Chapter 12: Strategizing the future of finance: Ethical artificial intelligence, sustainable investment, and the role of regulation in innovation

12.1. Introduction

With the emergence of Artificial Intelligence (AI), the future of finance is making a definitive turn towards faster, more efficient, and effective instruments. Wealth creation and sharing used to exclusively occur in the private sector, but state institutional powers have targeted private gains to lessen the burden on society and direct market funds toward strategic goals that create public gains. At the same time, the private sector is increasingly taking on social functions by awarding monetary gains for building inclusive climates or ecological safety, thus both private and public gains overlap (Schanzenbach & Sitkoff, 2020; Zeng et al., 2021).

Notably, the negative spillovers of finance directed towards private gain are increasingly unbearable. Today, private action facilitates the accumulation of wealth in the hands of a few. The blockchain infrastructure is fuelling and exacerbating a trend already anticipated by economic scandals. What has seemed lost in the discussion about financialization, resulting in using money only to make money, has been the idea of risk taken in pursuit of private gain resulting in the sharing of risk and reward. Indeed, what could occur tomorrow to cause ordinary citizens to contribute to greater gains? Such is the objective of this essay: to explore that question, sceptical about the sustainability of finance conceived as using money only to make money and relying exclusively on private accumulations Døskeland & Pedersen, 2016; Arner et al., 2017; Gikay & Stanescu, 2022).

We cannot escape the idea that the worst in store for us is the dream of speculative finance resulting in high volatility of financial assets relative to their value. We consider

that speculation is a form of gambling, and gambling is based on high positive outcomes that are extremely unlikely. But what if the future were no longer mainly concerned with speculative finance, but with directing money towards the accomplishment of strategic goals that would create public gains? Would such a financial world force both the public and private sectors to accept that financial fate, pushed by risk-sharing?

12.1.1. Overview of the Sections

A new era in finance is emerging in which the focus is on a selective pool of innovation that aligns with the grand investment trends of our age and where what ought to be has more weight than what must be. These investment trends of our age are also referred to in shorthand as the "ethical AI" and "sustainable investment" megatrends. Differently put, a broadening of the investment landscape is set to take place where there is a selective focus on innovations that do good, or are good for business, and de-prioritization in the investment of financial innovations that are blamed for behaving badly.

Fig 12 . 1 : Strategizing the Future of Finance

One of the purposes of this volume is to bring clarity into the investment serration process and identify the role of regulators and financial authorities in this process. Section 2 provides a taxonomy of the major megatrends in finance to set the foundations. Section 3 discusses the megatrends in more detail while identifying the specific factors

that are predicted to shape the investment sector from different angles over the next few years. Section 4 highlights the ESG rules framing the finance investment landscape and discusses their implication for financial actors. Section 5 examines asset allocation in light of the megatrends in finance and discusses their impact on the types of risks that investors are confronted with. Section 6 discusses the responsibilities of financial authorities and regulators in ameliorating ESG-induced risks in finance, and Section 7 concludes.

12.2. The Evolution of Finance

The discipline of finance has evolved to fulfill the broad purpose of transforming economies' resources from units and periods of low-value and low-yield — typically consumers, businesses, and governments without adequate funds for their current and developing needs — to units and periods of high-value and high-yield which are then used as financial assets to produce interest or capital gains. This is accomplished by giving individuals and institutions with surplus liquid funds a chance to lend to, or buy securities issued by, borrowers who are prepared to pay a risk-adjusted return for funds that are not needed for a specific period of time. In the course of history, finance has evolved qualitative new roles, driven by external socio-economic or technological changes and developments. History shows that the unexpectedly forced adoption of new forms of finance was difficult and cumbersome at the beginning. There were frequent setbacks — and even mass disasters — on the way to the gradual steadying of systems and routines, business practices and institutions. Countries temporarily moved out of advanced technology finance and trade back to a kind of "savage" barter system. Long historical examples are China in the 11th century, Europe in the 14th century, and Japan from the end of the 18th century to the 1860s. Only gradually along the way have nations and regions adapted their financing processes to accelerating technological and service constraint changes and the higher standards of living these produced. The most recent development over the past three decades or so has been a political revolution aimed at de-regulating finance. This has allowed the free market elements of financial development to flourish — with large effects for the world economy. This raises the question of whether the late de-regulation revolution was indeed a search for the best market solution for financial deepening. Or on the contrary whether the institutional backwardness of the world in the domain of finance called for a more interventionist set of economic policies or regulations, designed to adapt the financing of economic development to the requirements of a postmodern world.

12.2.1. Historical Milestones in Financial Development

In the historical analysis of social and economic development, finance evolved gradually. In fact, it all started with agricultural and horse trading, and then animal husbandry expanded from its original narrow base to first create surpluses and then the need to store them. This led to the next step, with families accumulating wealth through agriculture building large storage facilities in villages to offer safety to their less wealthy neighbors for a fee. Neighbors depositing surplus goods during high-crop years and redeeming them in lean years creates the need for accounting and receipts representing surpluses now stored rather than physically held. The next step develops when traders build warehouses in cities. This step increases efficiency since traders have more access to agricultural surpluses, use the receipts to make purchases, and then deposit the receipts for redemption at the warehouse on a future date. This interchangeability from temporarily converting agricultural goods to receipts, using those receipts to conduct commerce, and then transforming them back into specific agricultural goods increases the velocity of money.

Those developments enabled populations to specialize in trading rather than agriculture and create the first real cities which, like marketplaces today, attracted people from neighboring regions with specific skills, like blacksmithing or weaving, and could support specialized artisans. The physical marketplaces were now also supported by written accounting with bills of exchange through which sellers could allow buyers not to pay cash at the moment, with drawing and remitting banks facilitating the payments using bills of exchange that those banks would accept for their customers as claims. This is how written credit conditions evolved over the next 400 years, until the spread of the Industrial Revolution. The means of production were now being changed from horse-drawn plows to steam engines and humans engaged in farming were being replaced by labor in factories.

12.3. Understanding Ethical AI

Artificial intelligence (AI) adds to the existing intellectual toolbox for investigating human beings' behavior and the course, functioning and controlling of systematically important infrastructures. AI is likely to be increasingly helpful in the brute force solution of complex optimization problems which appear in a host of management and logistics problems; moreover, big data and AI open up new avenues of social and financial science research. AI has already made a foray into prediction and classification problems that have always attracted scientists in their quest of the Holy Grail of a science of unearthing the causal chains that bind human nature. It can be expected that both more predictive and more prescriptive models will increasingly help to understand what motivates people to take decisions that special interest exploit by steering behavioral drivers like the degree of recency and the temperature of the moment in the hopefully

generalizable choice heuristics of Homo sapiens. While there are potential frictions such as biased results and solutions due to biased data applied in a black box environment, be it through supervised learning or reinforcement learning in the case of massive data applications, these drawbacks must not obscure the benefits that an ethical application of AI in a properly supervised fashion will bring to the empirical research and advisory toolkit to be applied in behavioral and financial sciences alike. AI has the potential to help increase transparency across a variety of processes, enabling a better understanding of risks, improving fraud and transaction monitoring, and enhancing customer due diligence practices.

12.3.1. Definition and Importance

Ethical AI, the practice of designing and implementing artificial intelligence (AI) systems that are not only technically proficient but also adhere to ethical norms and standards, will be key to developing a financially inclusive future that leaves no one behind. Its importance is amplified in the financial sector, where the consequences of unethical decision-making can be devastating and far-reaching. A commitment to ethical AI will also help the financial sector address the dual challenge of mutable public trust and AI-related resistances associated with job displacement and economic inequality. One way how the financial sector can simultaneously address such resistances and rebuild lost public trust is to use the capital at its disposal to support and offer services to all vulnerable segments of society. Ethical AI can generate insights that help institutions address root socio-economic causes for AI resistances leading to a win-win solution.

Although there is not yet a widely accepted definition for ethical AI that applies across domains and cultures, there is a growing corporate consensus on ethical AI principles such as fairness, accountability, transparency, inclusiveness, reliability, security, safety, and privacy. Such principles reflect the value judgments made by and the levels of accountability conferred to the designers and builders of AI systems and the particular societies in which such principles are enforced. AI systems need to be educated and trained in accordance with these principles, otherwise there is a risk of them inferring biased and unprincipled predictions and decisions. Several questions need to be addressed when it comes to ethical AI on a domain-by-domain basis. Such questions can address topics such as use case, objectives, diversity in the input data, ability of affected stakeholders to review, explainability, and privacy considerations.

12.3.2. Current Applications in Finance

Over the years, the power of AI has made it ubiquitous in markets, management, and trades within and outside finance. It has facilitated pattern recognition, data ingestion and analysis, business optimization, customer reach and engagement, branding, product offerings, and overall decision-making with its unique ability to enhance processing capabilities in the face of increasing pressures for growth and performance. These capacities have indeed allowed the business of finance to be significantly more efficient, offer greater breadth and depth of products and relations, and enhance trading profitability while also lowering trading costs. The various AI capabilities – such as Data Mining, Predictive Analytics, Machine Learning, Robotic Process Automation, Natural Language Processing, and Speech and Vision Recognition – are being used in finance to develop tools for FinTech, RegTech, AuthTech, InsurTech, CreditTech, and WealthTech, and apply them to myriad use cases.

Financial institutions and companies are harnessing AI for a repertoire of capabilities including faster and more cost-effective trade execution, portfolio management, and investment strategy development; credit assessment and risk management; anti-money laundering and discovery of financial frauds; smoother and less expensive compliance and Ethics-Tech; underwriting of insurance, management of claims, and prevention and acts of evasion; valuation of risks and development of niche products and services; know-your-client and other customer interactions; enhancement of operational processes, including Know Your Machine and verification; detection and management of cyber risk. These applications are being deployed by a range of stakeholders – such as banks, hedge funds, family offices, asset managers, pension funds, buy-side and sell-side firms; and across a variety of purposes including trading, compliance, command, risk and portfolio management, research, advisery, operations, insurance, and lending.

12.3.3. Challenges and Risks

Instruments based on ethical AI can still be gamed by unethical actors. To counter this, ethical constraints must therefore be embedded within smart contracts of ethical DeFi instruments, making any deviation from the rules impossible. However, it always remains possible that ethical AI is used to refine and optimise strategies that are only least socially damaging in those very rare cases that have been anticipated by ethical AI. Even more worrisome is the use of unethical AI, which applies to models that are not constrained by ethical values either functionally or even manually. This could lead to devastating consequences. Moreover, the behaviour of AI markets, and indeed many other financial markets,

that are relying on AI, are difficult to predict. Therefore, it is really not possible to rely on AI assistant tools to ensure that the maintenance of collective stability, security, and welfare. This implies that reliance only on AI and DeFi to govern a significant part of the financial system would be a mistake. A prudential regulation, through which risks posed by reliance on AI are contained, very much remains necessary. Potential systemic risk could also persist due to the interconnectedness of different DeFi services. Financial innovation in DeFi, as is the case for traditional finance, tends to be very rapid. Encrypting and tokenising assets such shares or commodities does move their ownership into the blockchain, and thus governable by smart contracts. In so doing, it is possible to make these assets much more liquid than in the traditional financial market. By allowing traders to take on huge liquidity-based bets, the financial risk tolerability threshold is breached and perhaps a new market crash is produced. In other words, such drowned volatility would threaten the entire financial economy.

12.4. Sustainable Investment Strategies

1. Overview of Sustainable Investment

Investing in a manner that is compatible with a sustainable world is the key focus of this section. Sustainable investment has been defined as an investment strategy that considers environmental, social, and governance factors, in addition to financial performance; looking for both strong returns and positive impact. This is related to the concept of corporate social responsibility that is to be achieved through a stakeholder approach to the business and management activities of a firm. A company practices corporate social responsibility when the interests of its stakeholders are taken into account, and is said to practice strategic corporate social responsibility only when these activities are integrated into the core profit making strategy of the firm. This approach requires necessary tradeoffs to be made between the interests of various stakeholders to optimize socially responsible behavior. The importance of the stakeholder approach is that it expands the concern of corporations beyond just shareholder wealth maximization to factor in the well being of all stakeholders, who may suffer consequences from the activities of the firm. Corporations have the ability to employ both positive and negative means to impact stakeholders.

2. Market Trends and Growth

Worldwide, sustainable investments in the alternative investment sector have reached USD 21 trillion, accounting for 25% of the global investment space at the end of 2020. In the U.S. market, total sustainable investment assets under management reached USD 12 trillion in early 2022, which is a 25% increase in two years since 2020. Europe continues to enjoy a position of leadership in sustainable investing with Paris emerging as the new sustainable finance capital of the world after Brexit. Climate change and other environmental, social and governance issues have taken a more prominent place on the agenda, partly due to the pandemic. This has pushed companies and investors to look towards democratizing wealth and degrowth, along with the more traditional focus areas of climate change mitigation and adaptation, such as increasing energy efficiency.

12.4.1. Overview of Sustainable Investment

Sustainable investments are investment operations in the financial services space that, in addition to optimizing for traditional financial results, also optimize for ethical goals with regard to social and environmental issues. Investment firms accomplish this optimization using different criteria and methods for coinciding with the ethical objectives of their investors. The interest in and volume of sustainable investment is growing in the marketplace. The contribution of private capital, as a part of the global funding solution to reach the objectives of the Paris Climate Agreement, is being recognized by many. The capital markets have access to a vast pool of capital to fund the transition envisioned by the Agreement. Nevertheless, to realize the economic financing opportunities offered by the Agreement, several prerequisites and enabling factors have to be created. The value proposition for investors engaging in sustainable investment has to be strengthened, towards achieving competitive risk-adjusted returns, while measuring the impact of sustainable investment on achieving positive change in furtherance of the ethical objectives, for example through the converging goals of the Sustainable Development Goals framework. Furthermore, reporting and disclosure obligations in relation to climate risk have to be implemented by financial regulators across the globe.

A significant amount of financial decision-making in the public markets is currently based on questionable or poorly-documented financial models, which rely heavily on historical data, especially in relation to risk and return. In sustainable investment, for many of the key risk factors, historical (and existing) data is often limited or non-existent. Determining exposure to climate risk is even being referred to as having unpredictable borderline characteristics that require engendering the risk models with the qualitative assessments of self-interested parties with skin in the game. Innovation is

required in terms of applicable methodologies in these new frontier areas of investment decision-making and asset pricing if private capital is to play a significant role in funding the transition required to avoid the worst impacts of climate change.

12.4.2. Market Trends and Growth

At the end of 2020, global sustainable investment assets reached USD 35.3 trillion in the six major markets: Europe, the United States, Canada, Australia and New Zealand, Japan, and Mexico, which was a 15 percent increase over the previous two years. Amazingly, assets in the EU alone were estimated at over USD 18 trillion. The boom has been particularly driven by institutional investors. Interestingly, since the Global Financial Crisis of 2007 to 2009, asset growth rates are higher for equity funds that apply ESG screens than for all equity funds. Although only 2 percent of the total real-settled derivatives notional volume is categorically labeled as ESG, there has been a compound annual growth rate of 71 percent for such ESG-focused derivatives over the past three years, compared to 19 percent for all derivatives.

In terms of size categories, there is strong interest in private equity/venture capital funds, investing in various ESG-related strategies, including climate tech, agriculture and food, diversity, equity and inclusion, education, health and wellness, and mental health, as opportunities for the accelerating impact of sustainable investment strategies. Accordingly, academic studies continue to document evidence of a significant and growing value-added across equity, fixed income, and private equity markets, even after considering diversified long-term holding periods and controlling for alternative explanations. Such value is generally attributed to the integration of ESG considerations into the traditional investment process, leading to improved risk management and the identification of ESG-driven growth catalysts.

12.4.3. Impact Measurement and Reporting

Sustainable impact measurement and reporting involves defining, measuring, and reporting the breadth and depth of impacts across the economic, environmental, and social dimensions. Impact measurement and reporting of data, including backward-looking data from prior-year investments and forward-looking estimates from planned or proposed allocations to thematic strategies, can capture both implicit and explicit returns from thematic impact investing. Economic data include estimates of output created or revenue generated, value-added, gross-profit, and taxable income. Environmental data include estimates of tons of carbon saved or reduced, cubic meters of water consumed or saved, and tons of solid waste generated or reduced. Social data include estimates of the number of people employed, the number of people trained and

receiving support services, and the number of people meeting minimum standards related to living and working conditions.

Estimates of the magnitude of economic, environmental, and social impacts cannot measure changes in specific themes over time. For example, improving the conditions of work would be more impressive if the composting of organic waste or servicing of access to safe drinking water, hygiene, and sanitation generated a profit of $1 million or $2 million, respectively, than if these enterprises made modest profits of $100,000 each. Thematic impact measurement and reporting will thus always be a work in progress. External impact ratings geared to publish listed companies or active mutual funds are only meant to be taken as starting points in the design of a thematic strategy. Consequently, external support services on impact measurement and reporting will need to be used, with investors paying these organizations to rate investees and undertaking impact due diligence before committing their capital.

12.5. The Role of Regulation in Financial Innovation

The financial industry is known for its innovation cycles, wherein new products and tools emerge to disrupt the status quo, such as credit cards, electronic trading, or crowdfunding. The motivations behind such disruption are numerous, including a competitive need to attract more resources and customers through cheaper offerings or a desire to create and capture new value propositions. However, accompanying this innovation is risk—future events including financial crises and contagion have resulted in great societal and economic ill effects. In one of the earliest instances of financial regulation, the Bank of England was founded in 1694 to protect the English economy from the threat of instability by providing a centralized source of capital. Over the last century, a multitude of regulatory agencies and frameworks have emerged around the world to monitor and regulate the financial sector, performing various core functions.

While their mission is to discourage reckless celebrations of innovation, the function of regulation in the context of financial innovation is not to stifle it completely. Instead, an effective regulatory framework needs to establish the right balance in order to afford the benefits of innovation without succumbing to the associated risks. The technology revolution that has accelerated considerably during the pandemic presents policy and regulatory makers with a renewed challenge for modernizing these frameworks in order to be effective going forward. As such, we examine how regulation has balanced innovation and risk throughout history in order to inspire how we approach the task today. We begin by first considering examples of how regulators have effectively been on both sides of the debate as experienced or inept.

Fig 12 . 2 : Regulation in Financial Innovation

12.5.1. Historical Context of Financial Regulation

A great deal of financial regulation today can still be traced back to the response of states to the Great Depression and the subsequent World War. For instance, the main premises of the Basel Capital Accord still build on the original concerns of the Glass-Steagall Act, which was one of several acts enacted to stem the risk that had built up around the US financial system in the 1920s. Similarly, investment company regulation in the US is grounded in concerns over imbalances emerging in and around the financial intermediation process during the early 1930s. The property crisis in the US in the late 1980s and early 1990s, particularly the failure of savings and loans, also stemmed in large part from the inability of regulators to keep pace with innovations in the mortgage market. These events continue to influence thinking on the regulation of private equity and investment funds today.

Financial regulation came to prominence in response to a particular sequence of financial disasters brought about by the way markets function: inappropriate incentives, failures of information processing, the way in which financial instabilities spread from one country to another, political interference, and regulatory capture. In short, the aim of regulation was to make the financial services sector function more reliably. Regulation then attempted to correct for what was viewed as market failures, such as those associated with the presence of major externalities, or local monopolistic behavior present in banking markets. Furthermore, central banks were always granted quasi-autonomous powers, largely through their role as the lender of last resort, to use their

regulatory framework to deal with failures related to imbalances that were specific to the financial sector: excessive risk-taking relative to bank capital, and the correlated dangers associated with bank runs.

12.5.2. Balancing Innovation and Risk

The regulation of certain areas of finance builds in expectations of return that stymie innovation. Regulation reaffirms the wisdom of a particular set of processes and business models. And so, if systemic risk is of the utmost concern, regulation too should re-affirm existing structures and processes. Yet finance innovates because that is its purpose: creative destruction. Balancing these competing dynamics demands a constant weighing up of competing and conflicting objectives. It is easy to balance when one objective is moving we are in a crisis and the movement of the first is clearly in one direction. However, at other times – and in between the big movements of risk or innovation – the tension between the two demands judgements of value and realism in equal measure.

How regulators have made that judgement call has varied vastly over time, from one country to another, and even from one agency to another within each country. In some countries it has tended toward a preference for stability regulation, while in others it has tended toward a preference for innovation regulation. And – again – within countries even from agency to agency. These policy goals were at times achieved through process specificity regulation and others through portfolio concentration or systemic risk regulation. The French had their engagement coefficients, which effectively mandated differences in yield – and absorption through market-making functions – between the bonds backing Caisse Des Dépôts et Consignation and all the other bonds in circulation at any point in time. Throughout history, regulation has evolved in tandem with the business cycles of innovation and stability, and innovations of FinTech in the 2020s – and the digitalization of finance – are no different.

12.5.3. Case Studies of Regulatory Frameworks

As discussed in Section 5.2, our argument is that regulations should balance financial innovation with risk propensity to minimize consequences of any new financial products. We propose two case studies with relatively different regulation framework within which innovation took place: the United States and the United Kingdom. We found that the US approach to financial regulation is centered around conflict of interest and has a higher level of prescriptiveness, while the UK focuses on conduct regulation, is outcome based, and less prescriptive in nature. The US long-term capitalism model allows for private management of funds, primarily for external equity owners, while the UK short-

term capitalism model relies on institutional ownership of equity, primarily for external equity providers.

The regulatory policy with respect to AI application in finance may be subject to mainly two important characteristics. First, where regulators consider that some aspects of responsibility associated with AI systems cannot be performed by the developers or users of AI systems in question, they may intervene by imposing certain legal and practical responsibilities or prohibiting implementation of such systems. Second, based on the assessment of the possible conclusion arisen from particular risks, regulators may conclude that AI systems can be applied with minimum or no adverse influence on products or services. AI tools may enhance levels of efficiency and security in providing financial products or services in question and start-out investments of Fintechs or individuals on regulatory supervision.

12.6. Intersection of Ethical AI and Sustainable Investment

There is a growing recognition of the important intersection between the spheres of sustainable investment and ethical AI development and deployment. Part of this stems from the rising interest in AI and the wider array of sensitive issues raised by its potential proliferation through finance that AI systems will need to solve. While the use of AI itself must be responsibly and prudently done, we should not lose sight of the opportunity that data-centering, AI-enabled future finance presents to help solve environmental, infrastructural, demographic, and equity problems at national and global levels. Deep Impact Finance catalyzed by powerful, mission-driven investors or policy makers who create the ecosystem for successful cutting-edge companies can help make the examples given above live up to their apparent promise. More generally, urgency exists at present in mobilizing capital to mitigate climate change due to the planetary emergency we now find ourselves in. But equally, a major hurdle is being able to correctly and confidently map the contours of risk associated with this systemic shock.

This at the same time provides open doors through which mission-driven AI can enter. For instance, shaping of frameworks for how to include in investment decisions the uncertain and vague set of "nature-related risks" would provide clear guidance to companies on metrics to gather and allow actually Quite rightly, many argue that information asymmetries regarding potential 'greenwashing' of promises or semi-structured data-based impact assessments lack sufficient granularity and timeliness. Can the employment of Machine Learning and Natural Language Processing in particular to analyze vast troves of data, for attribution modeling of clinical outcomes, or for sentiment metrics, be leveraged such that company performance on implementing gotten to the point where routine performance-based assessments and verification are possible?

12.6.1. Synergies and Opportunities

The ongoing dialogue between AI researchers and the representatives of the global investor community in the context of the Asset Owner's Policy Discussion Paper has explored how to implement the AI Ethics Overview in financial decision-making; how AI technology can help comply with existing global ESG frameworks and policies; and how the application of AI technology for investing can contribute to, or conflict with, sustainable outcomes. A number of frameworks have been proposed by global investors as reference guides. The Ethical Guidelines for Investment Products Based on AI describes the core concerns of regulators and society: the principles of Religious Foundations, Harmony, Oneness, Openness, and Care through a Board of Wisdom.

Ethical AI has the potential to serve as a powerful catalyst for the implementation of socially responsible investment strategies globally, and a useful detector of "greenwashing" in the investment process. Contributing to that goal is the approach of the AI Ethics Guidelines. Such ethical reference guides allow product and service developers to align their solutions with the values of their stakeholders, and close any gaps between potential risk and actual ESG principles and criteria. Such an alignment of interests between the investors and the companies provides the groundwork for a true partnership around the understanding and processes of ethical/value-driven corporate governance functioning in tandem with AI-enhanced risk management.

12.6.2. Potential Conflicts and Resolutions

However, potential conflicts between implementing more ethical AI and pursuing sustainable investment practices may arise. These can include difficulty measuring difference enhancements to AI, disenfranchising people by eliminating their jobs, implementation costs, and even opportunistically 'greenwashing' and funding opaque industries. Companies are likely to either realize near-term profits that are not accounted for in their decision-making or invest in building their social credibility over time. Indeed, many companies today claim their commitment to being sustainable investors in their qualitative disclosures, only to keep acting like regular profit-maximizers when their quarter earnings are released. Or they gradually skip their expenses for upgrading to more ethical AI usage for a while until a significant AI failure occurs. The environmental benefits of AI are areas where growth and risks are well-defined, and inspection of the tradeoffs or relative importance of the various dimensions at play can be solved easily. The AI risk dimension of adequate transparency is highlighted, and trust and reputation are called upon to be the basis for the shift towards more ethical AI. Revenue-generating threats that are difficult to quantify can materialize only when problems arise. The obvious next step seems to be the collaboration between companies providing AI tools, sustainable investors, and specialists in the design of responsible AI

systems to tackle the problems at their root, devoting resources to developing a transparent AI infrastructure that allows for adequate inspection of investments in those services. Indeed, in the case of mature companies providing commonly used AI tools, this should already be in place, as the lack of it would prevent many fundamental companies' values for consumers and investors alike to be verified.

12.7. Technological Innovations in Finance

This section summarizes some of the most prevalent technological innovations in finance, including developments, blockchain and cryptocurrencies, and applications. The role of technology is critical to all aspects of finance, and we highlight specific participative innovations that affect market structure and the nature of financial services. Our interest is on technological developments that have a significant impact on sustainable investing, responsible investing, and ESG in general. Given the fast pace of change in this sector, the material is not exclusive; we focus primarily on aspects of interest for all stakeholders.

has become a common buzzword of the new 21st century; the term, which can be attributed to a union of the terms financial and technology, refers to those technological innovations that aim to provide solutions for the deficiencies in the financial systems, facilitating, automating, or innovating by offering services that can be considered as financial. In the last years, has been able to effectively and efficiently address the provision of traditional financial services, opening the financial sector to new innovative financial intermediaries, mobile money, chatting apps, and the use of for credit provision. As a result of developments, the competitive landscape is changing, and existing incumbents have had to adapt their business strategies and models to take advantage of the new technological tools and infrastructure adopted also by customers. Overall, emphasizes the digitization of the economy but also forces more attention to the discussion on the role of regulation.

12.7.1. Fintech Developments

Innovation in technology, especially digital technology—especially in the form of computing and telecommunication advances—deregulation, globalization, and the encroaching presence of financial services in the lives of individuals and small and mid-sized firms have driven both the introduction of innovative products and the delivery of old products in new ways. Historically, however, the more aggressive thrusts have come from innovative new lenders located outside the traditional banking system, but recently, in fact, some of the largest banks have also been investing in disruptive technology. Digital-only banks offer a range of traditional banking services—repositories for

deposits, payment services, savings accounts, loans—over smartphones, tablets, and computers, but do so without the infrastructure of a physical branch network. Online lending not only means new channels to facilitate lending across the economy but also different business models for lenders. They have different incentives—speed, convenience, core competencies of data manipulation—than traditional banks, and this opens a host of new propositions for borrowers. New lenders allow many borrowers to avoid incumbents altogether. Consumers may simply shift their transactions to lenders who provide leasing and credit card services without fees (but with high prices). To be sure, such firms take their share of fees every time a transaction takes place, and so consumers may pay more in the long run, but the banks still lose a large share of their fee income even if there is no transaction duration effect. And for many transactions—those that are preferred—and for consumers who frequently establish battery patterns that lead to stored-value cards or debit cards being the most profitable transaction modes, the banks become more costly and less competitive.

12.7.2. Blockchain and Cryptocurrencies

The blockchain was developed in 2008 by an individual known by the pseudonym Satoshi Nakamoto, but it was not until 2013 that the idea came to life with Bitcoin becoming the first alternative currency. The original aim of creating an alternative currency was to eliminate the need for intermediaries in financial transactions and to provide a decentralized mechanism for recording transactions between users. The success of Bitcoin subsequently inspired more than 18,000 currencies and tokens and many other projects built on blockchain technology. Nowadays, there is a universal agreement that blockchain or distributed ledger technology will revolutionize global finance.

DLT was originally meant to execute transactions between peers without the need for a trustworthy party to settle the transaction. From that standpoint, Bitcoin was a virtual currency providing a means of exchange and a store of value. DLT's disruptive potential lies however in its capacity to recreate not only a peer-to-peer payments system cutting off commercial banks from the process of granting liquidity to consumers but more generally a transaction verification and storage system which could replace the centralized agents in charge of verifying transactions in other economic sectors. Just as DLT was aimed at recreating the settlement system used by banks for clearing transactions, a number of other uses were initially envisaged. Smart contracts would recreate the functions of lawyers, notaries and judges for the implementation of legal and business contracts, including transactions involving collateral and escrow accounts.

12.7.3. AI and Machine Learning Applications

AI and machine learning are closely related topics, as the latter is a subdivision of the former. Machine learning refers to computer applications capable of modifying their processing in order to improve their performance after having received more data. It is a method of AI that employs algorithms that can learn from past experiences and thereby optimize the use of datasets and improve themselves, thus allowing computers to handle complex and high-dimensional problems, such as automated speech and hand recognition, natural language processing, forecasting, diagnostic decision-making, and a host of others that were previously reserved for humans. These features and advantages have made machine learning an appealing approach for a variety of complicated business issues. There are various reasons why machine learning applications have come to prominence in finance. First, finance is data-driven by its nature. With the widespread usage of the internet, social media, IoT, blockchain, and quantitative trading, there has been an increase in the availability of large amounts of qualitative and quantitative data related to financial modeling, and consequently, a huge increase in demand for machine learning techniques which can efficiently capture hidden patterns from this data. The second reason is technological advancement that has reduced the cost of and increased the computing power of graphic processing units, allowing very complex neural networks to be trained in practical time frames. Finally, the third reason for the increased interest in machine learning applications in finance is its success. Thanks to the advantages of more realistic modeling of complex systems, as well as the ability of machine learning to combine and analyze large volumes of structured and unstructured data, it has been applied successfully to many areas of finance, such as risk management, credit scoring, high-frequency trading, fraud detection, algorithmic trading, robo-advisory, and several others, with more expected.

12.8. Stakeholder Perspectives

Though finance encapsulates many roles and activities, at a functional level it is concerned with facilitating the flow of funds. Therefore, the spectrum of finance stakeholder views is somewhat narrower than in many other domains. The opening position of finance is that without investment, people are not being compensated for giving up something they could consume now. Their savings can only be well spent on new activities and projects, or on the activities of other savers, if the value added by those is greater than the enjoyment of their current consumption. The role of business finance is to ensure this, and the role of investment is to transfer resources towards that type of economic activity. Without that link, the guardian function of finance comes under threat. Investors will have little idea about how their funds are being used. That is, and should be, the prime responsibility of boards, and they will be fully accountable to

investors for doing it well. They should be ensuring that management are applying capital prudently, not on glossy but misconceived schemes.

Into the discussion of stakeholder input comes the idea of a regulatory role, because of the distance between investors and management. Society is used to relying on regulators or rating markets to keep managers on course and protect capital. Government has a long history of involvement, though for the most part it tries to leave private regulation to monitor companies and keep managers honest. Governments of democratic societies invariably insist on an independent judiciary to enforce debt contracts. The danger is that, without the feedback from investor disappointment, the market will not purge bad management. For the system to work well, it is important that market responses to bad enough behavior are swift and severe. When they are, shareholders benefit from the profit-seeking urgencies in management, just as consumers do from those in suppliers.

12.8.1. Investors' Viewpoints

Investors as stakeholders of AIF assume a variety of roles and may have many opinions on the topic of sustainable investments, but the opinions should be considered according to the investor's position in relation to the investment relationship. Quite generally, among institutional stakeholders, there are two basic and opposing views that should be detailed, the first holding that investors are driven engendering effects from sustainable investments, and the second that investors can influence the company's CSR actions. This consulting study explores perspectives of institutional stakeholders on the investment concept with a comprehensive focus on sustainable investments so that ideally, highlight proposals relevant for developing the investment relation. At the micro-level of finance, the investor–company relation aims at generating economic performance through effecting efficient capital allocation and fund disbursement. Therefore, the relation should be particularized becoming sustainable-related or green, if this process effects positive externalities for the sustainability of the natural environment.

In analyzing and reporting the qualitative interview data with nine institutional stakeholders who grant entry into the sustainable investment decision, the results indicate the delegating decision of the majority of all investors allocate capital to the portfolio companies to be effecting promoting and guiding impacts. The investors influence the signaling and incentive effects of the corporate financial market as an exchange with the companies and coordinate the delegated power with dialogue activities such as shareholder engagement and vote management. The regulating system of the investment relation may enable deliberative appointments – directing and conducting the social action of the corporates towards long-term enterprise value creation, which is a necessary prerequisite for the success of sustainable investments.

12.8.2. Regulators' Insights

The rapid advances in Artificial Intelligence (AI) raise many public conversations and the role which AI should take in creating value and that of regulators in ensuring a balance between innovation and consumer protection. The more urgent the needs of society are, the more important it becomes to ask ourselves how to teach the industry to work openly and effectively together to meet society's needs. This is all the more true in financial markets; the pandemic only highlighted the basic fragility of economic conditions and people's lives. Society thus expects new and better financial products from the finance industry. AI's potential for innovation is thus enormous.

The process of drafting legislation and regulation has increasingly to be carried out in partnership, its preconditions being an ongoing and rigorous dialogue between the regulators and the lobbyists or other stakeholders who help them absorb the knowledge and experience that is critical for successfully regulating a world in constant change. The experience of the last decade with the regulation of the financial economy has amply shown the necessity for companies to understand the substance of the needs which regulation must justify, and also for the individuals drafting these rules to understand the viewpoint of the observers they are seeking to control. Far too often, these discussions remain superficial and short-term; they do not ask the right questions or take a longer-term perspective which would better blend social utility, considerations of effective market and competitive order, and measures for regulatory efficiency.

AI will no doubt not only help improve the quantitative qualities of current market products; it will also permit the rapid opening of new creative paths by better adapting the proposed products to client needs and explaining their designs. However, these new tools, thanks to their continuous presence and the superhuman abilities of intelligent algorithms, also increase the consumer risk tied to digital finance. It is thus necessary for public authorities to rethink today the nature of the links which should connect the finance industry to society as a whole, anticipating the innovations that will appear in the user experience and conceiving the new types of regulation and supervision that should help guarantee accountability with respect to the expected rules, and in particular, those which define transparency, fairness, accessibility for all and integration into a sustainable economic model.

12.8.3. Public and Community Engagement

In recent years, community engagement has been on the rise. There are calls from community groups and citizens that civil society and digital commons should be the priority and financial services should cater to those priorities. Several initiatives are being explored. Many local governments are directly exploring the creation of digital

strategies. Besides, community currencies or local currencies are also becoming interesting financial products. In effect, these financial tools try to imitate Issuing Bank Money, which is performed by Central Banks. Beyond that, many key players in the cryptocurrency ecosystem are trying to create some alternative system.

The answer to the explorations mentioned before is basically one: Community Currencies. These types of financial services and products only serve to some objectives of the community. Their use is supposed to create links between people and the community, to find alternatives to the usual model of the flow of money, to finance and assist sustainable local development, etc. However, there is an important question: Why are those issues of the cryptocurrency ecosystem not used as marketing tools for those community-type currencies, at least to shorten the Bootstrapping Period? The answer is very easy: People trust Bitcoin instead of Bitcoin Currencies. Therefore, this type of currency, aimed at a community or group of individuals, should be normally supported in a cryptographic currency, usually in Bitcoin, at least during its first phases of existence.

Fig 12 . 3 : Public Trust in Crypto Assets

12.9. Conclusion

This short essay has presented some initial speculations on the challenges and opportunities that AI-driven financial capital markets could bring for the future of finance, as well as for the principles of corporate governance and international regulation that regulate them. As early initiatives demonstrated, AI could bolster the conflict-prone nature of financial markets and, that while sustainable investment could be advanced through AI, it could also be levied and trivialized for market opportunities and profit reasons, promoting hollow initiatives and risk windfalls instead. In addition, regulatory proposals suggesting a progressive shift toward sustainability-oriented financial markets through AI investment approaches in international capital markets are emerging, especially in the US and the EU.

In this respect, the Long-term investment – Short-term gain conflict is of primary relevance in the dialogue between AI possibilities and investment market options. Can investors and companies be reoriented toward a healthy, societal-oriented "symbiosis of freedom and responsibility"? Furthermore, can democratic political systems properly regulate AI application in international capital markets and promote their contribution to building a fairer, more equitable future, based on the principles of objective possibility and moral responsibility? Or will they succumb to technocratic capitalist impulses and the mere satisfaction of stakeholder profit interests? Future research and cross-industry collaborative action should aim to further analyze the potential use and contribution of AI in capital markets and promote its intelligent application to achieve a more holistic view of financial enterprises' function for society as a whole, rather than merely serving a fraction of it.

12.9.1. Final Reflections and Future Directions

The recent technological and organizational advancements in financial services are bringing forth a series of innovations that could be considered a "next generation" of finance, enabling enduring and diversified forms of value creation for a broader group of stakeholders. We have focused on the notion of "value" as a primarily normative concept and advocated engagement with the expertise and methods of the humanities disciplines that have hitherto played a marginal role in shedding light on value creation in business. There is a growing awareness that the interdisciplinary connection to the humanities can enhance financial services and more broadly, business, intent on a more deliberate notion of value creation. In the coming years, pioneering financial services firms will continue to innovate by combining on the one hand, computational, big data and analytics competencies with, on the other hand, judgement and deep understanding of human, social, cultural and environmental dimensions. Eventually, we can expect the emergence of a more democratized finance, purporting to align the interests of various

stakeholders, and driving more egalitarian forms of wealth and value creation. In view of the clear necessity to address market failures in the social, environmental, and cultural dimensions, and in light of the changes that technology is driving in the area of financial services, we would like to suggest some promising research directions. Specifically, we would like to highlight the need to clarify the role of government in overseeing and regulating innovation at the intersection of practical and moral philosophy, while at the same time consider the question of curating innovation in these fields, both from a political-economy and public policy perspective and also addressing the question of the limitations of such curation from an ethical viewpoint.

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