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An Analytical Framework for Strategic Intervention in Financial Systems

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Introduction

The global financial system is an umbrella term, encompassing the various financial markets, actors and financial instruments and assets. There is daily and constant interaction between financial markets and market actors with financial instruments and assets. Ultimately, the financial system has been described as a carousel on a playground, with money going round and round.¹

The importance of the financial system in relation to climate change is reflected in the essential functions it performs for the wider economy. These functions can be divided under three broad headings. First, the financial system offers savings intermediation services. This includes savings, credit, funding and investment services. More specifically, financial markets' 'raison d'être' has been described as "raising capital and matching those who want capital (borrowers) with those who have it (lenders)".² In this area, the sources of savings can be perceived to be ordinary citizens, companies and the government itself. These actors in turn interact with financial intermediaries such as, amongst others, commercial banks, investment banks, institutional investors and asset managers in the relevant financial markets. Examples of these interactions include ordinary citizens depositing money in banks or special savings in institutions. Investors participate in capital markets by buying shares and selling them. This can also be delegated to asset managers who invest on behalf of investors which can either be individuals, companies or institutional investors such as pension funds.³ This is achieved with the help of financial intermediaries such as banks which provide, amongst others, lending services. Second, risk management services are offered through various intermediaries such as insurance companies and complex financial instruments known as derivatives. Third, the financial system is a crucial conduit for the provision and exchange of payment. This includes the interaction between various financial intermediaries and actions and infrastructure such as the payment, settlement and clearing system.

These functions also apply in the context of climate change, where the role of the financial system is crucial. The financial system can be visualized as the central gear in the funding cycle of both environmentally damaging and environmentally sustainable company practices. Equally, the move towards climate change mitigation and adaptation, culminating to a carbon-

¹ Stephen Valdez and Philip Molyneux, *An introduction to global financial markets* (8th edn, Palgrave, 2016), 1.

² *Ibid*, 1.

³ John Armour *et al*, *Principles of Financial Regulation* (OUP, 2016).

neutral world, requires substantial mobilisation of capital. Consequently, the financial system is a crucial component in this collective effort against the existential threat that climate change represents. Particularly, financial markets have been described as possessing the power to be a ‘catalyst for change’.⁴ Ultimately, given the importance of these functions, no modern economy could function without a well-functioning financial system. Most importantly, however, no modern company is able to operate outside of the financial system.

Against this background, the purpose of this report is to strategically map out the financial system in an attempt to aid and illuminate the various interconnections between corporations and the financial system. More specifically, this report seeks to better understand how carbon-intensive companies such as coal companies interact within the financial system more widely. This is an important area to explore because, according to IPCC 2019 Report, global warming ‘will not be limited to 1.5°C or 2°C unless transformations in a number of areas achieve the required greenhouse gas emissions reductions’.⁵ An important part of this is phasing out coal in the energy sector. Climate change is coal’s most serious, long-term, global impact. It is responsible for ‘46% of carbon dioxide emissions worldwide and accounts for 72% of total greenhouse gas emissions from the electricity sectors’.⁶ Carbon dioxide ‘works like a blanket [in the atmosphere], warming the earth above normal limits’.⁷ As a result, coal companies become relevant targets in the fight against climate change, with the financial system transforming into a strategic battlefield.

Crucially, most (non-profit) organizations and individuals seeking to pursue and litigate matters relating to climate change are therefore often lost in the vast complexity and endlessness of this system. Consequently, the overarching aim of this report is to facilitate strategic litigation and legal intervention in matters relating to climate change. Significantly, the individuals which are most adversely affected by climate change are ‘disproportionately found among societies’ most marginalized and disenfranchised’.⁸ Additionally, when it comes

⁴ Walt Lukken, Opening Remarks, FIA IDX (4 June 2019, London), cited in FIA, ‘How Derivatives Markets are helping the world fight climate change’ (September 2020) 2.

⁵ IPCC, *Global Warming of 1.5 °C* (Intergovernmental Panel on Climate Change, 2019), 161.

⁶ <https://endcoal.org/climate-change/> (accessed 9 July 21); The World Bank ‘Understanding CO2 Emissions from the Global Energy Sector’ (2014) <https://documents1.worldbank.org/curated/en/873091468155720710/pdf/851260BRI0Live00Box382147B00PUBLIC0.pdf>(accessed 9 July 2021)

⁷ UCS, ‘Coal Power Impacts’ (2017) <https://www.ucsusa.org/resources/coal-power-impacts> (accessed 9 July 2021)

⁸ Liane Schalatek, ‘Democratizing climate finance governance and the public funding of climate action’ (2012) 19(5) *Democratization* 951-963, 951

to climate action, large groups often remain excluded from participation and decision-making.⁹ This report could therefore also constitute a significant step towards ‘democratizing knowledge’. In this case, this means providing accessibility to organizations and individuals which lack the resources that corporations possess, to navigate the financial system and improve their understanding of the various actors, their roles, and the interrelationships of financial institutions, financial actors and money in the wider financial system.

The report is structured in the following way. Section One introduces the reader to recurrent features of the financial system and its sectors that will be relevant throughout the report to identify strategic considerations. Section Two explores the main services provided to companies by the financial system. Part A discusses the wide landscape of financial intermediation, giving an overview of the main sources of savings, intermediaries and advice providers within the financial system. A sophisticated infrastructure is in place to allow the exchange of services and interconnection of participants. Part B explores how companies manage their risk, mainly through services provided by insurance companies and the use of derivatives. Part C deals with payments and their key role in the financial system and particularly for companies to run their day-to-day business. Finally, Section Three, in light of the analysis above, considers the parts of the financial system that are amenable to strategic interventions. Strategic intervention in these areas can push companies to change their practices and policies and facilitate the fight against climate change on the part of the financial system.

⁹ Ibid, 951

SECTION ONE

RELEVANT NOTIONS FOR STRATEGIC CONSIDERATIONS

The following section is aimed at briefly describing general notions and features that were taken into consideration, and which are recurring throughout the report. They serve the purpose of assisting the reader to assess the relevance of an area or a service provided within the financial system from a strategic point of view due the features elaborated on below.

1. Concentration and substitutability

Concentration and substitutability are vital factors in the evaluation of the relevance of an area or service provided from a strategic point of view. It is easier to target a highly concentrated market with only a few actors prevailing in it as opposed to a market providing multiple substitutable actors. Credit rating agency markets, for instance, are oligopolistic markets due to the small number of these agencies. Payment systems are of crucial strategic relevance, since central banks are at the centre of the payment system and there is no other viable option for participants. Moreover, the trading of investment securities in secondary markets also tends to be highly concentrated as very few trading platforms tend to concentrate a large proportion of market activity.

2. Necessity

Furthermore, another important factor to assess the strategic importance of an area or service constitutes its necessity. A service is necessary if companies cannot operate their business without it. In this light, any regulatory intervention or change intervening in the necessary sector or service will still be complied with by companies or actors of the financial system, if otherwise they could not have access to the service. Therefore, the indispensability of the service becomes strategic. Access to payment systems, for example, is indispensable for companies because they cannot survive without the transfer of funds to pay their employees and suppliers. Consequently, payment systems show the strategic feature of being necessary.

3. Universality

The term of universality, in this regard, is used to describe a service that works similarly globally. Strategic consideration in such areas could be applied in the same way all over the world. Consequently, if a service is provided globally, any form of intervention would have a far-reaching effect.

4. Legal requirement

Apart from the considerations above, legal requirements of actors make it easier to hold them accountable. For example, disclosure requirements can facilitate the detection of any breaches. There are financial key actors that are on the doorway to the financial system, such as stock exchanges and payment systems called gatekeepers. To access financial services, one must meet the gatekeepers' requirements. These are strategically vital as points of intervention and can be utilised by reforming access criteria. Therefore, targeting gatekeepers is an effective tool as financial participants have no option but to comply to be able to access the financial system.

5. Timing of intervention

Importantly, in terms of opportunities for intervention, it seems easier and more effective to intervene at the early stage of the financial cycle. For instance, in securities transactions, it is more effective to intervene in stock exchanges (by introducing sustainable access criteria) than intervening at the tail-end of the transaction (clearing and settlement phase).

SECTION TWO

PART A

FINANCE AND INVESTMENT

The financial system performs the main functions of collection of savings, their distribution for industrial investment, stimulating capital formation and thereby accelerating the process of economic growth. A company will need finance for development projects, for instance coal companies will need finance for exploration of resources, mine exploitation and building production plants. The function of financing such projects and allocation of assets is performed by what are called financial intermediaries. These intermediaries play an important role in transforming savings into investments and provide multiple financial services. This section deals with an understanding of finance, financial and informational intermediaries and financial infrastructure.

1. Finance and investment

The financial system facilitates the allocation of resources in the economy by providing finance and investment services. Those with excess funds are offered investment services while those with a deficit obtain finance to meet their financial needs.

The provision of finance is essential as it literally allows companies to run. Companies, large and small, operate on the fuel of capital and often, their own capital is not enough to meet their business needs; they fill the gaps from savings (cash) deriving from the financial system. Savings are the cornerstone of the financial system and so are they to companies. Indeed, without funds, a coal company cannot finance, develop or even expand their projects; this includes exploiting a new coal mine, opening a new plant or even purchasing machinery. Investment, on the other hand, allows companies to generate more income (through interests or dividends) from the profits derived from their production.

There are many ways of sourcing funds, including equity (share issuance, crowdfunding), debt finance (bank loans), debt securities, and retained profits.¹⁰ Equity capital is derived from

¹⁰ Louise Gullifer and Jennifer Payne, *Corporate Finance Law: Principles and Policy* (2nd edn, Hart Publishing 2015) chapter 2; Retained profits is the profit made by the company from the previous financial year which it decides to re-invest back to the company. Although it is important to be aware of, it is not of strategic relevance since one cannot interfere with the company's profit; To facilitate debt finance (such as loans), securities must be registered at Company registries. Registration assures financial markets participants of security from fraud with respect to subsequent security on the same asset. Although they are important in the financial system, registries have little interaction with climate change and are effectively addressed in company laws.

trading company shares in the secondary market and is generally the easiest and inexpensive way to obtain a lot of capital. Equally, a company can raise funds by issuing debt securities¹¹ such as bonds to the public, in which case a bond document that includes the terms of the loan, interest payments and when the loaned funds must be paid back, is executed. The main difference between equity and debt securities is that in the former, the investor acquires ownership of the company shares which entitles him/her to vote and receive dividends, whilst in the latter, the security is simply a loan to the company, with fixed interest rates but without ownership or voting rights. To raise finance by share issuance or debt securities, a company must adhere to the regulatory requirements of listing in a stock market.¹² Further, a company can also obtain finance by obtaining a bank loan; a bank-customer loan agreement (contract) will be executed by both parties. Often, the agreement is accompanied by a debenture where the loan is given subject to security (mortgage or charge). Securitisation is also used to raise finance. Here, there is a pool of assets, sold to an intermediating entity, which issues securities traded to investors, called ABS (Asset-Backed Security).

Furthermore, companies invest by buying equity shares and debt securities, this is done using similar documents, with only the role of the company changing from borrower (deficit) to lender (excess).

2. Intermediaries

The essence of financial intermediation is the use of a third party to facilitate the transfer of information or wealth between the parties such as lenders and borrowers. Financial intermediation is the matching of excess with deficit capacity financial needs. Financial intermediaries (such as banks, insurance and pension funds) link parties with surplus resources (savings or investment) with those requiring funds (borrowers) to their mutual advantage. Financial intermediaries are able to reduce the inequality and gaps of information between parties. Wide gaps in information between parties can jeopardize market solidity as it does not ensure that both the parties are mutually satisfied by terms and conditions of the transaction. It is precisely what financial intermediaries succeed by gathering information and allocate funds to high yielding returns investments¹³. Financial intermediaries significantly influence the

¹¹ Debt securities are tradable instruments issued by a company in order to raise money from a number of lenders: see *ibid*, 162.

¹² See subsection 4 (below) on infrastructure.

¹³ Mahdi Salehi, *The Role of Financial Intermediaries in Capital Markets*, *Zagreb International Review of Economics and Business* (January 2008) <https://www.researchgate.net/publication/227654623> accessed 1 June 2021.

savings and allocation decisions by researching potential investments, mobilizing savings, and managing risks.

2.1 Financial Intermediaries

2.1.1 Investment Banks

Businesses need money for operation and expansion, raising money or capital for business involves providing information about the company to the investors, which is done by investment banks. Investment banks recommend ways to raise finance either through stock offers or issuing bonds to the public. The process of raising capital through selling stocks or bonds to investors (e.g., an initial public offering IPO) on behalf of corporations or other entities is called underwriting.¹⁴ There are several advantages for a company to offer shares to the public. It gives the companies an opportunity to raise finance from the wider public than the existing shareholders, which will also enable them to enhance their equity base for funding their expansion plans, launching new products.¹⁵ Investment banks manage complex financial transactions and often act as a connecting link between buyers and sellers of securities. Over the period of 2016 to 2019, investment banks like Goldman Sachs, JP Morgan Chase, Morgan Stanley financed coal mining accounting for 1.842 billion dollars, 1.380 billion dollars, 785 million dollars respectively.¹⁶

2.1.2 Investment Funds

2.1.2.1 Pension funds

Contribution to pensions is often a requirement by law in many developing and underdeveloped countries. Employees often make voluntary contributions or get certain amounts deducted from their paycheques as a contribution to such funds. Funds are invested on behalf of the employee and after retirement, the income from such investments enables the retired employees to get their realized gains, interests and all the contributions they made. Under the right conditions, pension funds' capital by making long-term investments, can contribute significantly to the real development of the economy. Many of the start-ups, small and medium enterprises get investments from pension funds through venture capital and private equity. Within the

¹⁴ Corporate Finance Institute, 'Overview of Investment Banking Industry', <https://corporatefinanceinstitute.com/resources/careers/jobs/investment-banking-overview/> accessed 22 February 2021.

¹⁵ Louise Gullifer and Jennifer Payne, *Corporate Finance Law: Principles and Policy* (2nd edn, Hart Publishing 2015)

¹⁶ Rainforest Action Network, 'Banking on Climate Change Fossil Fuel Finance Report' (2020) <https://www.ran.org/bcc-2020-data-explorer/> accessed 12 July 2021.

European Union member countries, the magnitude of asset investment ranges from 50% - 75%¹⁷. In 2020 OECD report on pension funds, it was reported that in 5 countries: Australia (132%), Iceland (167.6%), the Netherlands (191.4%), Switzerland (141.1%) and the United Kingdom (123.3%), the assets in pension funds exceeded the size of domestic economy.¹⁸ Pension funds are invested in a diverse class of assets ranging from private equities, stocks, real estate. However for the purposes of this report, the focus is on infrastructure investments. Pension fund investments in infrastructure are a growing diverse mix of public private projects on development of water, road, energy. Financing of infrastructure projects is often bridled with obstacles, for instance public infrastructure projects have budget and borrowing limitations. Private infrastructure projects are often expensive and require large capital. Pension fund investments owing to their long term nature can finance such projects. Typical financial arrangements include a base payment of interest and capital back to the fund, along with some form of revenue or equity participation. A toll road might pay a small percentage of tolls in addition to the financing payment. A power plant might pay a little bit for every megawatt generated and a percentage of the profits if another company buys the plant.¹⁹ From a strategic point of view, pension funds have significant relevance which is elucidated in the strategic consideration section.

2.1.2.2 Hedge funds

These funds are private investment pools which often employ nontraditional investment strategies with an objective of gaining higher returns for the investor. By way of hedge funds, investors are willing to take higher risk positions. Only accredited investors are allowed to invest. They are subject to the terms of an agreement between the sponsor of the fund and its investors. They are less liquid and are subject to less strict securities legislation. Liquidity of funds implies the ease with which an investment can be sold or bought without affecting the market price of the asset or security.

¹⁷ Pensions Europe, 'How pension funds contribute to jobs and growth in Europe – and how to strengthen their participation in the Capital Markets Union' (Pensions Europe 2015). <https://www.pensionseurope.eu/system/files/PensionsEurope%20-%20CMU%20brochure.pdf> accessed 12 July 2021.

¹⁸ Pension Funds in Figures, (June 2020 OECD) <https://www.oecd.org/pensions/Pension-Funds-in-Figures-2020.pdf> accessed 12 July 2021.

¹⁹ Eric Whiteside, 'How Do Pension Funds Typically Invest?' (April 2021) Investopedia <https://www.investopedia.com/articles/credit-loans-mortgages/090116/what-do-pension-funds-typically-invest.asp> accessed 12 July 2021.

2.1.2.3 Mutual funds

These funds are managed by professional investment managers and allow individuals to pool their money along with other investors in an investment. The funds are acquired by sale of shares, bonds or stocks to individuals. They have greater affordability as individual investors might not have the capacity to directly purchase all of the securities held by a single mutual fund. It also offers the investors an opportunity to diversify their investment by investing across many securities. It is relatively more liquid, as compared to hedge funds and can be redeemed easily depending on the value of the shares on the day of such redemption. They are subject to strict securities regulations.²⁰

2.2 Informational Intermediaries

Information intermediaries are groups or individuals that gather, process, reorganize, analyse and distribute information. To do so they use annual accounts and reports, preliminary announcements of profits, and interim financial statements but also any other financial or non-financial information they can obtain.²¹

2.2.1 Financial analysts

Financial analysts are concerned with the examination, collection, and interpretation of financial information in order to help companies and financial investors make investment decisions through contracts. This is particularly done by analysing investments and their market performances. The expectation is that financial analysts act in the best interests of their clients and of the market at large. On the one hand, they point out investment opportunities and, on the other hand, exert a monitoring pressure upon issuers.²² Therefore, financial investors forecast the profitability of investments in the next year and compare the results.²³ However, it is not necessary to hire a financial analyst to make investments.

There are three types of financial analysts, namely buy-side analysts, sell-side analysts and independent analysts. Buy-side analysts that are mostly employed by institutional investors to

²⁰Franklin Templeton: An Introduction to Mutual Funds, <https://www.franklintempleton.co.uk/investor/resources/investor-education/introduction-to-mutual-funds> accessed 20 February 2021.

²¹ Armour *et al* (n 3) 141.

²² Konstantinos Sergakis, *The Law of Capital Markets in the EU: disclosure and enforcement* (Macmillan Education UK 2018) 248.

²³ Gregory Jackson & Anastasia Petraki, 'How does corporate governance lead to short-termism?', in Norbert Kluge and others (eds), *The Sustainable Company: A new Approach to Corporate Governance* (European Trade Union 2011) 199, 210.

increase the performance of various investment portfolios. Sell-side analysts sell financial instruments such as sale of stocks, bonds, foreign exchange, and other financial instruments to the public market and provide other services to issuers. Independent analysts, on the other hand, generally are employed by institutional clients that want to follow certain stocks, particularly in small stocks ignored by traditional brokerage research departments.²⁴ Their clients desire to obtain financial analysis services by recruiting analysts directly or by subscribing to these services together with other market actors.²⁵

It is less likely for them to be involved in conflicts of interest, as they sell their research reports to their clients and their interests are aligned with those of their clients. A conflict of interest might emerge if the research firm has a contractual relationship with the subject company, i.e., the company that is subject to the analyst's evaluation. Furthermore, their reputation is a sign of their independence and their success in the industry. Buy-side analysts' interests also match those of their employers and their clients. This is because the goal is to produce an objective, reliable and ultimately successful report containing information that leads to profitable investment decisions. However, sell-side analysts may be viewed more critically as they are primarily conducting the interest of financial instruments' sellers and thus the contact to issuers and the subsequent pressure to achieve positive results will greatly influence their work.²⁶

2.2.2 Credit Rating Agencies

Credit rating agencies (CRA) are intermediaries between rated entities and market actors interested in evaluating the quality of their debt, in other words, rating the creditworthiness of entities.²⁷ Therefore, a rating typically constitutes an opinion regarding the likeliness that an issuer will repay, in a timely fashion, a certain debt or financial obligation, or its debt in general.²⁸ The rating allocated to a given debt demonstrates an agency's level of confidence that the borrower will acknowledge the agreed upon debt obligations. Ratings normally result from a contract between an issuer and a CRA, but it can also result from a CRA's unilateral decision.²⁹ For ratings, each agency usually uses individual letter-based scores to allude if a debt has a low or high default risk and its issuer's financial stability, e.g., AAA, B, etc. Usually,

²⁴ Mary Hall, '3 Types of Analysts: Which Is Best for You?' (2021) <https://www.investopedia.com/investing/testing-3-types-analysts/#independent-analysts> accessed 7 July 2021.

²⁵ Sergakis (n 16), 249.

²⁶ Ibid, 252.

²⁷ Ibid, 268.

²⁸ Report on the Activities of Credit rating Agencies (IOSCO Technical Committee 2003) ("CRA Report") <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD153.pdf> accessed July 4, 2021.

²⁹ Sergakis, 270.

a rating committee is formed which is composed of lead analysts, managers, and junior analytical staff. A simple majority vote of the committee determines a rating.³⁰

Before lending money, the lender will want to know about the creditworthiness of the potential borrowers. Since borrowers are more likely to know about the probability if they can repay a loan than lenders, there is an asymmetry between the lender's information and the borrower's information. Therefore, CRAs collect information about borrowers, particularly bond issuers, such as corporations; local, state, and national governments and the special financial vehicles that are associated with asset-backed securities and assess their creditworthiness.³¹ In the bond market, a CRA assesses the creditworthiness of debt securities issued by corporations and governments.

Issuers and corporate borrowers use CRAs' opinions to help them raise capital. In absence of a reputable credit rating, investors and lenders may perceive a greater risk of default and thus expect a higher interest rate which leads to the reduction of cost of capital for issuers. In fixed-income securities, CRA opinions can help lenders and investors to assess the likely risks which would follow after lending money to or investing in the securities of a particular issuer.³²

The CRA market is highly concentrated since there are three big CRAs which are in control of 95 % of the rating business, namely Moody's Investor Services, Standard and Poor's (S&P), and Fitch Group which operate globally.³³ Therefore, there barely are other options for entities that want to be rated. CRAs are greatly considered by markets and governments as they are perceived as an authoritative source of judgments, providing clear, internationally harmonised signs of the default risk. Due to their reputation, CRAs are able to operate as gatekeepers to the international capital markets.³⁴ Thus, ratings by CRA have become necessary for entities to access international capital markets. The issuer-pays model constitutes the basic business model that requires the issuer to pay the CRA for its rating. However, this has the potential to cause a conflict of interest as the CRA's direct incentive would seem to benefit the issuer by offering a favourable rating of the issuer's bonds to win or keep the issuer's business. If the

³⁰ CRA Report (n 22), 5.

³¹ Lawrence J. White, 'The Credit Rating Agencies and Their Role in the Financial System' (2018), in Eric Brousseau and others, *The Oxford Handbook of Institutions of International Economic Governance and Market Regulation* (Oxford University Press 2019) 5f.

³² CRA Report, 1.

³³ Armour *et al* (n 3), 127.

³⁴ David F. Tennant, Marlon R. Tracey, 'Credit Rating Agencies as Gatekeepers' in *Sovereign Debt and Credit Rating Bias* (Palgrave Pivot, New York, 2016) 7.

users of the CRA's ratings notice the biased nature of its ratings in favour of the issuers, the user will stop giving regard to that CRA's ratings.³⁵

Generally, CRAs rely on data derived from information released by the issuer in its disclosure statements to make a rating decision. As a consequence, an issuer's disclosure obligations matter substantially for the CRA's rating process.³⁶ The company's code of conduct, financial stability, investments, capital and more matter for the rating process. It is argued that if ratings are made public briefly before the relevant stock exchange closes, they might contribute to the volatility of the market since investors would buy or sell shares according to the new rating without having the time to verify the benefits of the rating. This would result in short-term decisions without considering the effects on climate change so that it could be exacerbated. However, the market never closes since trading that ceased on a particular exchange may be continuing in another time zone.³⁷ Moody's new scores, for example, show that ESG risks have a negative credit impact on coal, metals and mining companies. These companies face exposure to environmental considerations carrying high credit risks mainly due to carbon transition.³⁸

2.2.3 Proxy advisors

Shareholders of a company have the right to vote on resolutions which are proposals ratifying or requesting a company's specified action at its general meeting. When exercising their voting rights, shareholders heavily rely on proxy advisors to evaluate resolutions and vote accordingly in an accelerated and cost-saving framework.³⁹ The cost of voting could be reduced by hiring a proxy advisor as many investors do not have the sufficient knowledge to make informed decisions. By paying a proxy advisor, shareholders can reduce agency costs, i.e., the costs they incur to monitor directors if managers act in their own interests. These agency costs stem from the myth that managing directors are the agents of the shareholders that constitute the principals.⁴⁰

Proxy-advisory firms are responsible to advise institutional investors⁴¹ and exercise their voting rights when they have been delegated to such firms. Most importantly, proxy advisors

³⁵ White (n 26), 16.

³⁶ CRA Report, 12.

³⁷ Ibid, 13.

³⁸ 'Research Announcement: Moody's – New scores reflect negative credit impact of ESG risks on metals, mining and coal companies' (2021) https://www.moodys.com/research/Moodys-New-scores-reflect-negative-credit-impact-of-ESG-risks--PBC_1288467 accessed 7 July 2021.

³⁹ Marc Moore & Martin Petrin, *Corporate Governance Law, Regulation and Theory* (Red Glove Press 2017) 84.

⁴⁰ Ibid, 36.

⁴¹ Sergakis, 299.

are used by institutional investors as problem spotters helping them differentiate controversial matters that need a review of the proxy advisor's analysis and possibly other information sources from non-controversial matters where they can vote according to the proxy advisor's recommendation without further audit. In the latter case, the proxy advisor's recommendation is in line with that of the management. Moreover, proxy advisors provide for research and reduce the costs of voting. The market for proxy advisory markets is highly concentrated since two of largest proxy advisory firms, Institutional Shareholder Services, Inc. and Glass, Lewis & Co LLC, represent about 61% and 37% of the market.

However, an institutional investor would most likely need to verify its proxy advisor's report to understand and assess the assumptions and analyses that form the basis of the report, so that a fully informed voting decision can be made. Proxy advice is criticised on the basis that good governance requires different practices in different circumstances and that one-size-fits-all policies are not suitable, and institutional investors' use of proxy advisors that use such policies shows that they must be negligent to their obligations to exercise their voting rights in a return-maximising way.⁴² Normally, a proxy-advisory contract describes obligations and services they have to provide to shareholders. These obligations include the provision of a recommendation which must not prove itself to be successful so that proxy advice does not guarantee the increase of a share price. In the UK, for instance, a proxy advisor who has been appointed by one or more members to vote has one vote according to section 285 CA 2006. Pursuant to the Proxy Advisors (Shareholders' Rights) Regulations 2019, proxy advisory firms must disclose their code of conduct and report on the way they have applied the code. However, climate change as a matter of consideration when advising is not explicitly required. Therefore, unless shareholders do not include climate change considerations into the proxy advisory contract these must not be taken into account.

3. Infrastructure

While intermediaries are institutional enablers, infrastructure is the technical facilitator of financial transactions matching borrowers and savers as well as effectively completing the transactions. A financial market is an organised process where buyers and sellers trade in

⁴² Douglas Sarro, 'Proxy Advisors As Issue Spotters, Working Draft' (2020) Forthcoming, Brooklyn Journal of Corporate, Financial & Commercial Law (2021), 34.

financial instruments including shares and bonds issued by companies and governments.⁴³ Financial markets comprise inter-alia stock, bond, options and futures markets.⁴⁴ Infrastructure provides the means by which the structure of these financial markets is coordinated namely, exchanges, market makers, central counterparties, clearing and settlement.⁴⁵

Infrastructure is used in two ways, first, to facilitate trade by providing a system through which purchasers and sellers enter their demands and supplies and secondly by facilitating the post-trade processes i.e. a mechanism for matching orders and executing transactions.⁴⁶

3.1. Trading Platforms and Exchanges

Trading platforms and exchanges are a significant medium through which companies raise fresh external finance at low cost. They provide a marketplace where financial instruments are traded. Trading platforms/venues comprise of exchanges (which are regulated marketplaces for the trading of stock (corporate or government),⁴⁷ and off-exchange platforms. In the latter, financial instruments are traded in a physical location while in the former they are traded through electronic trading mechanisms on computer systems.

In exchanges, the companies (issuers) raise capital by issuing shares, bonds and other financial instruments.⁴⁸ Here, citizens and companies buy and sell shares from the issuing companies. Renowned exchanges include the London Stock Exchange and the New York Stock Exchange. Notably, these exchanges and trading platforms are private businesses in pursuit of profit. They earn profit from a number of charges. They charge a one-off listing fees and recurrent annual companies to all listed companies in the exchange.⁴⁹ They also charge transaction fees for all financial transactions on participants (buyers and sellers).

Stock exchanges are key gatekeepers through which a company must pass in order to access the capital/stock market. For example, to be able to sell shares to the public, a coal company

⁴³ Armour *et al* (n 3) 101.

⁴⁴ *ibid*.

⁴⁵ *ibid*, 16.

⁴⁶ *Ibid*, 401.

⁴⁷ Michael Blair, George A Walker and Stuart Willey, *Financial Markets and Exchanges Law* (2nd edn, OUP 2012) para 1.64.

⁴⁸ Sergakis, 21.

⁴⁹ Shorbit Seth, 'How The NYSE Makes Money' (31 March 2020)

<https://www.investopedia.com/articles/investing/050515/how-nyse-makes-money.asp> accessed 4 July 2021.

must first meet the access requirements⁵⁰ (such as capital) in order to be admitted to trade in an exchange. To trade on exchanges, a company must be a public company, formed according to the company laws of the country in which it is incorporated.⁵¹ Companies (issuers) must adhere to public listing rules which are largely aimed at protecting the investors by minimising the information asymmetry between issuers and investors. This includes abiding by the entry and ongoing disclosure obligations namely, prospectus, periodic and episodic disclosure obligations.⁵²

Other trading venues —off-exchange platforms—use technology to facilitate trading from a distance. In particular, they are electronic trading platforms entailing electronic communication networks and crossing networks which provide traders with liquidity services in competition with traditional exchanges.⁵³ Trading operations are similar with exchanges as orders are entered directly into an electronic order book and then matched using automated execution algorithms. The distinguishing feature between traditional exchanges and off-exchange platforms, is that in the latter, there is no screening of issuers through admission to listing, so the issuers' securities are not listed.⁵⁴ Additionally, companies provide less pre-trade transparency than in exchanges. As such, they are attractive to companies because without sharing information on the company, they are able to issue shares and raise funds. Given the lack of access formalities, it is imperative to advocate for more regulation to ensure disclosure of climate related information to investors.

Moreover, over-the-counter (OTC) markets operate in non-physical trading venues where securities are bought and sold by an individual dealer on a bilateral basis.⁵⁵ Derivatives are the common financial products that are traded on OTC markets.⁵⁶ Unlike in exchanges, OTC markets are not formally regulated and therefore no screening procedures are required in order to operate.⁵⁷

⁵⁰ London Stock Exchange Admission and Disclosure Standards (2021) < <https://www.londonstockexchange.com/resources/raise-finance-resources?tab=main-market> accessed 5 June 2021.

⁵¹ Gullifer and Payne, 479.

⁵² Sergakis chapters 4, 5 and 6.

⁵³ Armour *et al* (n 3), 150; known as Multilateral trading facilities ('MTFs') in Europe.

⁵⁴ *Ibid.*

⁵⁵ Blair, Walker and Willey, para 1.83.

⁵⁶ Derivatives infrastructure is discussed below at PART B subsection 5.2.

⁵⁷ Randall Dodd 'Markets: Exchange or Over-the-Counter' (2020)

<https://www.imf.org/external/pubs/ft/fandd/basics/markets.htm> accessed 17 July 2021.

3.2. Clearing and Settlement

After the trading process at the trading platforms, clearing and settlement provides a means for matching orders and completing transactions. Whilst clearing infrastructure intermediates risk exposures between market participants, guaranteeing that financial obligations are met, settlement infrastructure facilitates the movement of cash and securities required to settle transactions.⁵⁸ Clearing is conducted by Central counterparty clearing houses (CCPs) while settlement is conducted by Central Securities Depositories (CSDs)⁵⁹. The latter are discussed in the securities settlement section.⁶⁰

3.3. Central counterparty clearing houses

In a financial transaction, it is possible that the buyer or the seller defaults in their contractual obligation to pay or to deliver the financial instrument, respectively. This is called counterparty credit risk. CCPs are crucial because they reduce and ‘mutualise’ — that is, share between their members — this counterparty credit risk. Indeed, in this way CCPs prevent the possibility of systemic (total collapse) failure of the financial system. In turn, financial transactions can go on smoothly with the assurance that respective contractual obligations will be met.

By central clearing, CCPs perform ‘multilateral netting’ (that is, offsetting an amount due from a member on one transaction against an amount owed to that member on another, to reach a single, smaller net exposure) of transactions between market participants and therefore simplify risk exposures compared to clearing trade bilaterally.⁶¹ They do so by interposing themselves between the buyer and seller of an original trade; consequently, the CPP becomes the buyer to the original seller, and the seller to the original buyer. As such, the performance of the obligations under the trade contract are guaranteed. Where one counterparty fails, CCPs have a number of management procedures, rules and resources to manage such default in an orderly manner;⁶² accordingly, the other party is protected.

⁵⁸ Amandeep Rehlon and Dan Nixon ‘Central counterparties: what are they, why do they matter and how does the Bank supervise them?’ (Bank of England Quarterly Bulletin Q2, 2013) 147

<https://www.bankofengland.co.uk/quarterly-bulletin/2013/q2/> accessed 4 July 2021.

⁵⁹ CSDs are addressed below in subsection 5 of Part C (Payments).

⁶⁰ *ibid.*

⁶¹ Rehlon and Nixon, 150 ; Carmine Di Noia and Luca Filippa, ‘Looking for New Lenses: How Regulation Should Cope with the Financial Market Infrastructures Evolution’ (2020), 3

<http://dx.doi.org/10.2139/ssrn.3759177> accessed 8 July 2021

⁶² Rehlon and Nixon (n),147.

CCPs are important as they prevent - in fact, are used to address the ills leading to the 2007 financial crisis⁶³- systemic risk of the financial system. Equally, they simplify the settlement of trade by acting as nodes/connections in the financial network.

CCPs act as essential gatekeepers to the financial system. To be able to access and utilize them, a company/institution must be a member and must adhere to the requisite CCP membership requirements, including solvency, operational and liquidity prerequisites.⁶⁴

⁶³ Ibid, 148.

⁶⁴ Ibid, 152.

PART B

RISK MANAGEMENT

Financial market participants are exposed to various risks when interacting in financial markets. ‘Risk’ may be understood as “uncertainty about future returns on investments in the market”.⁶⁵ However, it can also be understood as “the probability that a [corporation]...will be subjected to losses as a result of events in the market, improper controls or the profligacy of others”.⁶⁶ While corporations and investors have always been aware of these ‘traditional risks’, they have only now begun acknowledging climate change as a type of business risk. This section explores traditional risks to the financial system. It then expands to consider these risks in the context of climate change.

Traditionally understood risks in the financial system include⁶⁷:

- a. Credit risk – credit risk is the risk that results from the borrowers failure to repay a loan or pay the interest. This is also known as counterparty risk.

- b. Interest rate risk – it is the risk of investment loss due to a change in interest rates. With an increase in interest rate, the value of a bond or other fixed-income asset will decline.⁶⁸

- c. Currency risk – This is also sometimes referred to as foreign exchange risk, which is the loss that an international financial transaction may incur due to currency fluctuations and a change in price of one currency against another.⁶⁹

- d. Liquidity risk – the risk of being unable to satisfy cash flow needs.

- e. Operational risk – operational risk is the loss resulting when internal processes or IT systems fail or are inadequate, or where fraud occurs.

⁶⁵ Tee Williams, *An Introduction to Trading in the Financial Markets: Global Markets, Risk, Compliance and Regulation* (ScienceDirect, 2012) 62.

⁶⁶ *ibid*

⁶⁷ Peter Mülbert, ‘Managing Risk in the Financial System’ in Niamh Moloney, Ellis Ferran and Jennifer Payne (Eds) *The Oxford Handbook of Financial Regulation*, 5.

⁶⁸ James Chen, ‘Interest Rate Risk’ *Investopedia* (9 January 2021) <https://www.investopedia.com/terms/i/interestraterisk.asp> accessed 11 June 2021.

⁶⁹ Akhilesh Ganti, ‘Foreign Exchange Risk’ *Investopedia* (Nov 28, 2020) <https://www.investopedia.com/terms/f/foreignexchangerisk.asp> accessed 11 June 2021.

f. Transfer risk – the risk that a borrower will not make debt service payments in a foreign currency because of his inability to obtain the pertinent currency

g. Market risk – market risk is the risk of losses due to changes in market prices. It encompasses interest rate risk and foreign exchange risk.

h. Legal risk – legal risk may be broadly understood as any risk faced by a business which has a legal component.⁷⁰ This could include the risk of litigation against the company, the risk of the regulatory framework or a policy changing to the disadvantage of the company which necessitates compliance. For example, some claimants will complain that their human rights such as the right to life, the right to a safe and healthy environment, the right to human dignity and so on are violated⁷¹.

Nonetheless, it is increasingly acknowledged and embraced that these risks also have a “sustainability dimension”.⁷² Therefore, they can be understood as climate-related financial risks:

a. Physical risks – these are risks resulting from changes of the climate such as extreme weather temperatures, floods, storms and other natural disasters. Considering past weather data⁷³, due to climate change, the frequency and intensity of these extreme climate events will become higher and more destructive. Extreme weather-related event can damage property or disrupt trade⁷⁴. An example of damage to investors and corporations resulting from physical risks of climate change is stranded assets. Stranded assets are “ assets that have suffered from an unanticipated or premature write-downs, devaluations or conversion to liabilities”.⁷⁵ Stranded assets may be a consequence of environmental changes or a change in the resource landscape. For example, for some traditional industries, if they give up the use of traditional energy, it means that a considerable part of the developed or developing fossil energy will face the risk of being abandoned.

⁷⁰ Deloitte Legal, ‘Legal Risk Management: A Heightened focus for the General Counsel’ (2019) <https://www2.deloitte.com/global/en/pages/legal/articles/legal-risk-management.html> (accessed 11 June 2021).

⁷¹ Javier Solana, ‘Climate change litigation in financial markets: a typology’ (2019), 108, 109.

⁷² Karel Lannoo and Apostolos Thomadakis, *Derivatives in Sustainable Finance* (CEPS-ECMI Study, Centre for European Policy Studies, 2020), 6.

⁷³ World Meteorological Organization (WMO), State of the Global Climate 2020 (WMO-No. 1264)(2021), https://library.wmo.int/doc_num.php?explnum_id=10618 (accessed 13 July 2021).

⁷⁴ United Nations Environment Programme, the final report on the project of UN Environment Programme’s Principles for Sustainable Insurance Initiative to pilot the TCFD recommendations (2021).

⁷⁵ Ben Caldecott et al, *Stranded Assets: A Climate Risk Challenge* (Inter-American Development Bank, 2016) 5.

b. Transitional risks – these are the financial risks which might arise in the course of transitioning to a low-carbon economy. Transitional risks include the enactment of legislation, technology renovation and market expectation to reduce greenhouse gas emissions which may adversely affect companies,⁷⁶ or risks involved in green investments. An example of such transitional risk is the “risk that a loan is not repaid, or an investment does not perform as expected”⁷⁷ due to changes that emerge “within a greenhouse gas emissions-constrained global economy”.⁷⁸ Another is the above mentioned risk of stranded assets due to new government regulations in, for example, carbon pricing or the fall of clean energy costs.⁷⁹ Additionally, corporations and other financial actors may face litigation if they fail to mitigate or adapt to climate-related risks. While there are not many successful cases to-date, climate risk liability is “a risk iceberg” for companies, “a real hazard of which only a minor part is visible, but the size and shape of the iceberg remain unknown”.⁸⁰ Litigation may concern, amongst others, carbon emissions, lack of climate-related disclosures, directors duties, fiduciary duties (for trustees)⁸¹. Litigation risk, in turn, exposes companies to financial risks and reputational risks. These types of litigation are growing, with a recent landmark example in Europe being the recent Shell litigation. A Dutch court ruled that Shell has a legal obligation to reduce its emissions by 45%.⁸² It also noted that Shell’s climate change policy is inadequate, and that it’s emissions threatened the “right to life” and “undisturbed family life” rights under the European Convention of Human Rights.⁸³ This ruling has been described as “legally, economically and societally...significant”.⁸⁴ It will alert “all companies in the energy industry and all heavy emitters”, accelerating their decarbonization plans.⁸⁵

⁷⁶ WRI and UNEP-FI, ‘Carbon Asset Risk: Discussion Framework’ (2015) 6.

⁷⁷ Ibid.

⁷⁸ Ibid.

⁷⁹ Caldecott et al, (n 74) 5.

⁸⁰ Matthew F. Pawa, “Global Warming Litigation Heats Up” (2008) April Trial 18 quoted in Jacqueline Peel and Hari M. Osofsky, *Climate Change Litigation* (Cambridge University Press, 2015) 183.

⁸¹ see *McVeigh v REST*; Travers Smith ‘Pension Fund Agrees Settlement in Landmark Australian Climate Change Case, *McVeigh v Rest*’ (Jan 2021) <https://www.traverssmith.com/knowledge/knowledge-container/pension-fund-agrees-settlement-in-landmark-australian-climate-change-case-mcveigh-v-rest/> (accessed 18/7/21).

⁸² Milieudefensie et al. v. Royal Dutch Shell plc. (2019) [20210526_8918_judgment-2.pdf](https://www.climatcasesearch.com/cases/20210526_8918_judgment-2.pdf) ([climatecasechart.com](https://www.climatcasesearch.com))

⁸³ Ibid.

⁸⁴ Anjali Raval, ‘Dutch court orders Shell to Accelerate emissions cuts’ *Financial Times* (May 2021) <https://www.ft.com/content/340501e2-e0cd-4ea5-b388-9af0d9a74ce2> (accessed 18/7/21).

⁸⁵

- c. Systemic risks – a scenario can be imagined where environmental risks can lead to wider systemic risks for the whole of the financial system. Systemic risks threaten the stability of the financial system, possibly triggering an economic collapse. Caldecott *et al* identify three scenarios where these could happen. The first scenario is ‘bottom-up contagion’:

“if mispriced environmental risks are repriced at sufficient speed and scale, they could have a cascading effect and affect financial stability”.⁸⁶ The second scenario is identified as ‘capital flight’ where: ‘natural capital catastrophes driven by climate change result in significant negative capital outflows from an impacted country’.⁸⁷ The final scenario which could trigger systemic risk is ‘hazard globalization’: ‘natural catastrophes and natural capital degradation resulting from climate change can significantly affect global markets and trade flows through price-based shifts, regulatory actions or supply chain disruption... This has microeconomic impacts, such as increases in inflation and currency volatility that can significantly impact countries dependent on imports’.⁸⁸

Overall, the risk that each corporation or financial entity faces depends on its business model and activities it exercises. Therefore, risks differ from legal entity to legal entity. Corporations desire to reduce this risk. Additionally, assessing and responding to climate change risks are crucial to the financial activities and investment decisions of participants in the financial system. As Solana observes, unless carbon-intensive companies are able to develop and implement a sustainable business plan, “the transition to a low-carbon economy poses a serious challenge to the long-term viability of companies”.⁸⁹ Against this background, the next section explores risk management from the perspective of insurance and derivatives. Insurance can effectively disperse and transfer the loss of climate disaster⁹⁰, reduce and prevent the adverse impact of climate risk on capital. Derivatives can help financial participants to hedge against risk and they can also be used as vehicles for speculation, arbitrage, and investment.

⁸⁶ Ibid 10.

⁸⁷ Ibid, 10.

⁸⁸ *ibid*, 11.

⁸⁹ Javier Solana, ‘The Power of the Eurosystem To Promote Environmental Protection’ (2019) 30(4) *European Business Law Review* 547-576.

⁹⁰ Melecky M., Raddatz C., *How do governments respond after catastrophes ? natural-disaster shocks and the fiscal stance* (2011).

1. Insurance

Buying insurance is a kind of financial arrangement for the financial participants to share the accident loss. By signing the insurance contract, the policy holders will transfer their potential risks to the insurer. Underwriting service is the core business of insurance companies. Insurance is an important part of the social and economic security system, and it can relieve the public purse.⁹¹ It is a stabilizer of the whole society as many losses can be covered by insurance instead of being made up of the communities.

1.1 Non-life insurance.

Generally, insurance refers to the commercial insurance behaviour that the policyholder pays the insurance premium to the insurer according to the contract, the insurer undertakes the liability of compensation for the property loss caused by the possible accidents as agreed in the contract. To serve the topic best, we just focus on non-life insurance. Non-life insurance can be defined as any insurance that is not determined to be life insurance. Non-personal insurance business includes property loss insurance, liability insurance and credit insurance.

Traditionally, some important insurance products have played an important role in climate change⁹². E.g., Catastrophe insurance refers to the risk of huge property losses and serious casualties due to natural disasters such as earthquakes, hurricanes, tsunamis, floods, etc., through the form of insurance to spread the risks. This type of insurance can effectively deal with physical risks. Another popular insurance product is pollution liability insurance which is based on the liability for damages caused to a third party by a company in a pollution accident. Once a pollution accident occurs, insurers are responsible for paying a certain amount of compensation to the pollution victims. In recent years, the insurance industry also offers several new insurance products and services⁹³, which have also played a significant role in tackling climate change risks. For example, the renewable energy project insurance is insurance based on risks in the development and use of renewable energy, such as photovoltaic project insurance and wind power insurance.

⁹¹ Zweifel Peter and Roland Eisen, *Insurance Economics* (2012), 11-14.

⁹² Insurance information institute, *Spotlight on: Catastrophes- Insurance issuers* (2020) <https://www.iii.org/article/spotlight-on-catastrophes-insurance-issues> accessed 14 July 2021.

⁹³ Felix Nagrawala, Krystyna Springer and Sonia Hierzig, *Insuring disaster a ranking of 70 of the world's largest insurers' approaches to responsible investment and underwriting* (2021),48,49.

1.2 Relationship between insurance corporations and high-carbon companies.

The insurance industry is closely related to the high-carbon industry. Insurance companies not only provide underwriting services for high-carbon undertakings, e.g., environmental pollution liability insurance (this insurance is based on the company's liability for damages caused by a pollution accident to a third party in accordance with the law), but also invest in corporate bonds and stocks involving (coal) mining, oil and gas and public utilities sectors⁹⁴. However, the traditional underwriting and investing routes have been testified that they can trigger climate change (a picture can illustrate the process clearly)⁹⁵.

Currently, many insurance corporations gradually withdraw support for the high-carbon industry has already been a new trend. In terms of underwriting, many insurance companies show a cautious attitude towards the insurance of high carbon companies. Many insurers are reluctant to add new policies on coal insurance.⁹⁶ There is an increase in insurers divesting from coal⁹⁷ and the decrease in coal insurance⁹⁸.

According to the above analysis, what insurers and high-carbon policy holders can do in the fight against climate change?

1.2.1 High-carbon policy holders

From the perspective of high-carbon policy holders: self-insurance⁹⁹ combined with insurance products. Essentially, they can improve risk allocation and protect existing wealth by choosing suitable insurance products¹⁰⁰. Insurance has significant functions in risk management. It also has a better ability to monitor and manage the potential loss risk¹⁰¹. Insurance can help the high-carbon companies to predict, analyze and evaluate the potential loss risk, and put forward reasonable pre-prevention programs and loss management measures. When the loss occurs, the insurer will make economic compensation to the insured companies suffering from the loss

⁹⁴ Melecky, Martin and Raddatz, Claudio E., How Do Governments Respond after Catastrophes? Natural-Disaster Shocks and the Fiscal Stance (2011), World Bank Policy Research Working Paper No. 5564, <https://ssrn.com/abstract=1759155> accessed 27 June 2021

⁹⁵ Source: <https://insureourfuture.co/>

⁹⁶ David Mason, Greenhouse PR, and Peter Bosshard, The 2020 Scorecard on Insurance, Fossil Fuels and Climate Change (2020), 14.

⁹⁷ Source: <https://insureourfuture.co/>

⁹⁸ Ibid.

⁹⁹ Matthew frost, using risk and analytics to support your risk financing strategy: the views of a former risk manager (2020), 4 <https://willistowerswatson.turtl.co/story/mining-risk-review-2020-ungated/page/12/4> accessed 27 June 2021.

¹⁰⁰ Zweifel Peter and Roland Eisen (n 13).

¹⁰¹ Ibid.

according to the insurance contract. Simultaneously, they should have a clear development strategy¹⁰². They need to make a comprehensive analysis and forecast of the relevant market prospects and policy changes as they need to choose a good time and way of transformation.

1.2.2 Insurance corporations

From the perspective of the insurance corporations, as an important tool of risk management, insurance corporations should effectively play their functions in reducing and preventing the adverse impact of climate risk on finance. Insurance industry is a very important financial sector, and its strategic changes will have an important impact on other areas. Regarding how the insurance industry can develop to deal with the risks of climate change, this part has the following suggestions.

Firstly, in terms of underwriting business, insurance corporations can further enrich climate-related insurance products and services. Today, companies are gradually transforming to sustainable production and operation methods in response to climate change and energy conservation and emission reduction. Insurance companies should constantly update their product systems in accordance with the needs of the financial market, which can largely support high-carbon companies to achieve new industrial restructuring, disaster prevention and mitigation, and carbon emissions reduction goals.

Secondly, insurance corporations need to implement differential rates, design different compensation standards to improve the adaptability of green insurance products to industries and enterprises. It's necessary to the insurance companies' daily operation. When risks cause damage to the policyholders, the loss will be passed on to the insurer. If the loss is huge, the insurance company will face excessive compensation. They may go bankrupt or get into trouble, which may have a chain reaction to the whole financial system.

Thirdly, based on the characteristics of the insurance business, the insurance industry needs to strengthen the research on the risk of climate change and pay attention to the management and control of ESG risk (environment, society, and governance). Insurance institutions should strengthen the training of professionals with knowledge of climate and environment, big data and algorithms, and financial knowledge, to reduce the technical obstacles in dealing with climate risk.

¹⁰² Ibid.

Additionally, insurance corporations should make climate friendly policies to make full use of the function of accumulating capital and mobilizing financial resources.¹⁰³ An important way for insurance companies to make profits is to invest with a premium. Therefore, in terms of investment, insurance companies also need to control the ESG risks faced by investment projects. They should increase more investment in green and low-carbon projects (e.g., renewable energy projects, carbon trading projects) by reducing investment in high pollution projects.

Finally, insurance companies can strengthen cooperation with governments and NGOs to establish a cooperative climate insurance mechanism. They can use the cooperation mechanism to transfer the catastrophic loss compensation; they can also work with governments and NGOs to encourage the whole society to access climate insurance.

¹⁰³ Zweifel Peter and Roland Eisen (n 13).

2. Derivatives

Derivatives are a significant class of financial instrument, representing “a financial market segment that has long exceeded the growth rates of both equity and bond markets”.¹⁰⁴ Derivatives as financial products derive their value from another, underlying financial product/asset.¹⁰⁵ These underlying assets may either be, amongst others, credit, shares, commodities, foreign exchange rates or interest rates.¹⁰⁶ Nonetheless, derivatives have a separate value of their own, albeit a derived one, and therefore the derivative can be viewed as an asset in itself.¹⁰⁷ Most derivative contracts are “contracts for differences – the difference between the agreed future price of an asset, on a future date, and the actual market price on that date”.¹⁰⁸

The role of derivatives in the financial system is significant. It enables corporations and investors to manage the above-mentioned risks to which they are exposed to more efficiently and to “more effectively align their exposure with risk tolerance and risk management requirements”.¹⁰⁹ Consequently, derivatives are used for hedging risk purposes but may also be used as vehicles of speculation, arbitrage and investment.¹¹⁰

¹⁰⁴ Tom Kokkola (Ed), ‘Payments, Securities and Derivatives, and the role of the Eurosystem’ (ECB, 2010), 93.

¹⁰⁵ Simon Firth, *Derivatives: Law and Practice* (Sweet & Maxwell, 2003)

¹⁰⁶ Kokkola (n 103), 93.

¹⁰⁷ *Lomas v JFB Firth Rixson, Inc* [2012] 2 All ER (Comm) 1076 [2].

¹⁰⁸ Phillip Wood, *Law and Practice of International Finance* (Sweet & Maxwell, 2008), 425.

¹⁰⁹ Lannoo and Thomadakis, (n 71), 1.

¹¹⁰ Kokkola (n 103), 93.

2.1 An Overview of Derivatives

The most common form of derivatives are futures, forwards, options and swaps.

Futures

Futures are standardized forwards traded on exchanges.¹¹¹

Forwards

A Forward is a non-standardized contract where a buyer agrees to buy a certain asset at a future date, at a pre-arranged price.¹¹² Forwards are different from a futures contract in that they are non-standardised and take place ‘Over-The-Counter’, rather than via an exchange.

Options

An option is a contract that allows, but does not oblige, the buyer to buy (through a call option) or sell (through a put option) the underlying asset at a certain point in time or within a specified period in the future at a predetermined price (‘strike price’) in return for the payment of a premium. The premium is the maximum possible loss for the buyer of an option.¹¹³

Swaps

Swaps are derivative contracts for the exchange of assets on an agreed notional principal amount. More simply, it is a contract to exchange one security for another. These assets could be interest rates, foreign exchange, credit, equities or commodities.¹¹⁴ In the commodities market, ‘a swap allows a party to change its exposure or risk from ‘floating’ prices to ‘fixed’ prices, or vice versa’.¹¹⁵

2.2 Derivatives Documentation

Generally, no specific documentation is required for the valid execution of derivative transactions. However, it is common practice for derivative agreements to adopt either the 1992 ISDA Master Agreement (Multicurrency-Cross Border) and 2002 ISDA Master Agreement. It is recommendable for such agreements to be evidenced in writing for reasons of proof. The

¹¹¹ Kokkola (n 103), 94.

¹¹² Ibid 94.

¹¹³ Ibid, 95.

¹¹⁴ Ibid 95.

¹¹⁵ European Commission, ‘EU ETS Handbook’ (2015), available at [ets_handbook_en.pdf \(europa.eu\)](https://ec.europa.eu/ets_handbook_en.pdf) 71.

ISDA Master agreements are internationally agreed standardized documents for OTC derivatives published by the International Swaps and Derivatives Association ('ISDA').

ISDA is an influential trade organization in over-the-counter derivatives based in New York.¹¹⁶ It has over 950 member institutions from 76 countries. These members include derivative market participants (such as amongst others, corporations, investment managers, law firms and government entities) and derivative market infrastructures (such as, amongst others, exchanges and clearing houses).¹¹⁷

The 2002 Master Agreement updates the 1992 Master Agreement and is 'used to document transactions between parties in different jurisdictions and/or transactions involving different currencies'.¹¹⁸ It also introduces new provisions such as a 'force majeure termination event'. The Master Agreements set out all terms between the parties trading OTC derivatives.

3. The Relationship between Climate change and Derivatives

The derivatives market is expected to play an important role in the transition towards sustainability and fighting climate change.¹¹⁹ This is because it is one of the largest global markets and a strategic component of the financial system which is crucial in raising and investing the money required for a net-zero transition.

3.1 Hedging Risk

As explored above, there are various risks to companies and investors in the context of climate change in addition to the usual types of risk in financial markets. Companies particularly exposed to the above mentioned risks include, but are not limited to, carbon-intensive corporations. Derivatives are an efficient way to hedge against these risks. Hedging or transferring in this case reduces uncertainty and 'provides a shield to a portfolio from climate or environmental risk and transforms erratic cash flows into predictable sources of return'.¹²⁰ A weather derivative is a particular derivative which has 'gained significant interest over the past 20 years', used to 'assist resilience in the face of climate change'.¹²¹ It is particularly used by companies who depend on weather for their business (such as power companies) to

¹¹⁶ ISDA, 'About ISDA' <https://www.isda.org/about-isda/> (accessed 4/6/21).

¹¹⁷ Ibid.

¹¹⁸ ISDA, '2002 ISDA Master Agreement' <https://www.isda.org/book/2002-isda-master-agreement-english/> (accessed 4/6/21).

¹¹⁹ Lannoo and Thomadakis (n 71), 1.

¹²⁰ *ibid* 11.

¹²¹ *ibid* 12.

hedge against the risk of extreme weather.¹²² There are also carbon derivatives are considered in the context of the EU carbon derivatives market below.

3.2 Sustainable Finance

More broadly, derivatives play an important role in transitioning to a sustainable global economy. Derivatives facilitate the channelling of capital towards sustainable investments.¹²³ This is because its availability as a risk mitigation tool encourages investment activity on the part of borrowers while lenders are more willing to extend credit to those that can hedge their credit exposure.¹²⁴ Therefore, companies would be shackled in raising substantial capital for large projects without the ability to hedge risks and exposures through derivatives.¹²⁵

3.3 Carbon Derivatives Markets

Carbon markets and more specifically emissions trading schemes illustrate how the derivative markets can play a “key role in reducing global greenhouse gas emissions cost-effectively”.¹²⁶ These schemes allow a market-based control and regulation of carbon-intensive companies’ emissions. Most emissions trading systems are national or regional, with the exception of the EU-wide Emissions Trading System.¹²⁷ The Kyoto Protocol also provides for ‘a sort of an international trading system’¹²⁸ with its own operational characteristics.¹²⁹ As the EU’s emissions trading system is one of the most developed examples of such a scheme, it is used as an example below of how such a system can work to mitigate greenhouse gas emissions.

3.3.1 The European Union Emissions Trading System

In the EU, the European Union Emissions Trading System¹³⁰ is the “cornerstone of the European Union’s drive to reduce its emissions of man-made greenhouse gases”¹³¹ to reduce greenhouse emissions and thereby tackle climate change. It is the world’s first and biggest

¹²² Ibid, 12.

¹²³ Ibid 8.

¹²⁴ Ibid, 9.

¹²⁵ Ibid, 8.

¹²⁶ European Commission ‘International Carbon Market’ https://ec.europa.eu/clima/policies/ets/markets_en (accessed 9/7/21)

¹²⁷ OECD, ‘Emission trading systems’ <https://www.oecd.org/env/tools-evaluation/emissiontradingsystems.htm> (accessed 9/7/21).

¹²⁸ Ibid

¹²⁹ UNFCCC, ‘What is the Kyoto Protocol?’ https://unfccc.int/kyoto_protocol (accessed 9/7/21)

¹³⁰ Directive 2003/87/EC

¹³¹ European Commission, *The EU Emissions Trading System (EU ETS)* (2016) available at https://ec.europa.eu/clima/sites/clima/files/factsheet_ets_en.pdf (accessed 5/6/21).

emissions trading market.¹³² It is based on a legislative framework which operates in trading phases¹³³ to ensure any revisions necessary for the framework to remain strong and up-to-date with new challenges.

The EU Emissions Trading System operates on a ‘cap and trade’ basis. A maximum ‘cap’ or limit is set on the total amount of greenhouse gases that can be emitted by participants for a certain time period. The cap is reduced over time so that total emissions fall. This limit is then divided and shared between different sectors in the form of European Allowances (hereby referred to as ‘EUA’) which act as tradable credits.¹³⁴ “One EUA entitles the holder to emit one tonne of carbon dioxide within the valid period of one year”.¹³⁵ Corporations (ie a coal power plants)¹³⁶ can trade these allowances with each other as needed.¹³⁷ The limit on the total number of these allowances ensures their value.¹³⁸ Importantly, by allowing companies to buy credits from emission-saving projects around the world, in particular in least developed countries, the EU Emissions Trading System acts as a driver of investment in clean technologies and low-carbon solutions globally”.¹³⁹ These allowances must then be returned, or ‘surrendered’ at a specified time each year. The quantity of allowances to be surrendered must be equivalent to their greenhouse gas emissions. This allows participating companies to “compensate for their emissions from the previous year, concluding that year”.¹⁴⁰ Non-compliance results in heavy fines. Participants who fail to comply with their obligation to surrender allowances under the EU Emissions Trading System are fined €100 per tonne of CO₂ for which no allowance has been surrendered.¹⁴¹ Non-compliant companies are also ‘named-and-shamed’.

¹³² Ibid, 2.

¹³³ Ibid, 6.

¹³⁴ EC, EU Emissions Trading System (EU ETS) < https://ec.europa.eu/clima/policies/ets_en

¹³⁵ European Commission, ‘Interplay between EU ETS Registry and Post Trade Infrastructure’ Consolidated Report (2015), 15.

¹³⁶ Referred to as an ‘installation’ Article 3(e) of the EU Emissions Trading System Directive 2003/87/EC

¹³⁷ European Commission (n 130).

¹³⁸ Ibid

¹³⁹ European Commission, *The EU Emissions Trading System (EU ETS)* (2016)

https://ec.europa.eu/clima/sites/clima/files/factsheet_ets_en.pdf accessed 5 June 2021, 2.

¹⁴⁰ Dutch Emissions Authority, ‘Year-end closing EU ETS and CH ETS aviation’

<https://www.emissionsauthority.nl/topics/year-end-closing/surrendering-allowances-ets-aviation> (accessed 9/7/2021)

¹⁴¹ International Carbon Action Partnership, ‘EU ETS’ (May 18, 2021)

<https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=43 accessed 6 May 2021.

3.3.2 Interaction with Derivatives

In the context of derivatives, it is these emissions allowances upon which derivative contracts are based. L Kirke provides a helpful example demonstrating how a European allowance interacts with derivatives in practice. “Assume that Company ABC is a manufacturer whose emissions amount to 250,000 tonnes every year. As it is located within Europe and part of the EU Emissions Trading System, it is required to limit such emissions and therefore attempt to cap pollutants, say to 180,000 tonnes. As costs of investing in new technology are prohibitive, Company ABC decides to purchase EUAs. Whilst it could trade via the spot market, allowances would be subject to price volatility, therefore providing a level of price uncertainty in the future. However, 70 EUA-based futures or options contracts would be purchased now, locking in price.” A spot market, also known as the cash or physical market, is a financial market where the financial instruments or commodities traded are instantaneously delivered. Delivery constitutes an immediate physical exchange of the asset; the e financial instrument or commodity with a cash consideration.¹⁴²

An EUA future contract could therefore be a standardized contract between two coal plants “to buy or sell a specified amount of carbon units for a price agreed today (the futures price) with delivery and payment occurring at a specified future date, the delivery date. The contracts are negotiated at a futures exchange, which acts as an intermediary between the parties”.¹⁴³ This similarly applies to forwards although forwards are non-standardized and take place over-the-counter (see 5.2 below). The EUA option contract would give coal plants “the right, but not the obligation to buy (through a ‘call option’) or sell (through a ‘put option’) allowances at a fixed price upfront.”¹⁴⁴ Another way derivatives can be used in the EU Emissions Trading System is by using swaps. For example, “an amount of EUAs for an equivalent number of Kyoto carbon credits. Both types of unit can be used for compliance in the EU ETS, but carbon credits (e.g. CDM credits) sell at a discount to EUAs. The seller of the EUAs receives not only the credits in return, but also the price differential between the two units, thereby reducing the overall cost of complying with the EU ETS”.¹⁴⁵

¹⁴² Corporate Finance Institute, ‘Spot Market’
<https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/spot-market/> (accessed 6/6/2021)

¹⁴³ European Commission, (n 130)_71.

¹⁴⁴ Ibid_71.

¹⁴⁵ Ibid_.

4. Market Practices

It is interesting to note how corporations apply derivatives in practice in the context of climate change. For example, an Environmental, Social and Governance (‘ESG’) foreign exchange derivative can be used to hedge a company's foreign exchange risk exposure related to a wind farm construction project and commit the provider of the derivative to reinvest the premium it receives in a reforestation project, in line with the UN’s SDGs principles.¹⁴⁶

In the context of institutional investors such as pension funds, derivatives may be used as ‘‘a substitute to direct investment in the underlying asset’’ as ‘‘a risk control mechanism’’ or to ‘‘alter the characteristics of the fund’s portfolio investments’’.¹⁴⁷

In an interesting development to alleviate developing country debt and promote sustainable finance and development, the IMF and World Bank is to introduce the ‘green debt swaps’. The IMF managing director described green debt swaps as having the ‘‘potential to contribute to climate finance’’ and to ‘‘facilitate accelerated action in developing countries’’.¹⁴⁸ While there will not be a one-size-fits-all approach, what are also called ‘‘debt-for-climate’’ or ‘‘debt-for-environment’’ swaps will be based on an overarching concept. International creditors will offer debt relief in exchange for faster coal closures and a shift to renewables. In terms of how this would work is that ‘‘ the debtor nation, instead of continuing to make external debt payments in a foreign currency, makes payments in local currency to finance climate projects domestically on agreed upon terms’’.¹⁴⁹ Alternatively, new debt may be issued by a debtor nation ‘‘to replace existing debt with a commitment to use proceeds to address climate change through mutually agreed performance-linked incentives such as lower interest rates, grants, carbon offsets to service interest’’.¹⁵⁰

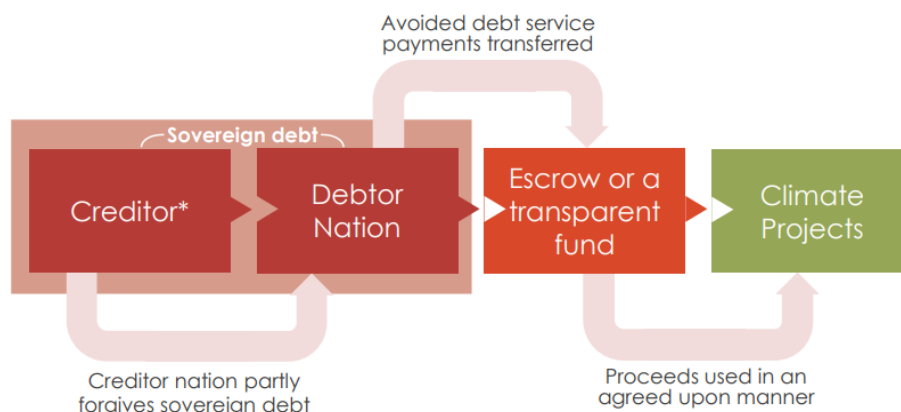
¹⁴⁶ Example taken from Lannoo and Thomadakis, (n 71), 10.

¹⁴⁷ Ibid, 12.

¹⁴⁸ Andrea Shalal, ‘IMF, World Bank to unveil ‘green debt swaps’ option by November, Georgieva says’ *Reuters* (April 8, 2021) <https://www.reuters.com/article/us-imf-world-bank-climate-swaps-idUSKBN2BV2NU> accessed 6 June 2021.

¹⁴⁹ Climate Policy Initiative, ‘Debt for climate swaps, Blueprint’ (May 2021) <https://www.climatepolicyinitiative.org/wp-content/uploads/2021/05/Debt-for-Climate-Swaps-Blueprint-May-2021.pdf> accessed 6 June 2021, 11.

¹⁵⁰ Ibid



Source: Climate Change Initiative

The EU expressed interest in adopting these green debt swaps. This would fit in the current EU Emissions Trading Scheme framework where these swaps by private sector investors could be linked to these existing emissions credits.¹⁵¹

Nonetheless, as the OECD emphasizes, such a task required ‘‘concerted efforts of the whole government and very thorough preparations’’ such as ‘‘robust re-feasibility studies, strong fiscal capacity, commitment to transparency and international credibility of the domestic spending and expenditure programme that is attractive to the whole government’’.¹⁵² However, ‘‘with caution and determination’’ these debt-for-environment swaps constitute ‘‘a realistic option for some countries and can play a significant role in mainstreaming the environment in government policies and in domestic environmental financing’’.¹⁵³

5. Derivative Market Actors and Infrastructure

5.1 Derivatives Broker-Dealers & Clients

The derivatives market is a ‘‘professional wholesale (i.e. inter-dealer) market, with trading taking place mainly between large broker-dealers’’.¹⁵⁴ These broker-dealers are large banks and investment firms. On the buying side are various financial institutions. More often, these

¹⁵¹ Leigh Elston, ‘How debt-for-climate swaps can help fund the energy transition’ available at <https://energymonitor.ai/finance/sustainable-finance/how-debt-for-climate-swaps-can-help-fund-the-energy-transition> accessed 6 June 2021.

¹⁵² OECD, ‘Debt-for-environment swaps’ < <https://www.oecd.org/env/outreach/debt-for-environmentswaps.htm> accessed 6 June 2021.

¹⁵³ Ibid.

¹⁵⁴ Kokkola (n 103), 93

include large institutional investors such as hedge funds, mutual funds and pension funds. Nonetheless, corporations and insurance companies also buy derivatives.¹⁵⁵

5.2 Derivatives Exchanges

Derivative exchanges are where the process of derivative trading takes place. Orders are sent for execution by dealers (whether on their own behalf or on behalf of their customers), where they are collected and matched. This can occur on ‘on-exchange’ trading and on ‘over-the-counter’ (‘OTC’) exchange trading. OTC derivatives are mainly used for hedging purposes. Future contracts are usually traded OTC.

On-exchanges are utilized for fully standardised products, whereas most derivatives are traded bilaterally, over-the-counter. Exchange-traded contracts are, as a rule, subject to CCP clearing, whereby the trading parties usually remain anonymous to one another. The most common exchange-traded derivatives are futures and options.¹⁵⁶ Examples of Derivative exchanges include, amongst others, CME Group, Intercontinental Exchange, Eurex and Nasdaq OMX. More specifically, the CME Group is “the exchange of choice for trading and clearing thermal coal futures and options”.¹⁵⁷ It therefore plays a significant part in offering global coal risk management to coal companies. These exchanges have taken an initiative towards contributing to climate change mitigation through integrating Environmental Social and Governance (‘ESG’) principles aligned indexes. ESG indexes are “designed for investors seeking exposure to companies with stronger sustainability profiles (often measured by ESG scores) with relatively low tracking error to the underlying equity market”.¹⁵⁸ CME Group launched E-mini S&P 500 ESG Index Futures while Eurex, the largest derivatives exchange in Europe “introduced a new class of equity index futures contracts tied to ESG benchmarks widely accepted by global investors”.¹⁵⁹ Overall, there appears to be great demand for these products as over \$30 trillion USD are directed to ESG investments.¹⁶⁰

¹⁵⁵ Ibid, 93

¹⁵⁶ Kokkola (n 103) 103.

¹⁵⁷ Coal - Futures, Options and OTC Clearing (cmegroup.com)

¹⁵⁸ Barbara Novick *et al*, ‘The Investment Stewardship Ecosystem’ (*Harvard Law School Forum on Corporate Governance*, July 24, 2018) <https://corpgov.law.harvard.edu/2018/07/24/the-investment-stewardship-ecosystem/> (accessed 9 June 2021.)

¹⁵⁹ FIA, ‘How Derivatives markets are helping the world fight climate change’ (September 2020)

¹⁶⁰ Global Sustainable Investment Alliance, ‘Global Sustainable Investment Review’ (2018) www.gsi-alliance.org/trends-report-2018

5.3 Clearing Houses

Clearinghouses are an essential part of the financial infrastructure in the area of derivatives. Clearing itself involves “the transmission, exchange and settlement for payments”.¹⁶¹ Consequently, a clearinghouse acts as an intermediary between buyers and sellers of financial instruments.¹⁶² The two main clearing houses used by exchanges are ICE Clear Europe (for ICE) and European Commodity Clearing (ECC) (for EEX). Other clearing houses are CME Clearing (for CME) and Nasdaq OMX’s clearing house.¹⁶³

¹⁶¹ Valdez and Molyneux (n 1).

¹⁶² CFA Institute, ‘Financial Clearing Houses’ Clearing House | Financial Clearing House Function | CFA Institute

¹⁶³ European Commission, ‘Interplay between EU ETS Registry and Post Trade Infrastructure’ Consolidated Report (2015), 15.

PART C

PAYMENTS

Companies rely on payments every day in order to run their business. As a way of illustration, coal companies may rely on payments to pay taxes, salaries and wages to their employees, to pay for raw materials provided by their suppliers as well as to pay for their insurance. In addition, payments are extremely important to allow coal companies to receive, for example, the income coming from consumers for the service provided, i.e. electricity supply. As mentioned above, firms may issue shares and bonds to raise funds, invest surplus funds or savings or make use of derivatives to manage their risk. The trading of financial instruments usually involves some kind of transfer of funds, which means that payments are still involved. It is self-evident that payments play a crucial role for companies, allowing them to engage in different kinds of transactions every day, which may either respond to the primary needs of a company or enable the most complex financial operations. As a matter of fact, payments are not only relevant for companies, but for the financial system as a whole, since they allow funds to flow between different financial actors across time and space. Due to that, payments have been considered the backbone of the financial system and payments systems its plumbing, since they are the conduits through which most payments flow. The fact that every drop of water necessarily goes through the same conduits, makes them or, out of metaphor, payment systems crucial from a strategic point of view. At the end of the day, closing the taps means imposing water shortage on the other side of the conduit. In the same way, intervening on payment systems could really alter the flow of money moving in and out companies' pockets. In turn, this means to have leverage to really make a change, since it is money that makes things happen, even climate change.

1. Banks, money and payments

Before diving into payment systems, it is important to understand what a payment is. A payment is a transfer of funds, which discharges an obligation on the part of a payer *vis-à-vis* a payee. A payer is the party to a payment transaction which issues the payment order or agrees to the transfer of funds to the payee, whereas a payee is the final recipient of funds¹⁶⁴. Although historically payments and money have been connected to banks, recent decades have witnessed

¹⁶⁴ Kokkola (n 103) 25.

a number of promising transformative developments, which have made possible a lot of new financial markets, institutions, and platforms¹⁶⁵. Nevertheless, banks still play a central role in the transfer of payments, which should not be particularly surprising, since bank deposits represent the accounting liabilities of a bank to its customers. This means that it is relatively easy for a bank to execute payments between customers at the *same* bank¹⁶⁶. Indeed, an intra-bank payment will usually be ‘little more than a series of book entries on the bank’s internal accounting system’¹⁶⁷.

The real challenge comes as far as payments between customers at *different* banks are concerned. Initially such transfers were mainly possible thanks to correspondent banking arrangements, but today interbank payments are more commonly processed through multilateral arrangements, the so-called *payment systems*. Generally talking, the term ‘payment system’ refers to the complete set of instruments, intermediaries, rules, procedures, processes and interbank funds transfer systems which facilitate the circulation of money in a country or currency area¹⁶⁸ among all participants¹⁶⁹ of that system. Indeed, a payment system allows its participants to transfer funds by holding an account in a single bank, which is usually the central bank or any other creditworthy bank. In other words, banks are part of a payment system usually run by the central bank, so that they are basically all ‘customers’ of the same bank. This essentially allows participants to discharge their payments obligations as simple intra-bank transactions¹⁷⁰.

Payments get even more complicated when the exchange of financial assets is involved, and that is because there are two ‘delivery legs’ to be handled, namely the ‘cash leg’ and the ‘securities leg’. For the delivery of securities *Securities Settlement Systems* (SSSs) play a central role, since they enable securities to be transferred according to a set of predetermined multilateral rules¹⁷¹. This Section will focus mainly on payment systems, since their functioning is more straightforward, but some reference will be made also with regard to SSSs to the extent needed for the purposes of the report.

¹⁶⁵ Dan Awrey, ‘Unbundling Banking, Money, and Payments’ (2021) 565 ECGI Working Paper Series in Law 1, 4.

¹⁶⁶ *ibid* 14.

¹⁶⁷ Armour *et al* (n 3) 394.

¹⁶⁸ Kokkola (n 103) 25.

¹⁶⁹ On payment system participation see below.

¹⁷⁰ Morgan Ricks, *The Money Problem: Rethinking Financial Regulation* (The University of Chicago Press, 2016) 394.

¹⁷¹ BIS, ‘A glossary of terms used in payments and settlement systems’ Committee on Payment and Settlement Systems <https://www.bis.org/dcms/glossary/glossary.pdf?scope=CPMI&base=term> accessed 11 July 2021.

In brief, payment systems and SSSs are part of the wider infrastructure that allows the financial system to provide its actors with payment services, ultimately consisting of the transfer of funds and the delivery of securities¹⁷².

2. Life cycle of a payment

Payment systems play a vital role within the normal life cycle of a payment. The main steps are further explained in the following sections.

2.1 Instruction and verification

The life cycle of a payment normally begins with the submission of the payment instruction¹⁷³ from the payer to her bank. The sending bank then verifies and authenticates the payment instrument in order to establish its legal and technical validity, checks the availability of funds, makes the necessary entries in the bank's accounting system and prepares the payment instruction for clearing and settlement¹⁷⁴. If a payment message fails the validation procedures, it is not accepted by the system and is returned to the sending participant.

2.2 Interbank processing

Interbank processing is the phase in which payment systems may come into play. Indeed, the interbank processing of payments may take place either in the form of correspondent banking (bilateral agreement) or through payment systems (multilateral agreement)¹⁷⁵. For the purposes of this report, the focus will be on how the interbank processing, which consists of the *clearing* and *settlement* of payments, is carried out within payment systems. That is because most payments are processed through payment systems, which - together with other features - makes them interesting from a strategic perspective. Indeed, they present many of the general features, including concentration, necessity and universality that have been mentioned at the beginning of the report and that will be highlighted beyond.

¹⁷² BIS, 'Principles for financial market infrastructures' (2012) Committee on Payment and Settlement Systems and Technical Committee of the International Organization of Securities Commissions 5 <https://www.bis.org/cpmi/publ/d101a.pdf> accessed 11 July 2021.

¹⁷³ Kokkola (n 103) 26. Note that the submission may vary depending on the payment instrument chosen. For example, credit transfers, direct debits, payment cards, debit cards, credit cards, etc. See Kokkola (n 103) 30, 31.

¹⁷⁴ Ibid.

¹⁷⁵ Ibid.

2.2.1 Clearing

Once the payment has been submitted and validated, depending on the rules and procedures of the payment system concerned, the further processing of that order will involve technical activities such as the transmission, reconciliation¹⁷⁶, sorting¹⁷⁷ and, in some cases, confirmation of payment transfer orders. In simpler words, the clearing of a payment consists of the exchange of relevant payment information between the financial institutions of the payer and payee. Clearing may also involve the calculation of participants' mutual positions, on a bilateral or multilateral basis, with a view to facilitating the settlement of those participants' obligations in the books of a settlement institution¹⁷⁸.

One way of organising the clearing process is in the form of a *clearing house*. A clearing house is an organisation that operates central clearing facilities, potentially also offering bilateral or multilateral netting arrangements. Technological advances over the course of the last several decades have resulted in an enormous increase in the volume of interbank payments. As a result, a large proportion of interbank payments are now cleared through *automated clearinghouses* before being routed to a central bank or private settlement agent for final settlement¹⁷⁹. An alternative to such automated model is the use of multilateral arrangements revolving around a "clearing association", namely a coordinating body that organises and facilitates clearing for institutions, but it does not operate central processing facilities¹⁸⁰. Important clearinghouses include the Clearing House Automated Payment System (CHAPS) and Bankers' Automated Clearing Systems (BACS) in the United Kingdom, and TARGET2 in the European Union.

2.2.2 Settlement

Once the payment is cleared, it is ready for *settlement*, which is the act of discharging the obligations between two or more parties. In a payment system, settlement occurs when funds are transferred from the payer's bank to the payee's bank and such funds are known as 'settlement assets'. 'Settlement assets are the assets, or claims on assets, that are accepted by a

¹⁷⁶ A procedure to verify that two sets of records issued by two different entities match. T. Kokkola, 364.

¹⁷⁷ Reconciliation is an accounting process that compares two sets of records to check that figures are correct and in agreement. Further, reconciliation involves resolving any discrepancies that may have been discovered. See <https://www.investopedia.com/terms/r/reconciliation.asp> accessed 11 July 2021 . See also <https://finance.uw.edu/fr/internal-controls/reconciliation> accessed 11 July 2021.

¹⁷⁸ Kokkola (n 103) 40. This is usually called *netting*, which in economic terms is the agreed offsetting of mutual obligations in order to establish single net settlement positions

¹⁷⁹ Dan Awrey, Kristin van Zwieten, 'The Shadow Payment System' (2018) 43 (4) *The Journal of Corporation Law* 775, 791-792.

¹⁸⁰ Kokkola (n 103) 40.

beneficiary in order to discharge a payment obligation'.¹⁸¹ The settlement institution is the institution across the books of which transfers between participants take place in order to achieve settlement. The settlement institution will be either a central bank, providing settlement in *central bank money*, or a commercial bank, providing settlement in *commercial bank money*, in the form of deposit liabilities that can be used for transaction purposes¹⁸². In payment systems the settlement agent is often the central bank, which means that payments are settled in central bank money. In this case, payments are settled via central bank accounts, where the recipient bank has a claim on the central bank and the paying bank either holds deposits with the central bank or has the option of obtaining credit from the central bank. The majority of payment systems, particularly those processing large-value payments, settle in central bank money. The reason for that is that using central bank money substantially reduces the credit and liquidity risks in payment and settlement systems¹⁸³.

Settlement can be *gross* or *net* and conducted in *real time* or at *designated* times. In gross settlement, each payment instruction is settled individually across the accounts of the paying and receiving banks, resulting in a debit and credit entry for each and every payment instruction settled. In net settlement, payment instructions are netted, which means that the number of claims after the *netting* will be smaller than the number of original payment instructions. Real-time settlement occurs on a continuous basis during the operational day. Designated-time settlement occurs at pre-specified points in time, ranging from a single settlement cycle at the end of the day, to frequent settlement cycles during the day¹⁸⁴.

2.3 Crediting and communication

Eventually, the receiving bank credits the account of the recipient¹⁸⁵. The receipt of payment is then communicated to the beneficiary via account statements following the crediting of its account.

¹⁸¹ Ibid 44.

¹⁸² Ibid 47.

¹⁸³ Ibid 44.

¹⁸⁴ Ibid 47.

¹⁸⁵ Ibid 26.

3. Payment systems

3.1 Types of payment systems

Payment systems are usually classified as ‘large-value’/ ‘wholesale’ or ‘retail’ payments systems, depending on the main type of transaction processed in the system. Large-value payment systems (LVPS) facilitate the flow of funds between financial intermediaries, whereas ‘retail’ payment systems are designed primarily to process payments between businesses and households¹⁸⁶.

Wholesale payment systems’ functioning is nearly identical in most countries, namely participants usually hold accounts within one single bank, which is most of the time the central bank. Wholesale payment systems, by and large, operate as described above with regard to the clearing and settlement phases and payments are typically settled on a real-time gross settlement basis. Participants exchange information with the central bank in order to process payments through dedicated communication services like SWIFT and payments are practically discharged by crediting accounts¹⁸⁷. On the other hand, retail payment systems, which generally process huge amounts of smaller value payments, are way more complex and involve a higher number of actors. In retail payment systems transactions are made via a wide range of payment instruments and methods: cash, cheques, credit or debit cards, electronic funds and transfer. There are considerable variations in its infrastructure between different payment instruments and methods, and from jurisdiction to jurisdiction. Over the past two decades the most significant long-term trend in the use of payment products has been the relative shift away from cash in favour of non-cash payment methods – particularly payment cards – for consumer payments, combined with increases in electronic and automated processing of payments more generally. Additionally, the infrastructure supporting retail payments is almost universally owned and operated by private-sector payment services providers such as banks, credit card companies (Visa and Mastercard) and, increasingly, non-bank intermediaries such as mobile phone operators and PayPal¹⁸⁸. This is a highly interesting and growing dimension, yet from a first brief analysis it is clear that it is way patchier, since many more variables and actors are involved. For this, this report will mainly focus on wholesale payment systems, which are more concentrated and work really similarly across the world. The fact that wholesale payment

¹⁸⁶ Ricks (n 169) 391.

¹⁸⁷ Kokkola (n 103) 35-36.

¹⁸⁸ Armour *et al* (n 3) 405.

systems work almost the same universally and that they usually operate under the oversight of central banks¹⁸⁹ makes them more attractive from a strategic point of view.

Payment systems may also be distinguished on the basis of their settlement system. While LVPS predominantly are based on the Real-time gross settlement systems (RTGS), retail payment systems mostly rely on Designated-time net settlement systems (DNS) to settle the net positions of participants at one or more discrete pre-specified settlement times during the processing day (often with several settlement cycles during the day). Ultimately, Designated-time gross settlement systems exist in some countries. In these systems, the final settlement of transfers occurs at the end of the processing day with no netting of credit and debit.

Prior to the 90s DNS systems were the most common ones, but they entailed high settlement failure risks. As the volume of payments processed through wholesale DNS systems around the world grew during the 1980s and 1990s, central banks became increasingly concerned about the possibility of settlement failure and its potential impact on financial stability. As a result, steps were taken to reduce the amount of settlement risk via the implementation of RTGS systems. By the turn of the new millennium, traditional wholesale DNS systems had been replaced by RTGS systems within most developed economies¹⁹⁰. RTGS systems surely address the issues connected to settlement failure, since they settle on a gross basis, but this means that they require participating banks to keep more funds on hand in order to execute payments. Put differently, RTGS systems require more liquidity than DNS systems¹⁹¹ and this liquidity need puts pressure on central banks to ensure the continuous flow of funds within these systems. Indeed, central banks are uniquely positioned to offer subsidized short-term credit to participating banks and this is what they usually do by providing intraday credit, which is typically fully collateralized¹⁹².

3.2 Payments systems and their risks

Payment systems are exposed to different kinds of risks, that may find their root either within the system or outside, but that still manifest themselves into payment systems. Common risks in financial markets have already been mentioned in Part B of the report. However, in this section the focus is on how those risks materialise in payment systems, in the form of liquidity, credit, operational and systemic risk. *Credit risk* is the risk that participants in the transaction

¹⁸⁹ BIS, 'Central bank oversight of payment and settlement systems' (2005) Committee on Payment and Settlement Systems <https://www.bis.org/cpmi/publ/d68.pdf> accessed 11 July 2021.

¹⁹⁰ Armour *et al* (n 3) 397.

¹⁹¹ Ibid.

¹⁹² Kokkola (n 103) 52. On collateral see below.

will not be paid for an outstanding claim, in case a counterparty will not settle an obligation for full value, neither when that obligation becomes due nor at any time thereafter. Credit risk stems from the extension of any form of unsecured (i.e., non-collateralised) credit and from a failure to synchronise the various interrelated elements of a transaction¹⁹³. *Liquidity risk* materialises if a party does not have the necessary funds or assets at its disposal when the obligation becomes due, yet it does not imply that any of the parties is insolvent, since it may be able to settle at some unspecified time thereafter¹⁹⁴. Historically, *operational risk* was regarded as the risk of technical failures such as a computer breaking down or faulty software. However, today it is defined in a much broader way as the risk of losses resulting from inadequate or failed internal processes, people and systems or from external events. This definition goes way beyond the narrower focus on technological errors¹⁹⁵.

Operational or financial problems can also expose payment systems to *systemic risk*. Indeed, the inability of one participant to meet its obligations in a system will cause other participants to be unable to meet their obligations when they become due, potentially with spillover effects (e.g. significant liquidity or credit problems) threatening the stability of or confidence in the financial system¹⁹⁶. By their very nature, networks such as payment systems are potentially a key institutional channel for the propagation of systemic crises, and this is the reason why it is so important to seriously address all risks to which such systems are exposed¹⁹⁷.

3.3 Payments systems and risk management

3.3.1 Access criteria

As mentioned above, a payment system *only* allows its *participants* to discharge their payments obligations¹⁹⁸. It is important to be aware that participation in a payment system is governed by ‘access criteria’. It is not easy to examine access criteria generally without referring to any specific payment system, since rules can widely vary from one system to the other. However, with a degree of approximation, it is possible to say that access criteria first of all depend on the *institutional standing* of participants. Payment systems’ participants are for the most part credit institutions like banks and clearinghouses, but participation may also be extended to

¹⁹³ *ibid* 115-116. See also Bruce Summers, ‘Payment System Risk and Risk Management’. In *The Payment System: Design, Management and Supervision*. (1994) IMF, 89.

¹⁹⁴ *ibid* 122-123. See also Summers (1994) 89.

¹⁹⁵ *ibid* 124-125.

¹⁹⁶ *ibid* 129, 137.

¹⁹⁷ *ibid* 129.

¹⁹⁸ Ricks (n 169) 394.

treasury departments, public sector bodies and investment firms¹⁹⁹. It is important to note that payment systems participants are usually pretty few, as it is the case of the UK high-value payment system CHAPS, which has no more than 35 direct participants²⁰⁰, yet in May 2021 it processed 3.6 million payments worth £6.1 trillion over 19 settlement processing days²⁰¹. Access criteria may further provide for *technical* requirements like the ability to install, manage, operate, monitor and ensure the security of the necessary IT infrastructure²⁰² or to have access to SWIFT²⁰³. Criteria may also include also *risk mitigation requirements*²⁰⁴, based for instance on ratings or imposing participants to hold a certain amount of funds on their settlement account²⁰⁵. The point is that in most countries, participation requirements reflect a combination of institutional and functional criteria²⁰⁶. The basic objective of such access criteria is to ensure that individual members do not introduce an unacceptable financial or operational risk into the system²⁰⁷.

Going in more detail, there are two basic means for accessing a payment system, namely *direct* participation or *indirect* participation via a direct participant²⁰⁸. Direct participants can perform all activities allowed in the system without using an intermediary, including, in particular, the direct inputting of orders and the performance of settlement operations. Direct participants clearly have to fulfil all of the system's access criteria. An indirect participation entails the use of a direct participant as an intermediary²⁰⁹ in order to perform some of the activities allowed in the system (particularly settlement). The rights and responsibilities of indirect participants vary from system to system, and so they may or may not have to fulfil certain access criteria, and they may or may not be directly addressable in the system.

¹⁹⁹ Guideline of the European Central Bank of 5 December 2012 on a Trans-European Automated Real-time Gross settlement Express Transfer system (TARGET2) (ECB/2012/27), Article 4. See also CHAPS participants <https://www.bankofengland.co.uk/payment-and-settlement/chaps> accessed 11 July 2021.

²⁰⁰ <https://www.bankofengland.co.uk/payment-and-settlement/chaps> accessed 11 July 2021.

²⁰¹ <https://www.bankofengland.co.uk/payment-and-settlement/chaps> accessed 11 July 2021.

²⁰² Guideline of the ECB (n 199), Article 8.

²⁰³ BoE, 'CHAPS Reference Manual', Ch. 2, 3.2.2.

²⁰⁴ *ibid.*

²⁰⁵ *ibid.*

²⁰⁶ On access criteria see also World Bank Group, 'Payment systems worldwide: A snapshot' (2018)

<https://thedocs.worldbank.org/en/doc/591241545960780368-0130022018/original/PaymentSystemsWorldwideASnapshotSummaryOutcomesoftheFourthGlobalPaymentSystemsSurvey.pdf> accessed 11 July 2021.

²⁰⁷ Kokkola (n 103) 40.

²⁰⁸ For Target 2 direct and indirect participation see ECB, 'Information Guide for TARGET2 users: Version 12.0' (2018) 43-45.

²⁰⁹ This is done through the establishment of a bilateral agreement with the relevant direct participant.

As a way of illustration, according to Target 2²¹⁰ access criteria, direct participants can be credit institutions, investment firms, treasury departments of central or regional governments of Member States, other public sector bodies of Member States, organisations providing clearing and settlement services and Central banks of Member States²¹¹. For what concerns indirect participation, it is open only to supervised credit institutions established in the EEA²¹². Smaller domestic banks, as well as financial institutions located outside their country of incorporation are typical example of indirect participants²¹³.

The above analysis makes it clear that companies do not participate either directly or indirectly in payment systems, which means that they have to rely on direct or indirect participants, to have their payments dealt with. This means that companies are not directly concerned with access criteria, yet they might be indirectly affected in the event participants on which they rely are cut out from the system for not meeting the requirements or in the event they did not make adjustments in order to keep being ‘eligible’.

3.3.2 Collateral frameworks

It has been previously shown how payment systems may require a high amount of liquidity by its participants and how important it is to ensure that liquidity risk is properly addressed within the system. Consequently, payment systems have developed important mechanisms to allow payment systems participants to meet their liquidity requirements, as it is the case for services of intraday credit lending offered by central banks. It is important to note that central banks will only grant such short-term lending in front of collateral being given in exchange. Collateral frameworks establish the rules according to which central banks can provide liquidity both in the context of payment systems and in other cases²¹⁴. To better understand the functioning of collateral, it may be useful to refer to the European framework. The Eurosystem only lends central bank money to banks against security, a form of insurance, referred to as *collateral*. In other words, when the European Central Bank (ECB) and the national central banks lend money to other banks they take financial assets, like government or corporate bonds, as ‘security’ that the loan will be paid back. Such financial assets act as *collateral*. The use of

²¹⁰ Target 2 is the main EU wholesale payment system.

²¹¹ ECB, ‘Single Shared Platform. User Detailed Functional Specifications.’, 19-21

https://www.ecb.europa.eu/paym/target/target2/profuse/nov_2018/shared/pdf/T2_UDFS_book_1_v12.01.pdf
accessed 11 July 2021.

²¹² *ibid*, 22.

²¹³ Kokkola (n 103) 41.

²¹⁴ Kjell Nyborg, *Collateral frameworks: The open secret of central banks* (Cambridge University Press 2016) 18.

collateral is justified on the basis that it protects the Eurosystem from financial losses in case banks are unable to pay back the loans they receive²¹⁵. The Eurosystem accepts a broad range of financial assets as collateral, which are the so-called ‘eligible assets’²¹⁶, among which are listed also corporate bonds. The eligibility of assets is established on the basis of eligibility criteria, which may include considerations on the currency of denomination, the place of issue, the settlement procedure, the type of issuer (central bank, public or private sector institutions) and the credit quality of the asset²¹⁷.

Moreover, there are studies showing how assets which are deemed eligible as collateral by the Eurosystem unavoidably become more valuable (relative to other non-eligible assets) to banks, since they demand eligible assets to directly obtain liquidity from central banks. Therefore, being such eligible assets critically important to the functioning of the banking sector, other investors and creditors will want to hold them, prompting yet more demand. The overall increase in demand for these assets can increase their price and meanwhile lower interest rate and borrowing cost for the government or corporate that issues the debt instrument²¹⁸. In brief, eligibility criteria not only establish which assets are eligible, but also attribute a comparative advantage to their issuers.

It is also important to note that the ECB applies a specific ‘haircut’ to each eligible asset in its collateral framework. A haircut establishes the amount of cash that borrowers receive in return for collateral, which is given by the market value of the asset less a certain percentage (the haircut)²¹⁹. In numbers, if an asset has a market value of € 10 on the day it is posted as collateral, and the haircut assigned to it is 10%, the bank receives a loan of € 9 (€10 less €1 corresponding to the 10% haircut applied). In this example, it effectively means the ECB treats the asset as it has a value of € 9, even though it has a market value of € 10. Thus, the higher the haircut, the lower the secured funding that commercial banks can obtain for a given asset²²⁰. Haircuts work as a cushion for central banks, to manage risk, since prices flow from the moment in which the money is lent and repaid. In the Eurosystem collateral framework, the value of haircuts depends on a number of factors, including the credit quality of the bond issuer

²¹⁵ Nyborg (n 214) 23-25.

²¹⁶ Yannis Dafermos *et al.*, ‘Greening the Eurosystem collateral framework. How to decarbonise the ECB’s monetary policy’ (2021) New Economics Foundation 8.

²¹⁷ <https://www.ecb.europa.eu/mopo/assets/standards/marketable/html/index.en.html> accessed 11 July 2021.

²¹⁸ Jean-Stéphane Mésonnier *et al.*, ‘The Interest of Being Eligible’ (2017) 636 Banque de France Working Paper 1, 1-2. See also Dafermos (n 216) 11-12.

²¹⁹ Nyborg (n 214) 26-27.

²²⁰ Dafermos (n 216) 10-11.

(i.e. the credit rating), the remaining time until the repayment of the bond, and the interest rate paid on the asset at regular intervals²²¹.

In brief, payment systems highly rely on the use of collateral in order to allow credit that usually comes from central banks, without compromising the risk exposure of the lender. However, the collateral framework has additional consequences. It influences how assets are considered in the financial system on two grounds: whether the asset is eligible or not and what is the haircut applied to each eligible asset. Indeed, as mentioned above assets, including corporate bonds, commonly experience favourable financial conditions just for the fact that they are eligible. Similarly, assets with lower haircuts will be preferred, since the lower the haircut, the higher the amount of money that can be borrowed with that corporate bond²²². Consequently, the nature of eligibility criteria and the allocation of higher or lower haircuts to corporate bonds allows certain issuers, including certain companies, to have access to more advantageous financial conditions²²³.

3.4 Payment systems and climate risk

It is important to mention the role that climate change risk can play within payment systems. As explained in Part B of the report, climate change risk mainly takes the form of physical, transition and systemic risk. This Section focuses on climate change risk with regards to payment systems. The most straightforward cases of climate risks affecting payment systems are actually the ones that manifest outside the systems, yet have an indirect impact on them. An example in this sense is the increased likelihood of natural disasters affecting non-financial entities. Physical risks to banks' customers may have impacts on banks' liquidity. If households and corporations affected by natural disasters need liquidity to finance recovery and other cash flow needs, they may withdraw deposits or draw on credit lines. These withdrawals could put the bank's own liquidity under pressure²²⁴, which in turn could have an impact on payment systems, since they require for high amounts of liquidity by its participants. Moreover, climate risk could also manifest in the form of a sudden shift in market sentiment away from carbon-intensive assets of non-financial institutions, which could lead to decline in price/valuation of such assets²²⁵. In case the carbon-intensive assets were held as collateral by the central bank,

²²¹ *ibid* 11.

²²² *ibid*, 14-16.

²²³ *ibid*, 13-18.

²²⁴ BIS, 'Climate-related risk drivers and their transmission channels' (2021) Basel Committee on Banking Supervision 18-19 <https://www.bis.org/bcbs/publ/d517.pdf> accessed 11 July 2021.

²²⁵ NGFS, 'Overview of Environmental Risk Analysis by Financial Institutions' (2020) Technical Document 9.

the safety cushion given by haircuts against price fluctuations may not be sufficient and the central bank could be exposed to a greater risk than expected.

On the other hand, it was not possible to find any reference to climate risks arising directly from the inside of payment systems, yet it is not excluded that there may be space for research in this field.

Unfortunately, payment systems do not seem to take climate risks into consideration. As a way of illustration, access criteria do not integrate climate change in any form. Indeed, they try to address the credit, liquidity and operational risk to which payment systems are exposed, but they fail in tackling climate risk. Similarly, collateral frameworks make sure that the central bank is not exposed to non calculated risk when providing liquidity to payment system participants. However, they are entirely insensitive to climate risk, since eligibility criteria and haircuts do not integrate such kinds of concerns in any form. Therefore, payment systems and central banks - relying on collateral frameworks - are not properly managing their risk and thus, are more exposed than what they are expected to be. This is clearly a financial reason to integrate climate change-related considerations within payment systems.

In addition, recent empirical studies have shown how the ECB, through its collateral framework implemented in total disregard of climate change concerns, is currently supporting fossil fuel and carbon-intensive companies, giving them access to financial and borrowing conditions²²⁶. Therefore, not only are payment systems more exposed to risks, but they also seem to actively contribute to climate change.

4. Securities Settlement Systems (SSSs)

Securities have already been discussed in Part A as an important source of finance for companies. In that context, the role of infrastructure has already been explained with regard to the first part of the life cycle of a financial instrument. Here the focus is on the post-trade process, when orders are matched and executed mainly through SSSs. Similarly to payment systems, once a securities trade has been agreed, the parties to the trade confirm the terms agreed, and instructions are generated for the execution of the trade and sent for clearing and settlement in SSSs. Again, the *clearing*²²⁷ includes the process of transmitting, reconciling and, in some cases, confirming securities transfer orders prior to settlement, possibly including the

²²⁶ Dafermos (n 216) 13-18.

²²⁷ In some markets, there may be a *central counterparty* (CCP), a central provider of clearing services which interposes itself between the two parties and provides multilateral netting and centralised risk management.

netting of orders and the establishment of final positions for settlement²²⁸. The actual delivery of the securities and the corresponding payment is referred to as settlement. Settlement services are offered by Central Security Deposits (CSDs), which both maintain the accounts that record the issuance, ownership, and transfer of securities and provide for the centralized safekeeping of those securities.²²⁹ A CSD can be national, National central securities depository (CSD), or international, International central securities depository (ICSD). Usually, countries have one domestic CSD that is traditionally associated with the national stock exchange. Similarly to payment systems, ICSDs and CSDs establish access criteria to take part in their SSS. For instance, Euroclear, which is a provider of Financial Market Infrastructure acting as an ICSD, requires its participants to meet the following criteria: adequate financial resources, operational and technological capacity, legal capacity, internal control and risk management, and ethical standards²³⁰. Evidently, access criteria are aimed at ensuring that members do not introduce an unacceptable financial and operational risk into the system²³¹.

SSSs work in a similar way to payment systems, yet a high level of fragmentation can still be observed in the trading, clearing and settlement layers²³². This relates not only to the large number of service-providing entities involved, but also, to a large extent, to national differences as regards institutional, legal, tax-related and technical issues, as well as business practices. Moreover, cross-border activities often rely on the involvement of a variety of intermediaries, which results in complex processes.²³³

It is also important to point out that payment systems and SSSs are not only conceptually intertwined, but also in practice²³⁴. As a rule, securities are delivered against payment in a delivery versus payment (DvP)²³⁵ procedure, unless it has been agreed that securities will be delivered free of payment (FOP). DvP requires interaction between the SSS and a payment system, since there are two delivery legs to consider, namely the cash leg and the securities leg²³⁶. Payment systems and SSSs can interact mainly in two ways. The SSS and the payment

²²⁸ Kokkola (n 103) 67.

²²⁹ Armour *et al* (n 3) 402.

²³⁰ <https://my.euroclear.com/dam/EB/Legal%20information/Operating%20procedures/public/LG001-Operating-procedures-of-the-Euroclear-system.pdf> accessed 11 July 2021.

²³¹ Kokkola (n 103) 40.

²³² *ibid*, 205.

²³³ *ibid*.

²³⁴ Armour *et al* (n 3) 391.

²³⁵ In DvP settlement, the discharging of the obligation to deliver securities is made conditional on the successful discharging of the obligation to transfer cash, and vice versa. This is done in order to shield the two parties from the risk of losing the full value of the transaction following the non-delivery or default of their counterparty. Kokkola, 84.

²³⁶ Kokkola (n 103) 67-68.

system may interact through a communication interface in order to exchange information on the status of the two legs being settled in the respective system. On the other hand, both the securities accounts and the cash accounts may be maintained on a single technical platform, with settlement achieved either in commercial bank money or in central bank money²³⁷. The point is that payment systems and SSSs are highly interconnected, which turns them into preoccupying channels of risk propagation. For instance, if payment systems experience a lack of liquidity, which does not allow participants to discharge their payment obligations, this might have an impact in SSSs, since participants may not have enough liquidity to deliver their securities obligations as well²³⁸. Unfortunately, similarly to payment systems, SSSs do not seem to integrate climate change considerations - access criteria are a clear example - which means that they are exposed to climate risk. An over-exposition of SSSs and of payment systems to non-calculated risk can be extremely dangerous, in particular in terms of enhanced likelihood of a systemic crisis.

²³⁷ *ibid* 84-85.

²³⁸ *ibid* 128.

SECTION THREE

STRATEGIC CONSIDERATIONS

The report shows how the financial system plays a central role in providing services to companies by facilitating access to finance, allowing them to manage their risk and ultimately dealing with their payment obligations. If companies want to have access to the above-mentioned services most of the time they will need to comply with the legal framework prevailing in the financial system. Thus, the financial system, its actors, and infrastructures are a highly strategic area of intervention in the fight against climate change. Indeed, targeting the different areas within the financial system would not only target its immediate participants but also the actors which rely on the system. ‘Greening’ the financial system would - implicitly - create an incentive for corporations to transition to a climate aligned and greener economy. However, financial systems have shown to struggle to respond to the challenges posed by the ordeal of climate change and adapt to new regulatory frameworks and transition to low carbon emissions. In this light, the report intends to provide the reader with some interesting considerations on how to strategically intervene in the different areas of the financial system, to ultimately target companies.

1. Finance and Investment

1.1 Advocacy

1.1.1 Sustainable access criteria requirements for stock exchanges and CCPs

As gatekeepers, stock exchanges and CCPs can make a meaningful impact by allowing only compliant companies to access the essential services offered by them. Besides, the financial infrastructure offers necessary services to companies, in the sense that it is the only means for them to raise finance or invest their profits. Although companies have the option of off-exchange platforms for less regulation, most of them prefer stock exchanges for better returns. Accordingly, imposing new regulation would be effective.

Along with the documentary (prospectus), financial and accounting entry requirements, stock markets should include sustainability requirements for prospective issuers. Similarly, clearing membership requirements for example, capital, technological, and operational risk management requirements- should also incorporate sustainability requirements. Although CCPs present a potential intervention opportunity, it is not timely. CCPs are at the end of the

financial cycle where a lot has already happened, so intervention measures are less effective compared to those imposed at the beginning, that is, at the trading process.

As mentioned earlier, companies must comply with financial reporting obligations in order to access and continue utilising stock exchanges. For example in the European Union (and by extension the United Kingdom), a company must publish a prospectus in order to offer shares for the first time (also known as initial public offering).²³⁹ It must also publish annual and half-yearly reports on its financial progress.²⁴⁰ Similarly, any inside information that could affect investors must be disclosed to the public as soon as possible.²⁴¹ Mandatory sustainability reporting as part of the foregoing financial reporting obligations, is desirable. This will ensure that companies are raising sustainable finance.

1.1.2 Reforming directors' duties towards a pluralist approach

The ultimate obstacle to a more sustainable financial system is the shareholder primacy model of companies prevailing directors' duties in most jurisdictions. In the UK, for instance, an enlightened shareholder approach is advocated by section 172(1) of the Companies Act 2006 (CA 2006), which requires directors to "have regard" to other stakeholders and the environment. However, the main focus still lies on shareholder wealth maximization, as managers are pressured by financial investors to pursue short-term goals because planning for the long-term could lead to average-looking performance of managers due to a not increasing share price and the fact that higher dividends would be paid more slowly.²⁴² This leads to short-term decisions focusing on short-term results rather than strategy and long-term value creation, thus not considering climate change-related risks which might contribute to the exacerbation of climate change. Directors' duties containing a pluralist approach, paying equal attention to all stakeholders may have potential to make managers pursue long-term and climate change-

²³⁹ Regulation (EU) 2017/1129 of the European Parliament and of the Council of 14 June 2017 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing Directive 2003/71/EC [2017] OJ L 168/12, article 3(1).

²⁴⁰ Directive 2013/50/EU of the European Parliament and of the Council of 22 October 2013 amending Directive 2004/109/EC of the European Parliament and of the Council on the harmonization of transparency requirements in relation to information about issuers whose securities are admitted to trading on a regulated market, Directive 2003/71/EC of the European Parliament and of the Council on the prospectus to be published when securities are offered to the public or admitted to trading, and Commission Directive 2007/14/EC laying down detailed rules for the implementation of certain provisions of Directive 2004/109/EC [2013] OJ L 294/13 (cumulatively referred to as Transparency Directive), Article 4 and 5.

²⁴¹ Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse (market abuse regulation) and repealing Directive 2003/6/EC of the European Parliament and of the Council and Commission Directives 2003/124/EC, 2003/125/EC and 2004/72/EC OJ L 173/1, Article 17.

²⁴² Andrew Keay, 'The Duty to Promote the Success of the Company: Is it fit for purpose?' (2010), 24f.

mitigation goals. Directors should be incentivized to comply with them by exposure to penalties or, conversely, by remuneration rewards for compliance.

1.1.3 Reducing information asymmetry and conflicts of interests with regard to proxy advisors

It might be effective to regulate proxy advisory services as the market is dominated by only two firms. Issues raised about proxy advisors include, amongst others, lack of transparency of the process creating recommendations and conflicts of interest by offering advice to companies that are subject to their proxy recommendations.²⁴³ This could lead to more lenient recommendations not taking into account the subject company's effect on climate change. Consequently, a regulation could require proxy advisors to report on their standards and information used and prohibit proxy advisors from offering services to companies about which they issue recommendations to their institutional investors.²⁴⁴

1.1.4 Incorporating ESG matters into rating criteria

Due to the gatekeeping function and high concentration of the CRA market, it might be strategic to regulate CRAs. Although Moody's acknowledges a company's ability to mitigate ESG considerations can affect its credit rating, there is no regulation in place that explicitly requires CRAs to do so, and that carries consequences for not complying with it. Therefore, a regulation regarding mandatory conduct of an ESG analysis and thus rating bonds, loans and entities according to their environmental consciousness would be helpful²⁴⁵ to avoid a rather lenient approach to fossil fuel investments and promote a long-term analysis since climate change-related risks tend to be longer term.²⁴⁶ Mandatory disclosure of information about their decisions and rating criteria would further promote the consideration of these risks due to the CRA market's high concentration and make other companies and investors aware of the consequences of climate change.

1.1.5 Decarbonizing Pension Fund Portfolios

Pension funds are another pertinent area for intervention as they are large investors in publicly listed companies on stock exchanges around the world and hold around 35 trillion dollars. In

²⁴³ Yvan Allaire, 'The Troubling Case of Proxy Advisors: Some policy recommendations' (2013), 5.

²⁴⁴ *ibid*, 25.

²⁴⁵ Nadege Tillier, 'ESG and credit rating agencies: The pressure accelerates' (2021), <https://think.ing.com/articles/esg-and-credit-ratings-the-pressure-has-accelerated> accessed 7 June 2021.

²⁴⁶ Alison Moodie, 'Credit rating agencies are miscalculating risks of climate change, report finds' (2015) <https://www.theguardian.com/sustainable-business/2015/jun/25/credit-rating-agencies-risks-climate-change-report-finance> accessed 5 July 2021.

16 out of 36 reporting OECD Countries, pension funds held more than 75% of portfolios in equities and bonds²⁴⁷. Various fund managers invest in companies which are basing their models on sustainability and environmental practices by developing products. Some pension funds are now focusing on shifting assets to low carbon, energy efficient emissions for instance, Australian Superannuation fund Local Government Super Scheme invests approximately 8% of the assets in low carbon activities and property, the Environment Agency Pension Funds UK is aiming to cut down the carbon emissions associated with its investments by half by 2030²⁴⁸. Mobilizing pension fund investors to create awareness and to shift the investments to decarbonized equity portfolios becomes pertinent in fight against climate change

2. Risk Management

2.1 Advocacy

2.1.1 Derivatives

In the context of Derivatives, strategic considerations are based on advocating for a change of market practices and regulatory reform. The use of green debt swaps by international creditors should be encouraged. There should also be advocacy for the introduction of disclosure obligations requiring companies to disclose how their use of derivatives aligns with environmental considerations where this has not been done. Emission trading schemes should also be encouraged where jurisdictions are not part of one. For example, a US-wide emissions trading scheme similar to the EU emissions trading scheme.

2.1.2 Insurance

In view of the practice that some regulators are taking relevant measures to strengthen cooperation insurance company²⁴⁹, such as establishing industry-led forums and processes, public consultations, thus, it is possible to establish a broader ‘insurer- enterprise- public organization’ cooperation mechanism. Precisely, the insurance companies could make full use of their technical and experience advantages to analysing the potential demand of the insurance

²⁴⁷ Pension Funds Figures, OECD Report (2020) <https://www.oecd.org/pensions/Pension-Funds-in-Figures-2020.pdf> accessed 9 June 2021

²⁴⁸ Susanna Rust, Environment Agency Pension Fund adopts 2045 Net Zero Climate Policy, 20 April 2021, IPE <https://www.ipe.com/news/environment-agency-pension-fund-adopts-2045-net-zero-climate-policy/10052271.article> accessed 9 June 2021

²⁴⁹ Maryam Golnaraghi, Insurance Industry Perspectives on Regulatory Approaches to Climate Risk Assessment | Issue brief (2021) https://www.genevaassociation.org/sites/default/files/research-topics-document-type/pdf_public/climate_regulation_web2.pdf accessed 10 July 2021.

market in the context of fighting climate change; and continue to introduce innovative insurance products based on market demand. Other relevant enterprises should actively participate in activities related to climate governance and transformation and upgrading; choose and rationally use more environmentally friendly financing methods and green financing activities; pay more attention to innovative insurance products related to their own industries and industrial activities. The government organizations and NGOs: formulate relevant standards and guidance documents for addressing climate change, guide industry development and climate risk management; actively hold exchange activities, and vigorously promote the innovative business models of existing industries such as photovoltaic industry and wind power industry in other industries.

3. Payments

In the attempt to incentivise companies to join the fight against climate change, payment systems are an extremely interesting area of the financial system from a strategic point of view. Payment systems are highly concentrated, since they usually present only few participants. Indeed, a domestic payment system has commonly around 20-30 direct participants²⁵⁰, yet it operates a plethora of payments coming for a high number of entities, including companies. Wholesale payment systems operate similarly almost universally and the more cross-border transactions develop the more payment systems become interconnected between each other. Moreover, payment systems provide a necessary service for financial and non-financial actors, who could hardly just stop engaging in their daily transactions. And the truth is that in providing such service payment systems are almost non substitutable, since there is no other viable choice, apart from bilateral arrangements, which are not equally effective. In addition, banks are not even that free to jump from one system to the other, since States commonly rely on one main payment system to process large value payments. A country may even have more than one clearing system, but most of the time payments will all converge eventually to be settled in the books of the central bank, acting as the settlement agent of the payment system run by it²⁵¹. Central banks lie at the heart of payment systems when acting as settlement agents, exercising oversight power and providing intra-day liquidity to their participants. Here is where payment systems reach their highest level of concentration.

²⁵⁰ See above VII (3.3.1)

²⁵¹ The Bank of England acts as settlement agent for a number of domestic payment and settlement systems such as CHAPS, CREST, Bacs, FPS, C&CC, and LINK. See Committee on Payment and Settlement Systems (CPSS), Payment, clearing and settlement systems in the United Kingdom (2012) 445. See https://www.bis.org/cpmi/publ/d105_uk.pdf accessed 11 July 2021.

Many of these features like concentration, necessity and non substitutability can also be recognised with regard to SSSs. However, as explained above SSSs are much more complex and fragmented. In this light, although scope for legal intervention is certainly not excluded, this report preferred to focus mainly on payments systems.

All the above listed features make payment systems extremely strategic. Indeed, by setting out a new legal framework for really few actors (participants) or even one single actor (central bank) it is possible to have an impact on many more banks, corporations and households which rely on such systems and have no other available option. Particularly, in the course of the analysis two areas of intervention came to light: access criteria and collateral frameworks.

3.1 Advocacy

3.1.1 Access and participation requirements

As illustrated in Part C the participation in payment systems is regulated through so-called ‘access criteria’, which play a crucial ‘gatekeeping’ function, establishing who has access to the system and who does not. In this light, our suggestion is to advocate for regulation intervention to enable access criteria to take into consideration the exposure of payment system participants to climate risk, which would also allow better risk management. However, access criteria could also take a step further by imposing green requirements to enter the system or a maximum tolerance limit for ‘brown’ assets held by participants. Advocacy for the enactment of a legal framework that entails climate related and green considerations would primarily affect direct and indirect participants of the payment systems. Indeed, banks will have to comply with the climate-related requirements if they want to be part of payment systems. More importantly, it would implicitly incentivise corporations to transition towards a low-carbon economy, if they still want banks to process their payments. The same could be said for SSSs access criteria. However, SSSs access criteria become relevant only at the end of the process, when securities are to be delivered and the payment obligation is to be settled. Clearly, it is far more effective to intervene at the root of the problem, namely narrowing down access to the system in the first place.

3.1.2 Suggestions for greening the Collateral Framework

Collateral frameworks are another strategic sector of payment systems, since they establish the rules to have access to central bank intraday liquidity services. Regulatory intervention in this field could be advocated to adjust eligibility criteria and haircuts so that they can take into consideration the exposure of assets to climate risk, which - once again - could help better

manage risk²⁵². Moreover, eligibility criteria and haircuts could be calibrated such that they could go beyond what might be required from a purely risk mitigation perspective in order to incentivise the market for sustainable assets²⁵³. Indeed, eligibility criteria could limit or totally exclude assets based on their carbon footprint from the eligibility list and accept instead sustainable collateral assets²⁵⁴. Interesting proposals have been advanced on how to implement climate-change related requirements and green the collateral framework for central banks²⁵⁵.

3.1.2.1 Climate-aligned haircuts

The ‘climate-aligned haircuts scenario’ foresees leaving the list of current bond eligibility criteria unchanged. It aims to adjust haircuts applied to corporate bonds based on their climate footprint. The haircuts of carbon intensive issuers are supposed to be higher, whereas on the other hand, haircuts on ‘green bonds’²⁵⁶ are to be lowered under this scenario. This means that, depending on the particular company’s climate performance, the haircut would decrease or increase accordingly and thus adjust to the corporate’s climate footprint. Under this scenario, central banks would create a framework for their participants incentivising companies to become more climate aligned and green in order for them to have a lower haircut to their assets.

3.1.2.2 Lower-carbon, climate- aligned haircuts

The idea under this scenario is to fully exclude all dirty bonds issued by companies and to add green bonds in exchange. By enacting regulations that implicitly require companies to do so, they are incentivized to issue green bonds in order to stay eligible. Their haircut is then adjusted accordingly as illustrated in the ‘climate-aligned haircuts scenario’. The aim under this scenario is to completely eliminate brown corporate assets and conversely to create more green assets.

3.1.2.3 Low-carbon climate aligned haircuts

The ‘low-carbon climate aligned haircuts scenario’ targets the bonds of all companies that engage in carbon-intensive activities and replaces those with green bonds and bonds issued by companies that engage in green activities that are neither brown nor green. Under this scenario,

²⁵² Dafermos (n 216) 22-27

²⁵³ *ibid.* See also NGFS, ‘Adapting central bank operations to a hotter world: Reviewing some options’ (2021) Technical document.

²⁵⁴ *ibid.*

²⁵⁵ The following three scenarios were made in a collaborative policy report issued by Greenpeace, ‘Greening the Eurosystem Collateral Framework – How to Decarbonise ECB’s Monetary Policy’, https://www.greenpeace.de/sites/www.greenpeace.de/files/studie_greening_the_eurosystem_collateral_framework-report-final_0.pdf accessed 11 July 2021.

²⁵⁶ A green bond is a type of fixed-income instrument that is specifically earmarked to raise money for climate and environmental projects. <https://www.investopedia.com/terms/g/green-bond.asp> accessed 15 July 2021.

all companies which engage in carbon-intensive activities would be excluded, even if the asset is not brown.

In conclusion, regulatory intervention in this sense could lead payment systems participants to be less interested in holding ‘brown’ assets, since they would not be able to pledge them as collateral. In turn, ‘brown’ companies would not be able to enjoy the comparative advantage descending from being eligible and having lower haircuts.

In light of the above recommendations, it is important to be aware that there are strong counter arguments to them, although an in-depth analysis of these aspects lies outside the purpose of this report. Indeed, the question may arise whether it is the function of payment systems and their actors to lead the transition to a low carbon economy. Similarly, with regard to the proposals for regulatory intervention in the central bank collateral framework it could be argued that the mitigation of climate change falls outside their mandate. Moreover, the introduction of climate-related considerations could deteriorate the independence of central banks, pouring political questions in their mandate²⁵⁷.

3.2 Litigation

Strategic intervention into the payment system has experienced notable developments with a specific focus on central banks. For instance, ClientEarth has initiated legal action against the National Bank of Belgium. The NGO is accusing the Belgian central bank of having failed to incorporate environmental and human rights considerations in purchasing corporate assets – as a part of a program by the European Central Bank - from corporations that are ‘fuelling the climate crisis’.²⁵⁸ With the ultimate aim to challenge the validity of ECB’s program²⁵⁹ ClientEarth is intending to bring the case before the European Court of Justice.²⁶⁰ Indeed, the NGO argues that the ECB is bound by a legal obligation to protect the environment and integrate climate change in its decision making²⁶¹.

²⁵⁷ Rodolfo Dall’Orto Mas *et al.*, ‘The case for central bank independence: A review of key issues in the international debate’ (2020) ECB Occasional Paper Series No. 248, 41-43.

²⁵⁸ ‘Why ClientEarth is suing the central bank of Belgium for climate failings’ (ClientEarth, 13 April 2021) <https://www.clientearth.org/latest/latest-updates/news/why-clientearth-is-suing-the-central-bank-of-belgium-for-climate-failings/> accessed 11 July 2021.

²⁵⁹ See ECB Corporate sector purchase programme <https://www.ecb.europa.eu/mopo/implement/app/html/index.en.html#cspp> accessed 11 July 2021.

²⁶⁰ A. White, J. Randow (2021) Climate Lawsuit Targets ECB \$320 Billion Bond-Buying Program, <https://www.bloomberg.com/news/articles/2021-04-13/belgian-central-bank-sued-for-fueling-the-climate-crisis> accessed 11 July 2021.

²⁶¹ On the arguments in support of the existence of a legal obligation see ‘Letter from ClientEarth to Christine Lagarde, President of the European Central Bank’ (ClientEarth, 13 April 2021) <https://www.clientearth.org/latest/documents/letter-from-clientearth-to-christine-lagarde-president-of-the-european-central-bank/> accessed 13 July 2021.

These developments illustrate that litigation strategies targeting central banks can be a powerful tool in the fight against the climate crisis. A legal action brought against a central bank could not only target specific programs, as shown in the case of the ECB, but it can also serve the purpose of trying to implement new regulations with regard to access criteria or altering the legal regulation concerning its collateral framework, as depicted above. This would force the central bank to implement new regulations and thus, create a domino effect throughout the entire payment system.

