

Erasmus Platform for Sustainable Value Creation

Working paper

A Framework for Sustainable Finance

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1 Abstract

This paper develops a new framework for sustainable finance. Financial institutions have started to avoid unsustainable companies from a risk perspective, which we label as Sustainable Finance 1.0. In Sustainable Finance 2.0, financial institutions look for companies that balance the financial, social and environmental goals. The frontrunners are mission driven and invest in and lend to sustainable companies that create long-term value for the wider community (Sustainable Finance 3.0). The new framework allows us to develop an indicator to assess how deep sustainable finance is. While general reports suggest a large increase in sustainable investing and banking, our empirical findings suggest that the financial system is just above, but still quite close to, Sustainable Finance 1.0.

2 Introduction

The Industrial Revolution, and the development of production processes dependent on fossil fuels that it triggered, has brought prosperity in the form of economic and population growth. At the same time, this evolution away from a previously 'empty' world¹ with abundant natural resources has intensified social and environmental challenges (Daly and Farley, 2011). Mass production in a competitive economic system has led to long working hours, underpayment and child labour, first in the developed world and later relocated to the developing world. Social regulations have been increasingly introduced to counter these practices and to promote decent work and access to education and healthcare. Mass production and consumption is also stressing the Earth system through pollution and depletion of natural resources. Climate change is the most pressing ecological constraint (Stern, 2008).

There is broad acknowledgement on the need for a transition to a low-carbon, circular economy to overcome these environmental challenges. While an early transition – with substantial cuts in carbon emissions starting in 2020 – would allow for production and consumption patterns to be gradually adjusted, a late transition – starting in 2030 – is likely to cause sudden shocks and lead to the stranding of assets that have lost their productive value (ASC, 2016). Many natural resources companies are still in denial, irrationally counting on a late and gradual transition. On the social side, growing inequality leads to political tensions hampering development (Acemoglu and Robinson, 2012). To guide the transformation towards a sustainable and inclusive economy, the United Nations (2015) has developed the 2030 Agenda for Sustainable Development.

Sustainable development is an integrated concept with three aspects: economic, social and environmental. Why should finance contribute to sustainable development? The main task of the financial system is to allocate funding to its most productive use. Finance can play a leading role in allocating investment to sustainable companies and thus accelerate the transition to a low-carbon, circular economy (Schoenmaker and Schramade, 2019). Sustainable finance considers how finance (investing and lending) interacts with economic, social and environmental issues (Scholtens, 2006). In the allocation role, finance can assist in making strategic decisions on the trade-offs between sustainable goals. Moreover, investors can exert influence over the companies they invest in. Long-term investors can thus steer companies towards sustainable business practices. Next, financial firms have a moral or ethical responsibility to adopt sustainable lending and investment principles. A growing group of investors and depositors expect

¹ In the empty world scenario, the economy is very small relative to the larger environmental ecosystem and the environment is thus not scarce. Continued growth of the physical economy into a non-growing ecosystem will eventually lead to the 'full world economy' (Daly and Farley, 2011).

their asset manager or bank to invest and lend in a socially responsible way (Nilsson, 2008). Finally, finance is good at pricing risk for valuation purposes and can thus help to deal with the inherent uncertainty about environmental issues, such as the impact of carbon emissions on climate change (Bianchini and Gianfrate, 2018). Finance and sustainability both look at the future.

The emerging literature on sustainable finance deals with different aspects of sustainable investing and banking. Renneboog, Horst and Zhang (2008) examine, for example, investor behaviour and find that socially responsible investors may be willing to accept suboptimal financial performance to pursue social or ethical objectives. By contrast, Friede, Busch and Bassen (2015) show in a mega study that the large majority of studies report a positive relationship between ESG performance and investment performance. Moving to banking, Chava (2014) and Goss and Roberts (2011) find that lenders charge a significantly higher interest rate on bank loans to companies with environmental concerns compared to companies without such concerns. These mostly empirical papers show that sustainability is a relevant factor for finance. However, a comprehensive classification of the various forms of sustainable finance is lacking.

The main contribution of this paper is to provide a typology of sustainable finance and to apply that typology to aggregate figures on sustainable investing and banking. The new typology or framework allows us to develop an indicator to assess how deep sustainable finance is.

The thinking about sustainable finance has gone through different stages over the last few decades. The focus is gradually shifting from short-term profit (Friedman, 1970) towards long-term value creation (Tirole, 2017). This paper analyses these stages and provides a new framework for sustainable finance. Financial and non-financial firms traditionally adopt the shareholder model, with profit maximisation as the main goal. A first step in sustainable finance (Sustainable Finance 1.0) is for financial institutions to avoid investing in companies with very negative impacts, such as tobacco, cluster bombs or whale hunting. Some financial institutions are starting to incorporate social and environmental considerations in the stakeholder model (Sustainable Finance 2.0). A very small fraction of financial institutions put social and environmental impact first, when considering investing or lending proposals. These frontrunners, which aim for long-term value creation, include impact investors and values-based banks.

This paper highlights the tension between the shareholder and stakeholder models. Should policymakers allow a shareholder-oriented firm to take over a stakeholder-oriented firm? Or do we need to protect firms that are more advanced in sustainability? Another key development is the move from risk to opportunity. While financial firms have started to avoid (very) unsustainable companies from a risk perspective (Sustainable Finance 1.0 and 2.0), the frontrunners are now increasingly investing in sustainable companies and projects to create value for the wider community (Sustainable Finance 3.0), which Tirole (2017) defines as the common good.

A first empirical assessment indicates that the financial system is just above, but still quite close to, Sustainable Finance 1.0. About one third of financial institutions are in the process of migrating to Sustainable Finance 2.0 and a tiny fraction of ethical investors and banks (less than 1 per cent) is adopting Sustainable Finance 3.0. The policy challenge is to accelerate the migration to Sustainable Finance 2.0 and 3.0 as well as promoting the remaining financial institutions to start the migration.

This paper is organised as follows. Section 2 reviews the concept of sustainable development. Section 3 introduces our framework for sustainable finance. Next, Section 4 estimates at which stage of sustainable finance the financial system is currently operating. It also provides an application of the framework in the case of company take-overs and discusses further policy implications. Finally, Section 5 concludes.

3 Sustainable development

To guide the transformation towards a sustainable and inclusive economy, the United Nations has developed the 2030 Agenda for Sustainable Development (UN, 2015). The 17 UN Sustainable Development Goals (SDGs) stimulate action over the 2015-2030 period in areas of critical importance for humanity and the planet. Following Rockström and Sukhdev (2015), we classify the SDGs according to the levels of the economy, the society and the environment:

Economic goals

- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation
- Goal 10. Reduce inequality within and among countries
- Goal 12. Ensure sustainable consumption and production patterns

Societal goals

- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5. Achieve gender equality and empower all women and girls
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Environmental goals

- Goal 6. Ensure availability and sustainable management of water and sanitation for all
- Goal 13. Take urgent action to combat climate change and its impacts
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss

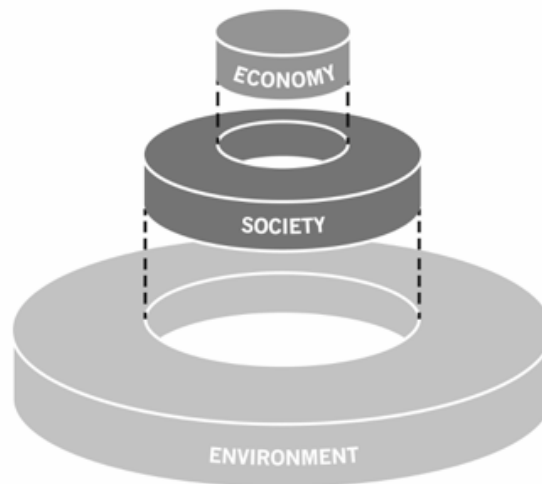
Overall goal

Goal 17. Strengthen the means of implementation and revitalise the Global Partnership for Sustainable Development

The SDGs are interrelated. A case in point is the move to sustainable consumption and production (economic goal 12) and sustainable cities (societal goal 11), which are instrumental to combat climate change (environmental goal 13). Another example is an appropriate income and decent work for all (economic goal 8), which is instrumental in attaining the societal goals 1 to 4. Through a living wage (i.e. a wage for a full-time worker sufficient to provide his or her family's basic needs for an acceptable standard of living), households can afford food, healthcare and education for their family.

Figure 1 illustrates the three levels and the ranking between them. A liveable planet is a precondition or foundation for humankind to thrive. Next, we need a cohesive and inclusive society to organise production and consumption in order to ensure enduring prosperity for all. Acemoglu and Robinson (2012) show that political institutions that promote inclusiveness generate prosperity. Inclusiveness allows everyone to participate in economic opportunities. Next, there can be resource conflicts: unequal communities may disagree over how to share and finance public goods. These conflicts, in turn, break social ties and undermine the formation of trust and social cohesion (Barone and Mocetti, 2016).

FIGURE 1: SUSTAINABLE DEVELOPMENT CHALLENGES AT DIFFERENT LEVELS



Source: Adapted from Rockström and Sukhdev (2015)

Gladwin, Kennelly and Krause (1995) define five principles of sustainable development:

1. Comprehensiveness: the concept of sustainable development is holistic or all-embracing in terms of space, time and component parts. Sustainability

embraces both environmental and human systems, both nearby and far-away, in both the present and the future;

2. Connectivity: sustainability demands an understanding of the world's challenges as systemically interconnected and interdependent;
3. Equity: a fair distribution of resources and property rights, both within and between generations;
4. Prudence: keeping life-supporting ecosystems and interrelated socio-economic systems resilient, avoiding irreversible actions, and keeping the scale and impact of human activities within regenerative and carrying capacities;
5. Security: sustainable development aims at ensuring a safe, healthy, high quality of life for current and future generations.

Although sustainable development is a holistic concept, Norström *et al* (2014) argue to address trade-offs between the ambition of economic, social and environmental goals and the feasibility of reaching them, recognising biophysical, social and political constraints.

3.1 System perspective

While it is tempting to start working on partial solutions at each level, the environmental, societal and economic challenges are interlinked. It is important to embrace an integrated social-ecological system perspective (Norström *et al*, 2014). Such an integrated system perspective highlights the dynamics that such systems entail, including the role of ecosystems in sustaining human wellbeing, cross-system interactions, and uncertain thresholds.

Holling (2001) describes the process of sustainable development as embedded cycles with adaptive capacity. A key element of adaptive capacity is the resilience of the system to deal with unpredictable shocks (which is the opposite of the vulnerability of the system). An adaptive cycle that aggregates resources and periodically restructures to create opportunities for innovation is a fundamental unit for understanding complex systems, from cells to ecosystems. But some systems are maladaptive and trigger, for example, a poverty trap or land degradation (i.e. the undermining of the quality of soil as a result of human behaviour or severe weather conditions). Holling (2001) concludes that ecosystem management via incremental increases in efficiency does not work. For transformation, ecosystem system management must build and maintain ecological resilience as well as social flexibility to cope, innovate and adapt.

As we have argued, the economic, social and environmental systems interact. A well-known example of cross-system interaction is the linear production of consumption goods at the lowest cost contributing to 'economic growth', while depleting natural resources, using child labour and producing carbon emissions and other waste. In this paper, we use carbon emissions as shorthand for all greenhouse gas emissions, which include carbon dioxide CO₂, methane compounds containing CH₄, and nitrous oxide N₂O.

Another cross-system interaction is climate change leading to more and more intense disasters, such as storms, flooding and droughts. The low- and middle-income countries around the equator are especially vulnerable to these extreme weather events, which could damage a large part of their production capacity. The temporary loss of tax revenues, and increase in expenditure to reconstruct factories and infrastructure, might put vulnerable countries into a downward fiscal and macro-economic spiral with an analogous increase in poverty (Schoenmaker and Zachmann, 2015). Social and environmental issues are thus interconnected, whereby the poor in society are more dependent on ecological services and are less well protected against ecological hazards.

An example of an uncertain threshold combined with feedback dynamics is the melting threshold for the Greenland ice sheet. New research has found that it is more vulnerable to global warming than previously thought. Robinson, Calov and Ganopolski (2012) calculate that a 0.9°C of global temperature rise from today's levels could lead the Greenland ice sheet to melt completely. Such melting would create further climate feedback in the Earth's ecosystem, because melting the polar icecaps could increase the pace of global warming (by reducing the refraction of solar radiation, which is 80% from ice, compared with 30% from bare earth and 7% from the sea) as well as rising sea levels. These feedback mechanisms are examples of tipping points and shocks, which might happen.

Summing up, we cannot understand sustainability of organisations in isolation from the socio-ecological system in which they are embedded: what are the thresholds, sustainability priorities, and feedback loops? Moreover, we should not only consider the socio-environmental impact of individual organisations, but also the aggregate impact of organisations at the system level. The latter is relevant for sustainable development.

4 The role of the financial system

How can the financial system facilitate decision-making on the trade-offs between economic, social and environmental goals? Levine (2005) lists the following functions of the financial system:

- Produce information *ex ante* about possible investments and allocate capital;
- Monitor investments and exert corporate governance after providing finance;
- Facilitate the trading, diversification, and management of risk;
- Mobilise and pool savings;
- Ease the exchange of goods and services.

The first three functions are particularly relevant for sustainable finance. The allocation of funding to its most productive use is a key role of finance. Finance is therefore well positioned to assist in making strategic decisions on the trade-offs between sustainable goals. While broader considerations are guiding an organisation's strategy on sustainability, funding is a requirement for reaching sustainable goals.

Finance plays this role at different levels. In the financial sector, banks, for example, define their lending strategy regarding which sectors and projects are eligible for lending and which not. Similarly, investment funds set their investment strategy, which directs in which assets the fund invests and in which assets not. The financial sector can thus play a leading role in the transition to a low-carbon, circular economy. If the financial sector chooses to finance sustainable companies and projects, it can accelerate the transition.

In terms of monitoring their investments, investors can also influence the companies in which they invest. Investors thus have a powerful role in controlling and directing corporate boards. The governance role also involves balancing the many interests of a corporation's stakeholders, including the interests of the environment and society (see Section 3.4). A rising trend in sustainable investment is engagement with companies in the hope of reducing the risk of adverse events occurring in those companies.

Finance is good at pricing the risk of future cash flows for valuation purposes. As there is inherent uncertainty about environmental issues (e.g. exactly how rising carbon emissions will affect the climate, and the timing and shape of climate mitigation policies), risk management can help to deal with these uncertainties. Scenario analysis is increasingly used to assess the risk and valuation under different scenarios (e.g. climate scenarios; see Bianchini and Gianfrate, 2018). When the potential price of carbon emissions in the future becomes clearer, investors and companies have an incentive to reduce these emissions. The key

challenge is to take a sufficiently long horizon, because sustainability is about the future.

4.1 Three stages of sustainable finance

How can finance support sustainable development? Figure 2 shows our framework for managing sustainable development. At the level of the economy, the financial return and risk trade-off is optimised. This financial orientation supports the idea of profit maximisation by organisations and economic growth of countries. Next, at the level of society, the impact of business and financial decisions on the society is optimised. And finally at the level of the environment, the environmental impact is optimised. As we have argued, there are interactions between the levels. It is thus important to choose an appropriate combination of the financial, social and environmental aspects.

The concept of sustainable finance has evolved as part of the broader notion of business sustainability over the last decades (Dyllick and Muff, 2016). Table 1 introduces a new typology for sustainable finance on four aspects: i) the value created; ii) the ranking of the three factors; iii) the optimisation method; and iv) the horizon. The evolution highlights the broadening from *shareholder value* to *stakeholder value* or triple bottom line: people, planet, profit. The final stage looks at the creation of common good value (see also Tirole, 2017). To avoid the dichotomy of private versus public goods, we use the term common good referring to what is shared and beneficial for all or most members of a given community. Next, the ranking indicates a shift from economic goals first to societal and environmental challenges (the common good) first. Importantly, the horizon is broadened from short term to long term along the stages.

FIGURE 2: MANAGING SUSTAINABLE DEVELOPMENT

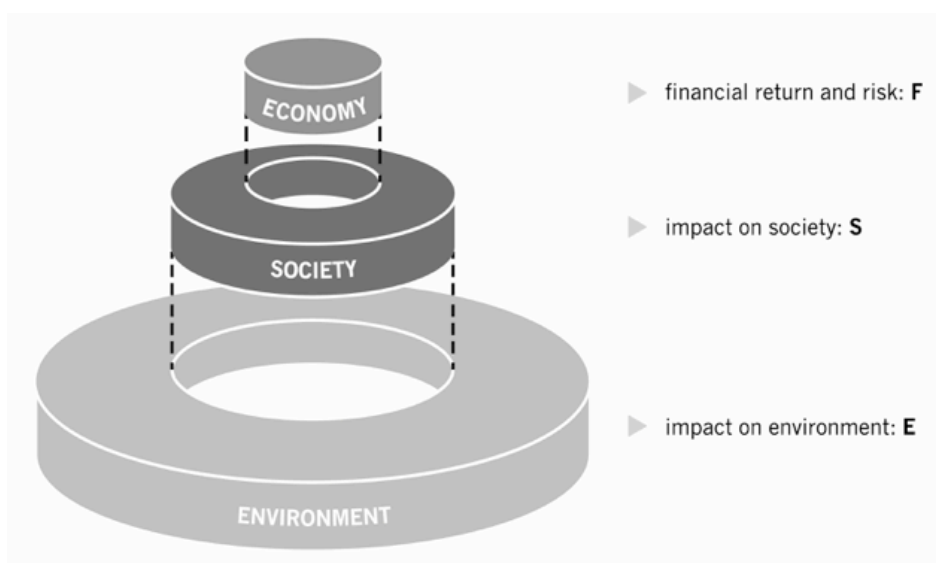


TABLE 1: FRAMEWORK FOR SUSTAINABLE FINANCE

Sustainable Finance Typology	Value created	Ranking of factors	Optimisation	Horizon
Finance-as-usual	Shareholder value	F	Max F	Short term
Sustainable Finance 1.0	Refined shareholder value	$F \gg S \text{ and } E$	Max F subject to S and E	Short term
Sustainable Finance 2.0	Stakeholder value (triple bottom line)	$I = F + S + E$	Optimise I	Medium term
Sustainable Finance 3.0	Common good value	$S \text{ and } E > F$	Optimise S and E subject to F	Long term

Note: F = financial value; S = social impact; E = environmental impact; I = integrated value. At Sustainable Finance 1.0, the maximisation of F is subject to minor S and E constraints.

In traditional finance, shareholder value is maximised by looking for the optimal financial return and risk combination. Table 1 labels this the finance-as-usual approach. Although shareholder value should also look at the medium to long term, there are built-in incentives for short-termism, such as quarterly financial reporting and monthly/quarterly benchmarking of investment performance (Schoenmaker and Schramade, 2019). Finance-as-usual is consistent with the argument of Friedman (1970) that ‘the business of business is business’. The only social responsibility of business is to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game. Friedman (1970) argues that it is the task of the government to take care of social and environmental goals and set the rules of the game for sustainability.

However, product demand ultimately derives from societal needs. Moreover, externalities are not perfectly separable from production decisions (Hart and Zingales, 2017). While there is a good case against corporate philanthropy, there is not a case against integration of sustainability into strategy and finance.

The three stages of our Sustainable Finance (SF) typology in Table 1 are discussed one after another below. The stages move from finance first, to all aspects equal, and finally to social-environmental impact first (see the ranking of factors in the third column of Table 1).

4.2 SF 1.0 - profit maximisation, while avoiding ‘sin’ stocks

A first step in sustainable finance is that financial institutions avoid investing in, or lending to, so-called ‘sin’ companies. These are companies with very negative impacts. In the social domain, they include, for example, companies that sell

tobacco, anti-personnel mines and cluster bombs or that exploit child labour. In the environmental field, classic examples of very negative impacts are waste dumping and whale hunting. More recently, some financial institutions have started to put coal and even the broader category of fossil fuels on the exclusion list because of carbon emissions. These exclusion lists are often triggered under pressure from non-governmental organisations, which use traditional and social media for their messages (Dyllick and Muff, 2016).

But the effects of exclusion and divestment are limited (Skancke, 2016). From a general equilibrium perspective, fewer investors hold the excluded companies, leading to lower stock prices and a higher cost of capital. In an empirically calibrated model, Heinkel, Kraus, and Zechner (2001) indicate that over 20 per cent of green investors are required to induce any polluting companies to reform. Existing empirical evidence indicates that at most 10 per cent of funds is invested by green investors. Divestment by a growing number of investors might turn the balance. Another effect is that divestment may stigmatise a sector or companies to the point where they lose their social license to operate (see Section 3.4). This might lead to less investment in that sector. An exclusion criterion targeted at a sector or the worst performers within a sector could have an effect by setting a norm for acceptable standards.

A slightly more positive variant of the refined shareholder value approach is if financial institutions and companies put systems in place for energy and emissions management, sustainable purchasing, IT, building and infrastructure to enhanced environmental standards, and all kinds of diversity in employment. The underlying objective of these activities remains economic. Though introducing sustainability into business might generate positive side-effects for some sustainability aspects, the main purpose is to reduce costs and business risks, to improve reputation and attractiveness for new or existing human talent, to respond to new customer demands and segments, and thereby to increase profits, market positions, competitiveness and shareholder value in the short term. Business success is still evaluated from a purely economic point of view and remains focused on serving the business itself and its economic goals (Dyllick and Muff, 2016). Shareholder value or profit maximisation is still the guiding principle for the organisation, though with some refinements.

The formal objective function for the refined profit maximisation approach of investors can be derived. Investors optimise the financial value FV of their portfolio by increasing profits and decreasing their risk (i.e. the variability of profits), while avoiding excessive negative social and environmental impact by setting a minimum level SEV^{min} . The objective function is given by:

$$\begin{aligned} \max FV &= F(\text{profits}, \text{risk}) \\ \text{subject to } F'_{\text{profits}} &> 0, F'_{\text{risk}} < 0, SEV \geq SEV^{min} \end{aligned} \quad (1)$$

Where FV = financial value = expected current and discounted future profits, and SEV = social and environmental value. F'_{profits} is the partial derivative of F with respect to the first term, and F'_{risk} with respect to the second term.

This optimisation can be used by investors in a mean-variance framework to optimise their portfolio and by banks and corporates in a net present value framework to decide on financing new projects.

4.3 SF 2.0 - internalisation of externalities to avoid risk

In Sustainable Finance 2.0, financial institutions explicitly incorporate the negative social and environmental externalities into their decision-making. Over the medium to long-term horizon, there are governmental forces (future regulation and taxation) and societal forces at work (see Section 3.4), which put pressure on investors and business to internalise social and environmental externalities. Incorporating the externalities thus reduces the risk that financial investments become unviable. This risk is related to the maturity of the financial instrument, and is thus greater for equity (stocks) than for debt (bonds and loans). On the positive side, internalisation of externalities helps financial institutions and companies to restore trust, which is the mirror image of reputation risk.

Attaching a financial value to social and environmental impacts facilitates the optimisation process among the different aspects (F, S, E). Innovations in technology (measurement, information technology, data management) and science (life-cycle analyses, social life-cycle analyses, environmentally extended input-output analysis, environmental economics) make the monetisation of social and environmental impacts possible (True Price, 2014). In this way, the total or integrated value I can be established by summing the financial, social and environmental values in an integrating way. Financial institutions and companies use a private discount rate (which is higher than the public discount rate because of uncertainties) to discount future cash flows. Stern (2008) argues that the public discount factor should be very small or zero in sustainable development, because the government should value current and future generations equally. Because social and environmental impacts are particularly felt in the long term, private discounting leads to insufficient effort from a social welfare perspective.

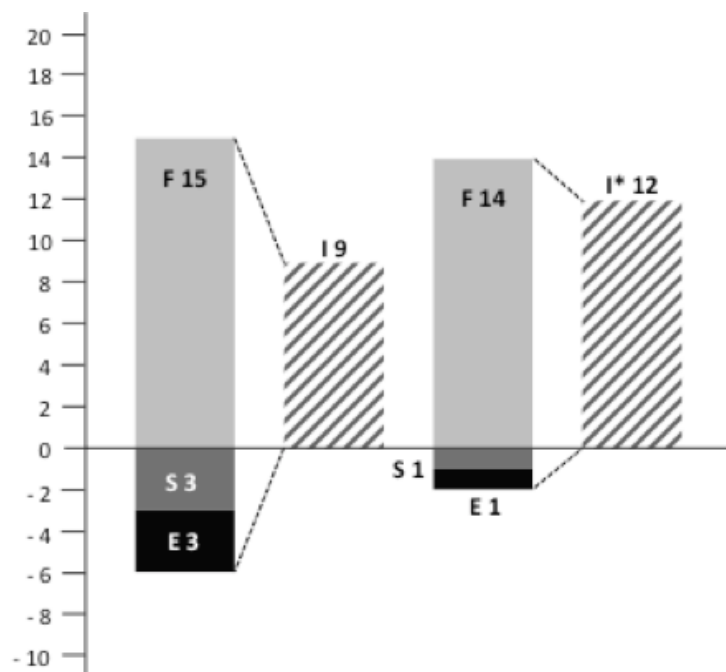
The methodology for calculating the integrated value involves measuring, monetising and balancing financial and non-financial values (True Price, 2014). Figure 3 illustrates the four steps to calculate the total value:

1. We start by calculating the financial value and quantifying and monetising the social and environmental impacts (bar 1);
2. We then internalise the social and environmental externalities and calculate the integrated value as the sum of the values (bar 2);
3. Next, we adjust to account for the combination of the three factors. As explained in section 2, there are several non-linear trade-offs between the

economic, social and environmental aspects of corporate investment. The monetisation helps corporations to find the optimal combination of the three factors. In our example, the corporation is able to reduce both the social and environmental impact from 3 to 1 at an extra cost of 1 (bar 3) by adapting its production process;

4. Finally, we calculate the integrated value I^* (bar 4).

FIGURE 2: FROM FINANCIAL VALUE TO INTEGRATED VALUE



Note: F = financial value; S = social value; E = environmental value; I = integrated value; I^* = optimised integrated value. The first two bars illustrate the values based on the original production process; the final two bars show the values based on the optimised production process.

However, integrated value optimisation can lead to perverse outcomes: the negative environmental impact of deforestation, for example, can be offset by large economic gains; in other words legitimising destruction. To avoid these outcomes, we incorporate in equation 2 the constraint that the social-environmental value cannot be worsened compared to its initial value. Another caveat is the inherent uncertainty (e.g. underlying climate scenarios) that makes pricing difficult. A final issue is participation (Coulson, 2016). Producers could involve stakeholders in the application of the integrated value methodology to form a more inclusive and pluralist conception of risk and values for social and environmental impacts.

The formal objective function of investors for optimising the integrated value of their portfolio can be derived. To internalise the social and environmental externalities, investors optimise the integrated value IV of their portfolio. The integrated value is the sum of the financial value, the social value and the

environmental value: $IV = FV + SV^p + EV^p$. The superscript p stands for the privately discounted value of the social and environmental impacts.

Investors thus optimise the integrated value IV of their portfolio by increasing their integrated profits, and decreasing their risk (i.e. the variability of integrated profits), while not worsening their social and environmental impact SEV^p . The objective function is given by:

$$\begin{aligned} \max IV &= F(\text{integrated profits, integrated risk}) \\ \text{subject to } F'_{\text{int profits}} &> 0, F'_{\text{int risk}} < 0, SEV^p_{t+1} &\geq SEV^p_t \end{aligned} \quad (2)$$

Where SEV^p_{t+1} = next period social and environmental impact. In line with the total value methodology, not only profits but also risk is assessed in an integrated way (i.e. integrated across the three values), which includes the covariance between the profits.

Sustainable Finance 2.0 comes in different shapes. Examples are triple bottom line (people, planet, profit) and integrated profit and loss accounting. Within corporate governance, we can speak of an extended stakeholder approach, whereby not only direct stakeholders, such as shareholders, suppliers, employees and customers, but also society and environment, as indirect stakeholders, are included. Nevertheless, Dyllick and Muff (2016) claim that corporates still adopt an inside-out perspective by asking how they can reduce their social and environmental impact. While this is helpful, it also restricts their potential to address social and environmental challenges.

4.4 SF 3.0 - contributing to sustainable development, while observing financial viability

Sustainable Finance 3.0 moves from risk to opportunity. Rather than avoiding unsustainable companies from a risk perspective, financial institutions invest only in sustainable companies and projects. In this approach, finance is a means to foster sustainable development, for example by funding healthcare, green buildings, wind farms, electric car manufacturers and land-reuse projects. The starting point of SF 3.0 is a positive selection of investment projects on their potential to generate social and environmental impact; creating an inclusion list instead of an exclusion list as in SF 1.0. In this way, the financial system serves the sustainable development agenda in the medium to long term.

The question that then arises is how the financial part of the decision is taken. An important component of sustainable development is economic and financial viability. Financial viability, in the form of a fair financial return (which at the minimum preserves capital), is a condition for sustainable investment and lending;

otherwise projects might need to be aborted prematurely because of financial shortfalls.

The formal objective function for this approach can be derived. To foster sustainable development, investors optimise the social-environmental impact or value SEV of their portfolio, which is the sum of the social and environmental value $SEV = SV + EV$, by increasing their impact, and decreasing their risk (i.e. the variability of impact), subject to a minimum financial value FV^{min} . The objective function is given by:

$$\begin{aligned} \max SEV &= F(\text{impact}, \text{risk}) \\ \text{subject to } F'_{\text{impact}} &> 0, F'_{\text{risk}} < 0, FV_{t+1} &\geq FV_{t+1}^{min} \end{aligned} \quad (3)$$

The financial viability or minimum financial value can be presented as follows: $FV_{t+1}^{min} = (1 + r^{fair}) FV_t^{min}$, where $r^{fair} \geq 0$ is a fair financial return for one period. The key change is that the role of finance FV turns from primacy (profit maximisation in equation 1) to serving (a means or condition to optimise sustainable development in equation 3).

What is a fair financial return? Of the respondents to the Annual Impact Investment Survey (GIIN, 2016), 59 per cent primarily target risk-adjusted, market-rate returns. Of the remainder, 25 per cent primarily target returns below market-rate that are closer to market-rate returns, and 16 per cent target returns that are closer to capital preservation. So the great majority pursues returns at market rate or close to it, while a small group accepts lower returns for sustainability reasons.

More broadly, the question is whether investors including the ultimate beneficiaries, such as current and future pensioners are prepared to potentially forego some financial return in exchange for social and environmental returns (e.g. enjoying their pension in a liveable world). Social preferences play an important role for investors in socially responsible investment (SRI) funds, while financial motives appear to be of limited importance (Riedl and Smeets, 2017). SRI investors expect to earn lower returns from SRI funds than from conventional funds, suggesting that they are willing to forego financial performance in order to invest according to their social preferences. However, ex ante it is not clear what the ultimate effect of impact investing is on financial return. If investor coalitions, for example, could accelerate the transition towards sustainable development, there would be less chance of negative financial returns because of extreme weather events or stranded assets (Schoenmaker, 2017). This argument depends on sufficiently large amounts of investment moving to sustainable finance (see Section 4 for an empirical assessment).

On investment performance, there is a mixed picture on the relationship between corporate social-environmental performance and financial performance.

Reviewing several studies, Busch, Bauer and Orlitzky (2016) conclude that, at the very least, there is no clear indication of a negative relationship, or trade-off, between corporate social-environmental performance and corporate financial performance. While the evidence on financial performance of companies that pay attention to general environmental, social and governance (ESG) factors is mixed, Khan, Serafeim and Yoon (2016) find that companies that focus on material ESG issues (i.e. these ESG issues that are relevant for the company or the industry in which it operates) show a superior financial performance.

Ortiz-de-Mandojana and Bansal (2016) investigate the short and long-term benefits of organisational resilience through sustainable business practices. In the long run, a higher survival rate of sustainable organisations is expected, as resilience helps companies to avoid crises and bounce back from shocks. They show that companies that adopt responsible social and environmental practices, relative to a carefully matched control group, have lower financial volatility, higher sales growth and higher chances of survival over a 15-year period. Yet, they do not find any differences in short-term profits. This suggests that there is no short-term cost to adopting sustainability practices.

However, the evidence on socially responsible investing (SRI), which incorporates environmental, social and governance issues in investment decisions, is mixed. In a meta-study, Friede, Busch and Bassen (2015) obtain that some 90 per cent of studies find a nonnegative relation between ESG and company financial performance, while the large majority of studies reports positive findings. In another meta-study, however, Revelli and Viviani (2015) find there is no real cost or benefit to socially responsible investing (SRI) but that the level of performance depends on the methodological choices made by researchers to consider the matter or the ability of SRI funds managers to generate performance.

In banking, recent studies show that social capital improves the viability of stakeholder-oriented banks (Ostergaard, Schindele and Vale, 2016). Banks with the strongest shareholder-oriented governance performed worse during the crisis. Moreover, most vulnerable have been those institutions that had most of their funding in interbank markets as well as a high leverage (Kotz and Schmidt, 2016). In a comparative study, the Global Alliance for Banking on Values (2016) contrasts the activities and performance of values-based banks (VBBs) - defined as banks that aim to deliver economic, social and environmental impact as part of their mission statement - with those of the global systemically important banks (G-SIBs). Table 2 shows that values-based banks are more involved with the real economy with 77 per cent of loans to assets (compared to 42 per cent for global banks) and 82 per cent of deposits to assets (compared to 52 per cent for global banks). Values-based banks are also safer. They have lower leverage - that is more equity as share of total assets: 8.1 per cent for values-based banks compared to 7.3 per cent for global banks. The average return on equity for the group of values-based banks is slightly lower at 8.3 per cent compared to 8.7 per cent for the global banks over the 2006-2015 period, but the variance is lower for the values-based banks at a standard deviation of 4.9 per cent compared to 7.7 per cent for the

global banks. Given lower leverage, this implies a higher return on assets for the values-based banks. The lower variance for both return on equity and assets makes the values-based banks more stable.

TABLE 2. FINANCIAL COMPARISON OF VALUES-BASED AND GLOBAL BANKS, 2015

		2015	
		Vaues-based banks	Global banks
Real economy	Loans / Assets	76.8%	41.6%
	Deposits / Assets	81.7%	52.2%
Capital strength	Equity / Assets	8.1%	7.3%
	Tier 1 Ratio	12.8%	14.0%
	Risk weighted assets / total assets	61.6%	44.2%
		10 years (2006-2015)	
		Vaues-based banks	Global banks
Financial returns and volatility	Return on Assets (RoA)	0.65%	0.53%
	Standard deviation RoA	0.26%	0.35%
	Return on Equity (RoE)	8.3%	8.7%
	Standard deviation RoE	4.9%	7.7%

Note: The table analyses values-based banks (VBBs) and global systemically important banks (G-SIBs).

Source: Global Alliance for Banking on Values (2016).

Moving to corporate governance, legitimacy theory underpins Sustainable Finance 3.0, which targets long-term value creation for the common good. Legitimacy theory indicates that companies aim to legitimise their corporate actions in order to obtain approval from society and thus, to ensure their continuing existence (Omran and Ramdhony, 2015). This social licence to operate represents a myriad of expectations that society has about how an organisation should conduct its operations. The corporation thus acts within the bounds and norms of what society identifies as socially responsible behaviour, including meeting social and environmental standards.

Finally, Dyllick and Muff (2016) argue that corporates need to develop an outside-in perspective by asking how they can contribute effectively to solving social and environmental challenges (instead of looking inside-out by asking how they can

reduce their social and environmental impact). This outside-in perspective allows corporates to take a system approach towards sustainability at the macro level (Thurm, Baue, and Van der Lugt, 2018). As indicated in Section 2, an integrated social-ecological system perspective is needed to address the discrepancy between the emerging practices in sustainable investments and business at the micro level and the outcomes or impacts at the macro level . On the environmental aspect, this system approach starts with the planetary boundaries or ecological limits. So, natural resources are not depleted, waste is reused and carbon emissions stay within the available carbon budget to limit global warming. In short, the available or sustainable 'budgets' respect the closed cycles of the natural environment and thus point to a circular or closed-loop economy (Busch, Bauer and Orlitzky, 2016).

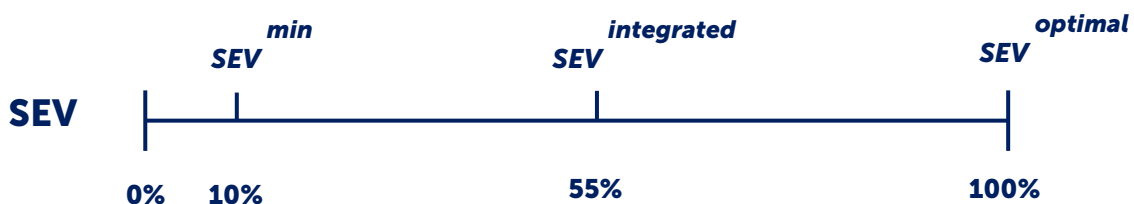
5 Application of the framework

The three stages of sustainable finance lead to different levels of realised social-environmental value. Sustainable Finance 1.0 introduces a minimum level, SEV^{min} , below which investors and bankers cannot go. This minimum level can be set at 10 per cent of the social-environmental value scale in Figure 3. Corporates or investment projects that do not meet this minimum level are on an exclusion list. The next stage, Sustainable Finance 2.0, balances the financial, social and environmental value in an overall approach optimising the integrated value. We label this $SEV^{integrated}$. The integrated social-environmental value is set halfway between the minimum and optimal level of social-environmental value in Figure 3. Finally, Sustainable Finance 3.0 optimises the social-environmental value, $SEV^{optimal}$, at 100 per cent. Companies and projects that deliver this this optimised social-environmental value are eligible for investment or lending and are on an inclusion list. The overall SEV of the financial system can be calculated as follows:

$$SEV^{overall} = \alpha_{1,0} * SEV^{min} + \alpha_{2,0} * SEV^{integrated} + \alpha_{3,0} * SEV^{optimal} \quad (4)$$

Where α_i is the fraction of SF i investors and bankers. Note that $\sum_{i=1,0}^{3,0} \alpha_i = 1$. The first two stages of sustainable finance (SF 1.0 and SF 2.0) aim to avoid reputation risk, because the public demands a minimum level of corporate social responsibility and externalities are expected to be priced-in at some stage. The third stage (SF 3.0) aims to grasp the opportunities of realising social-environmental impact through investment and lending.

FIGURE 3: LEVELS OF SOCIAL-ENVIRONMENTAL VALUE (SEV)



Note: SEV^{min} = minimum level of social and environmental value; $SEV^{integrated}$ = integrated level of social and environmental value; and $SEV^{optimal}$ = optimised social and environmental value.

5.1 Empirical assessment

Where are we currently on the social-environmental axis? Several investor and banking coalitions on long-term sustainable investment and lending have recently emerged.

These coalitions include the Principles for Responsible Investment (PRI), Focusing Capital on the Long Term Global (FCLTGlobal), the Global Impact Investing Network (GIIN), the Equator Principles, and the Global Alliance for Banking on Values (GABV). Schoenmaker and Schramade (2019) provide a detailed overview of these coalitions.

Table 3 describes the coalitions for asset managers and banks, by providing their coverage in the respective sector and their sustainable finance typology. Table 4 provides a further breakdown of the total size, main members and size of the reference group they belong to (respectively, global assets under management and global banking assets). Some of the coalitions are very small in comparison to their benchmark, with a few members making up most of the coalition's total size (for example FCLTGlobal or GABV). Others are very big, with the five biggest members representing less than 30 per cent of the total coalition (for example PRI and Equator Principles).

TABLE 3: COALITIONS FOR SUSTAINABLE FINANCE (END-2016)

Coalition	Coverage (in %)	Sustainable finance typology
PRI	38.0%	1.0 / 2.0
FCLTGlobal	6.0%	1.0 / 2.0
GIIN	0.05%	3.0
Equator Principles	30.0%	1.0 / 2.0
GABV	0.07%	2.0 / 3.0

Notes: The two or three main coalitions are shown for each group (asset managers and banks). PRI = Principles for Responsible Investment (supported by the UN); FCLTGlobal = Focus Capital on the Long Term Global; GIIN = Global Impact Investing Network; GABV = Global Alliance for Banking on Values. The coverage is calculated as follows: the assets of members as percentage of global assets under management at conventional, alternative and private wealth funds - for asset managers; and the assets of member banks as percentage of global banking assets - for banks. The Sustainable Finance typology (1.0, 2.0 and 3.0 from Table 1) is based on the author's assessment. Source: Website of respective coalitions and author's calculations.

TABLE 4: MAIN COALITIONS FOR SUSTAINABLE FINANCE (END-2016)

Panel A. Asset managers							
PRI Asset manager				FCLTGlobal Asset manager			
	AUM (\$ Bn)	% of coalition	Coverage in %		AUM (\$ Bn)	% of coalition	Coverage in %
1	BlackRock	5,117	8%		BlackRock	5,117	52%

2	Vanguard Group	3,814	6%		State Street Global Advisors	2,446	25%	
3	UBS	2,771	4%		APG	498	5%	
4	State Street Global Advisors	2,446	4%		Schroders	490	5%	
5	Allianz Asset Management	2,086	3%		CPPIB	279	3%	
6	Others	45,766	74%		Others	982	10%	
Total PRI		62,000	100%	38%	Total FCLTGlobal	9,812	100%	6%
Total AUM		163,000		100%	Total global AUM	163,000		100%

Panel B. Banks								
Equator principles bank				GABV bank				
		AUM (\$ Bn)	% of coalition	Coverage in %		AUM (\$ Bn)	% of coalition	Coverage in %
1	JPMorgan Chase	2,491	5%		Group Credit Cooperative	26	23%	
2	HSBC Holdings	2,375	5%		Vancity	18	16%	
3	BNP Paribas	2,190	5%		Amalgamated Bank NY	18	16%	
4	Bank of America	2,188	5%		Triodos Bank	14	12%	
5	Bank of Tokyo	1,982	4%		GLS Bank	5	4%	
6	Others	34,733	76%		Others	30	28%	
Total Equator Principles		45,959	100%	30%	Total GABV	110	100%	0.07%
Global banking assets		152,961		100%	Global banking assets	152,961		100%

Note: The table shows the share of the largest five members in each coalition (3rd column). The 4th column indicates the coverage of the coalition in the reference group (i.e. the relevant sector). The figures are for end-2016. See Table 3 for description of coalitions and sources.

The majority of financial institutions are at the Sustainable Finance 1.0 level, putting financial value first. The larger coalitions – covering 30 to 40 percent of the relevant reference group – are somewhere between Sustainable Finance 1.0 and 2.0 (see Table 3). These coalitions include social and environmental factors in their decision-making, alongside the financial factor. Schoenmaker (2017) notes that coalitions progressively

tighten the principles (to which members have to adhere) over time, providing a dynamic component to these coalitions – some sort of virtuous cycle. However, not all coalitions have clear principles guiding the behaviour of their members. Next, the coalitions adopting Sustainable Finance 3.0 put social and environmental factors first and the financial factor second. The coverage of these advanced coalitions is very small with less than 1 percent of the relevant group covered. We classify GABV in between Sustainable Finance 2.0 and 3.0 as GABV stresses the triple bottom line (2.0) – people, planet and prosperity – as well as social and environmental impact (3.0). Table 3 shows an inverse relationship between the degree of sustainability (3rd column) and the size of the coalition (2nd column).

Table 5 provides a first approximation of the level of social-environmental value in the overall financial system. The estimation is based on five levels of social-environmental value: three levels of SF 1.0, 2.0 and 3.0 and two intermediate levels, which are calculated as an arithmetic average of the adjacent levels. The five coalitions of Table 3 can be reduced to four: all FCLTGlobal members are also member of PRI and our assessment for both coalitions is SF 1.0/2.0. The remaining financial institutions are at SF 1.0. Table 5 indicates that the level of social-environmental value in the investment sector is at 19 per cent and in the banking sector at 17 per cent. This produces a social-environmental level of 18 per cent for the overall financial system: $SEV^{overall} = 18\%$.

General surveys indicate that sustainable investing amounts to 28 per cent of global assets under management in 2016 (GSIA, 2018). However, these generic indicators do not assess the depth of sustainable investing. It appears that the largest sustainable investment category is negative/exclusionary screening (GSIA, 2018). This very shallow way of sustainable investing is classified as Sustainable Finance 1.0 in our framework. Our SEV level indicator provides thus a richer picture of sustainable investing.

TABLE 5: LEVEL OF SOCIAL-ENVIRONMENTAL IN THE FINANCIAL SYSTEM (END-2016)

Typology	Investment sector		Banking sector		Overall financial system
	Fraction	SEV level	Fraction	SEV level	SEV level
SF 1.0	61.9%	10.0%	69.9%	10.0%	
SF 1.0/2.0	38.0%	32.5%	30.0%	32.5%	
SF 2.0		55.0%		55.0%	
SF 2.0/3.0		77.5%	0.07%	77.5%	
SF 3.0	0.05%	100.0%		100.0%	
Total SEV level	100%	18.6%	100.0%	16.8%	17.7%

Note: The table provides the fractions (from Table 3) and the SEV level (from Figure 3) for each sector. Intermediate levels are calculated as an arithmetic average of the adjacent levels. The total SEV level for the overall financial system is a weighted average of the total SEV levels of the investment sector and the banking sector, with total assets as weights. Source: Author calculations based on Tables 3 and 4.

The empirical finding of a SEV level of 18 per cent implies that we are just above, but still quite close to, SEV^{min} . To increase the social-environmental value, the policy challenge is to switch from the shareholder model in Sustainable Finance 1.0 to the stakeholder model of Sustainable Finance 2.0. This is similar to the dichotomy of Hart and Zingales (2017), who distinguish between shareholder value (SF 1.0) and shareholder welfare (SF 2.0). Aiming for Sustainable Finance 2.0 is also in line with Sandberg (2018), who argues for finding a middle ground between the dominant view of finance (SF 1.0) and calls for far-reaching social responsibilities (SF 3.0). Sandberg (2018) introduces a two-level model of sustainable finance. While financial agents can still focus on profits and efficiency in their day-to-day business, they must align on the social aims of society. Sandberg (2018) recommends that public policy should codify this social consensus in the fiduciary duties of financial agents (see Section 4.2 below).

The framework is dynamic. Non-governmental organisations (NGOs) put pressure on investors and banks to raise the minimum level by expanding the number of exclusions. Anticipation of government regulation or taxation on social and environmental externalities can cause an upward shift of the social-environmental component in the integrated value calculation (Schoenmaker and Schramade, 2019).

5.2 A societal test for take-overs

The shareholder model (SF 1.0) and stakeholder model (SF 2.0) can clash, in particular during take-over contests. We illustrate this point with reference to a recent example. In February 2017, Kraft Heinz, the US food company, attempted a takeover of Unilever, the European food company (Financial Times, 2017). A deal would have brought together two companies with radically different business models and cultures. With a portfolio of slower-growing brands, Kraft Heinz is heavily concentrated in the US and underpinned by debt-financed deals. It implemented aggressive cost-cutting strategies to generate margin expansion that allowed it to repay the debt and bolster shareholder returns; this is the shareholder model framework. Meanwhile, Unilever is better known for strong brands and its presence in some of the biggest emerging markets. Under its chief executive, Paul Polman, Unilever attempted to focus on better balancing of profitability with social and environmental sustainability – the stakeholder model. This was a big takeover battle. Kraft Heinz offered \$143 billion for Unilever, but Unilever did not want to give up its sustainable business model. In the end, Warren Buffett, the financier behind Kraft Heinz, did not approve a hostile takeover and halted Kraft Heinz from further bidding for Unilever.

The aftermath of the aborted takeover generated a debate on the 'protection' of companies with stakeholder models against the aggressive bids of shareholder-model companies. Without protection, financial consideration (F) would always dominate over social and environmental considerations (S+E). This would imply a bias towards Sustainable Finance 1.0. General defences against takeovers, such as certified shares or priority shares with friendly shareholders, can reduce market discipline on the management, which in turn might decrease the stock price of the company.

De Adelhart Toorop, De Groot Ruiz and Schoenmaker (2017) propose a societal cost-benefit analysis, which includes financial, social and environmental factors, based on the integrated value methodology described in Section 3.3. It is the responsibility of the management of both the acquiring and target company to conduct this test to obtain the integrated value of the joint companies. Similar to the way that an investment bank decides whether the terms of a merger or acquisition are fair, an independent advisor would give a fairness opinion on the outcome of the societal cost-benefit test. A Commercial Division of the Court or a Take-Over Panel (as in the United Kingdom) would only approve a takeover or merger if and when this cost-benefit test showed an improvement in the integrated value for society (in comparison to the integrated value of the stand-alone companies). When necessary the Court or Panel could appoint experts to re-calculate the societal cost-benefit test.

It should be acknowledged that conducting such a societal cost-benefit test is administrative cumbersome and requires detailed information. With the advance to integrated reporting this information will become more readily available. A societal test is consistent with a trend towards broadening the responsibility of investors and lenders. The High Level Expert Group on Sustainable Finance (2018) recommends clarifying the fiduciary duty of institutional investors and their asset managers. Fiduciary duty sets out the responsibilities that financial institutions owe to their beneficiaries and clients. Clarified duties would encompass key investment activities, including investment strategy, risk management, asset allocation, governance and stewardship. Making it clear in the relevant directives that sustainability factors must be incorporated in these activities can ensure that the clarified duty is effective. The clarified duty would also require that all participants in the investment chain pro-actively seek to understand the sustainability interests and preferences of their clients, members or beneficiaries (as applicable) and to provide clear disclosure of the effects, including the potential risks and benefits, of incorporating them into investment mandates and strategies.

6 Conclusions

To address the social and environmental challenges in our economic system, the United Nations has developed the Sustainable Development Goals for 2030. Sustainable finance looks at how finance (investing and lending) interacts with economic, social, and environmental issues. This paper develops a new framework for sustainable finance and shows how sustainable finance has the potential to move from finance as a goal (profit maximisation) to finance as a means facilitating sustainable development (see also Scholtens, 2006). In his book *Finance and the Good Society*, Shiller (2012) provides some stimulating examples of how finance can serve the society and its citizens. The same could be done to address the environmental challenges.

Our empirical findings suggest that the financial system is still at low levels of social-environmental value at 18 per cent (based on a scale from 0 to 100 per cent). The vast majority operates still at Sustainable Finance 1.0 (minimum level of social-environmental value at 10 per cent). One third has started the migration to Sustainable Finance 2.0, which operates at an intermediate level of social-environmental value. A tiny group of frontrunners at Sustainable Finance 3.0, comprising less than 1 per cent of the overall financial system, aim to realise the full social and environmental impact in their investment and lending. Our findings suggest that it is important to stimulate SF 1.0 institutions to start the migration and SF 1.0/2.0 institutions to speed up the migration to SF 2.0. The High Level Expert Group on Sustainable Finance (2018) recommends to incorporate sustainability into the duties of investors and lenders.

We are in the transition to a low-carbon, circular economy. The externalities of the current carbon-intensive economy are becoming increasingly clear to the wider public. Examples are more catastrophic weather events, droughts and flooding in countries close to the equator, and air pollution. A case in point is California, where air pollution from heavy traffic in the 1990s prompted environmental regulations and stimulated innovations, such as electric cars of Tesla and solar technology. China, India and Mexico, for example, face similar, or even worse, air pollution today, which may prompt at some point environmental regulations in these countries. Finance is about anticipating such events and incorporating expectations in today's valuations for investment decisions. By speeding up the migration from SF 1.0 to SF 2.0 and SF 3.0, finance can contribute to a swift transition to a low-carbon economy.

7 References

- Acemoglu, D. and J. Robinson (2012), *Why Nations Fail*, Crown Business, New York.
- Advisory Scientific Committee (ASC) (2016), 'Too Late, Too Sudden: Transition to a Low-Carbon Economy and Systemic Risk', Report No. 6 of the Advisory Scientific Committee of the European Systemic Risk Board, Frankfurt.
- Barone, G. and S. Mocetti (2016), 'Inequality and trust: new evidence from panel data', *Economic Inquiry*, 54(2): 794–806.
- Bianchini, R. and G. Gianfrate (2018), 'Climate Risk and the Practice of Corporate Valuation', Chapter 23 in S. Boubaker, D. Cummings and D. Nguyen (eds), *Research Handbook of Finance and Sustainability*, Edward Elgar.
- Busch, T., R. Bauer and M. Orlitzky (2016), 'Sustainable Development and Financial Markets', *Business & Society*, 55(3): 303-329.
- Chava, S. (2014), 'Environmental externalities and cost of capital', *Management Science*, 60(9), 2223–47.
- Coulson, A. (2016), 'KPMG's True Value methodology: A critique of economic reasoning on the value companies create and reduce for society', *Sustainability Accounting, Management and Policy Journal*, 7(4): 517-530.
- Daly, H. and J. Farley (2011), *Ecological Economics: Principles and Applications*, Island Press, Washington DC.
- De Adelhart Toorop, R., A. De Groot Ruiz and D. Schoenmaker (2017), 'Maatschappelijke toetsing overnames is nodig' (Societal test of takeovers is necessary), *ESB*, 102(4752), 360-363.
- Dyllick, T. and K. Muff (2016), 'Clarifying the meaning of sustainable business introducing a typology from business-as-usual to true business sustainability', *Organization and Environment*, 29 (2): 156-74.
- Financial Times (2017), 'Kraft Heinz drops \$143bn pursuit of Unilever', 20 February.
- Friede, G., T. Busch and A. Bassen (2015), 'ESG and financial performance: aggregated evidence from more than 2000 empirical studies', *Journal of Sustainable Finance and Investment*, 5(4), 210-233.
- Friedman, M. (1970), 'The Social Responsibility of Business is to Increase its Profits', *The New York Times Magazine*, 13 September.
- Global Alliance for Banking on Values (2016), 'Real Economy – Real Returns: A Continuing Business Case for Sustainability-focused Banking', Research Report, Zeist.
- Global Impact Investing Network (GIIN) (2016), Annual Impact Investor Survey 2016, Global Impact Investing Network, New York.
- Gladwin, T., J. Kennelly and T. Krause (1995), 'Shifting paradigms for sustainable development: Implications for management theory and research', *Academy of Management Review*, 20(4), 874-907.

- Goss, A. and G. Roberts (2011), 'The impact of corporate social responsibility on the cost of bank loans', *Journal of Banking & Finance*, 35(7), 1794–810.
- GSIA (2019), '2018 Global Sustainable Investment Review', Global Sustainable Investment Alliance.
- Hart, O. and L. Zingales (2017), 'Companies Should Maximize Shareholder Welfare Not Market Value', *Journal of Law, Finance, and Accounting*, 2(2), 247-275.
- Heinkel, R., A. Kraus, and J. Zechner (2001), 'The effect of green investment on corporate behavior', *Journal of Financial and Quantitative Analysis*, 36(4), 431–49.
- High-Level Expert Group on Sustainable Finance (2018), 'Financing a sustainable European economy', Final Report, European Union, Brussels.
- Holling, C. S. (2001), 'Understanding the Complexity of Economic, Ecological, and Social Systems', *Ecosystems*, 4(5), 390-405.
- Khan, M., G. Serafeim and A. Yoon (2016), 'Corporate Sustainability: First Evidence on Materiality', *Accounting Review*, 91(6), 1697-1724.
- Kotz, H. and R. Schmidt (2016), 'Corporate Governance of Banks – A German Alternative to the Standard Model', *Zeitschrift für Bankrecht und Bankwirtschaft*, 28(6), 427-444.
- Levine, R. (2005), 'Finance and Growth: Theory, Mechanisms and Evidence', in: P. Aghion and S. N. Durlauf (eds.), *Handbook of Economic Growth*, Elsevier, Amsterdam, 865-923.
- Nilsson, J. (2008), 'Investment with a conscience: Examining the impact of pro-social attitudes and perceived financial performance on socially responsible investment behavior', *Journal of Business Ethics*, 83(2): 307–325.
- Norström, A. V., A. Dannenberg, G. McCarney, M. Milkoreit, F. Diekert, G. Engström, R. Fishman, J. Gars, E. Kyriakopoulou, V. Manoussi, K. Meng, M. Metian, M. Sanctuary, M. Schlüter, M. Schoon, L. Schultz and M. Sjöstedt (2014), 'Three necessary conditions for establishing effective Sustainable Development Goals in the Anthropocene', *Ecology and Society*, 19(3): 8.
- Omran, M. and D. Ramdhony (2015), 'Theoretical Perspectives on Corporate Social Responsibility Disclosure: A Critical Review', *International Journal of Accounting and Financial Reporting*, 5(2), 38-55.
- Ortiz-de-Mandojana, N. and P. Bansal (2016), 'The long-term benefits of organizational resilience through sustainable business practices', *Strategic Management Journal*, 37(8), 1615-1631.
- Ostergaard, C., I. Schindele and B. Vale (2016), 'Social Capital and the Viability of Stakeholder-Oriented Firms: Evidence from Savings Banks', *Review of Finance*, 20(5), 1673-1718.
- Renneboog, L., J. ter Horst, and C. Zhang (2008), 'Socially responsible investments: institutional aspects, performance, and investor behavior', *Journal of Banking & Finance*, 32(9), 1723–42.
- Revelli, C. and J. Viviani (2015), 'Financial performance of socially responsible investing (SRI): what have we learned? A meta-analysis', *Business Ethics: A European Review*, 24(2), 158-185.
- Riedl, A. and P. Smeets (2017), 'Why Do Investors Hold Socially Responsible Mutual Funds?', *Journal of Finance*, 72(6), 2505–50.

- Robinson, A., R. Calov and A. Ganopolski (2012), 'Multistability and critical thresholds of the Greenland ice sheet', *Nature Climate Change* 2(6), 429–432.
- Rockström, J. and P. Sukhdev (2016), 'How food connects all the SDGs', Stockholm Resilience Centre.
- Sandberg, J. (2018), 'Toward a Theory of Sustainable Finance', in: T. Walker, S. Kibsey, and R. Crichton (eds), *Designing a Sustainable Financial System*, Palgrave Macmillan, Cham.
- Schoenmaker, D. (2017), *From Risk to Opportunity: A Framework for Sustainable Finance*, Rotterdam School of Management, Erasmus University, Rotterdam.
- Schoenmaker, D. and W. Schramade (2019), *Principles of Sustainable Finance*, Oxford University Press, Oxford.
- Schoenmaker, D. and G. Zachmann (2015), 'Can a Global Climate Risk Pool Help the Most Vulnerable Countries?', *Policy Brief* 2015/04, Bruegel.
- Scholtens, B. (2006), 'Finance as a driver of corporate social responsibility', *Journal of Business Ethics*, 68(1), 19-33.
- Shiller, R. (2012), *Finance and the Good Society*, Princeton University Press, Princeton.
- Skauke, M. (2016), 'Fossil Fuel Investments: Fossil fuel investment and the broader issue of transitioning to a low-carbon economy', Australian Council of Superannuation Investors, Melbourne.
- Stern, N. (2008), 'The Economics of Climate Change', *American Economic Review: Papers and Proceedings*, 98(2), 1-37.
- Thurm, R., B. Baue and C. van der Lugt (2018), 'Blueprint 5 The Transformation Journey: A Step-By-Step Approach to Organizational Thriveability and System Value Creation', Reporting 3.0, Berlin.
- Tirole, J. (2017), *Economics for the Common Good*, Princeton University Press, Princeton.
- True Price (2014), 'The Business Case for True Pricing: Why you will benefit from measuring, monetizing and improving your impact', A report drafted by True Price, Deloitte, EY and PwC, Second edition, Amsterdam.
- United Nations (2015), 'UN Sustainable Development Goals (UN SDGs) - Transforming our world: the 2030 Agenda for Sustainable Development', A/RES/70/1, New York.