automatically, corporate and sovereign bond downgrades would lead to an increase in BBB holdings for any buy-and-hold investor – such as life insurers – as higher-rated bonds would migrate down the rating scale.[8]

Table 1 shows that rating downgrades for AAA to A rated corporate bonds increased during 2010-14 compared to the long-term average for 1981-2009: downgrades from AAA to BBB were non-existent during 1981-2009 but amounted, on average, to 1 percent of all AAA-rated corporate bonds per year for the years 2010-2014. Downgrades from AA to BBB were 0.8 percentage point (p.p.) higher in 2010-2014 than in 1981-2009; downgrades from A to BBB were 2.5 p.p. higher in 2010-2014 compared to 1981-2009. A priori, these percentage changes could be large enough to explain some of the changes in insurers' portfolios. We quantify by how much in the next subsection. During 2015-2020, corporate bond downgrades were at lower levels than previous decades.

[6] IMF (2017) argued that insurers have taken on more credit risk – mostly by accumulating BBB assets – as a strategy to adapt to the low-interest-rate environment.

[7] See Standard & Poor's "Annual global corporate default study and rating transitions," for the years 2008 and beyond, for detailed data on corporate downgrades. Fitch's "Annual sovereign transition and default studies," for the years 2008 onwards, provide data on sovereign downgrades. The data show that, between 2009 and 2013, 50 to 75 percent of global sovereign downgrades were of European nations. Downgrades to BBB included Greece (in 2009), Ireland (in 2011), Cyprus (in 2011), Portugal (in 2011), Italy (in 2012), and Spain (in 2012).

[8] Given their long-dated liabilities, most life insurance companies have traditionally relied on buy-and-hold investment strategies. A 2019 survey by EIOPA found that almost 80 percent of European life insurers self-declared as buy-and-hold investors. Moreover, EIOPA (2017) found that 40 percent of survey respondents claimed that the decrease in the average investment grade of their investments stemmed from rating changes. EIOPA (2020), in turn, found that although insurers sold some downgraded bonds throughout Q1-2016 to Q2-2020, these sales "remained largely contained" and amounted to a quarterly average of 3.7 percent of the downgraded bonds. This finding is further evidence of insurers' predominant buy-and-hold behavior.

Table 1: Average one-year corporate rating transition rates (1981-2009; in percent)

FROM/TO	AAA	AA	A	BBB	BB	B	CCC/C	D	NR
AAA	**88.5**	7.9	0.5	-	-	-	0.1	-	2.9
AA	0.3	**86.1**	9.8	0.5	-	-	-	-	3.4
A	-	2.5	**87.2**	5.1	0.2	0.1	-	0.1	5.0
BBB	-	0.2	4.8	**82.7**	3.6	0.5	0.2	0.1	8.0
BB	-	-	0.2	4.7	**70.7**	8.4	0.5	0.7	14.9
B	-	-	0.1	0.4	6.6	**64.3**	4.8	4.6	19.2
CCC/C	-	-	-	-	-	5.4	**31.1**	43.2	20.3

Average one-year corporate rating transition rates (2010-2014; in percent)

FROM/TO	AAA	AA	A	BBB	BB	B	CCC/C	D	NR
AAA	**69.2**	28.3	-	1.0	-	-	-	-	1.5
AA	0.1	**84.3**	10.8	1.3	-	-	-	-	3.5
A	-	1.0	**86.9**	7.6	0.3	-	-	-	4.2
BBB	-	0.1	3.4	**85.1**	4.8	0.5	-	-	6.2
BB	-	-	-	6.1	**76.6**	6.1	0.9	0.1	10.2
B	-	-	-	0.5	8.7	**74.3**	4.6	1.5	10.5
CCC/C	-	-	-	-	-	23.8	**42.3**	16.0	17.9

Average one-year corporate rating transition rates (2015-2020; in percent)

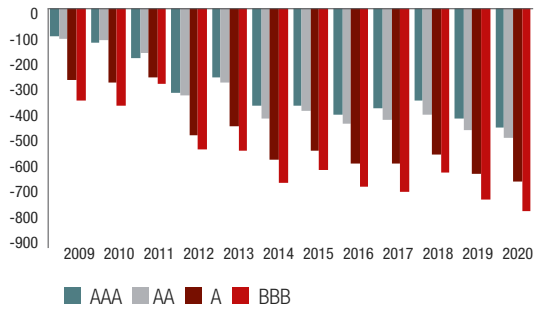
FROM/TO	AAA	AA	A	BBB	BB	B	CCC/C	D	NR
AAA	**94.4**	0.0	0.0	-	-	-	-	-	5.6
AA	0.2	**91.2**	4.4	-	-	-	-	-	4.3
A	-	1.1	**91.1**	3.5	-	-	-	-	4.4
BBB	-	-	3.1	**89.4**	2.0	-	-	-	5.5
BB	-	-	-	4.9	**77.7**	5.5	0.2	0.2	11.5
B	-	-	-	-	3.2	**75.1**	5.6	1.4	14.6
CCC/C	-	-	-	0.3	-	9.9	**42.9**	28.8	18.1

Source: Standard & Poor's and authors' calculation
Note: "-" stands for 0.0 percent. D stands for "default" and NR for "non-rated"

Bond revaluations due to falling yields could also lead to an increase in the value of bond holdings.[9] The increase in bond values would be greater the larger the drop in yields, which was indeed bigger for BBB bonds than for AAA, AA, and A for the entire 2009-2020 period (Figure 3).

Regulatory incentives changed from 2014 onwards, as the industry started preparations for the introduction of Solvency II on January 1, 2016. Under the new regime, capital charges for bond investments depend mainly on the bond's rating and duration. Consequently, when deciding on whether to hold a specific bond, insurers would compare the bond's yield with its capital cost.

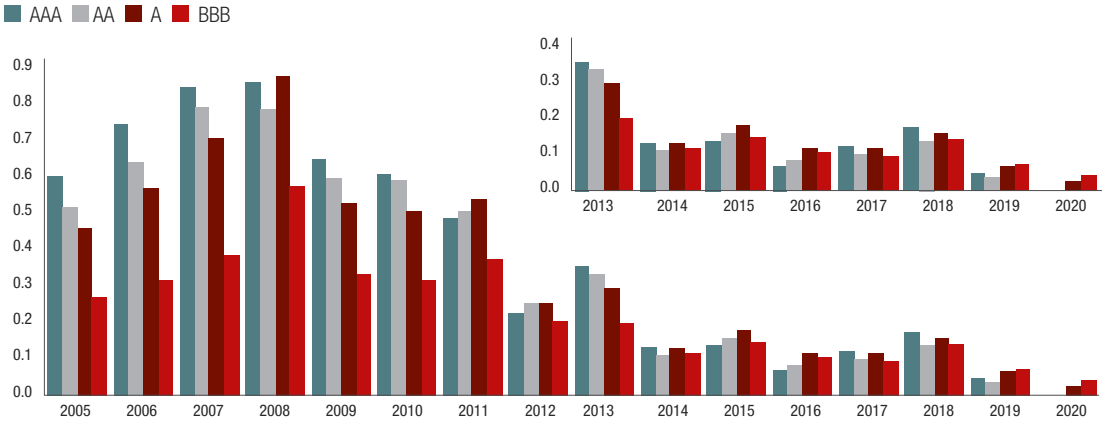
Figure 3: Cumulative change in bond yields since end-2008 (in basis points, by bond rating)



Source: Bloomberg LP, and authors' calculations
Note: Bond yields are yield-to-maturity of the euro-denominated Bank of America/Merrill Lynch bond index of each corresponding rating

[9] Recall that as interest rates steadily dropped, starting in late 2008, portfolio bond holdings would have begun to revalue higher.

Figure 4: Ratio of corporate bond yields to Solvency II capital charges



Sources: Bloomberg and authors' calculations
Notes: Bond yields are the yield-to-maturity of the euro-denominated Bank of America/Merrill Lynch corporate bond index for bonds with 5 to 10 year maturity. We focus on the 5-10 year maturity bucket as this matches the average maturity in insurers' bond protfolios. Solvency II capital charges are calculated as the average for bonds with maturities between of 5 to 10 years, for each rating class

An intuitive way to make such comparison is to look at the ratio of bond yields to capital surcharges.[10] Figure 4 shows that before 2014, the "yield/capital cost" ratio was notably larger – and hence more favorable – for highly-rated bonds than for BBB-rated bonds. From 2014, the difference effectively disappeared (Figure 4 insert). This suggests that, under an environment of ultra-low interest rates, the capital savings from holding higher-rated bonds did not compensate for the lower yields that safer assets carry.

3. QUANTIFICATION OF THE PORTFOLIO DRIVERS

To quantify the impact of rating and valuation changes on insurers' portfolios, consider the equation that describes the evolution of bond investments. Namely, bond holdings at time t are the result of (i) rating migrations at time t-1, plus (ii) bond valuation changes between t-1 and t, plus (iii) net purchases of bonds at t. A formal specification for this law of motion is presented below:

$$H_t = T'_{t-1} \cdot H_{t-1} + D_t \cdot \Delta i_t \cdot H_{t-1} + P_t$$

$T'_{t-1} \cdot H_{t-1}$ represents bonds upgraded/downgraded
$D_t \cdot \Delta i_t \cdot H_{t-1}$ represents valuation change
P_t represents new purchases[11]

3.1 Data

We collected data on each variable of the equation above from the following sources:

- Insurers' bond investments by rating are from S&P Global Capital IQ. Since this database does not provide the breakdown of corporate versus sovereign bonds, we rely on EIOPA data to estimate such split. However, EIOPA data is only available for 2016-2020. These data show that the share of sovereign to corporate bonds held by insurers from the countries in our sample oscillated within a narrow band of 51-54 percent for sovereign and 49-46 percent for corporate bonds. Discussions with industry participants confirmed that this split has been constant through time. Lacking other data on the sovereign/corporate split, we extrapolate the average split for 2016-2020 to 2005-2015. Section 4 presents several robustness tests to show that our main conclusions are not altered by this assumption.
- Annual rating transition matrices for corporate bonds are available from Standard & Poor's; and annual sovereign transitions are from Fitch Ratings (see references section).

[10] We reiterate here that although Solvency II came into effect finally in January 2016, this date had been pushed back several times. The years before 2016 were crucial for the calibration of the Solvency II parameters, and insurance firms started adjusting their behavior well ahead of the implementation of the new regime.

[11] Here H_t is the (N x 1) vector of holdings of bonds at time t with generic element h^a_t denoting the market value of bonds h rated a at time t; T_t is the (N x N) matrix of rating transitions with generic element $\tau^a_{b,t-1}$ denoting the percent of bonds rated a at time t-1 migrating (i.e., upgraded or downgraded) to bonds rated b; D_{t-1} is an identity (N x N) matrix with diagonal element, δ^a_{t-1} denoting the duration of bonds rated a at time t-1; Δi_t is the identity (N x N) matrix with diagonal element, $(i^a_t - i^a_{t-1})$, denoting the change in interest rates for bonds rated a between period t and t-1; and P_t is the (N x 1) vector of new bond purchases at time t.

- Data on duration is very limited. The only available sources of corporate and sovereign bond durations are EIOPA (2014) and EIOPA (2018). Thus, we calculated the average of the two years: corporate and sovereign bond durations are 5.7 years and 8 years, respectively. We assume this same duration for all the years in the sample. Section 4 presents a robustness check for this assumption.
- The change in interest rates for each rating category of corporate bonds was calculated from ICE's corporate bond indices and the change in sovereign yields was calculated from the iBoxx euro-denominated sovereign indices. For each of these indices we chose the relevant maturity bucket corresponding to the bonds' durations discussed in the previous bullet.

3.2 Results

The results of our decomposition cast new light on the dynamics of life insurers' bond portfolios (Table 2 and Figures 5 and 6). Several important points can be made:

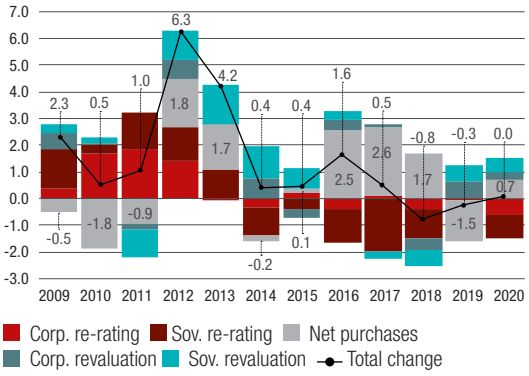
- Portfolio dynamics are the result of a combination of drivers of which net bond purchases are only one element and sometimes not even a dominant one (e.g., years 2009, 2011, 2014, 2015, or 2020). Moreover, even in years when net purchases were relatively large, there were other factors equally large (and sometimes even acting in the opposite direction): for instance, in 2010, life insurers actively sold BBB bonds equivalent to 1.8 p.p. of their bond portfolio. However, rating migrations added around 2.1 percentage point (p.p.) worth of BBB bonds, leaving the overall balance almost unchanged (+0.5 p.p., Table 2).

Table 2: Decomposition of annual change of BBB bond holdings

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	(in percentage points of life insurers' total credit assets)											
Annual change	2.3	0.5	1.0	6.3	4.2	0.4	0.4	1.6	0.5	-0.8	-0.3	0.0
of which due to:												
Corporate re-rating	0.4	1.7	1.8	1.4	0.0	-0.3	0.2	-0.4	0.1	-0.4	0.0	-0.6
Sovereign re-rating	1.5	0.3	1.4	1.3	1.1	-1.1	-0.4	-1.2	-1.9	-1.1	0.0	-0.9
Corporate revaluation	0.6	0.1	-0.2	0.7	0.0	0.7	-0.3	0.4	0.1	-0.5	0.7	0.3
Sovereign revaluation	0.3	0.2	-1.0	1.1	1.4	1.2	0.8	0.3	-0.3	-0.6	0.6	0.5
Net purchases	-0.5	-1.8	-0.9	1.8	1.7	-0.2	0.1	2.5	2.6	1.7	-1.5	0.7

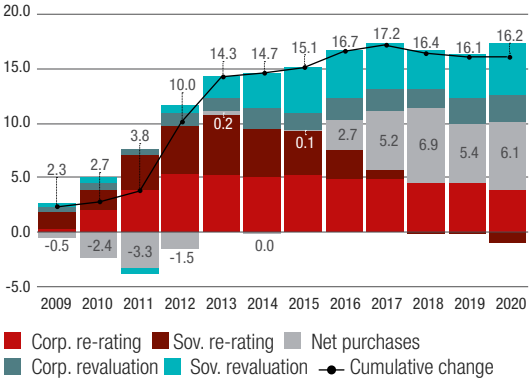
Sources: Standard & Poor's, Bloomberg, EIOPA and authors' calculations

Figure 5: Decomposition of change in BBB bond holdings, 2009-2020 (in percentage points of total credit risk assets)



Source: Standard & Poor's, Bloomberg, EIOPA and authors'calculations

Figure 6: Cumulative changes to BBB bond holdings by factor 2009-2020 (in percentage points of total credit risk assets)



Source: Standard & Poor's, Bloomberg, EIOPA and authors'calculations

- Rating downgrades added about 2 to 3 p.p. of BBB paper per year during 2009-2012, leading to a net accumulation of 10.9 p.p. due to downgrades by 2013 (Figure 6). Insurers reacted by selling some of these bonds in an effort to maintain their overall portfolio allocations in 2009-2011.
- From 2014 onwards, the rating cycle turned, as the impact of overcompensated upgrades downgrades, especially concerning sovereigns. Thus, the cumulative impact of re-ratings on the BBB portfolio started to reverse from 2014 (Figure 5). In fact, the sovereign rating cycle was fully closed by 2018, whereas the corporate cycle was still unwinding in 2020 (Figure 6). Insurers responded by net-buying BBB-bonds, especially in 2016-2018.
- Our decomposition also reveals that net purchases of BBB bonds took place from 2012 onwards, after it became apparent to market observers that global interest rates would remain low for the foreseeable future – the so-called "low-for-long" phenomenon [IMF (2012)]. Throughout 2012-2018, insurers annual net purchases of BBB bonds have oscillated considerably (between -1.5 and 1.8 p.p.), resulting in a cumulative net acquisition of 6.9 p.p. of the bond portfolio by 2018.
- Upward bond revaluations were an important driver of portfolio changes in 2012-15, especially for sovereign bonds as yields on BBB paper came down significantly from their heights in 2011 (Table 2 and Figure 5).
- The peak of accumulation of BBB bonds was in 2017 (Figure 6). Looking at the cumulative effect of each driver by that year, one can see a roughly equal impact from net purchases, re-ratings, and revaluations. That is, net purchases represented 30 percent of the total cumulative increase in BBB paper (5.2 p.p. out of a total of 17.2 p.p.), while rating migrations accounted for 34 percent of the change (5.8 p.p. out of 17.2 p.p.) and revaluations for 36 percent (6.2 p.p. out of 17.2 p.p.), respectively (Table 2).

4. ROBUSTNESS CHECKS

4.1 Assumption on corporate versus sovereign bonds split

One of our assumptions is about the split between insurers' investments in corporate versus sovereign bonds. As discussed, the only data available indicates that insurers allocated around 52 percent of their bond portfolios to sovereigns throughout 2016-2020. Due to lack of data, we assumed the same allocation for 2005-2015.

In this subsection we explore whether other distributions of bond holdings would yield very different results. Most importantly we want to confirm that net purchases of BBB bonds were an important – although not the only – driver in the accumulation of BBB bonds.

For this, we first consider two extreme distributions. A "sovereign bias" distribution assumes that during 2005-2015, insurers favored sovereign over corporate bonds with an allocation of 70-30 percent, respectively. The "corporate bias" distribution assumes the mirror 30-70 percent distribution. The results from these extreme distributions are presented in Figures 7 and 8.

Figure 7 (a) shows that the "stronger" the bias towards government paper, the "larger" the impact of sovereign downgrades and revaluations on BBB holdings compared to Figure 6. Bond purchases, on the other hand, play a much smaller role and account for only one-fifth of the cumulative change by 2017 – the year in which BBB accumulation peaked.

Under the corporate bias assumption, net purchases are responsible for slightly over two-fifths of the cumulative change by 2017, while the next most important drivers are corporate re-ratings and revaluations (Figure 7 (b)). An additional scenario to consider is one where the corporate/sovereign split is not the same across rating buckets – that is, a "non-uniform distribution". Instead, we assume that sovereign bond investments are highly concentrated in the higher ratings, while lower-rated bond holdings are largely comprised of corporate paper (Table 3). The results of such a distribution are presented in Figure 7 (c) and show again that net purchases of BBB bonds would be an important driver of portfolio dynamics but not the dominant one. Under this scenario, net purchases account for 38 percent of the total accumulation until 2017 (i.e., 6.5 p.p. out of 17.2 p.p.).

Table 3: Table 3: Non-uniform sovereign-corporate split across rating buckets (Sov %/Corp %)

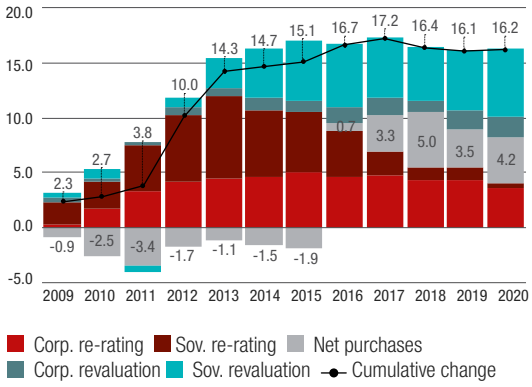
AAA	AA	A	BBB	NR
80% / 20%	80% / 20%	20% / 80%	20% / 80%	0% / 100%

Sources: Standard & Poor's, Bloomberg, EIOPA and authors' calculations

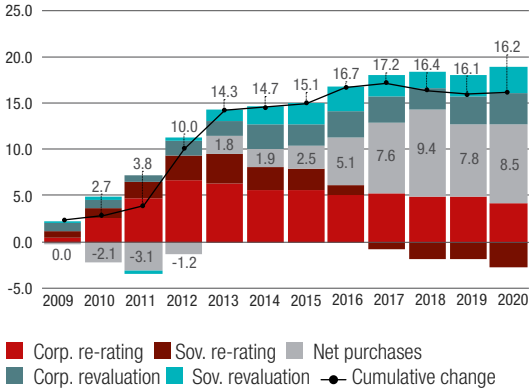
For ease of comparison across the different robustness checks, Figure 8 depicts the range of variation of each driver as a percentage of the total cumulative change of BBB holdings by 2017. That is, of the 17.2 p.p. increase in BBB

Figure 7: Cumulative changes to BBB bond holdings, by factor 2009-2020 (in percentage points of total credit risk assets)

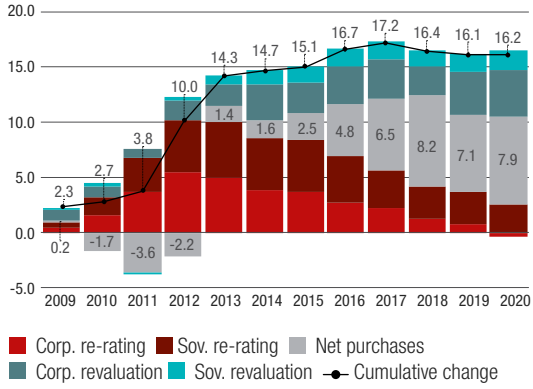
(a) Sovereign bias distribution



(b) Corporate bias distribution



(c) Non-uniform distribution: sovereign bias in high ratings, corporate bias in low ratings



Source: Standard & Poor's, Bloomberg, EIOPA and authors' calculations

holdings, how much corresponds to each factor? Figure 8 shows that the maximum effect of purchases would be under the corporate bias distribution (net purchases would explain 44 percent of the total change).

Taken together, these robustness checks confirm the conclusion that the accumulation of BBB bonds by insurers is the result of a combination of factors, of which "active" buying of BBB paper was only one element and would account for at most half of the total change even when assuming a very biased bond allocation.[12] The other drivers, which collectively account for half or more of the change, are "passive drivers", as would be expected of "buy-and-hold" investors.

4.2 Assumption on the duration of corporate and sovereign bonds

Another assumption we were forced to make due to data unavailability concerns the duration of insurers' corporate and sovereign bond portfolios. Recall that our solution was to compute the average of the two data points available (2014 and 2018) and apply that average to each year in the sample.

Alternatively, we consider here a linear extrapolation from those two years to the rest of the sample (Figure 9). The results obtained are very close to the ones obtained in Section 3, and thus deserve no further comment (Figure 10).

5. CONCLUSION

To sum up, between 2005 and 2017, life insurers rebalanced their portfolios from a substantial share of AAA (43 percent) and about 5 percent of BBB bonds, to about 18 percent AAA paper and 23 percent BBB bonds. The rebalancing has remained largely constant since 2017. This change has obviously worsened the credit quality of insurers' bond portfolios, raising the question of whether life insurers became more active risk-takers from 2011 onwards as they intensified their search for yield. The commonly accepted view in policy circles is that insurers have actively gone "outside of their traditional risk habitats as they searched for yield" [IMF (2017)].

Our decomposition of the evolution of bond portfolios has shown that this explanation needs qualification (and quantification): while it is true that insurers actively sought to increase their BBB holdings via net purchases starting in 2012, the impact of rating migrations and bond revaluations is equally important and of similar magnitude – each element accounting for around 1/3 of the cumulative change between 2008 and 2017.

[12] We also considered an unrealistic distribution where 100 percent of the portfolio is allocated to corporate bonds during 2005-2015. Even under this extreme assumption, corporate rating migrations and revaluations account for 55 percent of the cumulative change in BBB holdings.

Given some uncertainties in our estimation, we conducted some robustness checks. Overall, even in the most extreme scenario, net purchases would account for at most two-fifths of the total deterioration in credit quality during this period.

Passive drivers, like rating migrations and bond revaluations, were equally responsible for insurers' changing portfolio allocation.

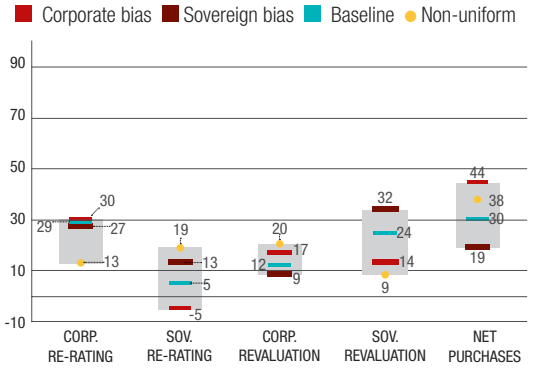
These findings shed critical light on the role of insurers in financial markets over the last two decades and should be taken into account by financial authorities. We presented evidence that insurers have largely retained their traditional "buy-and-hold" investment stance, even when faced with ultra-low yields and widespread sovereign and corporate rating downgrades. By not actively rebalancing their portfolios, insurers avoided aggravating market-wide fire-sale dynamics and additional stress for borrowing firms and sovereigns. Thus, from a financial stability perspective, life insurers continued to be a rather stable investor class. This conclusion has been further confirmed by insurers' contained net-selling of downgraded bonds during the COVID-19 crisis [EIOPA (2021)].

It is important to remark here that we are not suggesting that insurers are uninterested in obtaining higher yields. Indeed, insurers are not forced to hold bonds to maturity and thus can reoptimize their portfolio by buying safer assets after downgrades. Inertia (i.e., the buy-and-hold-strategy), is a choice. In fact, insurers have long term liabilities that leave them with more discretion to buy in downturns than other financial intermediaries [Timmer (2018)]. The point is that by managing their portfolios passively, insurers have been countercyclical investors and have not actively contributed to a pro-cyclical market dynamic.

Looking ahead, it is reasonable to expect that as central banks raise policy rates these portfolio dynamics will be (partially) reversed. Moreover, insurers may become active buyers of the highly rated paper that will come back to markets as central banks embark in quantitative tightening (QT) programs.

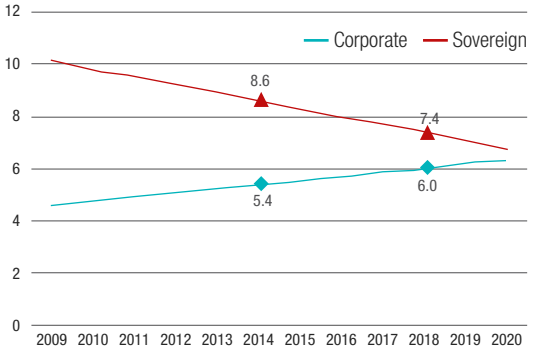
Finally, our analysis also raises a question for the design of insurance regulation. Are the capital costs embedded in Solvency II strong enough to promote safer investment allocations through the cycle? Our findings suggest that before 2014 the relationship between yields and capital charges would indeed have favored investments in higher-quality assets. From 2014 onwards, however, the return/capital-cost trade-off was not different across ratings, and so insurers naturally chose the higher-yielding assets.

Figure 8: Robustness analysis of the drivers of changes to BBB bond holdings (in percent of the total cumulative impact between 2005-2017)



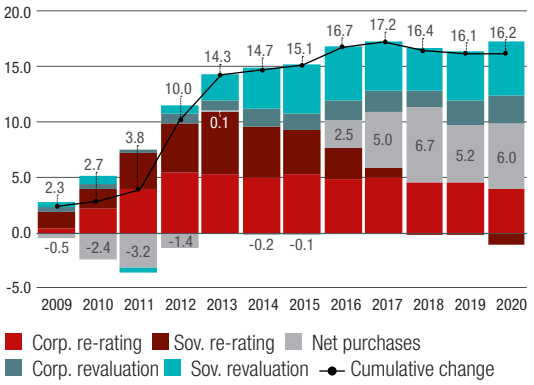
Sources: Standard & Poor's, Bloomberg, EIOPA and authors'calculations
Notes: Grey vertical bars denote the range of values for each driver across distributions

Figure 9: Linear extrapolation of bond duration from years 2014 and 2018



Sources: EIOPA and Authors' calculations

Figure 10: Cumulative changes to BBB bond holdings, by factor 2009-2020 duration extrapolation (in percentage points of total credit risk assets)



Source: Standard & Poor's, Bloomberg, EIOPA and authors'calculations

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OPEN FINANCE IN EUROPE: WHAT IS COMING AND WHY IT MATTERS

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ABSTRACT

Open Finance is a new development in the financial services industry that entails the sharing, access, and reuse of customer (business and consumer) data with customer agreement across, and in order to provide, a wide range of financial services. This article explains a number of use cases of "Open Finance" in order to understand its potential and then discusses some important aspects of this regime, which are still to be decided upon by the legislator. The advantages and disadvantages are explained in order to have a critical view of this development in the financial services industry. The article concludes with a number of recommendations for financial institutions.

1. INTRODUCTION: WHAT IS OPEN FINANCE?[2]

A data economy is rapidly emerging in the European continent and globally. Simultaneously, digitalization is growing, bringing efficiencies for customers (both business and consumer). Policymakers, therefore, need to decide how to bring these developments to their advantage. Open Finance is a policy choice of the European Union (E.U.) in the financial services sector and part of a wider strategy to progress towards a digital economy.[3] Open Finance can be defined as the sharing, access, and reuse of customer data with customer agreement across, and in order to provide, a wide range of financial services.[4] It aims to address the difficulties that arise in accessing and reuse of customer data and the low interoperability of data in the financial services sector. This problem hinders innovations and constrains customer choice. By sharing data with third parties, more tailored services can be offered and comparison will be possible leading to improved outcomes.[5]

While currently there is no legislation on Open Finance, the European Commission is expected to publish a proposal by the mid-2023.[6] In the E.U., a call for impact assessment has been made[7] and an expert group has been set up[8] in order to work out the features of such a regime. A number of principles of Open Finance can be identified at the time of writing.

[1] Emanuel van Praag is also member of the EC Expert Group on European Financial Data Space.
[2] This article builds on one of the authors' prior articles and draws from its ideas. The article is in Dutch: van Praag, E., 2022, "The European financial data space: Open Banking in actie," 5:33, Ondernemingsrecht 6-8, https://bit.ly/3KXyhxU.
[3] European Commission, 2022, "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A European strategy for data," (COM(2020)) 66 final, February 19, https://bit.ly/3ZjwJ5R
[4] See the definition in European Commission, 2022, "Call for evidence for an impact assessment," May 10, https://bit.ly/41xaScN; and in EC Expert Group on European Financial Data Space, 2022, "Report on Open Finance," October 24, https://bit.ly/3ZsFhXI
[5] European Commission, 2022, "Call for evidence for an impact assessment," September 28, https://bit.ly/3lLvrcC
[6] European Commission, 2022, "Annexes to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Commission work programme 2023, a Union standing firm and united," October 18, https://bit.ly/3ll5riC
[7] European Commission, 2022, "Call for evidence for an impact assessment," September 28, https://bit.ly/3lLvrcC
[8] European Commission, 2021, "Expert group on European financial data space," March 15, https://bit.ly/3EQ2hbd

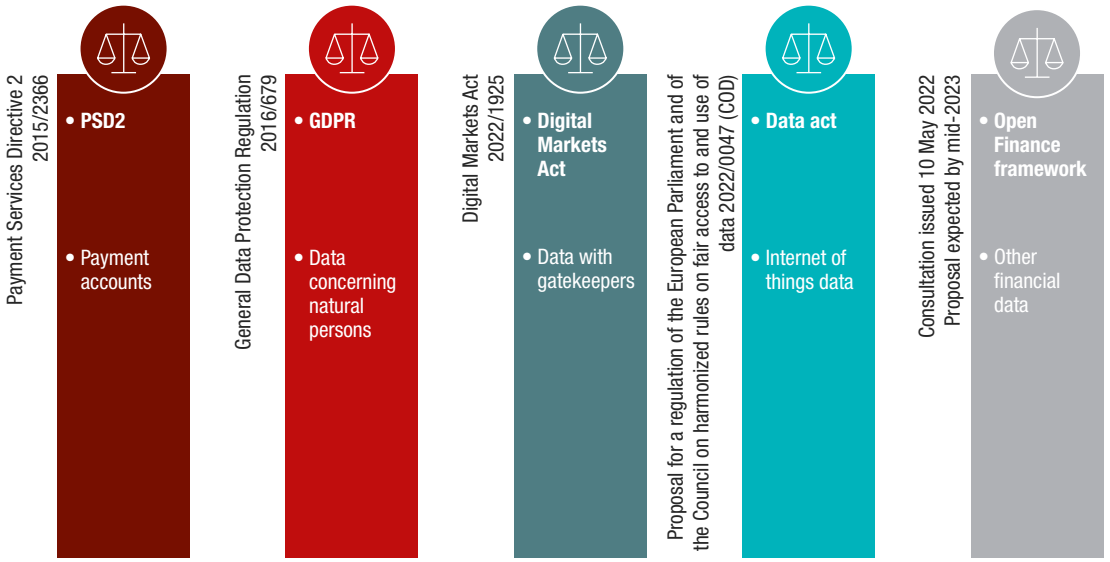
1.1 Data portability: Data is controlled by the customer

In an Open Finance system, data supplied by and created on behalf of financial services customers is controlled by those customers.[9] As such, they can make this data available to third parties or other financial institutions. The concerned financial institution holding the data (data holder, e.g., a bank) will be obliged to share this data. This data-sharing can be considered as a sector-specific data portability right of the customer, initially enshrined in the General Data Protection Regulation (GDPR).[10] The GDPR right to data portability, however, is limited and in practice hardly operational.[11] Two key reasons are that it only provides for direct portability from one firm to the other "where technically feasible," leaving much room for interpretation, and that it only applies to personal data. Open Finance, on the other hand, will have a broader scope of data, not only personal but also non-personal data[12] and portability will take place in a smoother way.

1.2 Standardization and machine-readability: Data should be made available in a machine-readable and standardized format

In order to facilitate the sharing of data, they should be in a machine-readable (think of CSV or XML files instead of Word or PDF) and standardized format. This process should be as smooth as possible and machine-readability is instrumental in that regard. Machine-readable means "a file format structured so that software applications can easily identify, recognize and extract specific data, including individual statements of fact, and their internal structure."[13] Emphasis in having more data made available in a machine-readable way can be seen across E.U. financial regulation. See, for example, in relation to crypto's the MiCA[14] and in relation to sustainability reporting the CSRD.[15]

Figure 1: Relevant rules to Open Finance



[9] FCA, 2021, "Feedback statement: Open Finance," Financial Conduct Authority, FS21/7, March, https://bit.ly/3FcriOj

[10] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (2016) OJ L 119/1, Article 20.

[11] A European strategy for data (no. 3) 10; European Commission, "Public consultation on the Data Act," https://bit.ly/3kDaF75; Kuebler-Wachendorff, S., R. Luzsa, J. Kranz, S. Mager, E. Syrmoudis, S. Mayr and J. Grossklags, 2021, "The right to data portability: conception, status quo, and future directions," 44 Informatik Spektrum 264, https://bit.ly/3y5k3Uo

[12] EC Expert Group on European Financial Data Space (2022)

[13] Article 13(2) of Directive (EU) 2019/1024 of the European Parliament and the Council of 20 June 2019 on open data and re-use of public sector information [2019] OJ L 172/56.

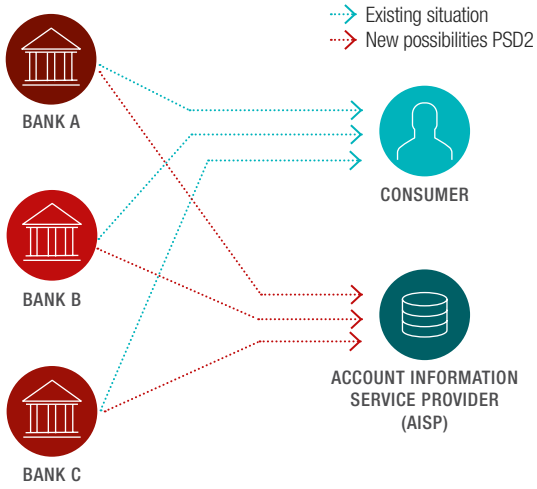
[14] Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937, https://bit.ly/3lltn5t

[15] Proposal for a Directive of the European Parliament and of the Council amending Directive 2013/34/EU, Directive 2004/109/EC, Directive 2006/43/EC and Regulation (EU) No 537/2014, as regards corporate sustainability reporting, https://bit.ly/41Hr1wq

1.3 General accessibility to data

This principle means that data should be reused as much as possible not only by individual clients porting their data but as wider datasets. The problem with individual clients porting their data to other institutions is that it is not sufficient to train models. A customer's dataset can be helpful to understand that one client's history, but it is not enough for the third-party firm to train a model. This is still an outstanding issue regarding the Open Finance proposal.[16] The Dutch Central Bank and the Dutch Authority for Financial Markets have recommended that the Open Finance scope should include the sharing of datasets too, and not be limited to the specific use cases. This can be important for innovation and a level data playing field, including in the financial services sector.[17] Governments in the E.U. already have to share and publish (public) data based on the Open Data Directive.[18]

Figure 2: Overview of data streams in the PSD2 business model



2. OPEN FINANCE 1.0: PSD2

The Open Finance journey is a further step towards creating a system in which data is shared across sectors. It can be seen as an extension of the "Open Banking" framework,[19] which is enshrined in the PSD2 (the revised Payment Services Directive). The PSD2 introduced inter alia a new right called "access to account" (XS2A) and two new kinds of payment service providers, which provide their services with respect to accounts at other financial institutions and were, therefore, called "third-party services providers" (TPPs). The two types of third parties introduced in the PSD2 are:

- **Account information service providers (AISPs):** these offer the new payment service introduced in the PSD2: "account information service". The latter is defined as "an online service to provide consolidated information on one or more payment accounts[20] held by the payment service user with other payment service provider(s)".[21] This means that AISPs can retrieve and use the data, but no payment can be made with it ("read" function only). They can use the data to offer added value for the customer but also for third parties. AISPs must at least have a registration and meet various requirements.[22] Customer's agreement is necessary in order to provide account information services, but a contract between the bank[23] and the third party is not needed.[24]
- **Payment initiation service providers (PISPs):** these cannot see what happens at a customer's account running at an account servicing payment service provider (ASPSP) but can initiate a payment on their behalf ("write"[25] function), so-called "account to account" (A2A) payments. Their added benefit is that they can confirm when the payee has paid for the goods bought, for example, and as such the seller can release the goods, without the money arriving in their account being necessary. This has the potential to act as an alternative to the major credit card schemes, such as Visa and MasterCard.

[16] See the EC Expert Group on European Financial Data Space (2022)
[17] The Dutch Central Bank (De Nederlandsche Bank) and the Authority for Financial Markets (Autoriteit Financiële Markten), 2022, "Data mobility and the financial sector: discussion paper," September, https://bit.ly/3ZkJY6w
[18] Open Data and Public Sector Information Directive (n 13)
[19] See for a similar approach, di Pascalis, F., 2022, "The journey to Open Finance: learning from the Open Banking movement," 33:3 European Business Law Review 397, 399; Vezzoso, S., 2022, "The critical journey from Open Banking to Open Finance," SSRN, https://bit.ly/3SGxPGg; Securities and Markets Stakeholder Group, 2021, "Advice to ESMA: European Commission's Request to EBA, EIOPA and ESMA for technical advice on digital finance and related issues," July 30, ESMA22-106-3473, https://bit.ly/3ZdV0dA
[20] Article 66 (1) and 67(1) of Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2012/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC [2015] OJ L 337/35 (PSD2)
[21] Article 4(16) and Recital 28 PSD2
[22] See for example Article 5 in conjunction with Article 33 PSD2
[23] In the PSD2, the institution where the payment account is held is termed: account servicing payment service provider (ASPSP). Although other parties are allowed to offer payment accounts, the ASPSP usually is a bank.
[24] Article 66 (5) and 67(4) PSD2
[25] Defined as the ability to initiate a transaction, Jeng, L., 2021, Open Banking, Oxford University Press

Regarding the background to such a sea change legislation, there was quite a competition angle to it. The aim was to enhance competition in the financial services sector, banking in particular.[26] Banks were considered gatekeepers, because they keep customers' finances and the latter represent a significant barrier to entry because information is vital to compete in the financial services sector. As such, banks leverage significant advantage over other parties in the market.[27] TPP business models were in existence prior to the PSD2 but they needed access to customers' finances, which banks did not have an economic interest in sharing and in fact refused to share.[28] As a result, it was legislated in the PSD2 that customers can make their payment account data available to third parties, without the bank having any say in it. The underlying logic is that customers own the data.

3. USE CASES UNDER PSD2

TPPs business models based on PSD2 data sharing have been numerous. They vary from general view of own finances, facilitating lending (creditworthiness assessments), money management for consumers and businesses, and accounting tools for businesses to PSD2 as a service, etc. Some are explained below.

3.1. Insight into (personal or business) finances

Open Banking enables customers to get better insights into their own finances. It is often cumbersome to have a comprehensive overview of all accounts and finances in one place when the individual or business has accounts in multiple financial institutions. There are budget tools and providers of tips to save money that target consumers. These were the apps that the European legislators had in mind when introducing AISPs in the PSD2.[29] For example, apps like Plaid offer Open Banking solutions for firms by looking at the payment account(s) after the customer's permission and consolidating more than five years of payment account data (one's subscriptions, expenditures, etc.). It will then categorize these transactions and make clear to the user what is wasteful spending and guide them to investment and savings goals. Plaid does not do this under its own name, but facilitates other firms in offering such services.[30] Apps like Dyme, for example, would also suggest actual ways to save money, such as by switching energy suppliers. The aim is to help customers improve their financial health through categorized transactions.[31]

The same goes for accounting tools for businesses. MoneyMonk or 9Spokes are good examples. MoneyMonk is an accounting app that has existed since 2012. Using the AISP license, it transfers data from the bank directly to the accounting app its client already has.[32] The advantage that Open Banking brings is that this transfer is automatic and there will be no need to copy the data manually from the bank statement to the accounting software. 9Spokes, another example, offers a business dashboard service, whereby all business metrics can be seen in one dashboard for 360° coverage of performance. The user can choose the most important business metrics to see and put on the app. It also consolidates data to see the past and forecast the future. The app makes it possible to see the net profits, last transactions, actions, recent documents, inventory value, and staff wages, etc. It also provides expert knowledge on the business progress (e.g., tips for business growth).[33]

3.2. Facilitating lending (creditworthiness assessments)

Accessing a huge amount of payment account data easily can improve evaluating creditworthiness and, therefore, reduce information asymmetry in the lending market. AISPs can help by gathering customer payment account data, e.g., seeing their spending or saving habits, and make a more accurate creditworthiness assessment. It can be done as part of one's business of lending, or only a credit rating as a business in itself, and give it as a service to lenders. An interesting example is FinCredible GmbH,[34] an Austrian company that offers two types of creditworthiness solutions for businesses: KontoCheck (AccountCheck) and MietCheck (RentCheck).

[26] Commission Staff Working Document, 2013, "Impact assessment: accompanying the document Proposal for a directive of the European parliament and of the Council on payment services in the internal market and amending Directives 2002/65/EC, 2013/36/UE and 2009/110/EC and repealing Directive 2007/64/EC and Proposal for a Regulation of the European Parliament and of the Council on interchange fees for card-based payment transactions," July 24, https://bit.ly/3kKzBcP; FCA (2021)

[27] Borgogno, O., and G. Colangelo, 2020, "Data, innovation and competition in finance: the case of the access to account rule," 31(4) European Business Law Review 573 4-7, https://bit.ly/3YdxMTB

[28] See the following court cases where third-party providers wanted access but were blocked by banks, BGH, Urteil vom 18. Juli 2017 – KZR 39/16; The Central Netherlands Court (Rechtbank Midden-Nederlands) Utrecht 30 July 2014, (ING Bank N.V. and ING Group N.V. / AFAS) ECLI:NL:RBMNE:2014:3250.

[29] Article 4(16) and Recital 28 PSD2; van Praag (n 2) 4.

[30] Plaid, "Use cases," https://bit.ly/3SEZK9I

[31] Dyme, "Our story," https://bit.ly/3ZvisTI

[32] MoneyMonk, "Online accounting for freelancers," https://bit.ly/3ZfZKPP

[33] 9Spokes, "You know banking, we know small businesses: together we're a powerful team," https://bit.ly/3Y89ri0

[34] FinCredible, part of KSV1870, https://bit.ly/3KRdcW2

With KontoCheck, FinCredible checks the solvency of customers with real-time bank data by accessing the payment account. It is ideal for businesses in e-commerce and retail applications.[35] With MietCheck, this AISP checks the solvency of tenants for the landlord, who wants to make sure that their tenant has enough money to afford the rent for the defined period.[36]

Another example of using Open Banking or PSD2 data to support a firm's lending business is Floryn. This app extends loans to businesses and estimates their creditworthiness by checking their turnover over the past six months, which the company provides.[37] With the AISP license, Floryn looks at this data directly by accessing the company's payment account, hence being less cumbersome and more time-efficient. Importantly, the data is far more reliable as it comes from the bank directly and cannot be tempered with, such as is possible with PDFs.

3.3. Sale of Open Banking data to interested companies

An example of firms that do this is the Belgian firm Cake, founded in 2018. Cake earns money from selling the data that the client offers when providing access to the payment account. This data is sold (anonymized) to interested companies with the proceeds being shared with the client (by creating targeted cashback campaigns).[38] For example, as Cake puts it in their website: AVA wants to give 10 percent cashback on the first shopping basket for customers who haven't been to AVA in the last three months.[39] Cake's role, as an AISP in this case, is to approach these customers on behalf of AVA and pay them the cash back on behalf of AVA if they use the offer.

4. OPEN FINANCE 2.0: THE COMING E.U. OPEN FINANCE FRAMEWORK

PSD2 has provided the basis for TPPs to build applications and services around banks' customer data by granting them access to it. What is being done today with customer payment account data held by banks is planned to be done across the financial services sector, with more data (mortgage, pensions, investments, etc.) and more holistically (banking, insurance, investments). Thus, Open Banking can be considered a subset of Open Finance. As already mentioned, an Open Finance framework is expected to be proposed in the second quarter of 2023. The European Commission has launched an expert group[40] to inform of the developments made towards an Open Finance legislative initiative. Below, we will discuss some use cases as well as the data fields that may be in the scope of the European financial data space.

4.1. Use cases under Open Finance

Open Finance will arguably bring many benefits and new business models based on data-sharing between financial institutions and with non-financial players. The expert group on Open Finance has identified, among others, five use cases where Open Finance can play a role. The following use cases are not exhaustive, but aim to highlight the potential of Open Finance.

4.1.1. MORTGAGE CREDIT

In this use case, the involved actors are the creditor (data holder), the credit intermediary (data user), and the borrower (data subject). The borrower would go to the credit intermediary for advice on the best creditor. The credit intermediary will gather data from the borrower and several creditors (e.g., banks) and provide a preliminary risk assessment and a comparison tool. Open Finance would help in every step of this process. The data gathering process of credit intermediaries and the creditor is often manual and cumbersome and although data is standardized it is not harmonized across all players.[41] Open Finance will make this process smoother as well and help improve the customer experience. The products, advice, and creditworthiness decisions will be improved and transparency is increased due to a more effective and less costly data access process.[42]

4.1.2. IMPROVING SME FINANCING BY ENHANCING THEIR "CREDITWORTHINESS ASSESSMENT" (CWA)

This use case takes into consideration small- and medium-sized enterprises' (SMEs) difficulties in obtaining financing due to the lack of data regarding their activities, constituting a limitation to an accurate CWA. For example, the traditional information used for CWA, i.e., balance sheet and profit and loss statements, tend to have a delay of nine months up to one

[35] KontoCheck, https://bit.ly/3YiZ62K
[36] MietCheck, https://bit.ly/3SOlBeY
[37] Floryn, "When waiting for your couch costs opportunities: who should you be then?" https://bit.ly/3kCy7kU
[38] Cake for Business, "Market insights and cashback campaigns for retailers and brands," https://bit.ly/3kHnRYA
[39] The Cake campaigns can reach up to around 150,000 consumers, Cake for Business, "Cake campaigns" https://bit.ly/41Cr4tf
[40] Register of Commission Expert Groups and Other Similar Entities, 2021, "Expert Group on European Financial Data Space," (E03763), March 15, https://bit.ly/41BUlEo
[41] See the EC Expert Group on European Financial Data Space (2022)
[42] Ibid. Notably the banking sector members did not agree to this use case's assessment, see footnotes 35 and 42.

year since the end of the fiscal year,[43] which means that they do not reflect the current state of SME activity and financial situation. Consequently, other reliable and up-to-date data can be used to offer a current picture of SME activity. This use case aims to broaden the type of data on which this CWA is done by including SME online commercial activity and other cross-sectoral data. For example, the lender would have access to data from:[44]

- **utilities provider** of the SME, which is an indication of an SME's activity: an increase in electricity and water consumption indicates an increase in production and, possibly, future sales
- **e-commerce platforms**[45] regarding B2B activity, aggregated real-time sales, inventory, customer satisfaction, cross-border activity, wish lists, refunds, etc.[46]
- **supply chain platforms** regarding purchase orders, invoice flows, financial reports, etc.

Open Finance would facilitate access to such financial and non-financial data, consequently facilitating and improving the CWA leading to lower default rates, higher acceptance rates, up-to-date sources of information and reduction of lead times, and reduction of collection of data costs.[47]

4.1.3. OPEN INVESTMENT DATA, FINANCIAL ADVISORY, SAVINGS, AND PENSIONS

Open Finance in this use case will target the need to improve financial advice regarding retirement planning, saving levels, and their investments. Regarding retirement, a national system would be created that has access to customers' social benefits or social security, tax payments, pensions, and data from land registry offices in order to obtain an accurate view of the customer's portfolio and thereafter, offer personalized financial advice, personalized retirement planning advice, and a comparison tool for insurance, and increasing customers' awareness and financial literacy.[48] Additionally, Open Finance will help create an aggregated view of investments, help consumers manage them, and advise on alternative options.[49]

Regarding savings, automated account switching to higher interest rate accounts, access to accounts and budgeting tools, and the ability to see all savings and investment products in one place to ensure risk is appropriate to needs (e.g., not over-saving in low return cash products) are possible.[50]

4.1.4. ENERGY, SUSTAINABILITY, AND CLIMATE DATA

This use case aims to contribute towards sustainability and fighting climate change. By using data such as acquisition of energy efficiency, energy consumption, and climate data, Open Finance can support consumers in protecting the value of their property. For example, a bank can offer loans to customers for renovating their house and improve their energy efficiency class ratings. This use case benefits consumers because they maintain the value of their property, achieve energy efficiency, and reduce energy consumption. Furthermore, it helps with the broader E.U. objectives of environmental transition and sustainability. But it also benefits financial institutions, as they adhere better to corporate social responsibility policies, increased consumer loyalty, and improved consumer solvency risk.

4.1.5. INSURANCE, E.G., SHARING OF IN-VEHICLE DATA

In this use case, insurers are given access to the data generated by vehicles, including usage and accident data. By using this information, insurers could draw up a more personalized and appropriate policy based on the actual risk of the driver or usage-based insurance. This will lead to financial inclusion because younger people, who tend to get higher cost policies regardless of how they drive, will have access to policies that are suited to their specific way of driving. An example is Tesla's real-time driving behavior-based insurance,[51] though in a future Open Finance ecosystem the insurance would be provided by an insurer independent of Tesla. Additionally, opening up vehicle data will help insurers understand risks related to automated and autonomous driving and, therefore, be able to insure such vehicles. Moreover, in damage claims vehicle data would clarify the causal events and, therefore, allocation of liability. Generally, sharing insurance data can

[43] Ibid 58
[44] Ibid 58 ff
[45] An example of lenders (banks) partnering with e-commerce platforms inter alia to enhance creditworthiness assessment is the partnership between ING Germany and Amazon aiming at facilitating SME lending. See ING, 2020, "ING in Germany and Amazon join forces in SME Lending," June 30, https://bit.ly/3ETdxnh
[46] See also, Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector (Digital Markets Act) [2022] OJ L 265/1 Article 6(9) and (10), according to which the designated gatekeeper should provide a third party or an end-user or business user with the data of the end-user or business user accordingly, at the latter's request free of charge.
[47] EC Expert Group on European Financial Data Space (2022)
[48] Inspiration in the E.U. was drawn from the Danish National Pension Tracking Services called "PensionsInfo," https://bit.ly/3ES3zTk; ibid 71 ff; FCA (2021)
[49] FCA (2021)
[50] Ibid 31
[51] Tesla, "Tesla insurance using real-time driving behaviour: how it works," https://bit.ly/3KPlgW5

help in creating aggregated services and determining when a person is over- or under-insured, will increase consumer understanding and, therefore, demonstrate "good risk" characteristics, and create bespoke deals and offers catered to a person's lifestyle, financial habits, and needs.[52]

4.2. Potential data fields

Open Finance will broaden access to much more data than in PSD2 Open Banking (payment accounts). As seen in the above use cases, and considering the Commission Communications relating to Open Finance,[53] there are three categories of data concerned:

- **Financial data:** this category will broaden to include other financial products such as client data on loans, investments, mortgages, pensions, savings accounts, and insurance. It will also include information about financial products (product characteristics).
- **Non-financial data:** including turnover at platforms, tax data, energy consumption, utilities subscriptions, social security, etc. This data can be held by public authorities or private parties.
- **Publicly disclosed data:** financial institutions constantly disclose large amounts of data to public authorities as part of the supervisory process. All this information is readily available but not accessible for use. Policymakers, therefore, aim to facilitate its use to the benefit of business. In other words, it should be easier for businesses to supply data that is public but not accessible and it should also be easier to make use of this data. In this regard, the proposal for a European Single Access Point (ESAP) will be helpful for the increased use of reporting data.[54] ESAP is part of the European financial data space[55] and it prescribes that entities should make such information available in a data extractable format[56] or where required by Union law in a machine-readable format.[57] It sets a standard for how the existing obligatory data should be reported.

5. THE KEY DISCUSSION POINTS

In the following, we will present and discuss some aspects of the Open Finance framework in the E.U. that are not straightforward considering other legislative pieces and current proposals, such as the compensation infrastructure, consent model, bigtech, permission model, regulatory status of Open Finance players, and standardization.

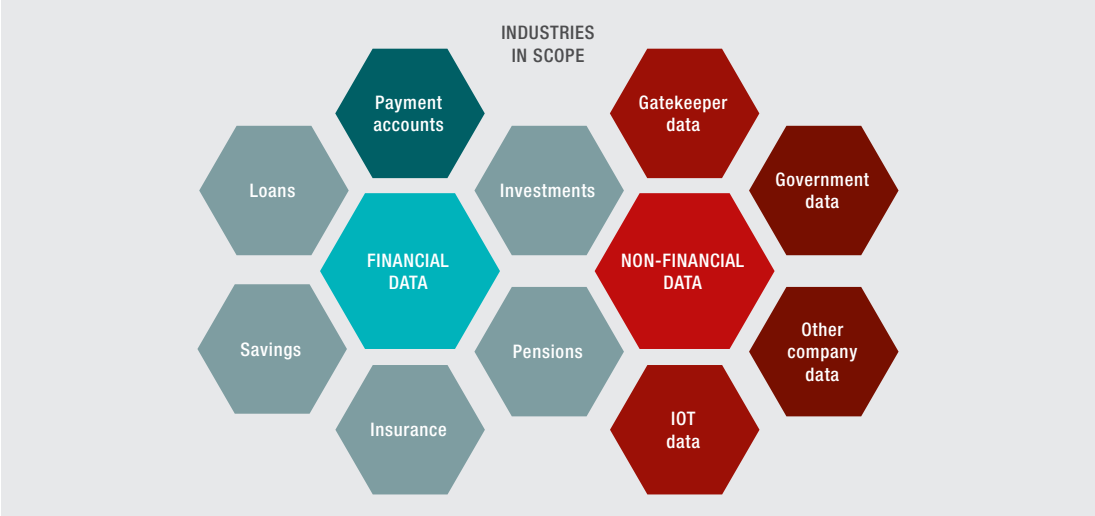
5.1. Who pays the costs for the data infrastructure

There is a divergence in E.U. law on whether the data holder can ask for compensation for the data and the costs of investment of infrastructure for collecting and maintaining that data from the data recipients. Starting out with the PSD2, it mandates that ASPSPs (banks) should provide their application programming interfaces (APIs)[58] to TPPs free of charge.[59] The Data Act (proposal) on the other hand explicitly provides for compensation.[60] In other words, the data holder is entitled to a fee for the data that it shares. Specifically, the data should be given for free to the customer, only covering costs to SME data recipients, and reasonable for other data recipients.[61] The Data Act will be a horizontal regulation, meaning that it envisages basic rules for all sectors as regards to the rights to use data.

Taking the above into consideration, Open Finance will in all likelihood be in convergence with the Data Act Proposal's principles, meaning that compensation should be allowed. What has been experienced so far is that because banks have been obliged to share their APIs with TPPs free of charge under the PSD2, they did not have incentives to invest in developing high-quality APIs,[62] standardization,

[52] FCA (2021)
[53] A European Strategy for Data (n 3); Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 2020, "On a digital finance strategy for the EU," September 24, https://bit.ly/41Ct58N; Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 2018, "Towards a common European data space" April 25, https://bit.ly/3mkKvqp
[54] Proposal for a Regulation of the European Parliament and of the Council establishing a European single access point providing centralised access to publicly available information of relevance to financial services, capital markets and sustainability (COM/2021/723), November 25, 2021, https://bit.ly/3y6NHZ8
[55] On a Digital Finance Strategy for the EU (n 53)
[56] Data extractable format "means any electronic open format – as defined in Article 2(14) of Directive (EU) 2019/1024 – that is widely used or required by law, that allows data extraction by a machine, and that is not only human-readable" at Article 2(3) ESAP Regulation Proposal. Open format "means a file format that is platform-independent and made available to the public without any restriction that impedes the re-use of documents" at Article 2(14) Open Data and Public Sector Information Directive (n 13). Examples are certain PDF, Excel, CSV, XML with stylesheet, XHTML, HTML, and iXBRL.
[57] Recital 4 ESAP Regulation Proposal. For a definition of "machine readable" see above in section 1, principle 1.2.
[58] See below at 5.6. Standardization
[59] Article 66(5) and 67(4) PSD2
[60] Proposal for a Regulation of the European Parliament and of the Council on harmonized rules on fair access to and use of data (Data Act) Article 5 and 9(1).
[61] Article 9 Data Act Proposal
[62] EBA, 2022, "Opinion of the European Banking Authority on its Technical Advice on the Review of Directive (EU) 2015/2366 on Payment Services in the Internal Market," June 23, https://bit.ly/3y24I6O; DNB and AFM (n 17) 38

Figure 3: Overview of data sources subject to Open Finance



or a good user experience.[63] This might be an issue when the aim of policymakers is to encourage the development of an E.U. data economy, because no economic incentives are provided to invest in gathering and maintaining high-quality data. Furthermore, in the Data Act Impact Assessment it is noted that data holders would be disincentivized to invest in data generation.[64] These disincentives require thereafter more extensive supervision aimed at establishing proper access.[65] A no-compensation scheme can create other costs. An example comes from the lack of standardization in bank APIs, which has led to the creation of API aggregators.[66] This is translated into higher transaction costs.[67] Compensation is also part of the industry-led SEPA Payment Account Access (SPAA) Scheme, developed by a multi-stakeholder group within the European Payments Council, as part of the wider SEPA API Access initiative. The SPAA scheme includes fees for the use of APIs, except for data covered by the PSD2 prohibition.[68] Considering that the PSD2 is currently under review,[69] the sharing of payment data may also be brought in line with the Data Act as future legislation should in principle be aligned with the horizontal principles of the Data Act.[70] However, the Data Act also leaves room for alternative compensation models when the specifics of an industry justify this.

Within the expert group, no consensus was achieved, though some notable recommendations have emerged. Firstly, it was noted that there should be a fair allocation of costs among different players of the data value chain to safeguard fair competition. A fair allocation of costs could mean that data holders are able to recover the costs of collecting, generating, preparing, and sharing the data, and eventually a reasonable margin of profit.[71] Secondly, Open Finance should be based on fair and proportionate access to data for market participants. Thirdly, the compensation scheme should, in principle, have incentives for data holders to encourage high-quality data sharing and any compensation exceeding the cost of data sharing should be reasonable and not lead to anti-competitive outcomes. Finally, some members suggested that there should be at least one free-of-charge, real-time (user) interface for data subjects to retrieve their data.

[63] DNB and AFM (n 17) 38
[64] Commission Staff Working Document, 2022, "Impact Assessment Report: Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council on Harmonised Rules on Fair Access to and Use of Data (Data Act)," February 23, https://bit.ly/3y5FRPC
[65] DNB and AFM (n 17) 38
[66] Data aggregators are service providers that "translate" a data-access request from a third-party provider to the various bank APIs, thus removing the need for the third party to be able to link to a wide variety of bank APIs at ibid.
[67] Ibid.
[68] European Payments Council, 2022, "SEPA Payment Account Access (SPAA): Scheme Rulebook," (EPC012-22, Version 1.0, November 30, https://bit.ly/3YfUH0C
[69] European Commission, 2022, "Targeted Consultation on the Review of the Revised Payment Services Directive (PSD2)," https://bit.ly/3kCFSYd
[70] Proposal for a Regulation of the European Parliament and of the Council on harmonized rules on fair access to and use of data (Data Act), February 23, https://bit.ly/3JfUDtD
[71] EC Expert Group on European Financial Data Space (2022)

5.2. Voluntary or mandatory data sharing

Another issue for discussion is whether Open Finance should be mandatory or voluntary. In other words, should financial institutions (data holders) be obliged to share the data? According to the expert group, the decision by the legislator whether to impose an obligation to open data or not will be key to the success of Open Finance.[72] Both models are currently present in the E.U. market. The PSD2 represents an example of the mandatory model, i.e., a regulatory compliance incentive to share data. On the other hand, an example of financial firms sharing data voluntarily is the SEPA API Access Scheme of the European Retail Payments Board.[73] After having analyzed the developer portals of a large number of banks and insurance companies, it seems that only a few – often large and avant-garde – institutions have taken the step to go beyond PSD2 APIs (e.g., Deutsche Bank, BPCE, or BBVA).[74]

In the U.S., New Zealand, Singapore, China and Hong Kong, the voluntary or market-driven model for Open Banking is present.[75] It is argued in fact that this lack of obligation in the U.S. has enabled the development of Open Banking,[76] though it is not certain whether the case will be the same in the E.U. While the objective of achieving the full potential of the data-related innovation could be established by voluntary data sharing, holders of data, such as incumbents, may lack the incentive to share their data. Consequently, a legislative initiative that obliges the data holder to share data with third parties will likely be needed.[77] Additionally, analysis has shown that most of the data needed is already available but not accessible and access is currently based on either bilateral agreements or web scraping (screen scraping). A compulsory regime would also be useful for SMEs that do not have enough negotiation power in concluding contracts on data sharing.

5.3. Bigtech

Notably, in this context the status of bigtech companies[78] is important to mention. In the Data Act Proposal, bigtechs are prohibited from receiving data from third parties, aimed at restricting the concentration of data.[79] Considering the rationale of this horizontal proposal, it is likely that the Open Finance proposal will not deviate. Hence, regardless of how the Open Finance regime will be decided, there is a category of firms that will not be allowed to receive data.

5.4. The permission model

The PSD2 had, among others, two notable requirements for third parties: explicit consent[80] and strong customer authentication (SCA).[81]

Firstly, TPPs (AISPs and PISPs) can only provide their services to the customer if the latter has given explicit consent for these services.[82] Asking for consent (or permission) should not be merely in the general terms and conditions, but be flagged to the customer so that they can explicitly agree to it.

Secondly, SCA is aimed at improving security of customer data. In order to provide access to their payment account to AISPs or PIPSs, the customer has to authenticate themselves based on at least two of the three elements categorized as knowledge (something that only the user knows, e.g., PIN or password), possession (something that only the user possesses, e.g., card or card reader), and inherence (something the user is e.g., face identification or fingerprint),[83,84] also known as "strong customer authentication" (SCA). For AISPs, this requirement can be burdensome. In order to avoid such requirements from undermining the viability of their businesses, the European Banking Authority (EBA) introduced an exemption allowing payment service providers to apply SCA every 90-days instead of for each account access.[85] As of July 25, 2023, this re-authentication period will be extended to 180 days.[86]

[72] Ibid 7
[73] European Payments Council, "SEPA Payment Scheme Management," https://bit.ly/3YfVvma
[74] Morvan, A-S., 2022, "The Open Finance report is out: what's in it & what's next?" November 15, https://bit.ly/3EQABmR
[75] di Pascalis (n 19) 404
[76] Mr. Open Banking Podcast, Season 3, Episode 5: Made in America, September 12, 2022, https://bit.ly/3kN6hT0
[77] DNB and AFM (n 17) 33
[78] Big technological companies like Amazon, Google, Microsoft, Apple, Meta.
[79] Article 5(2) and 6(2)(d) Data Act Proposal
[80] Article 66(2) and 67(2)(a) PSD2
[81] Article 67 and 97 PSD2
[82] For PISPs see Article 66(2) and 94(2) and for AISPs see Article 67(2)(a) PSD2
[83] Article 4(30) PSD2
[84] Articles 97(1)(a) and 97(4) PSD2 require "strong customer authentication" to be applied each time the payment is initiated through a PISP; and each time the payment service user accesses its payment account online, "including though an AISP".
[85] Commission Delegated Regulation (EU) 2018/389 of November 27, 2017 supplementing Directive (EU) 2015/2366 of the European Parliament and of the Council with regard to regulatory technical standards for strong customer authentication and common and secure open standards of communication OJ L 69/23 Article 10.
[86] Commission Delegated Regulation (EU) 2022/2360 of August 3, 2022 amending the regulatory technical standards laid down in Delegated Regulation (EU) 2018/389 as regards the 90-day exemption for account access [2022] OJ L 312/1 Article 1(2).

These two requirements imply hurdles for TPPs, especially AISPs, which have to go through such cumbersome procedures in order to provide their services. It also means that it is difficult for them to ensure a smooth and good user experience. Given that policymakers are thinking of Open Finance for the entire financial services industry, they may revisit these requirements and adapt them proportionally to the business model of AISPs. The key question here is whether a registered TPP that informs a data owner that they have got permission from the customer to access certain data, must be trusted by the data holder or whether the data holder can check this by applying SCA.

5.5. Regulatory status of Open Finance players

This section deals with the conditions for market players to participate in the Open Finance ecosystem. It is unresolved whether every market actor that obtains Open Finance data needs to be regulated. In other words, can anyone exercise Open Finance rights, or do they have to meet certain requirements? Under Open Banking, for example, AISPs and PISPs are under many requirements per the PSD2. For example, AISPs must at least have a registration and must meet various requirements.[87] In the Data Governance Act proposal, on the other hand, a service provider[88] with similar operations to that of an AISP is under a much lighter regime. They can opt for a simple notification[89] or ask for an authorization as "provider of data intermediation services recognized in the Union." The latter is subject to the requirement that the competent authority confirms that the provider meets various demands, but which are less cumbersome than those for AISPs.[90] Regarding Open Finance, this is an ongoing discussion.

5.6. Standardization

Standardization is discussed in this section from two perspectives: standardization of data fields and standardization of data access. The former refers to the general data fields stored by data holders.[91] Standardizing them would mean delineating which data fields should be shared, how to fill such data fields, and the minimum criteria that should be observed to implement established APIs.[92] On the one hand, standardization ensures legal certainty, clarity, and security for customers and market participants. On the other hand, risks that hinder innovation can become an obstacle for new business models to thrive. Nonetheless, in order to avoid different interpretation and thus, fragmentation in the E.U. internal market, the expert group identified the need for a higher standardization of core data fields.[93]

The second issue related to standardization is the route through which data is accessed. The PSD2 is technology-neutral and does not suggest a particular method. Previously, screen scraping has been used, which entails asking customers to hand over their user IDs and passwords and then using these credentials to sign in to the data holder (e.g., bank) by impersonating the customer.[94] Clearly, this is not a safe practice because the data holder will not recognize if the entry is by the user or the third-party and once the customer has given their credentials they have also given up control over their data.

On the other hand, a technology called application programming interfaces (APIs)[95] is more secure and many financial institutions are using it. Standardization bodies like the Berlin Group[96] or STET[97] have designed standard APIs for banks or other data holders to use. The EBA has also suggested the possibility of a common API standard across the E.U. and for it to be developed by the industry.[98] A single API would improve the data sharing process by reducing fragmentation and variability of data formats. But it would also hinder innovation and be difficult to implement due to extensive technical and/or cost requirements.[99] This would especially be the case for market participants who are already using a certain API. They would have to change their systems

[87] Article 33 PSD2 in conjunction with Article 5 PSD2
[88] There are two types of providers of data sharing services that are similar to AISPs: intermediation services between data holders (Article 9(1)(a)) and intermediation services between data subjects (Article 9(1)(b)) at "Proposal for a Regulation of the European Parliament and of the Council on European data governance (Data Governance Act)", November 25, 2020, https://bit.ly/3J6zXE3.
[89] Article 10 Data Governance Act
[90] Article 11 Data Governance Act
[91] EC Expert Group on European Financial Data Space (2022)
[92] Ibid. (n 4) 25
[93] Ibid.
[94] Jeng (n 25) 19-20
[95] APIs are defined as "a set of rules and specifications for software programs to communicate with each other, that forms an interface between different programs to facilitate their interaction," Basel Committee on Banking Supervision, 2019, "Report on Open Banking and application programming interfaces," November, https://bit.ly/3KRhn4a.
[96] The Berlin Group, "About," https://bit.ly/3KPLd97
[97] STET, "About us," https://bit.ly/3YgdjgK
[98] EBA Opinion on PSD2 Review (n 61) 8
[99] EC Expert Group on European Financial Data Space (2022)

Table 1: Overview of key expected differences between PSD2, Data Act Proposal, and the potential Open Finance model

	CAN THE DATA HOLDER REQUIRE COMPENSATION?	CONTRACT BETWEEN DATA HOLDER AND DATA RECEIVER?	CAN GAFA OBTAIN THE DATA?	CAN THE DATA BE USED TO OFFER COMPETING PRODUCTS?
PSD2	✖	✖	✓	✓
DATA ACT	✓	✓	✖	✖ (but an aftermarket is not considered a competing product)
OPEN FINANCE	Subject of discussion, probably yes	Subject of discussion, probably yes	Level playing field is an important subject of discussion	✓

and spend money to implement the standard API, though having several APIs under PSD2 might not be considered a problem because business models have arisen out of it. For example, API aggregators that connect different APIs into one single output and act as another commercial solution to the existing market situation.[100] The downside, however, is increased transaction costs.[101] A solution could be to establish at least one API standard for each sector or sub-sector (e.g., vehicle insurance, life insurance) beyond existing PSD2 API standards, and then individual firms be given the choice between the standard API or an API of their own.

6. EXPECTED MARKET IMPACT

6.1. Two-sided markets

In order for Open Finance to thrive, the right economic incentives should be provided for the market actors firstly, and secondly, both sides of the market (data holders and data users) ought to be met at a common interest. Banks as data holders have large amounts of data and new firms as data recipients or data users have agile technologies and innovative business models to offer. Consequently, both sides can benefit from each other's advantages, but in order to develop their products they need to know that there will be demand in the market. A firm would only develop a product if they have a demand for it. For example, a data holder will develop APIs and invest in collecting and maintaining data only if they know that there will be demand, i.e., a data recipient interested in that data. And there will be a demand if there is an offer for such data. In order to break such a vicious circle, firms from both sides of the market have to come together and agree on matching the offer and demand in order to develop a viable business model. This aspect might well determine the supply and demand side of the data sharing ecosystem. Notably, in Open Finance, a contractual agreement will likely be required between the data holder and the data recipient in the Open Finance framework, unlike the PSD2 that does not allow it.

6.2. Schemes

Open Banking and Open Finance generate the need for cooperation in the financial services sector. Both Open Banking and Open Finance have data exchange at their core, but Open Finance on a large basis implies schemes. The reason is that if data exchange requires contracts and compensation payments, the only way to facilitate it would be through a scheme. Otherwise, hundreds of parties would need to contract with each other and handle payments to each other. A scheme would lower such transaction costs and give some coherence in the ecosystem.

An example of a scheme is the Single Euro Payments Area (SEPA) Payment Account Access (SPAA) scheme. According to this scheme, data holders (such as banks) share customer data – with customer permission – to data brokers (third parties) for a fee. Third parties can then offer services beyond those in PSD2. The SPAA covers the set of rules, practices, and standards that allow the exchange of payment accounts related data and facilitates the initiation of payment transactions in the context of "value-added" (premium)[102] services provided by asset holders (i.e., ASPSPs) to asset

[100] EC Expert Group on European Financial Data Space (2022)
[101] DNB and AFM (n 17) 38
[102] Premium services are to be considered as: services building on PSD2-regulated ones, but going beyond the minimum regulatory requirements via the combination with (a) so-called premium feature(s). For example, the transaction asset "one-off payments" is a basic service but when combined with a premium feature, such as a "Payment certainty mechanism", it becomes a premium service as described under the rulebook; PSD2 services that are not available via online banking interfaces but provided via a SPAA API; at European Payments Council, "What we do: SEPA payment account access," https://bit.ly/3mn3H6Y.

brokers (e.g., TPPs).[103] The SPAA is set up by the European Payments Council, an organization composed of banks or association of banks,[104] and is developed collaboratively by the retail payment industry (supply and demand) and the end-user community as represented by the Euro Retail Payments Board (ERPB), and with the support of the E.U. institutions.[105] This scheme is industry-led and has the potential to facilitate the transition of the financial services industry towards Open Finance. It is voluntary to implement.

6.3. Advantages and disadvantages of Open Finance

E.U. policymakers have ambitious aims with Open Finance, also building upon the experience gained with PSD2 Open Banking. Up to now, a good deal of creativity and innovation in imagining new services of interest to bank account holders and others in the banking data value chain[106] has been witnessed with the PSD2 Open Banking. There are numerous advantages, as there are disadvantages, to this data sharing ecosystem. They will be analyzed below non-exhaustively.

6.3.1. FINANCIAL STABILITY AND COMPETITION PERSPECTIVE

Generally, Open Finance is aimed at improved financial stability of the ecosystem with more dynamic data sharing.[107] Data sharing with third parties has the potential to build a diversified ecosystem that allows more businesses to compete in the provision of financial services, thus widening the range of products and offering more choice to customers.[108] Hence, the availability of new and secure services will likely increase.[109] Another notable advantage will be enhanced competition of third parties with competing banks.[110] Secondly, customers are arguably given more power in this ecosystem, they are in control of their data as they are considered the data owners. This implies a more customer-centric approach.[111]

Additionally, operational risks are present, such as cybersecurity. Entry of small fintech firms ought to be closely monitored because they are conceivably not capable of dealing with anti-money laundering, cybersecurity, etc. risks, and may channel these risks to the other institutions and the financial system due to interconnectedness.[112] Furthermore, since banks have to open channels for accessing their customer data, they have to make sure that this is done in a safe and secure manner with proper safeguards.

Lastly, systemic risk might be present. Services that allow customers to move more of their money in real time could make it harder for firms to understand their liquidity position. Moreover, effects of deposit volatility on firm liquidity are not well understood and this could threaten the stability of the overall financial system.[113] Caution should also be taken towards the concentration of data as it can lead to new sources of systemic risk. When the power is in the data, financial regulators should address the new systemic risk stemming from concentration of data in the hands of a few technology firms. This risk is similar to the traditional systemic risk represented by banks that are too-big-to-fail or too-connected-to-fail.[114]

6.3.2. FINANCIAL INCLUSION PERSPECTIVE

Financial inclusion is expected to be a main advantage. Greater transparency around people's finances would improve access to a wider range of financial products and services. It could also lead to basic financial services for some currently excluded or underserved consumers.[115]

On the other hand, the use of alternative credit scoring methods,[116] such as psychometrics questionnaires that look for personality traits or the combination of mobile data, has been considered for customers, such as younger people or those who are self-employed (often called thin file customers) who cannot access mortgage credit or access it at higher price due to the lack of availability of data for an accurate creditworthiness assessment.[117] Open Finance would help by giving access to such non-traditional information and promote credit inclusion; however, other risks for the consumer simultaneously emerge.

[103] Ibid.
[104] European Payments Council, "List of members," https://bit.ly/3kDMwxc
[105] European Payments Council, 2022, "SEPA payment account access scheme: going beyond Open Banking," December 21, https://bit.ly/3JfXHG9
[106] Vezzoso (n 19) 4
[107] EC Expert Group on European Financial Data Space (2022)
[108] Open Banking Europe, 2020, "Open Banking: revolution or evolution? The Economist Intelligent Unit Limited, https://bit.ly/3ZACSdt
[109] Verbrauchzentrale, 2021, "Gutachten zur PSD2-Umsetzung in Deutschland," January 28, https://bit.ly/3ZeTnwi
[110] Innovation to offer compelling customer services would flourish, driving competition between firms, FCA (2021)
[111] di Pascalis (n 19) 417
[112] Institute of International Finance, 'Response to EBA Consultation Paper on EBA's Approach to FinTech' (Submission #53), https://bit.ly/3ZhC3H4
[113] FCA (2021) (n 9) 16
[114] Jeng (n 25) 41-42
[115] FCA (2021) (n 9) 3
[116] FCA (2021) (n 48) 33
[117] EC Expert Group on European Financial Data Space (2022) (n 4) 51 ff

6.3.3. CONSUMER DETRIMENT PERSPECTIVE

From another perspective, this innovation in the financial services industry comes with its own issues; chief among them are consumer concerns.[118]

Over-simplification of products for comparison purposes could lead to poor consumer outcomes. Furthermore, product comparisons focused solely on price could mean that scope and other value factors are not considered, which could result in consumers choosing unsuitable products; for example, risking under-insurance.[119] Another aspect is discrimination,[120] as big data and algorithms could exacerbate existing biases in society.

Creditworthiness checks might become a condition for consumer market participation more broadly, leading to exclusion of those consumers who cannot participate in Open Finance for lack of digital skills or who do not want to participate in Open Finance.[121]

Open Finance could potentially also worsen data holders' circumstances because firstly, customers can give more data due to being unable to understand the impact of their granting access and, therefore, not be adequately compensated; secondly, silent party data[122] will be visible to the data recipient, thus causing privacy loss; and finally, because companies with pricing power can use data they have received to implement price differentiation.[123] This can make consumers worse off, whether or not they have shared data with the user.[124]

6.3.4. SUCCESS FACTORS

There is a risk that Open Finance use cases will not work in practice, because individuals may be cautious of losing control over their data and, therefore, not participate in the Open Finance ecosystem.[125] Not only because of choice, but also lack of participation may be a consequence of digital illiteracy; for example, in older age groups. The issue of lack of trust in the sharing and reuse of personal financial data, and generally in Open Finance, is an important issue on its own and needs to be addressed.[126]

7. CONCLUSION: WHAT SHOULD FINANCIAL INSTITUTIONS DO?

Financial industry participants might want to adapt to these developments and, further, take advantage of the benefits that Open Finance promises to bring. There are several ways for incumbents to monetize Open Banking and Open Finance.

Firstly, investing in information technology (IT) is an essential recommendation. Otherwise, laggard financial institutions might find themselves unable to deliver the quality of service or price competitiveness necessary to maintain their market share and revenue streams.[127] Banks have gained substantial experience in the development of API catalogues[128] and can consider monetizing it, for example, by not only providing the main PSD2 APIs but also creating more advanced payment and non-payment APIs that they could charge for, hence creating new revenue opportunities.[129]

Another option for incumbents is to ponder around their relationship with fintechs, new firms in the financial services industry. They have the advantage of developing the latest technological solutions and be agile enough to implement them and reap the benefits. Financial institutions can consider partnerships, investments in, or acquisition of fintechs.[130] For example, the Financial Stability Board in a report on bigtech, envisaged banks partnering with fintechs.[131] This would help incumbents take advantage of the latest technology and allow the third parties to access the client base that they – as start-ups – lack but banks enjoy as the general public have more trust in them.[132]

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[118] Ibid 21 ff
[119] FCA (2021) (n 9) 16
[120] EC Expert Group on European Financial Data Space (2022) (n 4) 55-58, ff
[121] Vezzoso (n 19) 4
[122] When the data shared by one data holder provides the data user with information about other data holders. For example, when the TPPs access information on a payment, besides the information on the data subject, they also access information about the recipient or sender of that payment, which may reveal information about that other data subject.
[123] EC Expert Group on European Financial Data Space (2022) (n 4) 6
[124] DNB and AFM (n 17) 5
[125] EC Expert Group on European Financial Data Space (2022) (n 4) 74
[126] Ibid 14 ff, 21
[127] Moody's Investor's Service, 2018, "Innovative incumbents will thrive; laggards will be disrupted," April 25, https://bit.ly/41ByTiN
[128] DNB and AFM (n 17) 42, 43
[129] Guibaud, S., 2016, "How to develop a profitable customer-focused digital banking strategy: Open Banking services and developer-friendly APIs," 1(1) Journal of Digital Banking 6 12
[130] Ibid 6
[131] Financial Stability Board, 2019, "BigTech in finance: market developments and potential financial stability implications," December 9, https://bit.ly/3YdRezu
[132] Ibid.

Thirdly, financial institutions should consider how to help their customers stay in control of their data. They have a good starting position compared to other competitors, as they have large amounts of data and – most importantly – benefit from having the customers' trust.[133] Trust between the parties is the basis of a financial relationship.[134] A study from the Dutch Central Bank shows that Dutch consumers are not eager to share their transactions data, and if they do it is mostly with banks. They also trust their banks more than bigtechs when it concerns their privacy.[135] Hence, this means that incumbents are already powerful and it is more likely that they will receive more data as customers trust them more. They can use this trust and provide a helping hand to customers to safely navigate them through the coming Open Finance ecosystem.

All in all, when planning to launch a new business model, a firm should weigh their risk appetite, the reputational risk, which is higher for financial institutions as customers confide in them more, and the potential benefits. Financial institutions should think about the kinds of new services that will appeal to customers and how they can execute them properly (either by themselves internally or by integrating third-party services directly onto their platform) to maximize their chances of remaining the preferred personal finance management interface of their customers.[136] The digital economy will grow and data sharing will be central to it. Consequently, actors should consider obtaining and providing data that can add value to their clients, thus giving them a competitive advantage.

[133] The German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht), 2018, "Big data meets artificial intelligence," July 16, https://bit.ly/3mkrx39

[134] van Praag, E., 2022, "What should a bank know about us?" September 27, https://bit.ly/3EKA3if

[135] Dutch Central Bank (De Nederlandsche Bank), 2021, "Changing landscape, changing supervision: developments in the relationship between bigtechs and financial institutions," 18 Figure 3, https://bit.ly/3Zzi9ac

[136] Guibaud (n 129) 12

ESG

THE FUNDAMENTAL PROBLEM WITH ESG? CONFLICTING LETTERS[1]

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ABSTRACT

The term ESG – short for environmental, social, and governance – is routinely used to capture organizations' efforts to be more climate friendly and socially inclusive and to employ sound governance practices and processes. Although ESG criteria are well-meaning, the term lumps together concepts that are profoundly different on at least three dimensions: (1) the excludability of the benefits of an action, (2) the temporal gap between investment and the realization of its returns, and (3) the uncertainty surrounding any given action's outcome. In addition to these differences, E frequently goes head-to-head with S (both within and across countries). We propose a path forward, on the way investigating the solutions that businesses can explore in order to build a more sustainable future.

1. INTRODUCTION

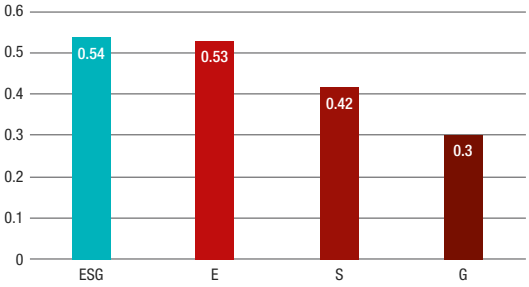
Environmental, social, and governance (ESG)[2] themes are one of the main topics of conversation in business circles. This popularity has been partly fueled by increasing concerns in society and by alarming reports from the scientific community, each putting further pressure on companies to act. By October 2022, more than 8,000 companies had joined United Nations Framework Convention on Climate Change's Race to Zero campaign, committing to take rigorous actions to limit the environmental impact of their activities. Currently ESG is mentioned on average nine times a quarter in earnings calls of S&P companies (compared to an average of at most one mention per quarter in 2017).[3] ESG ratings, which assess corporations against a variety of criteria, have proliferated. According to Bloomberg Intelligence, the value of investments in ESG assets could exceed U.S.$50 trillion by 2025.[4]

Although ESG criteria are well-meaning, they suffer from several flaws. There is little consensus on what ESG means and how it can be measured. This has two implications. On the one hand, this lack of transparency vis-à-vis measurement allows companies to engage in greenwashing.[5] On the other, this absence of uniformity with regard to measurement introduces noise to any attempt to rate companies. For instance, the average correlation between the overall ESG ratings of six prominent ratings providers is low (0.54), and values are even lower for individual criteria (0.53 for E, 0.42 for S, and 0.3 for G – see Figure 1). Research has shown that this lack of consensus between raters can be explained by their use of different survey items, scales, and weights, as well as by "rater-specific" bias.

We believe that a fundamental challenge underlying ESG is that it lumps together concepts that are profoundly different. In this paper we highlight the discord that exists between

[1] We are very grateful to Ioannis Ioannou for helpful discussions and to Dave Brooks for outstanding editorial support on previous versions of this manuscript.
[2] https://bit.ly/3WDTLCb
[3] https://econ.st/3HanddB
[4] https://bloom.bg/3XCwI1q
[5] https://econ.st/3XCWcGL; https://bloom.bg/3JcYQ1r

Figure 1: Average of correlations between Sustainalytics, RobecoSAM, Vigeo Eiris, Asset4, KLD, and MSCI's ESG ratings



Source: Data from Berg et al. (2022)[6]

E on the one hand and S/G on the other. Frequently, the improvement of one component, say E, leads to the worsening of another, say S, the result depending on the balance that the decision-maker strikes between potentially contradictory goals. We present solutions that businesses that wish to tackle environmental problems can explore.

We begin by examining the differences between the three components of ESG, in particular by contrasting the public-good characteristic of E with the private-good characteristic of S and G.

2. WHY E IS DIFFERENT FROM S AND G

Environmental considerations are fundamentally different from social and governance considerations in at least three dimensions. First, whether the benefits of a good or a service related to the individual components of ESG are excludable in consumption. Second, with regard to the time lag between an investment in one of these three components and the realization of the return on that investment. Third, regarding how uncertain any given action's outcome is.

2.1 Tragedy of the commons

In economics, a key dimension with which we classify a good is its excludability (i.e., can we exclude others from access and use?). This distinction has implications for how goods are produced, used, and managed. Fisheries is a typical example of a non-excludable resource. Given the migratory nature of most fish species and the fact that most fish stocks are in international waters, rules and property rights are hard to establish and enforce. Access to fish is thus mostly open and the rule of capture prevails. A negative consequence of this non-excludability is that no one has incentives to use the resource, fish, in a conservative manner. When such a resource is finite, a lack of sustainable management can lead to the tragedy of the commons: in this case, the rate of fishing exceeds the rate of reproduction, potentially leading to the extinction of the resource, the collapse of the fishing industry, and the reduction of food available to human populations as well as to other animals who rely on fish as a food source. Overfishing is one of the greatest threats facing the oceans.[7] Other resources clearly related to E, such as air, rivers, and forests, all suffer from a similar problem.

Because an organization cannot exclude its competitors from benefiting from its efforts with regard to E (e.g., efforts to reduce its carbon footprint) it has little incentive to pay the costs of those efforts. Most efforts with regard to S and G, meanwhile, are excludable. Improving the diversity of an organization's workforce (i.e., improving S), for example, leads to tangible benefits for that organization (e.g., positive effect on performance, creativity, and innovation, etc.), but not for its competitors. Likewise, a study by one of the authors of the present paper shows that better shareholder protection and accounting standards (i.e., improving G) lead to higher merger premia.[8]

2.2 Tragedy of the horizon

Another aspect of how E stands out from S and G is its temporal horizon. In the case of S and G, there is little temporal gap between an investment and its return. Take the example of a company offering its employees onsite daycare – something that comfortably belongs in the S dimension. Research has shown that such an initiative leads to numerous benefits, such as reduced absenteeism, improved employee retention, and stress reduction.[9] Investing in providing one's employees with onsite daycare quickly makes a concrete positive impact that will be reflected in the bottom line. For the G dimension as well, investments can generate returns that fall within the typical temporal horizon of political and top-management-team tenure. For instance, moving away from a "corruption

[6] Berg, F., J. Koelbel, and R. Roberto, 2022, "Aggregate confusion: the divergence of ESG Ratings," Review of Finance 26, 1315–1344
[7] https://reut.rs/3HzaX7R
[8] Bris, A., and C. Cabolis, 2008, "The value of investor protection: firm evidence from cross-border mergers," Review of Financial Studies 21:2, 605-648
[9] https://bit.ly/3wy3orK

culture" (measured as the shared values and beliefs of a firm's employees) is associated with a reduction in corporate misconduct (e.g., the receipt of kickbacks, accounting fraud, etc.).[10] Greater transparency in accounting also enables better decisions, ultimately producing rapid returns on investment.[11]

Unfortunately, the story is different for E. Following through on climate targets requires a long-term view. Scientists at the Intergovernmental Panel on Climate Change have raised the alarm: if we want to limit global warming, it is "now or never." In other words, actions should be taken now to ensure a livable future. But taking rigorous action (e.g., changing practices or acquiring technology) to limit environmental impact is costly. Most of these costs must be paid now, while the benefits are likely to materialize in a distant future. This gap between the timing of investment and its return has led to what Mark Carney has called the "tragedy of the horizon". Because the typical horizon of politicians and top management teams is just a few years (the average tenure of a CEO is seven years),[12] the temptation to leave the tough decisions to one's successor is high – and that is the tragedy.

2.3 Higher uncertainty of impact

The third reason why the E dimension is different from S and G is the higher uncertainty surrounding its impact. Pindyck (2022) suggests that "the extent of climate change and its impact on the economy and society more generally is far more uncertain than most people think."[13] For instance, climate sensitivity (the link between an increase in CO_2 levels in the atmosphere and an increase in temperature) and the likely economic and social effects of warming, rising sea levels, and other aspects of climate change are all highly uncertain. Higher uncertainty makes prediction, and thus business planning, much harder.

There is, meanwhile, much more clarity on the impact of the S and G dimensions. For instance, there are a large number of empirical studies that evaluate the impact of improved diversity, governance, and access to education. Reviews of the scientific literature have revealed the link between diversity and firm performance and the mechanism through which firms can extract benefits (or incur losses) from diversity.[14] A commitment to good corporate governance makes firms more attractive to investors and boosts performance.[15] Table 1 summarizes the above discussion.

These differences sometimes even manifest themselves in a completely opposing manner, by which improvement in one component results in decline in another.

Table 1: Why E is different from S and G – a summary

	E	S & G
TRAGEDY OF THE COMMONS	**Non-excludable** Everyone can benefit from a company's efforts to reduce pollution, even polluters.	**Can be excludable** Organizations can exclude their competitors from benefiting from their investments in S and G (e.g., onsite daycare for employees only; transparent accounting methods).
TRAGEDY OF THE HORIZON	**Short- versus long-term trade-off** The cost of reducing environmental impact must be paid now, while the benefits of such actions will mostly materialize in the long term.	**Little temporal gap** The rewards of investments in S and G are mostly reaped within the typical horizon of political and top-management-team tenure.
UNCERTAINTY OF IMPACT	**High uncertainty** The extent of climate change and its impact on the economy and society is highly uncertain.	**Strong business cases** There is a large academic literature documenting the positive impact of S and G policies in general practice (e.g., equity, diversity and inclusion, child labor, access to education, corruption, and business ethics).

[10] Xiaoding, L., 2016, "Corruption culture and corporate misconduct," Journal of Financial Economics 122:2, 307-327
[11] https://bit.ly/3R6lEki
[12] https://bit.ly/3RbPDIQ
[13] Pindyck, R. S., 2022, Climate future: averting and adapting to climate change, Oxford University Press
[14] Roberson, Q., O. Holmes, and J. L. Perry, 2016, "Transforming research on diversity and firm performance: a dynamic capabilities perspective," Academy of Management Annals 11:1, 189-216
[15] https://bit.ly/3JiFlVk

3. THE INTERNAL CONFLICTS BETWEEN E AND S/G

Compounding the fundamental differences between E, S, and G, they frequently go head-to-head with one another. The most salient of these conflicts is that between E and S, and we observe it both within and across countries.

3.1 Within countries: Social 1, Environmental 0

Initiatives to protect the environment (E) can have negative consequences for more vulnerable populations (S). Take the example of the yellow vests movement in France. The French government's decision to implement a carbon tax on fossil fuels triggered significant unrest in 2018. Although the tax was essentially "green" and aimed to incentivize consumers and producers to switch to more climate friendly alternatives, the French population did not find it socially acceptable. For many, the financial implications of this tax (it was to hit lower income groups hardest as a larger share of their disposable income is spent on energy, housing, and food) were more important than a green policy that would produce climate benefits in a distant future.[16] The unrest was further fueled by a sense of inequity, as consumers were paying €44/tCO_2 while industry would pay around €25/tCO_2 in the E.U. Emissions Trading System. A misunderstanding of the monetary impact on households' finances and of the environmental effectiveness of the measure has also been shown to have contributed to aversion to the carbon tax.[17] Overall, because this initially well-intended policy to improve E inadequately addressed the impact on S, the government was forced to suspend the tax, ultimately granting a win to S over E.

Local community resistance to renewable energy projects (e.g., wind turbines, solar farms, and dams) is another example of conflict between E and S, but this time relevant to the private sector. While renewable energy projects intend to reduce reliance on fossil fuels and lead to positive environmental impacts, they can also have unintended negative social consequences (e.g., displacement of local communities, loss of access to land and resources, and being harmful to wildlife). Unjust transition can be very costly for companies: protests and strikes can stall projects and tarnish a company's reputation, increase staff turnover, and create investor distrust.

3.2 Across countries: A just transition or no transition

As the examples from the previous section illustrate, efforts regarding E are unlikely to be successful unless there is a "just transition," where no one is disadvantaged by climate change action (hence, where efforts regarding E are not undertaken at the expense of low-income individuals or countries). This issue is at the heart of the loss and damage fund for vulnerable countries hit hard by climate disasters recently discussed at COP27.[18]

If companies do not want their E policies to be labeled antisocial, they need to understand the implications of these policies for S and engage in social dialogue. The wide acceptability of climate policies (at the local and the global level) will be crucial to ensuring success and continuity. The G of corporate governance can act as a referee in this E versus S battle, for instance by ensuring a fair redistribution of benefits and costs. In 2022, at a time of rising energy prices, some countries (including France) decided to freeze gas prices and cap electricity prices. Denmark, meanwhile, opted for a different approach. To maintain the incentive to switch to more climate-friendly energy alternatives (e.g., heat pumps or solar panels), the Danish government let prices rise but paid out a "heat cheque" to lower-income households to help them with their energy bills. This policy has led Danish households to significantly reduce their use of gas compared to the French.[19] Likewise, Unilever's commitment to Rainforest Alliance certification is an example of how it is possible to tackle E (in this case, sustainable tea production) without jeopardizing S (the social development of local communities).[20]

There are profound differences between E and S/G, and conflicts may arise between E and S both within and across countries. With this in mind, the next section explores a way that businesses might reconcile these differences.

[16] According to a survey sponsored by the French Haut Conseil pour le Climat, 91 percent of respondents acknowledged the urgency of acting against climate change but only 72 percent supported the "polluter pays" principle (including via a carbon tax, which would affect their purchasing power).
[17] Douenne, T., and A. Fabre, 2022, "Yellow vests, pessimistic beliefs, and carbon tax aversion," American Economic Journal: Economic Policy 14:1, 81–110
[18] https://bit.ly/3ZX1kqy
[19] https://econ.st/3kB0ijM
[20] https://bit.ly/3WBNqHv

4. UNPACK FOR REAL IMPACT

The discussion thus far has shown that the business case for companies' ESG efforts is very different for environmental (E) than it is for social (S) and governance (G) issues. While many companies enjoy rapid private net gains from addressing S- and G-related problems, they all too often do not benefit from costly environmental projects during the planning horizon of their senior management and board members. This is probably why many companies are making long-term emission reduction pledges (such as net zero targets by 2050) but often fall short on these promises in the short term (e.g., they refrain from making the costly investment necessary today if these promises are to be fulfilled). An analysis of the climate strategies of 25 major global companies reveals that the net zero commitments of the majority lack substance (they commit to reducing aggregate emissions by 40 percent on average instead of by 100 percent and report very few interim climate targets).[21]

In response to this fundamental difference between E, S, and G, companies need to acknowledge their differences, while making sure each does not conflict with the other. In the following, we propose four solutions that businesses can explore to tackle environmental problems.

4.1 Property rights

A classical approach to addressing the tragedy of the commons in economics is the assignment of private property rights for a common resource to a single economic agent. The underlying idea is that a single owner will manage the resource such that the owner's "best" actions coincide with those of a planner choosing a "socially optimal" policy for the use of the resource. As a result, the single owner can avoid the tragedy of the commons. Returning to the fisheries example we discussed earlier, assigning property rights for a lake to local fishermen would likely lead to a sustainable management of fish stocks. It would indeed be in their own interests to ensure that the catch rate does not exceed the rate of reproduction (as failure to do so would affect their future revenues significantly).

Emissions trading schemes (ETSs) (also known as the cap-and-trade system) are an example of the property rights approach. The government sets a maximum level of carbon emissions and allocates permits for each unit of emissions allowed. These permits can then be traded on a market. The idea underlying this system is that these permits will incentivize emitters to lower their emissions (for instance by investing in low-carbon technologies). One of the pioneers of the property rights approach, Ronald Coase, has noted that an efficient allocation of resources can be achieved under certain conditions (the Coase theorem). The most important of these are zero transaction costs and perfect information: the parties understand and agree on the issue at hand and are willing and able to talk to each other, and the implementation of any agreement can easily be monitored. Unfortunately, these conditions are usually not satisfied when dealing with a global problem such as climate change, which requires dialogue and agreement from hundreds of countries and hundreds of thousands of companies. For instance, there are 46 cap-and-trade systems across the world for CO_2 emissions and many are criticized for making too many allowances relative to their stated environmental ambitions.[22] For instance, the ETS in the E.U. only covers 45 percent of global E.U. emissions and has an equilibrium price that does not correspond to the present value of marginal climate damages generated by the corresponding emission. Hence, as a mechanism it does not sufficiently induce companies to internalize the social cost of their pollution.

The concept of property rights, therefore, does not offer a solution to the most pressing global environmental problem – the steady increase of greenhouse gas emissions and the global warming that results. Moreover, in cases where it could potentially apply (including fisheries, forestry, and rangelands), current scientific evidence on the effect of property rights regimes on environmental outcomes is insufficiently robust to draw firm conclusions (positive results are nevertheless more likely to be reported when the resource systems include monitoring and enforcement systems, when there is low resource use pressure, and when rights are clear, stable, and legitimate).[23]

[21] https://bit.ly/3WHSjil
[22] https://bit.ly/406NG4o
[23] Ojanen, M., W. Zhou, D. C. Miller, S. H. Nieto, B. Mshale, and G. Petrokofsky, 2017, "What are the environmental impacts of property rights regimes in forests, fisheries and rangelands?" Environmental Evidence 6:1, 1–23

4.2 Environmental regulation

Somewhat remarkably, in ESG-themed sessions in IMD's executive management programs many business leaders call for more environmental regulation. These managers recognize the tragedy of the commons. They argue that their fiduciary duties to their companies' owners do not allow them to unilaterally engage in more environmentally-friendly business practices: the resulting rise in costs and reduction in market share would hurt their companies' bottom line and would eventually cost them their jobs. At the same time, many business leaders would very much like to pursue greener business ideas even if they resulted in higher cost and smaller margins. But since they cannot move first, they want policymakers to force green policies upon them and their competitors.

Of course, emissions-intensive businesses in many countries are well versed in dealing with environmental regulation. For example, the U.S. Clean Air Act of 1963 (with numerous later amendments) and the 2008 E.U. directive 2008/50/EC on cleaner air for Europe set air quality standards that required many companies to make costly investments in order to reduce their emissions. It does not take a crystal ball to predict that in the face of ever-growing greenhouse gas emissions and further global warming many regulators will continue to impose ever higher environmental standards in their jurisdictions.

An extreme form of regulation may occur in the face of severe environmental degradation. As a result of warming waters in the Bering Sea, the numbers of Alaskan snow crabs dropped by more than 80 percent between 2018 and 2022. In October 2022 – for the first time in its history – the Alaska Department of Fish and Game forbade the harvesting of snow crabs. In addition, and for the second year running, the harvesting of red king crabs was also halted. These regulatory measures were a big blow to the industry concerned, which as recently as 2016 harvested snow and red king crabs valued at more than Can $250 million (approximately U.S.$187 million).

If the environmental conditions for crabs in the Bering Sea do not improve – and this appears likely at the time of writing – then the industry will not survive. Not only will some crabbing companies go out of business, many of the industry's assets will become stranded.[24]

Clearly, business leaders want neither environmental disasters that eliminate business-critical resources nor regulation that forces the outright closure of their businesses. Meanwhile, many regulators prefer – based on economic principles – systems of charges. For instance, even the mere threat of carbon regulation may push organizations to act. A 2020 report from the World Bank states, "companies that perceive higher risk from external carbon regulations are over five times more likely to implement an internal carbon price."[25] Yet, instruments such as the carbon tax have suffered from a "social acceptability problem" (including that of the yellow vests in France), as discussed in Section 2 above. A recent example of a company engaging in environmental regulation can be found in BP and the U.S. state of Washington. Although the company initially spent large sums of money advocating against the imposition of a carbon tax, it supported a state bill for an overall cap on carbon emissions.[26]

4.3 Technological innovation

Technology is routinely cited as a solution to global warming. Such technological innovations usually belong to one of two strategies – mitigation and adaptation. Mitigation involves finding ways to cut our carbon emissions, while adaptation involves taking measures to better cope with climate change.

While many cleantech innovations – including air carbon capture, green hydrogen, nuclear fusion, and sustainable aviation fuels – are still in the development phase, renewable energies are a mitigation technology that is already available and ready to be deployed. Several issues, though, have prevented mass implementation. The cost of these technologies is an important hurdle. The first wave of cleantech (now referred to as cleantech 1.0, which started around 2006, at the same time as Al Gore's documentary "An inconvenient truth" appeared) was diminished by the then availability of cheap fossil fuels. Scaling (in terms of the infrastructure needed and the regulatory hurdles to the construction of new renewable power plants) has also been proven to be critical if we want to increase our reliance on renewables. Although the energy crisis sparked by the war in Ukraine should be seen as an opportunity to switch to renewables, uncertainty around the war's implications has resulted in much hesitation from market participants. The adoption of mitigation technologies can also be impeded by market competitiveness issues. A

[24] https://bit.ly/3Y1yuU8
[25] https://bit.ly/3Y2t5wj
[26] https://bit.ly/3WG8LzH

representative of one airline told one of the coauthors of the present paper that the company had developed a sustainable fuel but could not use it because doing so would put the company at a cost disadvantage compared to its fossil fuel-using competitors. In other words, until everyone is forced to play by the same rules (for example, due to the introduction and enforcement of international regulations) the company will not implement the new technology it has developed.

Policymakers initially focused on mitigation. Our interactions with hundreds of corporate leaders reveal that many companies are also under pressure from the public and investors to pursue mitigation. Thus, past corporate and policy efforts have both focused almost exclusively on mitigation measures. This must change, as it is now clear that both adaptation and mitigation are needed and should be pursued in parallel. If we want companies and consumers to be more resilient to climate variability, adaptation will be key. For instance, Unilever has implemented mitigation measures to reduce the volume of water used in its manufacturing processes (in particular in plants located in water-stressed sites) and invested in adaptation through the development of "water-smart products," which require less water than traditional products. These include hair conditioners that do not need to be rinsed off, dry wash sprays to refresh clothes (thus reducing washing frequency), and a washing detergent bar that needs less water for rinsing.[27] These and other water-smart products can be interpreted as both mitigation (they require less water and energy today) and adaptation (they are suitable for a future with less water and thus preserve the company's market share and profits). Water resilience is seen as one of the key areas for adaptation in Africa, as investment in water management and water reuse technologies can help the continent adapt to the unpredictability of droughts and higher temperatures.[28] For instance, investments in desalination stations and wastewater recycling plants by global fertilizer producer the OCP Group has reduced water pollution and improved both the water resilience of the company's production systems and the livelihoods of communities in North Africa (hence also having a positive impact on the S dimension).[29] Building redundancy and improving emergency responses is another approach to adapting to climate change. The French utility company EDF has invested in adapting existing facilities to make them less sensitive to climatic conditions and more resilient to extremes, including heatwaves, rising sea levels, and drought.[30]

In the future, humanity not only needs to strengthen its mitigation efforts, it also needs to increase the attention it gives to adaptation. And as COP26 President Alok Sharma put it: "The annual adaptation costs are expected to reach at least U.S.$ 140 billion a year by 2030. And frankly, public finance is not going to be enough. We are going to need private finance."

4.4 Think global, act local, work together

Climate change is a global problem that will not be solved without business, government, and society working together toward a common goal. Embracing partnerships is thus another way forward.

Businesses can collaborate with their peers to establish some baseline rule or practice (within the limits of antitrust law).[31] For instance, the Consumer Goods Forum brought the world's largest consumer goods retailers and manufacturers together to develop sustainable packaging.[32] Likewise, companies in the fashion and textile industry created The Fashion Pact, an initiative that includes common core goals on stopping global warming, restoring biodiversity, and protecting the oceans. One of its targets is to remove single-use plastics from B2C by 2025 and from B2B by 2030.[33] Such partnerships can improve the resilience of entire industries, and allow companies to take bolder action and to scale their positive environmental impact.

Working with governments, NGOs, and civil society can also help companies improve their environmental performance. The collaboration between Swiss Re and Oxfam to develop insurance against climate change risks for Ethiopian farmers is one example of this.[34] The complementarities between Oxfam's knowledge of Ethiopia and long presence in the country and Swiss Re's expertise in insurance were key to the success of the partnership. Collaboration began with a pilot project in one village but rapidly expanded to include three other countries in West Africa and the development of other insurance products. It has since been rebranded the R4 Rural Resilience Initiative.[35]

[27] https://bit.ly/3JimOs7
[28] https://bit.ly/3DhjYQo
[29] https://bit.ly/3wwCwbr
[30] https://bit.ly/3Hw4dYm
[31] https://bit.ly/3wwzVhL
[32] https://bit.ly/3j98eZa
[33] https://bit.ly/3Dh1W0y
[34] https://bit.ly/3j5Bgce
[35] https://bit.ly/3XDzbmN

5. CONCLUSION

Many decision-makers use the term ESG without giving much thought to the interdependence of the three letters. It is not because certain criteria of E, S, and G overlap that each should necessarily be bound together. The economic forces operating behind E are different from those operating behind S and G. By focusing on ESG in the aggregate, we may hit the target but miss the point. While acknowledging the distinctions between E, S, and G, it is important to note that we do not advocate for siloed solutions that fail to consider the interconnected nature of these issues.

The first step in solving a problem is acknowledging its existence. Awareness is, therefore, of paramount importance to our work toward a solution. The way the term ESG became part of our daily vocabulary is both fascinating and intriguing. As soon as researchers started peeling off the obvious first level concepts, the complexity of the relationship between the three variables became obvious. It is time to explore the differences and, most importantly, the complementarities of the components of ESG if we are to achieve a sustainable outcome. Maintaining a dialogue with governmental authorities and other companies in and across industries will also be crucial to the success of this endeavor.

TRANSITIONING TO A LOW CARBON ECONOMY – (RE)INSURING CLIMATE CHANGE AND POTENTIAL BUSINESS RISKS AND OPPORTUNITIES

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ABSTRACT

(Re)insuring the risks related to a changing climate is a challenge and an opportunity – new risks are being created and existing risks are being amplified. As businesses seek to understand, and play an active role in mitigating, the effects of climate change they often focus on the physical risks associated with the changing environment. However, a key part of the business risk can come from the substantive change in consumer behavior, technological advances, and the change in operations needed of almost every company globally – the "transition risk". As the world works to decouple the link between the continuous need for economic growth and increasing emissions, we consider the pathway to manage that change.

1. INTRODUCTION

The transition to a lower carbon economy is a challenge and an opportunity for businesses now and for generations to come. As new risks are being created and existing risks are being amplified, we believe companies that set themselves up to understand and play an active role in the transition will perform better than those that don't.

Society currently focuses on physical risk, but a key part of the risk probably comes from the substantive change in consumer behavior, technological advances, and the change in operations of almost every company globally – what we call "transition risk" – as the world works to decouple the link between the need for economic growth and increasing emissions.

At AXA XL, the commercial P&C and specialty risk division of AXA Group, we have established expertise in traditional risk, but we need to understand the inherent volatility that will accompany this transition, which may manifest in geopolitical tension, mass migration, social unrest and polarization, increased income inequality, food shortages, and energy insecurity.

Companies across all sectors and geographies are at different stages in their journey to help in the fight against climate change. For the (re)insurance industry, working with clients to understand the risks and opportunities presented by the transition is both a challenge and an imperative.

2. PHYSICAL RISK – (RE)INSURING PHYSICAL ASSETS

Through the (re)insurance business that we underwrite, and the exposure that we have to natural catastrophes, (re)insurers are acutely aware of the physical risks associated with climate change; the effects of changes in the chronic and acute hazards that the world faces. To date, the ways that the impact of these risks can be modeled, mitigated, managed, and transferred has dominated much of the industry discussion.

When thinking about the physical risks associated with climate change, the (re)insurance industry considers all elements of the risk equation: hazard, exposure, and vulnerability,[1] where the "hazard" is the potentially destructive phenomenon, the "exposure" is the location and assets that could be affected by that hazard, and the "vulnerability" is the extent to which those assets are able to withstand the hazard.

In recent years, the volatility in the frequency and severity of extreme weather events, combined with exposure to growth driven by enlarged populations, urbanization, and inflation, has served to underscore the physical impact of climate change, resulting in large economic losses and widespread damage to property and infrastructure, as well as devastating effects on communities around the world, often in developing economies or vulnerable societal groups.

The fourth costliest year to date for natural catastrophes occurred in 2021, when the world was also grappling with the effects of the COVID-19 pandemic. Insured losses from natural catastrophes topped U.S.$105 bln in 2021.[2]

Notably, as well as major events such as hurricanes, the physical and economic impact of perils such as flooding or wildfire is also increasing, with several such events topping U.S.$10 bln in terms of losses in recent years. Losses caused by flooding, for example, are both frequent and severe; in 2021, there were more than 50 severe flood events globally, resulting in more than U.S.$80 bln of economic losses, of which approximately U.S.$20 bln were insured.[3]

2.1 The protection gap

As well as having a significant impact on (re)insurers, these physical losses highlight the so-called "protection gap" – the gap between economic losses caused by events and the proportion of those losses that are insured. This is a major focus for the (re)insurance industry, which has a vital role to play not only in assisting our clients in understanding their own exposure and resilience to hazards, and paying claims when events occur, but also in helping more vulnerable communities improve their resilience to natural catastrophe events.

A study by the Cambridge Centre for Risk Studies (CCRS) commissioned by AXA XL and published in 2020 looked at the impact of insurance penetration on the speed and quality of recovery for more than 100 events over a 30-year period.[4] In general, the higher the insurance penetration, the faster and better the recovery, with most high-insurance-penetration countries recovering to pre-disaster levels within 12 months and low-insurance-penetration countries[5] recovering more slowly, and in a number of cases never returning to pre-disaster levels. AXA XL funded an open source online Disaster Recovery Hub developed by Cambridge that gives a lot more detail on the selected items used to classify recovery and highlight the speed to recovery (cambridgebusinessriskhub.com).[6]

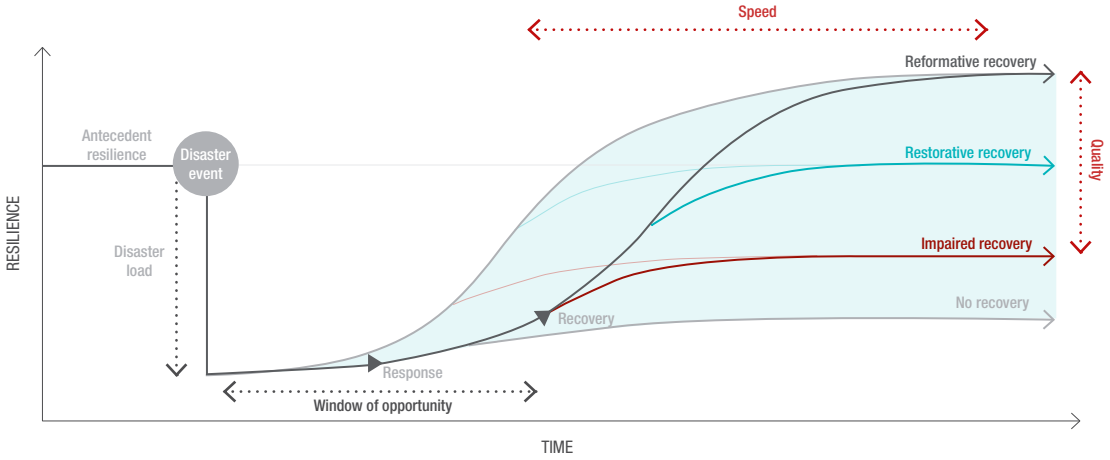
(Re)insurance is uniquely positioned to deliver non-contingent funding (no debt to pay back) immediately after an event, allowing both swift and reformative recovery – "Build Back Better". However, the gap between insured and economic loss remains high and the recent Turkish/Syrian earthquake will likely be another tragic example of this protection gap (albeit, even if the cause is not a climate related issue). Moody's RMS recently estimated the economic loss from the earthquake to be in excess of U.S.$25 bln and the insured loss to be greater than U.S.$5bln (a gap of 80 percent).[7] The (re)insurance industry, in partnership with governments or international financial institutions, such as the World Bank, can help close the gap, provide non-contingent funding, and help promote resiliency for future disasters – "Build Better Before".

2.2 Transition risk: Transitioning to a low carbon economy – risks and opportunities

The impacts of a changing climate, driven by the increasing concentration of greenhouse gases (GHGs), manifest in the impacts we see on the physical risk described above. The challenge of climate change is in managing and reducing these emissions; the world's response means that industries of all types around the globe are in transition. With that transition comes opportunity but also risk; as companies transition to a lower carbon economy, they change the way they operate, the way they produce and transport goods, the energy they use, and the way they interact with their customers and other stakeholders. All of these changes – driven through technology, consumer behavior, and regulation – will have implications for their risk profiles now and into the future.

[1] https://bit.ly/3lQaVl5
[2] https://bit.ly/3Jg6rM8
[3] https://bit.ly/3Zl5TnH
[4] https://bit.ly/3ZFy1b8
[5] Insurance penetration was assessed as premium as a percentage of GDP.
[6] https://bit.ly/3ZnHVyw
[7] https://bit.ly/3ZpYOsb

Figure 1: Process of disaster recovery



Against the backdrop of a changing and increasingly volatile climate, companies are evolving to try to address this challenge. There are several drivers prompting them to do so, which act in different ways on different companies, and eliciting differing responses depending on factors such as industry and geographic location. All of these changes create new risks and new opportunities.

The major drivers of the transition are changes in policy, advances in technology, and changes in consumer behavior. These affect companies to a lesser or greater extent for reasons related to their sector, geographic scope, shareholder base, customers, and so on. It is also important to understand that companies are at different stages of their transition journey – a challenge for risk professionals.

By and large, public sentiment appears to support the notion of policy changes and regulatory intervention to help drive the transition to a low carbon global economy. This is, however, currently variable across regions as well as between different industry sectors.

Politicians, though, have publicly made commitments not only to reduce carbon emissions and aim for net-zero by 2050, but also to put in place policy instruments to effect this change. In the U.S., for example, the Inflation Reduction Act of 2022 (IRA) pledges to create loans to try to curb emissions and increase investment in clean energy and energy innovation.[8] Policy moves like these send a clear message to businesses around the world that changing strategy to become more carbon-friendly is not just a good thing to do, it is imperative.

Questions arise, however, about the way that funding will flow through the economy. How can fair distribution be ensured? Can a just transition, whereby vulnerable and developing economies are not penalized, but brought along on this transition, be achieved?

Regulators too are increasingly focused on how investments are made and the disclosures companies make about their net-zero strategies. Collectively, the (re)insurance industry is one of the largest investors in the world, and individual (re) insurers have not only potential regulatory and shareholder pressure but ethical obligations too when determining how and where they invest. The Net-Zero Asset Owners Alliance (NZAOA), convened by the United Nations, is a member-led initiative of institutional investors committed to transitioning their investment portfolio to net-zero GHG emissions by 2050 – consistent with a maximum temperature increase of 1.5 degrees Celsius.[9] (Re)insurers, as one of the biggest investors globally, have a role to play in contributing to these commitments.

Alongside the NZAOA, the Net-Zero Insurance Alliance (NZIA), more recently convened in 2021 by the United Nations, supports its members in the journey to de-carbonizing their underwriting portfolios. This recognizes the role that (re) insurers have as enablers of economic activity in the global economy.[10] The NZIA's first target-setting protocol requires

[8] https://bit.ly/3JimZ6u
[9] https://bit.ly/3ZqnDnQ
[10] https://bit.ly/3Jin2iG

members to set and disclose initial targets from a variety of options; decarbonization, engagement, and actions to support the transition for (re)insurance portfolios by July 2023, which is an important milestone in our own industry's transition journey.

2.3 Liability risks – allegations of greenwashing and increasing litigation

Policymakers and activists are paying ever closer attention to the climate behaviors, policies, and commitments of companies and the sectors in which they operate. There has been an uptick in litigation involving people and communities who attest that their homes and livelihoods are being adversely affected by a changing climate and who are trying to hold companies to account for these impacts driven by their activities and their emissions. A landmark case involving a Peruvian farmer and his community and an energy provider is currently making its way through the courts.[11]

As well as legal and policy action to address the physical impacts associated with climate change, activists are seeking to hold companies to account for the pledges they make. There are now legal precedents for claims of so-called greenwashing, illustrating how companies need to ensure they are meeting the promises they make.

Policymakers are requiring ever more information from companies about their climate performance, transition plans, and net-zero commitments. In the U.K., for example, large companies have since 2022 been required to make climate disclosures in accordance with the Taskforce on Climate-Related Financial Disclosures (TCFD).[12]

In some instances, the legal cases and policies around climate performance are not necessarily motivated by a desire for financial redress, rather they are about holding companies to account for their actions and commitments and trying to effect change.

A major risk here for companies is around their reputations. Accusations of greenwashing or a failure to meet targets can be hugely damaging to a company's brand.

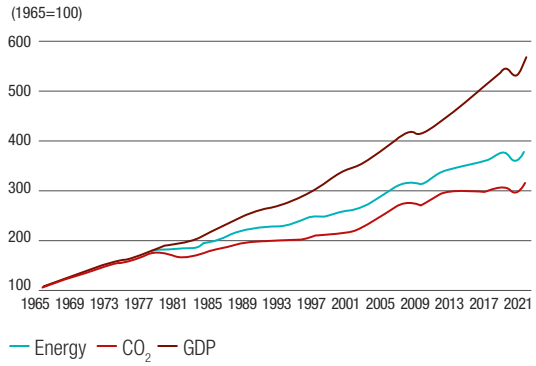
There is a need to be aware of this growing activism, the regulatory reporting requirements, and accountability of a businesses' actions. Liability cases that are on the rise globally bring with them potential impacts to reputation and brand if the commitments and disclosures that have been made cannot be supported.

3. BREAKING THE LINK BETWEEN ECONOMIC GROWTH AND INCREASING EMISSIONS

Moving away from (re)insurance and considering the economy as a whole, governments can look at managing and reducing emissions and break the link between economic growth and emission levels.[13] Academics have pointed to four main levers to achieving this: through managing population growth, producing energy more efficiently, generating economic output more efficiently, and consuming less.

In terms of producing both energy and economic output more efficiently, technology has a major role to play. As an economy, we need to be able to demonstrate that we can create a sustainable society – while reducing emissions. Figure 2 presents the relationship between GDP growth, energy, and emissions.[14] It is evident that there is a strong relationship between all three. In order to achieve net-zero ambitions and continue to generate GDP growth, this relationship needs to be decoupled: we need to see the energy and emission lines flatten out (or reduce) to show how we are becoming more efficient as a society whilst the GDP line continues to grow. This is where expectations of energy efficiency and technology will contribute towards meeting these objectives. If this does not happen, we need to contemplate the other levers around volume of consumption, which is likely to be driven by population size.

Figure 2: Emissions, energy, and GDP



Source: Fitch Ratings, BP, IEA, EIA

[11] https://bit.ly/3ZKUUds
[12] https://bit.ly/3ZqiGLK
[13] https://bit.ly/3yd9LSb
[14] https://bit.ly/3F1I4PP

There is both a demand and a desire to increase the efficiency of energy production, driven in no small part by the public net-zero commitments made by governments and companies operating in that sector. (Re)insurers have many years of experience working with energy clients to understand their risks and the technologies they use. The energy transition is a continuation of that journey. There are, however, challenges here, including the need for new technology and the speed with which society needs to scale this implementation. The availability of materials, the need to develop and repurpose infrastructure, and the need to find new ways to store and distribute the energy produced, all come with risks.

While this technology develops, and the demand for energy continues to grow, especially within the developing world, society needs to make sure that all the advances that have been made over the past 100 years are not reversed. We need to ensure that this technology and investment happens globally, reinforcing a just transition for all.

Likewise, the need for other goods and services to be produced more efficiently creates both opportunities and risks. Underwriters are working with risk engineers and risk managers to understand the nuances around topics such as carbon capture and storage, the electrification of vehicles, battery storage and power grids, and the production of materials like steel and cement with newer low-emission processes.

Companies across all sectors are aware of the need to become more efficient in their production, a need fueled at the macro level by policy and regulation and at the more micro level by the demands and priorities of stakeholders, including shareholders, employees and, crucially, customers.

Consumer behaviors are changing. Now more than ever before buyers want to know where the goods they are purchasing are from, the conditions in which they were produced, and how they have been packaged and transported. This is particularly noticeable for certain sectors, such as food and beverage and transportation.

Given that consumers are also voters – as well as investors, employees, and even activists – policy will, to an extent, be driven by these changes in consumer habits. Some studies have found that consumers are willing to pay more for a brand they deem environmentally responsible and that good corporate behavior is a driver in their purchasing decisions – so there is a business opportunity for companies that make changes to operate more sustainability.[15]

Consumers' altering behaviors will continue to bring about change, but consumer behavior can also be influenced by the behavior of a company's supply chain; get this right and there is a real opportunity for companies to create meaningful change.

3.1 How do individual businesses accomplish the transition, and what is the role of (re)insurance?

All industries are somewhere on the road to transition. It might not be a linear journey, and companies are at differing stages, but the need and the will to transition the global economy are gathering pace. The question then becomes: what does this mean for individual businesses? How can companies not only play their part in the global shift but achieve their own transition goals and make this work for their customers, employees, and supply chain?

In a sense, this is a large change-management exercise. Our own experience as a (re)insurer and as a part of a large, global financial services group, may be useful here in trying to assess how this change can be set in motion.

When we were devising our own climate strategy, we took into account the fact that we are an investor, a (re)insurer, and a company/employer that is part of the financial system and the global economy.

Across these three areas of activity, AXA has seven targets. As an investor, we pledge to play our part in reducing the carbon footprint of the AXA Group's investment portfolio by 20 percent by 2025 and to help increase AXA's green investments to reach €26 bln by 2023.[16]

Within AXA XL, we recently launched our latest sustainability strategy: Sustainability takes root; why sustainable business means better business.[17] Following interviews with key stakeholders to define the ESG issues most material to our business, we created a strategy to put sustainability at the center of what we do.

[15] https://bit.ly/3mn13Oh
[16] https://bit.ly/3YjlJEp
[17] https://bit.ly/3muPuVx

As a (re)insurer, we have committed to a green business target aimed at increasing the share of business we write supporting climate adaptation, climate mitigation, the circular economy, and the prevention of biodiversity loss. We are also committed to providing inclusive insurance protection to more vulnerable populations.

We are committed to leading the transformation by taking people and teams with us on this transition journey through training our colleagues on climate issues by 2023; embedding climate risk as part of our business strategy as well as by reducing the carbon footprint of our own operations.

As a founding member, and current chair, of the aforementioned NZIA, we will also be looking to transition our underwriting portfolio to net-zero in line with the NZIA commitments.

The final commitment is a general performance indicator around maintaining AXA's position in the Dow Jones Sustainability rating Index, recognizing the goal of maintaining AXA's leadership position in this space.

With any strategy, and particularly a climate strategy, embedding it is key; the people with whom you work, trade, and invest need to be on board. There needs to be key performance indicators to benchmark successes and make targets real.

This is a process, of course. The transition will not be linear, rather it will be jagged and disorderly. We tend to think in straight lines and envisage an orderly transition, but we can expect – and maybe already are seeing – increasing geopolitical tensions, mass migration, social unrest and polarization, food shortages, and energy insecurity. Climate change strategies must, therefore, evolve and flex as we all move along the road to transition and consider the inequities already inherent, which may be amplified by the transition.

(Re)insurers have always played a vital role in enabling economic activity, from ships delivering cargo to space craft sending satellites into orbit – and everything in between.

As technology develops to enable the transition and meet evolving consumer preferences, (re)insurance must have a seat at the table. We can use our risk expertise to help companies develop and then scale these new technologies. And, uniquely, as we have previously alluded, (re)insurance can achieve this with both sides of the balance sheet; with the products and solutions we provide and with the investments and partnerships we make.

4. CONCLUSION: TOWARDS A GREENER FUTURE

The risks and opportunities inherent in the transition to a net-zero carbon economy will vary in magnitude and complexity. These risks and opportunities will be dependent on the emissions pathways that we choose, driven by our actions and characterized according to the so-called shared socioeconomic pathways (SSPs).[18] SSPs examine how the actions of societies and geographies will impact emission pathways up to 2100. SSPs form an important input into models that explore how societal choices will affect greenhouse gas emissions and feed into the climate policies of the Intergovernmental Panel on Climate Change (IPCC).

The speed and impact of changes may vary by geographic region and industry; the risk landscape is changing and the transition will not be straightforward. Business owners, managers, and the (re) insurance industry need to be aware of this evolving risk landscape and the impacts on their own businesses and on the societies in which they operate. They need to adapt operating models and consider multiple scenarios in an uncertain environment.

To work with clients to understand and manage these risks – and to help them take advantage of the opportunities – (re) insurers will need even more data, more detailed information, a continuing dialogue, and, of course, imagination. The key question again is: what does climate change mean for your business? What are the risks you will face going forward, and how will they evolve? What are the opportunities of the transition to a lower carbon economy? And how will you develop your business to respond to these potential risks and opportunities now and into the future?

We are all learning about the transition, all of the time. (Re) insurers will use their risk expertise to try to understand this changing landscape, its nuances and complexities, while continuing to facilitate economic activity and support companies on this journey.

[18] https://bit.ly/3F3GXPF

PRUDENTIAL TREATMENT OF ESG RISK

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ABSTRACT

In May 2022, the European Banking Authority (EBA) published a discussion paper with the aim of evaluating the appropriateness of the current prudential framework to accurately assess the rising risks resulting from environmental issues. A key question the discussion paper seeks to address is: does the current Pillar 1 framework adequately cover new risks, such as environmental risk, or should they be subjected to a new dedicated treatment? In this article, we present the key concepts of environmental risk and examine the EBA's analysis of the interaction between environmental risks and the traditional prudential risk categories – such as credit, market, operational, and concentration risks – in order to determine whether the tools used for the latter could be modified to manage the former. We further outline the key actions firms need to take to prepare themselves for a potentially binding Pillar 1 treatment, while awaiting further regulatory guidance.

1. INTRODUCTION

In May 2022, the European Banking Authority (EBA) published a discussion paper[1] with the aim of evaluating whether the current Pillar 1 framework adequately covers new risks, such as environmental risk, or whether they should be subjected to a dedicated treatment. This article presents the key concepts of environmental risk and examines the EBA's analysis of the interaction between environmental risks and the traditional prudential risk categories – such as credit, market, operational, and concentration – in order to determine whether the tools used for the latter could be modified to manage the former.

1.1 Environmental risk – overview and key challenges

Environmental risks are by nature multidimensional, non-linear, uncertain, and forward-looking. Despite the uncertainties, environmental risks could be linked to the classic categories of financial risk through a range of transmission channels (Figure 1), and as such, they should not be considered as a separate category of financial risks.

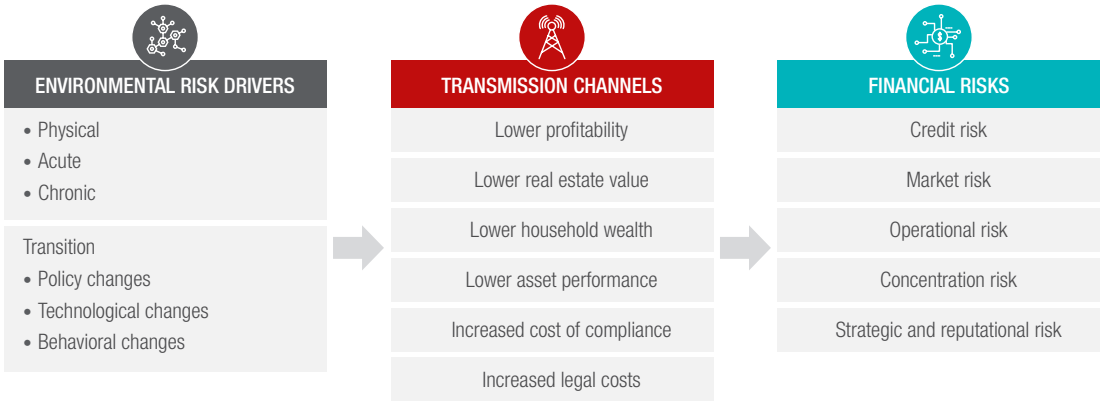
The main challenges in measuring environmental risks revolve around three major axes:

- **Data availability:** the risk classification and analysis are limited by the lack of data that is relevant, consistent, of high quality, and sufficiently granular. With time, data will become less of an issue as the E.U. taxonomy, the Corporate Sustainability Reporting Directive (CSRD), and other disclosure requirements are rolled out.
- **Estimation of losses:** the prudential framework is calibrated based on historical data, which is unlikely to fully reflect environmental risks, given the lack of sufficient or comparable information about losses due to climate-related events or transition trends.
- **Nature of most environmental risks:** there is a mismatch between the time horizon of the Pillar 1 framework (designed to capture the possible extent of cyclical economic fluctuations) and the long-term time horizon over which environmental risks are likely to fully materialize.

One of the key messages from the discussion paper is that to make the necessary adaptations to capture environmental risks within the structure of the prudential framework, it is important to keep in mind that the framework's sole objective is to strengthen institutions' resilience to all risks. The purpose of the prudential framework should not be to incentivize

[1] https://bit.ly/3D1i5XE

Figure 1: How environmental risks affect financial risks through various (non-exhaustive) transmission channels



Source: EBA, 2022, "The role of environmental risks in the prudential framework," EBA discussion paper no. 2022/02

Figure 2: How to integrate environmental risks within the standardized approach of the credit risk framework

	TOOL	ACTIONABILITY	LIMITATIONS / POTENTIAL UPSIDE
STANDARDIZED APPROACH	**External credit assessment (ECA)** – ESG factors are one of the criteria taken into consideration for the rating assessment	+	• Ambiguity over the methodology and analysis adopted by credit rating agencies (CRA) to capture environmental factors • Covering environmental aspects is not compulsory under CRA regulation leading to discrepancies • Ongoing initiatives to enhance environmental disclosure requirements and ensure transparency on ESG rating methodologies
	Credit risk mitigation (CRM) techniques – ESG factors to be captured via collaterals' valuation particularly for **exposures secured by immovable properties** whose valuation can be impacted by physical or transition risks	++	• Valuation methodologies and monitoring do not explicitly integrate environmental aspects • CRR3 proposal clarifies that energy efficiency improvements unequivocally increase the property value • Valuations will get better over time with data, standards and methodologies improvements
	Prescribed risk weights (focus on corporate and retail exposures) – ESG factors to be captured via a specific sub-exposure class. Any adjustment to the framework should be risk-based	-	• Lack of empirical evidence on risk differentials. • Adaptation of risk weight for retail exposures would be particularly challenging • Collecting further evidence (historical data, empirical research, etc.) on the risk differentials to be applied

- Very complex and/or long-term perspective
+ Complex and/or mid- to long-term perspective
++ Not complex and/or short-term perspective

institutions to redirect capital and lending, as this could negatively impact the framework's efficiency and undermine its credibility.

For that reason, the EBA adopted a risk-based approach to assess whether prudential requirements adequately reflect environmental risks and ultimately support institutions' resilience to such risks. It must also be noted that Pillar 1 is only one component of the prudential framework, which relies on the Pillar 2 entity-specific own-fund requirements, macroprudential capital buffers, and provision requirements from the accounting framework.

2. RELATIONSHIP BETWEEN ENVIRONMENTAL AND TRADITIONAL RISKS

Focusing on credit and market risks, the EBA discussion paper examines the different mechanisms (depending on whether the standard or internal model approach is used) through which environmental risk drivers could be captured within the current Pillar 1 framework and what adjustments may be necessary. Below, we examine each risk type in turn, summarizing the suitability of tools that could be activated to integrate environmental risk.

2.1 Credit risk

Credit risk is by far the most significant risk-weighted asset (RWA) component of the prudential framework. Mechanisms to integrate environmental risks into the framework depend on whether institutions apply the standardized or internal ratings-based approach.

The standardized approach is prescriptive and more simplified, thus any adjustments to integrate environmental risk drivers should avoid undue complexity. The EBA recognizes that environmental risks should be better reflected in the framework, which may be achieved through the following existing tools: external credit assessment, credit risk mitigation (collateral valuation), and prescribed risk weights (Figure 2).

Even if some modifications might need to be applied to credit risk mitigation techniques, they may be the least complex tool to use, as environmental risks may already be captured by collateral valuation.

External credit assessment is more of a mid- to long-term tool, as some improvements are necessary to guarantee the robustness and transparency of credit assessments. In its response to the EBA's discussion paper, the European Banking Federation (EBF)[2] suggested that improvements in ESG-related data quality is a priority. Improved data quality would allow credit rating agencies (CRAs) to better challenge their credit risk analyses, which in turn could lead to enhanced due diligence. Enhanced and robust methodologies should also prevent institutions from cherry-picking the most favourable credit rating, which may be based on less sound guidelines (where ESG factors are not adequately taken into account).

Figure 3: How to integrate environmental risks within the "internal rating-based" approach of the credit risk framework

	TOOL	ACTIONABILITY	LIMITATIONS / POTENTIAL UPSIDE
INTERNAL RATINGS-BASED APPROACH	Adding additional risk drivers to the **risk differentiation** step	−	• Model performance could be hindered if environmental risks not materialized yet via historical credit losses are integrated • Future defaults/losses may not be predicted by models entirely based on historical data • Ad-hoc conservatism doesn't easily tackle the uncertainty on risk differentiation as it could impede homogeneity within grades and pools • Model's design allows to capture environmental risks through expert-based qualitative variables as the IRB model is not based exclusively on optimization of quantitative performance metrics
	Adding environmental considerations to the **risk quantification** step through add-ons or margin of conservatism (due to data/ model deficiencies)	+	• Calibration of MoC usually based on existing data • Any adjustment will apply to all exposures in a grade or pool including those not impacted by environmental drivers • Introduction of "calibration segments": separation of risk quantification between exposures impacted by environmental risk drivers and unimpacted exposures.
	Applying further adjustments either as ad-hoc conservatism or as overrides during the **rating application** step	−	• Overrides are not intended to be a substitute for the model in general • Overrides do not require changes in the risk quantification and could be used as a temporary tool to address specific cases
	Amending the **RW formula** (change of correlation or systemic risk factors for PD, change of calibration for LGD and CCF in IRB-F approach)	−	• Difficulties defining common and impartial differentiation factors • Difficulties calibrating the adjustments and thus ensuring the framework's robustness • Double counting may arise as a result of potential adjustments and estimates.

− Very complex and/or long-term perspective + Complex and/or mid- to long-term perspective ++ Not complex and/or short-term perspective

[2] https://bit.ly/3l1W6BX

Prescribed risk weights are the most complex tool, as incorporating further differentiation is subject to numerous limitations. EBF stated that using risk differentiation in the corporate exposure class may be justified, but that implementation is still unclear and will need to go beyond just the sector level. As for the retail class, EBF acknowledged that risk differentiation may be too complex to establish.

The internal ratings-based approach is by nature much more risk sensitive and thus can embed environmental risks, thanks to its capacity to account for multiple risk drivers and its reliance on expert judgment. The main pitfall would be in how to manage the integration of environmental risk drivers without deterioration in the performance of the current model. The EBA highlights four tools in the credit risk modeling path where adjustments can be made, emphasizing the institutions' ability to establish a complete "reference dataset" as a prerequisite for ensuring good modeling (Figure 3). Whichever tool is activated, the EBF warns of the reliance of credit risk parameters on observed data and the great complexity of modifying related quantitative formula, such that expert judgment should be recognized to a greater extent to facilitate environmental risk integration.

2.2 Market risk

Market risk is typically characterized by a much shorter time horizon than credit risk and makes the integration of environmental risks even more complicated. Both standardized and internal model approaches are relying on the use of

Figure 4: How to integrate environmental risks within the market risk framework

	TOOL	ACTIONABILITY	LIMITATIONS / POTENTIAL UPSIDE
SENSITIVITIES-BASED METHOD	**Risk weights** adjustment through complementing projections or refined buckets (incorporating environmental risk dimension)	−	• Using projections based on forward-looking scenarios would be a significant divergence from the existing approach • CRR3 proposal introduces a lower risk weight for the commodity delta risk factor related to carbon emissions trading
	Creating a **specific risk class or "risk factor type"** on top of delta, vega and curvature, or adjust correlations	−	
	Residual risk add-on (RRAO) framework could be used to capitalize environmental risk without amending the two main building blocks of the framework (SbM and JTD)	+	• RRAO is not risk sensitive and its scope would need to be enlarged to comprise simple trading book instruments (currently addresses complex payoffs or exotic underlying only)
INTERNAL MODEL APPROACH	**Adjusting historical data** to reflect potential future dynamics	−	• Such a solution would be intrinsically difficult. It will likely be at the cost of affecting the accuracy of the traditional risk factors' measure
	Dedicated add-on outside the existing framework thus avoid adjusting historical data and avoid adapting regulatory tests	++	• Such a solution will require changes in the regulatory requirements for internal models as they are intended to capture all material risk • Similar existing treatment for the case of capturing unpegging event risk (not historically observed) for material FX exposure
	Integrating environmental risks into a **capital adequacy stress testing program,** which is part of the internal model approach's qualitative requirements	+	• According to stress test results, institutions would have to implement appropriate actions

− Very complex and/or long-term perspective + Complex and/or mid- to long-term perspective ++ Not complex and/or short-term perspective

historical data, such that complementing current measures with forward-looking data (adjusting the risk weights for the "sensitivities-based method" (SBM) or historical data for the "internal models approach" (IMA)) would represent a significant divergence from the existing approaches and would likely come at the cost of affecting their accuracy. To overcome this difficulty, as well as the fact that environmental risks are only likely to increase, the EBA is contemplating the use of add-on tools (Figure 4). This might be achieved through either the existing "residual risk add-on" (although it would imply a review of its scope of application) or the calibration of a dedicated add-on.

Regarding the default risk charge, in both standardized and internal ratings-based approaches, the EBA considers that, hypothetically, to capture default risk in the trading book, institutions must replicate the relevant/proposed credit risk solutions.

2.3 Operational and concentration risks

Operational risk covers losses of a diverse nature, and all loss types can be triggered by the environmental risks factors (e.g., damage to physical properties and liabilities arising from environmental factors and resulting in legal and conduct risks). The new standard framework for operational risk relies on two components: internal loss multiplier and business indicator component, although the former is likely to be neutralized in the European framework. Both components are based on historical losses and do not include any forward-looking elements. Such elements could be integrated in the framework in the future once clear evidence of the impact of environmental factors on banks' operational risk and robust data become available. In the meantime, the EBA advocates that institutions should identify environmental factors as triggers of operational risk losses on top of the existing risk taxonomy, in order to assess the materiality and the trend of the operational risks linked to environmental factors.

The Pillar 1 framework does not currently explicitly capture concentration risks resulting from environmental factors. Such integration could rely on the large exposure framework (concentration risk resulting from exposures to an individual client or group of connected clients), although it would need to be revamped to include sectorial and/or geographic dimensions. Alternatively, a new concentration limit for clients significantly exposed to environmental risks could be designed (e.g., limiting the exposure to counterparties subject to high transition risk as a percentage of a bank's Tier 1 total RWAs), but in a very careful manner to avoid undesirable side effects (e.g., decrease of financing for transitioning to environmentally sustainable activities).

3. CONCLUSION

So far, the European regulator is logically focusing on Pillars 2 and 3 (through stress testing exercises) to tackle the integration of environmental factors into the prudential framework. Academic research and preliminary regulatory proposals (highlighted by the EBA discussion paper) on the appropriateness of the Pillar 1 framework and its potential adjustments are inconclusive and nothing is set in stone (although the EBA excludes the use of supporting or penalizing factors).

While awaiting further regulatory guidance (as reaffirmed by the ECB in September 2022 at the 9th Banking Union conference),[3] financial institutions should nevertheless prepare themselves for a potentially binding Pillar 1 treatment and initiate the following actions:

- Design a robust environmental data framework and actively work on the data collection and quality, as a necessary (although only partial) prerequisite for any Pillar 1 integration.
- Engage in academic, regulatory, and industry discussions to raise awareness and be up to date with the latest developments.
- Begin exploratory work internally on prioritized items (e.g., assessing the relevance of additional risk drivers for credit risk differentiation, defining a methodology for calibrating overrides, etc.) to accelerate the learning curve and prepare the organization for a future implementation.
- Identify opportunities for partnership with other market players, both from within and without the financial services sector (data providers, regtech, fintech, greentech, etc.), in order to benefit from mutual efforts, best practices, and solutions.

[3] https://bit.ly/3D1qo5S

ESG COMMITMENT, SOCIAL IMPACT, AND A STRONG FOCUS ON CLIMATE: THE BUSINESS PLAN FORMULA SETS OUT INTESA SANPAOLO'S NEW STRATEGY

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ABSTRACT

In an increasingly complex environment, where sustainability has become a global trend and increasing attention is being paid to ESG (environmental, social, and governance) issues by a myriad of stakeholders, including the regulators, Intesa Sanpaolo recognizes that its own and its corporate clients' innovations and sustainable actions can contribute to the transition to a low-carbon, eco-sustainable, and inclusive economy. Intesa Sanpaolo is one of the top banking groups in Europe with significant ESG commitments, with a world-class positioning in social impact and strong focus on climate. The group's focus on sustainability results in a wide-ranging and comprehensive program of initiatives within the new 2022-2025 Business Plan, having ESG as one of its four pillars. The ESG commitment of the Plan is programmed to be rolled out through six stages. In this article, Elena Flor, Group Head of ESG and Sustainability at Intesa Sanpaolo, shares her insights on the 2022-2025 Business Plan.

1. INTRODUCTION

Social and climate-related issues have in recent years become an important topic of discussion among senior executives and policymakers, and the COVID-19 pandemic can certainly take some credit for that. As a result, we are witnessing the growth of a new sustainability culture, with increasing attention being paid to ESG (environmental, social, and governance) issues by a myriad of stakeholders, including the regulators.

And the regulators have not shied away from introducing new regulations. These include the European Green Deal, which sets out the E.U.'s strategic initiatives to reach carbon neutrality by 2050, the Next Generation E.U., a plan issued for stimulating the recovery of the economies of member states after the pandemic shock, and providing, at the same time, for a more digital, resilient, and – above all – greener Europe. Furthermore, in May 2022, the European Commission presented the REPowerEU Plan, in response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine. Backed by financial and legal measures to build the new energy infrastructure and system in Europe, the plan's aims include saving energy, shifting production processes toward clean ones, and diversifying member states' supplies.

On the reporting side, on January 5th, 2023, the Corporate Sustainability Reporting Directive (CSRD) entered into force. While amending the 95/2014 Directive on the disclosure of non-financial and diversity information by certain large undertakings and groups, the newest CSRD introduces more detailed reporting requirements and ensures that large companies are called-up to report on sustainability issues, such as environmental, social, and human rights, as well as governance factors. It also includes an assurance requirement

to ensure that the reported sustainability information is accurate and reliable. The CSRD also demands improved accessibility of information by introducing specific indications about the availability of data; it provides for mandatory European Sustainability Reporting Standards (ESRS), which are under development by the European Financial Reporting Advisory Group (EFRAG), appointed as the technical advisor of the European Commission. The ESRS are structured around three reporting themes (environment, social, and governance), three reporting levels (sector agnostic, sector specific, and entity specific), and three reporting areas (strategy, implementation, and performance measurement), according to the so-called "Rules of Three".

It is important to note that it is not merely a matter of more detailed and available information. The application of the regulation will take place in three stages, which also envisage a broadening of its scope. First, companies subject to the non-financial reporting directive will have to apply the new rules for the first time in the financial year 2024, for reports published in 2025. Second, starting from January 1st, 2025, the CSRD will be gradually extended to undertakings that pass at least two of the following criteria: 250 average employees, 40 million euros of net revenues, and total assets equal to or exceeding €20 mln. Finally, in 2026, the perimeter of the Directive will include listed SMEs too (apart from the so-called "micro-enterprises"), to further expand in 2027, when it will also cover companies with non-E.U. parent companies that have revenues of more than €150 mln for two consecutive years in the European Union.

In this increasingly complex scenario, Intesa Sanpaolo recognizes that its own and its corporate clients' innovations and sustainable action can contribute to the transition to a low-carbon, eco-sustainable, and inclusive economy. Always aware of the impact it can generate as a systemic bank, since its establishment Intesa Sanpaolo has been committed to pursuing balanced growth models, and is willing to be a driver for this change and create long-term value for the benefit of its people, customers, community, and the environment. This focus on sustainability results in a wide-ranging and comprehensive program of initiatives aimed both at confirming the bank's leadership profile and supporting the transition of customers, even in periods of economic difficulty, such as those brought about by the pandemic and the worsening geo-political environment.

2. INTESA SANPAOLO'S BUSINESS PLAN

Looking back at the 2018-2021 Business Plan, Intesa Sanpaolo set out on its path toward sustainable innovation, leveraging the strength of its relationships, its national and international presence, the expertise of its people, as well as its capital strength and ability to produce positive results in terms of revenues. The previous Business Plan had already established concrete goals and actions to contribute to global development by supporting clients in their ESG transition, promoting the development and wellbeing of people and communities, and protecting the environment, particularly combating climate change.

Key ongoing initiatives have been integrated into the new Business Plan 2022-2025 presented in February 2022. The Plan places sustainability as one of the four pillars of the bank's strategy, raises its level of ambition as far as ESG targets are concerned, and further confirms and strengthens Intesa Sanpaolo's focus on social and cultural issues, combating climate change, and safeguarding biodiversity. The Plan contemplates a "significant ESG commitment, with a world-class position in social impact and strong focus on climate," which means that we are taking a further step forward. If an ethical and social commitment has always been in Intesa Sanpaolo's DNA, which can be easily seen in the historical path undertaken by the group in the reference territories and the role played by its shareholder banking foundations, sustainability is now written in black and white and recognized as a trend of profound transformation. It has become an evident strategic guideline in which to invest and on which to build with conviction the bank that will lead the market in the coming years. A commitment that is programmed to be rolled out through six stages.

3. STRONG FOCUS ON CLIMATE AND ENVIRONMENTAL INITIATIVES

The ecological transition is an innovation process that promotes the shift from an economic, social, and environmental model that is dissipative and extraneous to the environmental context in which it is inserted to a system of regenerative production and consumption that has economic, social, and environmental sustainability as its goal. It aims to decouple economic growth from natural resources depletion, which includes replacing fossil fuels with renewable energy sources.

The path toward ecological transition includes the commitment to net zero emissions by around mid-century undertaken by the E.U. and by a number of countries worldwide and supported by global initiatives. In 2021, Intesa Sanpaolo joined all Net-Zero alliances promoted by the United Nations Environment Programme Finance Initiative (UNEP FI), the U.N.'s 30-year-old network of banks, insurers, and investors that collectively catalyzes action across the financial system to deliver more sustainable global economies. The UNEP FI brings together financial institutions from around the world to shape the sustainable finance agenda. It established the world's foremost sustainability frameworks to drive the financial services industry to address global ESG challenges.

More specifically, the Intesa Sanpaolo Group adhered to: the Net-Zero Banking Alliance (NZBA) with the parent bank; the Net Zero Asset Managers Initiative (NZAMI) through the group's asset management companies Eurizon Capital SGR, Fideuram Asset Management SGR, Fideuram Asset Management Ireland, and Asteria Investment Managers; and the Net Zero Asset Owner Alliance (NZAOA) and Net Zero Insurance Alliance (NZIA) through Intesa Sanpaolo Vita. Through these memberships, the group has committed to net zero for its own emissions and those connected with its loan and investment portfolios, and with the asset management and insurance businesses by 2050.

More than a year in advance of the NZBA's deadline, the 2022-2025 Business Plan has set emissions reduction targets for 2030, which are aligned with net zero, for the oil and gas, power generation, automotive, and coal mining sectors. This is particularly significant since these sectors account for more than 60 percent of the financed emissions of non-financial companies' portfolios in the sectors specified by the NZBA. In addition, in October 2022, Eurizon Capital SGR, Fideuram Asset Management SGR, Fideuram Asset Management Ireland, and the Insurance Group Intesa Sanpaolo Vita published their first intermediate targets.

The group has also committed to bringing its own emissions to net zero by 2030 by purchasing 100 percent of its energy from renewable sources at the group level, a goal already achieved in Italy in 2021. The plan also makes a strong commitment to the conservation of natural capital, through the development of a specific biodiversity policy and a major reforestation project – aiming to plant more than 100 million trees directly and through customer financing.

To build trust, one has to be fully transparent, which is why in June 2022 Intesa Sanpaolo became an "investor signatory" of the CDP,[1] a not-for-profit organization that runs the global disclosure system for investors, companies, cities, states, and regions to manage their environmental impacts, further promoting transparency on climate and environmental issues. This contributes to the bank's commitment to facilitating industrial-scale environmental disclosure and engagement, aligned with the Task Force on Climate-Related Financial Disclosures (TCFD). Intesa Sanpaolo decided to support the recommendations of TCFD in October 2018, thus committing itself to voluntary dissemination of transparent reporting on the risks and opportunities related to climate change. The bank published its first TCFD report in October 2021, covering the four pillars of the TCFD: governance (responsibilities assigned for the management of risks and opportunities related to climate change), the company's strategy (to support the transition to a low-emissions economy), risk management (the inclusion of climate change risks in the risk management systems and processes of the company), and metrics and targets (used to assess and manage climate-related risks and opportunities and to monitor performance against targets).

Thanks to the bank's strong commitment to decrease its CO2 emissions (Scope 1 + 2), between 2012 and 2022 it was able to surpass the 36 percent target stated in the Climate Change Action Plan adopted in 2017. This was made possible partly through purchasing of renewable energy and specific medium- to long-term actions taken by the group aimed at reducing its consumption, such as the rationalization of its perimeter of branches and buildings and other energy efficiency actions put in place.

4. A NEW CREDIT FRAMEWORK TO DRIVE THE SUSTAINABLE TRANSITION

In order to ensure that climate-related and environmental risks are considered at all relevant stages of the credit process, the bank developed a holistic, comprehensive, and dynamic approach for integrating ESG/climate metrics in the credit framework. In particular, the bank is progressively implementing dedicated tools to set up a process that would incentivize lending to counterparties with a strong ESG/climate performance or which have started a transition toward more sustainable business models, while disincentivizing lending to the ones with high ESG/climate risk.

[1] https://bit.ly/3lp0iM2

The new credit framework process includes three evaluation levels.

1. **Sector/microsector level:** in 2021, the first sectoral mapping of business activities from an ESG/climate point of view was completed. This mapping is fundamental in determining which sectors to engage with, disengage from, or support in their transition, as one of the drivers of the overall lending strategy. The sectoral mapping was based on a classification of the loan portfolio by the NACE (Statistical classification of economic activities in the European Community) code (about 55 sectors and 185 microsectors were analyzed). The objective of the sectoral assessment is to identify the sectors (and microsectors) most exposed to climate change and ESG risks. Based on the risk scores attributed, it was possible to define high ESG risk microsectors and climate sensitive microsectors. The ESG sectoral scoring constitutes one of the methodological drivers for the identification of specific credit portfolio strategies (engagement, selective engagement, disengagement) represented by a color-code clustering (blue, orange, red, yellow, and white).
2. **Counterparty level**: following sector mapping, Intesa Sanpaolo developed a broad ESG score at a counterparty level for non-financial corporates, which also includes separate modules for measuring transition and physical risk. The score will support various decision-making processes, in particular credit underwriting and credit strategies. The aim is to holistically assess the ESG performance of corporate clients, adopting the same approach across the entire portfolio, from large listed clients to small- and medium-sized enterprises. The score leverages external and internal data and covers the most important markers of ESG risks and opportunities across the three sustainability dimensions based on 140 KPIs. Both the ESG sectoral scoring and the score at the counterparty level are to be included in the "credit underwriting framework", guiding the "risk clearing process".
3. **Transaction level:** within the defined sensitive sectors, a reinforced process is provided, aimed at the identification and assessment of potential reputational and ESG risks associated with the "most significant transactions" (MST) and corporate financing transactions. This reinforced process allows for the assessment of critical issues and provides a risk opinion including the assignment of a risk level (from low to very high) to support the decision-making process. The assessment is carried out through the evaluation of companies' transition plans for high-risk sectors and larger, longer-term transactions, and the determination of transactions to undergo an enhanced ESG risk-clearing process through sector, counterparty, and product-level considerations.

5. ENABLING THE TRANSITION THROUGH SUSTAINABLE LENDING PRODUCTS AND ADVISORY SERVICES

As far as a bank is concerned, focusing on environmental, social, and governance matters cannot be separated from supporting its clients' projects and initiatives; basically, granting credit. To this end, €76 bln of new credits have been made available to support the green transition of businesses under the National Recovery Plan (NPR) 2021-2026, of which about €32 bln have already been disbursed in 2021 and 2022. Among the loan products, the Domus green loan stands out: it is a mortgage loan for the purchase of the customer's first or second home or financing the construction of a property for residential use in high-energy class (equal to or higher than B), or renovation with the improvement of at least one energy class of a building. Approximately €2.6 bln of mortgage loans were disbursed in 2022, compared to the targeted €12 bln of new green lending assigned to individuals in the 2022-2025 Business Plan.

The renewed commitment to the circular economy in the new Business Plan is also worth mentioning. It is pursued by promoting the spread of this model, renewing the strategic partnership with the Ellen McArthur Foundation, the world's leading reference on these issues, and announcing €8 bln in credit lines for the circular economy, of which €3.1 bln were disbursed in 2022.

Considering the significant role played by small and medium enterprises in the Italian economy, as well as in the country's industrial fabric, a significant role in supporting their sustainable transition can be played by sustainability loans. At Intesa Sanpaolo, they are represented by the S-Loan product, devoted to supporting SMEs that aspire to improve their sustainability profile by identifying specific ESG KPIs to be met by the borrower to allow for favorable conditions. In 2022, the bank disbursed €2.2 bln in the form of S-Loans (€3.5 bln since the launch of this financing product in July 2020). The S-Loan offering consists of different forms of financing, and companies interested in improving their ESG profile can choose between five lines of credit based on sustainable development goals.

Specifically:

- **S-Loan ESG** is dedicated to major improvements in sustainability performance related to, for example, sourcing energy from renewable sources or bioenergy (for the environmental sphere), community support activities (for the social sphere), and training activities for employees on environmental/social issues and development of programs to increase employee welfare (for the governance sphere).
- **S-Loan diversity** includes KPIs to enhance and promote gender equality and the role of women in the socioeconomic context.
- **S-Loan climate change** includes KPIs to develop the company's business in an environmentally friendly way by investing in projects that combat climate change and reduce emissions. The new KPIs relate to sourcing energy from renewable sources, introducing a "green procurement policy", achieving carbon neutrality, complying with green building and sustainable architecture standards, converting the fleet to vehicles with reduced environmental impact, and activating initiatives to protect and restore biodiversity.
- **S-Loan agribusiness** provides KPIs for corporations interested in protecting themselves against the risks of climate change and seizing key opportunities by adopting more sustainable business models.
- **S-Loan tourism**, based on KPIs for companies in the tourism sector, such as purchasing electricity from renewable or bioenergy sources, reducing energy consumption, improving the share of company vehicles with reduced environmental impact, renovation/construction of real estate assets to meet green building standards, reducing water consumption, and achieving carbon neutrality in business activities.

The digital transition is another extremely relevant issue for companies to foster competitiveness as well as to enable the sustainable transition. As part of the bank's commitment to providing financial support for companies willing to improve their digital profile, Intesa Sanpaolo delivered the D-Loan. Finalized and embedded in the bank's offer in October 2021, this specific product provides financing at favorable conditions on the rates charged for companies that declare a commitment to respect a list of selected digital KPIs. As of the end of 2022, about €22 mln of D-Loans were disbursed since its launch.

Business support during the transition is also provided through services, such as the Circular Economy Lab, which was established in collaboration with Cariplo Factory in 2018 to contribute to the evolution of the Italian economic system and the spread of new models of value creation in the collective interest, accelerating the transition towards circular economy models. The Business Plan 2022-2025 also confirmed the implementation of new ESG laboratories in collaboration with specialized partners, with the aim of supporting SMEs and corporate companies through at least one ESG laboratory in each regional directorate. Eight ESG laboratories have already been activated in cities located in strategic places within the Italian industrial landscape. In addition, the Skills4ESG online platform for customer training and engagement thought for sustainability topics has also been launched.

Within the new "credit framework", a new "sustainable lending products framework" has been developed, which meets the requirements of the European Banking Authority for "loan origination and monitoring" and defines sustainability categories to classify products and transactions according to the E.U. Taxonomy Regulation and international market standards.

6. MAKING AND PROMOTING INNOVATION

Intesa Sanpaolo has always invested in and promoted innovation, both within the group and by supporting business customers, recognizing its role in the growth of the new economy. The group has committed itself to achieving around 800 innovation projects in the Plan arc (70 percent more than in the period 2018-2021). They include multidisciplinary applied research projects in collaboration with research centers of excellence (e.g., artificial intelligence, neuroscience, and robotics), business transformation projects benefiting both the group and corporate innovation processes (e.g., scouting and application of new technologies, open innovation programs), and acceleration paths and support for the development of innovation ecosystems from an international perspective. In all of this, an important role is attributed to Intesa Sanpaolo Innovation Center, the division dedicated to the frontier of innovation. It explores future trends and scenarios, develops multidisciplinary applied research projects, supports startups, accelerates business transformation for companies according to the criteria of open innovation and the circular economy, facilitates the development of innovative ecosystems, and disseminates innovation culture.

Spreading innovation also includes creating a new mindset through dedicated events and educational formats – be they placement and matchmaking events,[2] events to spread innovation culture to clients or colleagues, and lessons and speeches to be carried out in universities. In this regard, the bank launched a collection of podcasts on innovation topics "A prova di futuro" ("future-proof"), which are freely available on the Intesa Sanpaolo website, and other initiatives to foster greater awareness. In 2022, there were 32 positioning and matchmaking events, with approximately 2,200 participants, and 15 innovation reports on technologies and trends released.

In 2022, 201 innovation projects were implemented by Intesa Sanpaolo Innovation Center, and 14 multidisciplinary applied research projects were in progress by the end of the year in the fields of artificial intelligence, robotics, and neuroscience (25 companies were involved in corporate open innovation programs).

The new Business Plan also includes support for high-potential startups that are not within financial services and a €100 mln investment from NEVA SGR, a venture capital company of the Intesa Sanpaolo Group. In 2022, Neva SGR invested over €54 mln.

The Business Plan also calls for investments in the group's technology infrastructure to provide all customer segments with innovative, secure, and effective offerings and for the creation of Isybank, the new digital bank of Intesa Sanpaolo that aims to effectively serve about four million customers who do not go to branches mainly due to the new digital habits that were accelerated by the pandemic. Isybank will provide them with the best digital experience, leveraging cutting-edge technology, distinctive features, and a lean service model that will contribute to structural cost reductions while further improving the group's footprint profile.

7. SUPPORTING FINANCIAL INCLUSION

In addition to solutions that help with the transition to a more sustainable economy, Intesa Sanpaolo also remains strongly committed to social inclusion, a crucial factor enabling the path toward an equitable and inclusive transition (the so-called "just transition").

In 2021, the last year of the previous business plan, in which the bank stated its intention of establishing itself as one of the European leaders in impact banking, the group disbursed about €20.6 bln of new loans to activities that have high social impact (26.6 percent of the total disbursed). Out of that, nearly €14 bln were used to support the production system during the health emergency (about €43 bln since the beginning of the pandemic). As for lending to groups that have difficulties accessing credit despite their potential, the €1.5 bln Fund for Impact has been active since 2018.

In the new Business Plan, the group has committed to granting about €25 bln of new credit to support various initiatives that have social impact. Credit will be provided to nonprofit organizations to promote territorial initiatives that benefit communities and the environment, with €339 mln already disbursed in 2022. The Fund for Impact project for direct support to people who cannot access credit despite their potential will continue to be nurtured (more than €53 mln were made available in 2022). Dedicated programs of Fund for Impact include MAMMA@WORK, a loan with highly subsidized conditions to reconcile the balance between motherhood and work in the early years of children's lives; "Per Merito", the first unsecured credit line dedicated to all college students; and "XME StudioStation", consisting of loans to families to support distance learning.

Social credit will be provided to vulnerable people who have difficultly accessing different forms of financing, such as young people or the elderly, or who have been affected by calamitous events. In 2022, the group granted about €9.3 bln in social lending. Key innovations to support financial inclusion include a specific urban regeneration program that envisages investments in hospitals, smart mobility, broadband networks, education, and sustainable infrastructure and services. In 2022, in the latter area, the group committed €616 mln in new loans to support investments in student housing, services, and sustainable infrastructure, in addition to the most important urban regeneration initiatives underway in Italy.

8. ADDRESSING SOCIAL NEEDS

Attention to communities in which the group operates and to people has been confirmed in the framework of the ongoing Business Plan, even accelerating and further strengthening support provided to fulfill social needs as the foreseeable continuation of the commitment to being a reliable partner of the bank's reference territories. In the bank's strategy for the period 2022-2025, this resulted in a comprehensive allocation of about €500 mln, including both investments and donations.

[2] A "positioning event" is an event in which a leading player illustrates innovation topics; a matchmaking event is an event that fosters a match between the supply and demand of innovation.

Looking back at 2022, there was also no lack of monetary contributions to the community in the social sphere, which stood at around €97 mln. In addition, Intesa Sanpaolo's Charitable Fund disbursed about €15.7 mln in support of more than 750 projects carried out by nonprofit entities, with 99 percent of the resources allocated to interventions in favor of the weakest segments of the population.

Current initiatives include the widening of the food and shelter program for those in need, with about 50 million interventions (meals, beds, medicine, and clothing). In 2022, more than 21.3 million interventions were carried out including 15.9 million meals, over 2.2 million dormitory spaces, 3 million medicine prescriptions, and about 264,000 items of clothing (also supporting people in Ukraine).

Moreover, Intesa Sanpaolo has always been attentive to the younger generation, and it will continue the promotion of educational inclusion and youth employability through programs such as "Giovani e Lavoro" (youngsters and work) and "Generation4Universities". The programs aim to support youth employability of more than 3,000 young people and the involvement of more than 4,000 schools and universities in inclusive education programs (e.g., through the WeBecome project). Regarding the "Giovani e Lavoro" program, over 2,300 companies have been involved since the program's inception, with 770 students trained or in training through 30 courses in 2022 (around 3,000 trained or in training since 2019).

Among the Plan's initiatives dedicated to the needs of the people and communities in which the bank is present, one of the most extensive social housing projects in Italy, targeting young people and the elderly, stands out. The project will promote housing (about 6,000-8,000 residential building spaces available to people in need over the Plan's horizon) for students or young workers and low-income seniors living alone. An additional project will be dedicated to assisting elderly people through the establishment of about 30 senior community hubs to locally offer social and leisure activities and dedicated health and social care services.

In 2022, the total contribution to the community amounted to €103 mln, including a donation of more than €10 mln to UNHCR and other nonprofit organizations for solidarity and shelter projects for the people affected by the humanitarian emergency in Ukraine. This initiative is intended to provide a prompt and meaningful response that can ensure concrete and immediate help while acting against future developments.

9. CONTINUOUS COMMITMENT TO CULTURE

Culture plays a strategic role in the development of any country. It is a means of nurturing civil progress and social inclusion, and a driving force for sustainable economic growth. This is particularly true for Italy, which can be easily defined as a cultural superpower. Intesa Sanpaolo strongly believes in this, and it is witnessed by its continuous contribution to life in Italy that goes beyond the financial sphere to include the country's cultural and civic life. The bank's support of Italian art and culture is an ongoing commitment and an inherent part of Intesa Sanpaolo's mission and identity.

Consequently, the 2022-2025 Business Plan calls for the expansion of exhibition spaces through two new Gallerie d'Italia venues, in Turin and Naples (opened in May 2022), and the expansion of the spaces of the two existing venues in Milan and Vicenza. Such an enlargement will bring the Group's Gallerie d'Italia – internationally recognized as a hub of excellence in Italian cultural offerings – to 30,000 square meters in 2025 from 14,200 square meters in 2021. The two new venues were originally historic buildings owned in the center of Turin and Naples, later converted into museums: the gallery in Turin is focused on photography, digital topics, and ESG themes, while the museum in Naples houses 680 works of art from the bank's collections, from archaeology to a Caravaggio masterpiece to modern and contemporary art.

The group's commitment to promoting, preserving, and spreading knowledge about art and culture in Italy also takes the form of a multi-year program of original temporary exhibitions, educational workshops with schools, and social inclusion projects dedicated to vulnerable groups. In 2022, 1,550 workshops for school groups were held at the Gallerie d'Italia with 33,000 students participating, and 260 tours for visitors with special needs with 3,680 participants.

In addition, the Restituzioni (Restitution) program, dedicated to the restoration and enhancement of the national heritage curated by the bank in collaboration with the Ministry of Culture, will continue over the current Business Plan period, as well as partnerships with museums and public and private institutions (at the end of 2022, 277 works of art from the proprietary collections are on loan to 61 temporary exhibitions hosted in Italian and foreign venues), while new sponsorships in the artistic and cultural sphere will be confirmed and activated. Furthermore, dedicated training paths in the professions of art and culture will be established (with the master's programs of Gallerie d'Italia Academy).

10. CONCLUSION

In summary, sustainability today has become a global trend that sees the convergence of major international institutions and requires an active contribution from the private sector. Beyond ethical considerations, there is a growing awareness that the financial cost of failing to solve environmental and social problems is enormous and that sustainability can be a strategy that both mitigates risks and generates competitive advantage by bringing about superior performance.

Reinforcing the sustainable growth role in its business strategy, therefore, testifies to Intesa Sanpaolo's strong commitment to present and future generations, and is also an important indicator of the company's ability to seize market opportunities related to the new environment. The 2022-2025 Business Plan confirms and accentuates the bank's commitment in this regard.

However, there are still many challenges to face: the frontiers in which banks are, and will be engaged in the coming years range over new or, until recently, little-considered areas, with the need to simultaneously advance technological progress and define ambitious environmental and social goals, to stimulate and lead the transition process towards a digital and sustainable world.

Intesa Sanpaolo, similar to other banks, has embarked on a transition path, which has a long-term horizon and that cannot fail to consider contingent factors, such as the current geopolitical context, in achieving its medium- and long-term goals. In 2022, the crisis in the energy and gas markets had a significant impact on the Italian economy, squeezing companies' operating margins and putting families in difficulty. This is the why Intesa Sanpaolo's CEO, Carlo Messina, announced the allocation of an additional €8 bln to help families in crisis, bringing the total aid package allocated by the bank to businesses and households to €30 bln.

In the long run, the transition path will lead to a transformation of financial institutions, not only in terms of the direct effects on their business and operating methods but also, and above all, because they will be increasingly called upon to broaden their role in supporting and addressing the economic and social environment around them and in supporting institutions and the regulators in fostering market transparency and corporate ESG disclosures.

IS CLIMATE CHANGE ANOTHER OBSTACLE TO ECONOMIC DEVELOPMENT?[1]

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ABSTRACT

Over the next decades, rising temperatures will be a bigger hurdle for emerging markets and developing economies than for advanced economies. Our analysis of data from 190 countries shows that a one-time, 1-degree Celsius annual average temperature increase is more damaging for emerging markets and developing economies (EMDEs) than advanced economies (AEs). We find that seven years after such a rise, gross domestic product per capita is 0.6-0.7 percentage points lower in countries with current annual temperatures averaging 22°C-24°C (mainly EMDEs) than in those averaging 15°C (AEs) – all other things being equal. Further, we find permanent income losses arising through lower productivity and investment, with the agricultural sector taking a long-term hit. Where annual temperatures average 24°C, GDP per capita of countries least ready to cope with climate change remains 2 percentage points lower, while countries most ready see no sustained losses, seven years after the 1°C temperature shock. Economies have adapted somewhat to one-off temperature increases over the past decades, with the sensitivity of GDP to temperature shocks decreasing by about 30 percent over the past 20 years. Supportive macro policy responses have also helped economies recover from climate-related shocks, restrictive monetary policy seems to amplify the shock, whereas low real interest rates are associated with little scarring.

1. INTRODUCTION

Over the next decades, we think rising temperatures will be a bigger hurdle for emerging markets and developing economies than for advanced economies. Emerging markets and developing economies (EMDEs) contribute less than 14 percent of global greenhouse gas emissions but are among the most exposed to, and least ready to cope with, the effects of climate change. Recent extreme weather events serve as a reminder that climate change is intensifying. In a recent study, S&P Global estimates that, even if all countries meet their current climate policy pledges, low- and middle-income nations could face losses equivalent to 12 percent of GDP by 2050, compared with 3 percent for high- and upper-middle income countries [Munday et al. (2022)]. That study also suggests that as much as 4 percent of global GDP annually can be at risk from climate change by 2050, absent adaptation measures. By comparison, during COVID-19 lockdowns in 2020, global GDP dropped 3.3 percent.

To assess whether the most vulnerable countries can cope with, and recover from, hotter temperatures, S&P Global Ratings examined the impact of physical risks on economic growth. Using data for 190 countries over roughly six decades (1965-2020), we looked at the relationship between temperature variations and distribution of real GDP per capita.

The results of our analysis show that, after a one-time 1-degree C rise in average annual temperature, GDP per capita tends to recover within two years for EMDEs (mean temperature = 22°C), while there is close to no negative impacts for advanced economies (AEs) (mean temperature = 15°C). Moreover, where the regular temperature averages

[1] This article does not constitute a rating action.

22°C-24°C, GDP per capita does not return to its previous trend level and continues to lag that of 15°C economies even after seven years.

Since lower middle-income and low-income EMDEs are concentrated in areas with much warmer climates, our results suggest that temperature rise would be another dimension holding back this set of countries to achieve durable growth in the long term – which is a precondition for convergence with high-income economies (as implied by neoclassical growth theory), although causal interpretation is difficult.

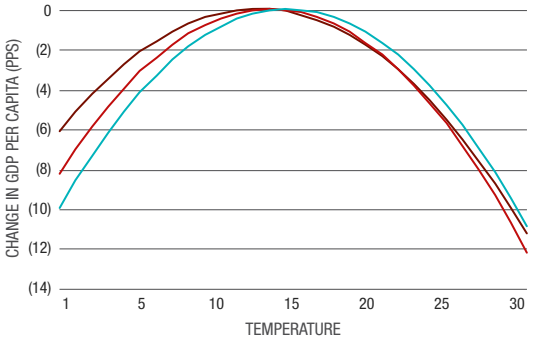
Looking under the hood of temperature shocks also shows that economic development and adaptation – both crucial for resilience to climate change – are two sides of the same coin. More developed economies with a bigger share of services activity in output and more flexible institutional set-ups do better at withstanding temperature increases. At the same time, more granular measures are needed to assess countries' readiness uncorrelated from economic development.

With the cost of physical climate risks increasing each year, the loss and damage debate also took center stage at the COP27 climate change conference in Egypt.[2] Our research highlights investing in adaptation to climate change could support long-term income prospects for EMDEs. Developing countries are calling on richer nations to help finance loss and damage linked to climate change and making their economies more resilient to cope with acute physical risks, like storms, wildfires, and drought.

2. TEMPERATURE STARTING POINTS MATTER: CLOSER TO 14°C IS MORE OPTIMAL

By linking economic output (GDP) to countries' annual average temperatures, we see that many advanced economies have more favorable temperature starting points when it comes to climate change. Using fixed-effects panel regression models (less prone to omitted variable bias as they control for unobserved time-invariant group heterogeneity, including, for example, differences in institutions) with data ranging from 1965 to 2020, we find that countries with more temperate climates tend to exhibit higher GDP per capita increases than those with harsher climates (very low or very high temperature averages), with the turning point likely to be around 13°C-15°C (Figure 1). This nonlinear relationship between annual temperature and growth is similar to findings uncovered in other studies [Burke et al. (2015), Kalkuhl and Wenz (2020)].

Figure 1: GDP responds to temperature shocks in a non-linear way



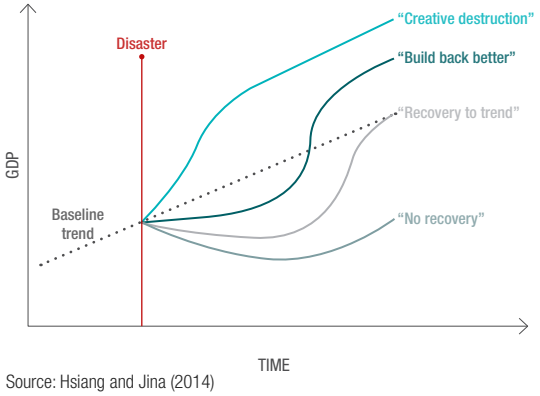
Change in GDP per capita associated with a 1°C increase in temperature (first year)

Note: The results describe the relationship between GDP per capita and temperature using a panel model estimation with country fixed effects and regional time fixed effects; the range refers to results of other modeling specifications

Pps = Percentage points

Sources: Authors' calculations; S&P Global Ratings

Figure 2: Stylized GDP outcomes: there is more than one potential outcome to economic shocks

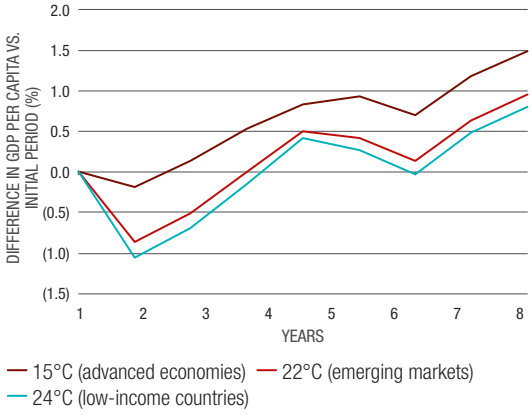


Source: Hsiang and Jina (2014)

The annual average temperature in advanced economies – such as the E.U., U.S., and Japan – is close to the optimum, at 15°C, while in EMDEs it is higher, between 19°C-24°C, suggesting that additional warming is likely to hurt EMDEs more than their richer peers. The results of our analysis show that a 1°C temperature increase would be associated with a GDP per capita drop of about 0.9 percentage points for countries where temperatures average 22°C, and 1.2 points where the average is 24°C. By comparison, there is close to no impact for economies where the average temperature is 15°C.

[2] https://bit.ly/3ZxHdye

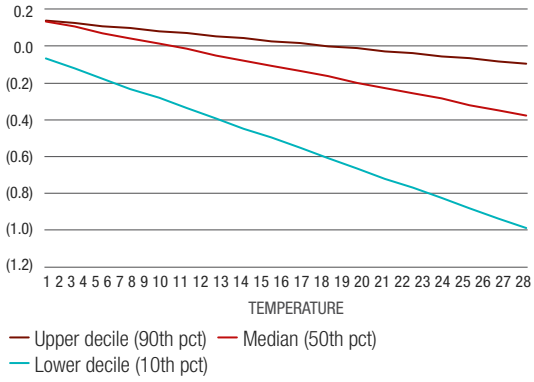
Figure 3: Temperature shocks have a permanent impact on relative GDP levels



GDP per capita response to a 1°C annual average temperature rise

Note: The results describe the relationship of the variable shown with average annual temperature using a panel model estimation with country fixed effects and regional time fixed effects. We derive impulse response functions using local projections and controlling for lags and forwards of the temperature
Sources: Authors' calculations; S&P Global Ratings

Figure 4: Output growth-at-risk exercise highlights 1°C increase in temperature is likely to make GDP contractions worse in hotter climates



GDP per capita response to a 1°C annual average temperature rise

Note: The results describe the relationship of the variable shown with average annual temperature using a panel model estimation with country fixed effects and regional time fixed effects. We derive impulse response functions using local projections and controlling for lags and forwards of the temperature
Sources: Authors' calculations; S&P Global Ratings

Although our results may be influenced by structural differences among the economies in our dataset, and important within-country variations may be hidden, they are similar to the findings of a comparable study utilizing regional and seasonal variations focused on the U.S. Increases in temperature beyond the summer average (that is, unusually warm weather) are associated with lower growth of the gross state product (gross value added during production by labor and capital at the U.S. state level) [Colacito et al. (2019)]. Furthermore, that study found the effect to be most significant in the summer months and for states where average temperatures are higher, irrespective of state income level. This further supports our finding that the starting point in temperature matters and that there is a nonlinear relationship between temperature and growth.

2.1 Four potential exit paths after a climate shock

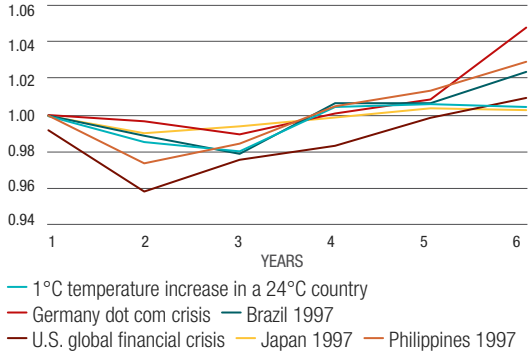
One way to look at the macroeconomic ramifications of climate change for vulnerable countries is to consider the impact on growth after temperature fluctuations and weather extremes. We focus on whether temperature increases reduce growth permanently or temporarily. There are four potential hypotheses of generalized economic outcomes in subsequent years, as illustrated by Hsiang and Jina (2014) (Figure 2). The temperature/climate shock triggers:

- A period of accelerated growth (a positive shock) after which growth returns to the baseline rate but at a higher level (creative destruction).
- Slow growth or a contraction, then a quick catch-up, and eventually convergence to a trajectory that is above the initial baseline growth rate and initial potential GDP level (build back better).
- A downturn, then a return to the previous growth path and potential GDP trajectory (recovery to trend).
- Contraction and slower growth for a finite interval before a resumption of the original growth rate, but without a period of acceleration and no return to the original baseline GDP trend.

2.2 Income losses can be permanent even if growth recovers

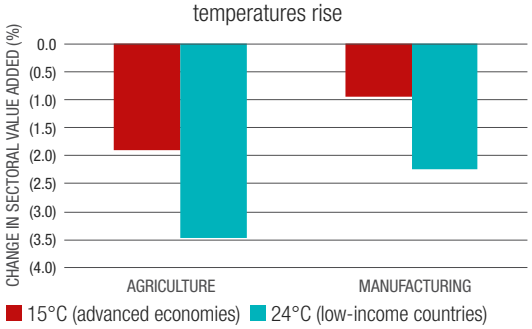
Our results show that even though a one-time temperature increase has a temporary impact on economic growth, there is a permanent relative loss of GDP in countries with hotter climates than those with lower average temperatures. GDP per capita tends to recover to the previous peak within two years after the shock, at the latest, for countries where the annual average temperature is about 22°C-24°C, namely lower-income countries and emerging markets (Figure 3). However, GDP per capita for such countries does not return to its previous trend or catch up to that of economies with cooler climates (average of 15°C); a GDP per capita gap of 0.6-0.7 points remains seven years after a one-time 1°C temperature increase. This suggests that economies with warmer climates are more likely to follow the "no recovery" path, meaning

Figure 5: External temperature shocks are slightly milder than shocks related to structural issues



Change in GDP per capita, constant local currency (period 1 = 1)
Sources: National Statistical Institutes, S&P Global Ratings

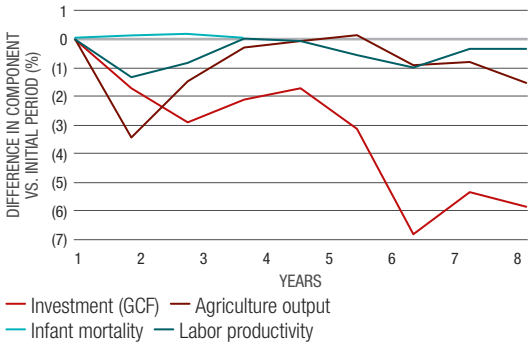
Figure 6: Agriculture is the sector most affected when temperatures rise



Impact of a 1°C annual average temperature rise on sectoral value added in the first year.

Note: The results describe the relationship of sectoral value added for a one degree increase in annual average temperature using a panel model estimation with country fixed effects and regional time fixed effects
Sources: Authors' calculations; S&P Global Ratings

Figure 7: Investment, productivity, and agriculture do not recover fully



Response of selected variables to a 1°C annual average temperature rise from 24°C.

Note: The results describe the relationship of the variable shown with average annual temperature using a panel model estimation with country fixed effects and regional time fixed effects. We derive impulse response functions using local projections and controlling for lags and forwards of the temperature
GCF = Gross capital formation
Sources: Authors' calculations; S&P Global Ratings

that they may recover to previous growth rates but not to the baseline trend level. There is no catch-up to previous trend path.

2.3 Hotter temperatures can make downturns worse

We also examine whether temperature change may make severe GDP contractions more likely conditional on climate. Using quantile regressions linking growth to temperature, we find that downside risks to growth (the lower 10th percentile of GDP growth distribution) are more strongly linked to warmer temperature than the central tendency or upside risks (90th percentile) (see tables in the Appendix and Figure 4). This implies that hotter temperatures can make downturns worse, even in economies where the climate is close to what is perceived as the 14°C optimum. As such, the impact of a temperature shock for the 10th growth percentile is more than three times larger than the relationship in the central tendency (the 50th percentile) for 22°C and 24°C economies; the impact on the 90th percentile (that is, when the economy is doing very well in relative terms) appears even slightly positive for temperate climates in comparison and slightly negative as the temperature gets warmer, highlighting a sharp increase in downside risk associated with the overall downward shift in the growth distribution associated with hotter temperatures across countries.

2.4 Yet historical data suggests temperature-driven shocks are relatively milder than other economic shocks

Taken together, the findings in the previous section suggest climate change will make economic convergence more difficult for EMDEs, most of which are located in hotter climates. They also highlight the absence of additional catch-up momentum following a temperature shock. Still, compared with other downturns, such as the global financial crisis, the Asian crisis, or the aftermath of Germany's reunification, our results show that a 1°C increase in temperature for economies averaging 24°C leads to relatively smaller losses (Figure 5). This may result from the external and exogenous nature of extreme weather events, in contrast to the causes of other downturns, which included structural inefficiencies and economic or financial imbalances such as risk buildup or inefficient allocation of resources. That said, the recovery paths are not entirely comparable, since our estimates isolate the effect of a one-time increase in temperature from other drivers of growth, that is if all other factors remain unchanged. Overall, this suggests the impact of temperature increases alone, while having a significant impact on economic activity,

especially in hotter economies, may not always be visible in aggregate indicators, especially when other trends come into play.

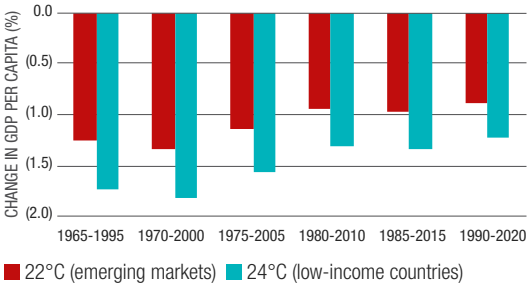
2.5 Agriculture, productivity, and investments experience permanent losses

Looking beyond aggregate growth dynamics to individual sectors sheds light on why the most vulnerable economies (with temperatures averaging 22°C-24°C) could struggle to get closer to richer peers after a temperature shock. Even if there is no permanent loss of growth prospects, the structure of the economy changes if there is a reallocation of resources in response to climate change. Using the same modeling framework (see Appendix), we replaced GDP per capita with other dependent variables (such as value added by sector and GDP components). The results show that, after a rise in temperature, the relative share of agriculture in total output decreases. This seems to come about through lower investment and productivity gains. Mortality also rises, potentially weighing on the long-term labor supply.

On a sectoral basis, agriculture is hardest hit by an increase in temperature, exhibiting a 3.5 percentage point initial loss of output, with output remaining around one point lower seven years later in economies where the temperature averages 24°C. This may be because the crop mix is likely to have benefited less from hotter temperatures, and hotter temperatures depress workers' productivity. Manufacturing output also shrinks, but the impact does not go beyond the year of the shock, while services activity does not appear to be significantly affected (Figure 6). Our results demonstrate that agricultural and manufacturing output is depressed in temperate climates (about 14°C) too, suggesting that those economies also have some way to go to prepare for the threat of climate change.

From a structural growth perspective, we find most of the impact on hotter climate economies (annual temperature averaging 24°C or higher) comes from lower investment, productivity losses, and increased mortality. While infant mortality recovers two years after the temperature shock, investment and productivity are still lower eight years later (Figure 7). By contrast, other components of growth such as average hours worked, capital accumulation, or the rate of depreciation of capital do not seem to be affected. However, since some of those variables are unobservable (for example, the capital depreciation rate), it is unclear whether the data can adequately capture a temperature shock impact or whether that is all captured by the productivity variable.

Figure 8: Adaptation likely explains economies' decreasing sensitivity to temperature shocks

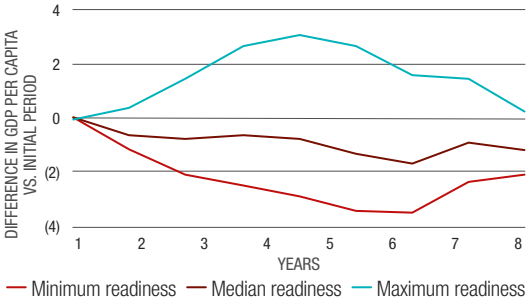


The effect of a 1°C annual average temperature rise on real GDP per capita growth has declined over time.

Note: The results describe the relationship of GDP per capita with temperature using a panel model estimation with country fixed effects and regional time fixed effects

Source: Authors' calculations; S&P Global Ratings

Figure 9: Countries with low readiness display a long-lasting impact on growth

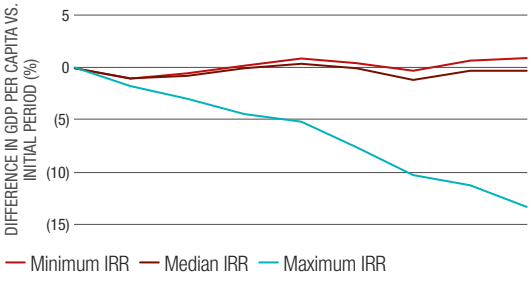


Response over time to a 1°C annual average temperature rise from 24°C

Note: The results describe the relationship of the variable shown with average annual temperature using a panel model estimation with country fixed effects and regional time fixed effects. We derive impulse response functions using local projections and controlling for lags and forwards of the temperature. Readiness as defined by ND-GAIN indicators

Sources: Authors' calculations; S&P Global Ratings

Figure 10: Countries with higher real interest rates display long-lasting effects on growth



Response over time to a 1°C degree annual average temperature rise from 24°C by real interest rate level (IRR)

Note: The results describe the relationship of the variable shown with average annual temperature using a panel model estimation with country fixed effects and regional time fixed effects. We derive impulse response functions using local projections and controlling for lags and forwards of the temperature

IRR = Internal rate of return

Sources: Authors' calculations; S&P Global Ratings

3. IMPROVING READINESS, DEMAND MANAGEMENT, AND ADAPTATION ARE CRITICAL

The results of our analysis provide insight on the economic dynamics at play when a temperature shock occurs. Yet they do not take differences in how countries prepare and respond to climate change into account. In this respect, we find that some adaptation has occurred over the years, with the sensitivity of GDP to a one-off increase in annual average temperature about 30 percent lower in the late 1990s than during 1965-1995 time period (Figure 8). This compares with a 258 percent increase in labor productivity in low- and middle-income countries (based on GDP per capita) between 1991 and 2021. Economies with better readiness to cope with climate change (as defined by the University of Notre Dame's ND-GAIN index) have been able to avoid most of the negative impact related to higher temperatures, while macroeconomic tools, such as lower interest rates, also helped cushion the impact on growth.

3.1 Increased readiness seems to be key to avoiding the negative impact on growth

Countries with the highest readiness (as defined by ND-GAIN indicators those displaying highly flexible product and labor markets, elaborate social safety nets, and stable institutional setups), do not experience a drop in income when temperature rises (Figure 9). Such economies may even experience an initial boost, perhaps due to some adaptation investment in response to the shock. By contrast, countries least ready to cope experience more permanent losses, with GDP per capita still declining up to six years after the temperature shock. Some of the variation in impact is likely linked to the composition of economies, where countries more ready to cope tend to be less dependent on agriculture and more service-oriented economies, like Singapore. However, it also highlights that geography alone is not the main determinant of economic outcome in the face of climate change.

Box 1: What adaptation looks like in practice

Adaptation to climate change can be evident even when readiness is relatively low

Measures of countries' readiness mostly typically reflect high-level drivers of adaptation (that is, the changes required to withstand the impacts from climate change) and resilience (that is, our ability to withstand the impacts from physical climate risks, while incurring minimal damage to society, the economy, and environment), as well as whether a country has the necessary finances and provides an adequate business and institutional environment to make effective use of investments in adaptation.

While our findings suggest that financial capacity and institutional setups play an important role in cushioning economies from losses linked to climate change, they do not tell us much about what countries, companies, and communities have already done to face and manage climate-related risks. Adaptation can also occur where readiness is relatively low, although this often happens with international support for financing and designing technical tools.

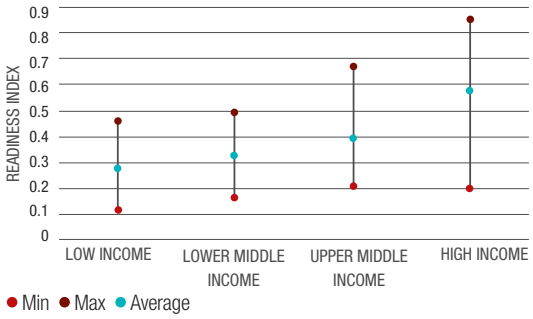
In practice, adaptation measures are multifaceted, reflecting the location- and context-specific nature of vulnerability

However, it is possible to distill adaptation measures into different types, for example:

- **Structural or physical options:** including engineered options such as a sea wall, technology (like an early warning system), or ecosystem-based adaptation, such as the restoration or creation of habitats (like mangroves that can help to reduce the impacts of cyclones, flooding, and coastal erosion).
- **Social:** including improvements to education, information awareness, or behavioral change.
- **Institutional:** including economic incentives, laws or regulations, policies, or programs.

It is also worth noting the significant overlap between adaptation measures and disaster risk reduction (DRR), or disaster risk management (DRM), measures and frameworks – for example, the Sendai Framework for Disaster Risk Reduction (SFDRR) (supported by the European Commission) and the E.U. Strategy on Adaptation to Climate Change, both of which serve to leverage synergies between DRR and climate change adaptation.

Figure 11: Readiness to cope with climate change correlates with higher economic development



Note: A higher score indicates a greater readiness
Sources: Notre Dame Global Adaptation Initiative; authors' calculations; S&P Global Ratings

3.2 Tools to manage demand also influence the direct impact of weather shocks

For example, we identify that when temperature shocks occur during a period of low interest rates, that environment can be of significant help to cushion a one-time climate shock. Economies with the highest real interest rates (of about 1.1 percent in our sample) do not show signs of recovery, even after eight years, in contrast to those with low or the median interest rate (0.01 percent and 0.1 percent respectively; Figure 10). This implies that lower interest rates help economies recover, for example, by providing incentives for investment and lowering the cost of financing for the whole economy. In a broader context, this would suggest that one way less vulnerable countries can help more vulnerable economies cope with climate shocks is by providing concessional finance.[3]

3.3 Adaptation and resilience foster economic development, and vice versa

While we find that high readiness helps countries mitigate the impact of climate shocks, we note that indicators of readiness themselves correlate with economic development given their focus on economic, institutional, and social factors (Figure 11). At the same time, our analysis highlights that climate change is already making it harder for lower-income countries to catch up to more developed nations. This circularity seems to indicate that changes in climate are another barrier to development for EMDEs.

It also implies that economic development and resilience to climate change feed off each other. Viewing adaptation to climate change in this context could thus also support long-term growth prospects for EMDEs. As such, institutional measures to promote adaptation, such as improving education, social safety nets, and product and labor market flexibility, are likely to overlap with economic development goals. Countries may find a third way to escape what seems to be a climate change-economic growth doom loop. Those would likely stem from more granular, readiness measures that work specifically for certain EMDEs, absent strong economic development (for which data is scarce); whereas our cross-country comparison of readiness to cope with climate change focuses on high-level institutional, economic, and social differences.

4. CONCLUSION

The starting point in temperature matters and there is a nonlinear relationship between temperature and growth, these are two important takeaways from this article. By linking economic output (GDP) to countries' annual average temperatures, we document that many advanced economies have more favorable temperature starting points when it comes to climate change. Since lower middle-income and low-income EMDEs are concentrated in areas with much warmer climates, our results suggest that temperature rise would be another dimension holding back this set of countries to achieve durable growth in the long term, which is a precondition for convergence with high-income economies (as implied by neoclassical growth theory), although causal interpretation is difficult. Even though a one-time temperature increase has a temporary impact on economic growth, there is a permanent relative loss of GDP in countries with hotter climates than those with lower average temperatures. Additionally, hotter temperatures can make downturns worse, even in economies where the climate is close to what is perceived as the 14°C optimum. Taken together, our findings suggest climate change will make economic convergence more difficult for EMDEs, most of which are located in hotter climates.

Economies have adapted somewhat to one-off temperature increases over the past decades, with the sensitivity of GDP to temperature shocks decreasing by about 30 percent over the past 20 years. Supportive macro policy responses have also helped economies recover from climate-related shocks, restrictive monetary policy seems to amplify the shock, whereas low real interest rates are associated with little scarring.

[3] https://bit.ly/3KSlpJv

Appendix: Methodology and data

Our model focuses on the short- to medium-term dynamics stemming from a one-time annual temperature shock, rather than the very long-term impact of a chronic increase in temperature. We look at the relationship between temperature and real GDP per capita using a sample of 190 countries. The data underlying this analysis is taken from several sources:

- Climate variables from the Centre for Environmental Data Analysis
- Readiness measures provided by the ND-GAIN database
- Macroeconomic variables from the World Bank's database (GDP per capita, gross capital formation, and infant mortality) and Penn World Tables (sectoral value added, capital, depreciation of capital, productivity, real rates of return, and human capital)
- Data sample from 1965 to 2020; the availability of historical data varies by country.

For our main model, we use a panel regression where GDP per capita growth is a function of:

$$\text{dlog(GDP per capita)}_{i,t} = \beta_1 \times \text{Weather}_{i,t} + \beta_2 \times \text{Weather}_{i,t}^2 + \gamma_1 \times \text{Weather}_{i,t-1} + \gamma_2 \times \text{Weather}_{i,t-1}^2 + \text{dlog(GDP per capita)}_{i,t-1} + \varepsilon_{i,t}$$

Weather variables include average annual temperature (T) and average annual precipitation (P). We also use country (i) and year (t) fixed effects to control for country differences (like macroeconomic conditions, latitude, and economic structure) and time specific shocks. Standard errors are clustered at the country level. Note that we replace GDP per capita with other dependent variables when we investigate the channels of the shock (like sectoral value added and growth components).

For impulse response functions to model the impact over time, we use the Jordá (2005) local projection method. The dependent variable becomes the cumulative growth rate of GDP (or the other dependent variable mentioned) between horizons t-1 and t+h. In the local projection regression, we also add controls for forwards of the weather variables (i.e., temperature and precipitation values in time t to t+h), to ensure that we isolate the effect of the weather shock occurring in time (t). In other words, the model only looks at the short- to medium-term effects of temperature increases on GDP.

For the growth at-risk exercise, we employ quantile regression for panel data on the same specification as above. The following tables show the results for the 10th, 50th, and 90th growth deciles; that is, we create subsamples of the data according to where they sit in the GDP per capita growth distribution (for example, the lowest growth rates would be found in the lowest 10th decile).

Table 1: Basic summary statistics by income*

	NUMBER OF OBSERVATIONS	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
Advanced economies					
High income					
GDP per capita growth	2,931	2.1	4.9	(79.1)	56.9
Temperature	4,026	15.0	9.5	(17.2)	29.5
Emerging markets and developing economies					
Upper middle income					
GDP per capita growth	2,402	2.1	7.6	(105.0)	87.7
Temperature	3,233	19.2	7.8	(6.7)	28.7
Lower middle income					
GDP per capita growth	2,521	1.5	5.2	(46.2)	35.9
Temperature	3,111	21.8	7.2	(2.0)	29.3
Low income					
GDP per capita growth	1,199	0.4	6.7	(64.6)	31.9
Temperature	1,586	24.3	4.6	4.6	29.4

* Data observations for 196 countries in annual average terms from 1960-2020

Table 2: Basic summary statistics by region

	VARIABLES	NUMBER OF OBSERVATIONS	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
East Asia & Pacific	GDP per capita growth	1,411	2.5	5.8	(79.1)	35.9
	Temperature	1,952	22.3	7.3	(2.0)	28.9
Europe & Central Asia	GDP per capita growth	2,067	2.2	5.4	(60.4)	65.3
	Temperature	3,233	8.4	5.5	(17.2)	20.6
Latin America & the Caribbean	GDP per capita growth	1,952	1.5	4.8	(33.8)	35.6
	Temperature	2,196	24.0	3.7	7.9	29.5
Middle East & North Africa	GDP per capita growth	742	1.3	9.6	(105.0)	61.9
	Temperature	1,098	22.3	3.9	15.4	29.3
North America	GDP per capita growth	152	1.8	3.0	(7.1)	11.6
	Temperature	183	8.5	10.8	(7.3)	22.6
South Asia	GDP per capita growth	364	2.6	4.4	(42.6)	22.3
	Temperature	427	20.1	8.0	6.7	28.6
Sub-Saharan Africa	GDP per capita growth	2,365	1.0	6.4	(64.6)	87.7
	Temperature	2,867	24.6	3.3	11.3	29.4

Source: S&P Global Ratings

Table 3: Results for quantile regression for panel data (QRPD)

Number of observations	8,856					
Number of groups	193					
Min observations per group	6					
Max observations per group	59					
For 90th percentile						
GDPPC_GROWTH	COEFFICIENT	STANDARD ERROR	Z	P>Z	95% CONFIDENCE INTERVAL	
temp	(0.07)	0.01	(5.10)	0.00	(0.09)	(0.04)
temp_sq	(0.01)	0.00	(22.12)	0.00	(0.01)	(0.01)
lag_temp	(0.23)	0.01	(18.55)	0.00	(0.26)	(0.21)
lag_temp_sq	0.01	0.00	36.09	0.00	0.01	0.01
lag_gdppc_growth	0.20	0.00	493.09	0.00	0.20	0.20
For 50th percentile						
temp	0.69	0.01	63.95	0.00	0.67	0.71
temp_sq	(0.02)	0.00	(54.39)	0.00	(0.02)	(0.02)
lag_temp	(0.66)	0.01	(57.66)	0.00	(0.68)	(0.63)
lag_temp_sq	0.02	0.00	45.04	0.00	0.02	0.02
lag_gdppc_growth	0.33	0.00	184.02	0.00	0.33	0.34
For 10th percentile						
temp	0.78	0.04	17.66	0.00	0.69	0.86
temp_sq	(0.04)	0.00	(25.06)	0.00	(0.04)	(0.04)
lag_temp	(0.73)	0.04	(16.32)	0.00	(0.82)	(0.64)
lag_temp_sq	0.03	0.00	20.24	0.00	0.03	0.04
lag_gdppc_growth	0.32	0.01	50.86	0.00	0.31	0.34

* Estimates generated using Stata's QRPD, an estimator developed by Powell (2015)

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