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**STIMULATING NON-BANK FINANCIAL INSTITUTIONS'
PARTICIPATION IN GREEN INVESTMENTS**

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Abstract

This paper analyzes the approaches adopted by institutional investors to manage climate risk in their portfolios and proposes policies to increase climate awareness in this large segment of the capital markets. Because of their size and their role as conduit of savers' climate concerns to the capital markets, most non-bank financial institutions are ideally positioned to steer corporate capital allocation toward more sustainable uses. Over the past decades, an increasing number of institutional investors have adopted strategies to mitigate climate exposure. These include negative screening, positive screening, active ownership, sustainability ratings, and hedging of climate risks. These strategies reflect specific fund manager mandates and the recognition that climate risks can have a tangible impact on financial assets' valuations and, as a result, institutional fund performance. We review the evidence about the adoption of these strategies, in both advanced and developing capital markets. We then analyze the pros and cons of each strategy in promoting more sustainable climate practices and identify best practices. We conclude with policy recommendations for capital markets regulators to incentivize the adoption of sustainable practices among institutional investors.

Keywords: climate risks, asset management, institutional investor, carbon pricing, sustainability

JEL Classification: G11, G21, G23, G24, G28

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1. INTRODUCTION

As climatic change and global warming are addressed by tougher regulation, new emerging technologies, and shifts in consumer behavior, global investors are increasingly treating climate risks as a key aspect when pricing financial assets and deciding the allocation of their investment portfolios.

So far, the focus of investors has been on whether policies on carbon emissions will strand the assets of investee fossil-fuel companies. For example, the Norwegian sovereign wealth fund—one of the largest institutional investors globally—announced in November 2017 the decision to drop its investments in oil and gas stocks.

However, new estimates are shedding light on the broader indirect impact of climate change on the value of assets held by banks and financial companies. Dietz et al. (2016) show how a leading integrated assessment model can be used to quantify the expected impact of climate change on the present market value of global financial assets. They find that the expected “climate value at risk” of global financial assets today is 1.8% along a business-as-usual emissions path, which amounts to \$2.5 trillion – however, for the 99th percentile the value estimate is \$24.2 trillion. Importantly, Battiston et al. (2017) find that while direct exposures to the fossil-fuel sector are small (3%–12%), the combined exposures to climate-policy relevant sectors are large (40%–54%), heterogeneous, and amplified by large indirect exposures via financial counterparties. In other words, there are substantial climate-change-related risks borne by the global financial system, and those risks are similar in magnitude to the ones that ignited the financial crisis.

Regulators’ growing concern about climatic change as a source of risk for the global financial system is reflected in the creation of the Task Force on Climate-related Financial Disclosures (TCFD) decided by the Financial Stability Board. The Task Force has recommended that global organizations enhance their financial disclosures related to the potential effects of climate change. However, enhanced transparency is only the first step. As climate risks do appear to be more pervasive and material for the financial system than previously thought, the compelling issue for banks as well as for non-bank financial institutions (NBFIs) is how to quantify, manage, and possibly hedge off such risks. If investors do not want to retain carbon risk—by covering the potential losses out of the capital invested – what are the possible strategies?

This paper discusses the extent to which NBFIs are exposed to climate change risks and how they can manage their exposure by “greening” their investments’ portfolios. After having defined NBFIs, we discuss how to identify climate change risks and what the possible approaches to managing them are. We finally present some policy recommendations to stimulate further NBFIs’ participation in green investments.

2. DEFINITION AND RELEVANCE OF NON-BANK FINANCIAL INSTITUTIONS

A non-bank financial institution (NBFI) is a financial institution that does not have a full banking license and is not supervised by a banking regulator. The definition is very broad and ranges from insurance companies and asset managers to brokers, market-makers, and financial advisors. This chapter focuses on NBFIs that invest capital on behalf of clients with the objective to maximize risk-adjusted returns, or what is commonly known as the asset management industry. This, in turn, comprises several constituents, categorized on the basis of their main source of capital and/or

investment strategy. The most prominent and largest asset managers include pension funds managing savers' capital, insurance companies investing insurance premium proceeds, endowment funds managing capital donated to universities and other institutions, sovereign wealth funds managing the proceeds derived from a country's natural resources or other sources, and alternative asset managers such as private equity, venture capital ("VC"), and hedge funds.

Depending on the return and liquidity requirements of their clients, NBFIs invest across the entire securities spectrum. The largest allocations are to bonds, both sovereign and corporate, and stocks listed and traded on exchanges worldwide. The liquidity of such securities allows NBFIs to alter portfolio composition over time, reflecting changed macroeconomic, sectoral, and market circumstances. A smaller portion of the NBFIs portfolio can be allocated to illiquid investments that are compatible with the contractual arrangement between the NBFIs and its clients. Private equity and venture capital funds that require clients to commit capital for, usually, ten years, are a prominent example of such illiquid allocations; their most prominent clients are other NBFIs (pension, insurance, sovereign wealth funds, and endowments) together with wealthy individuals investing directly. Private equity and VC funds require long-term capital commitments because they invest in unlisted securities—usually equity—issued by private companies and they hold on to their investments for several years, until the portfolio company can be sold to a competitor, another private equity fund, or the stock market through an initial public offering.

The pool of capital managed by NBFIs is very substantial, which makes them a potentially large source of capital for green investments. Total capital managed globally by the asset and wealth management industry (Assets under Management, or "AuM") reached \$85 trillion in 2016, of which there was \$47 trillion in North America, \$22 trillion in Europe, and \$12 trillion in Asia and the Pacific. Future growth will be driven by population growth and aging, and the related increase in global savings (PWC 2017). Pension fund AuM globally reached an all-time high of \$38 trillion in OECD countries in 2016; the US is the largest pension fund market in the world, with \$25 trillion managed, followed by Canada, the UK, Australia, Japan, and several other western European countries (OECD 2017a). Insurance companies and sovereign wealth funds managed \$29 trillion and \$7 trillion in 2016, respectively (PWC 2017). Private equity AuM reached \$2.5 trillion in June 2016, also an all-time high (Prequin 2017a).

The common denominator of all asset managers is the fiduciary duty to maximize risk-adjusted returns for their clients. This is true for any NBFIs investment, including in green sectors. NBFIs are not a suitable source of so-called "concessional" capital—willing to accept sub-market returns as a trade-off for the achievement of policy objectives. The only possible exception is some sovereign wealth funds with a hybrid mandate that includes policy goals, although it should be noted that some of the largest sovereign wealth funds operate on a purely commercial basis (e.g., the Norwegian and most Gulf countries' funds).

3. CLIMATE RISKS AFFECTING NBFIS

Climate change is a cross-countries coordination problem, the resolution of which would involve the establishment of sufficiently high costs of emitting CO₂ throughout most of the world through taxes or quotas. Without sufficiently high carbon prices, the pattern to lower emissions will be both more difficult and less effective. In fact, existing carbon markets are incomplete and subject to market failure, which reflects mostly political shortcomings. In particular, there exists a lack of relevant long-term price

signals for companies and investors, and where markets do exist, the current prices in most cases are far below the levels needed for a path toward sustainable climate targets. Nevertheless, especially after the COP21 agreement, more decisive actions seem likely to be taken by various governments around the world.

In this framework, it should not be a surprise that the phrase “put a price on carbon” has become increasingly popular as the debate about how to address climate change quickly moves from theory to action.

From a practical point of view, there are several possible ways to price carbon, and they all tend to lead to the same result. The various possible approaches try to quantify and capture the external costs of carbon emissions—costs that society pays in other forms, such as droughts, heat waves, damage to cultivations, health care—and tie them to their sources just through a price on carbon.

The objective of carbon pricing is to shift the social costs of damage back to those who are responsible for them (also known as the “polluter pays” principle), and who can actually curb them. In this way, polluters are ultimately left with the decision on whether to discontinue their polluting operations, to reduce emissions (e.g., by adopting cleaner technologies), or to continue to pollute and pay for it. Therefore, the price of carbon provides an economic signal to polluters who can decide for themselves how to respond. In this way, the global and local environmental goals are expected to be achieved in a flexible and efficient way. The pricing of carbon also has the advantage of stimulating technology and operational innovation, fostering the economy transition toward a low-carbon configuration.

There are two main approaches for pricing carbon: carbon taxes and emission trading systems. The former consists of defining a tax rate on greenhouse gas emissions or—more frequently—on the carbon content of fossil fuels. Following this approach, the overall emission reduction associated with the carbon tax is not pre-defined (but it can be estimated), while the carbon price is.

With the latter approach (also known as cap-and-trade system), the objective is to cap the total level of greenhouse gas emissions. The firms that perform better than expected in reducing the emissions can sell their surplus allowances to the larger emitters. In this way, the firms that are more effective in reducing the emissions get rewarded, while the least-effective ones get penalized. This is a market mechanism where the interplay between supply and demand for emissions allowances is reflected in a market price for greenhouse gas emissions. The caps ensure that the required emissions reductions will progressively take place by keeping all the emitters within the boundaries of the pre-allocated carbon budget.

The choice between carbon taxes and emission trading systems (or the coexistence of the two) depends on national policymakers and economic circumstances. According to recent estimates (World Bank 2017), as of 2016, 40 countries have a carbon pricing system in place, and that number is expected to increase significantly over next few years following the climate change agreement reached in Paris in 2015.

From the current systems of carbon prices in place, “carbon price risk” emerges as a new form of political risk for both companies and investors. Such risk is related to the probability of the emergence of future international climate agreements and of national policies. The timing and extent of carbon-related policies will dramatically determine when and which real and financial assets will be affected. The risk is not merely political, but technological as well, as there is uncertainty about possible future technologies that might affect the speed and scope of the transition toward a

low-carbon economy. This aspect further influences investors' ability to form long-term expectations about assets to be invested in.

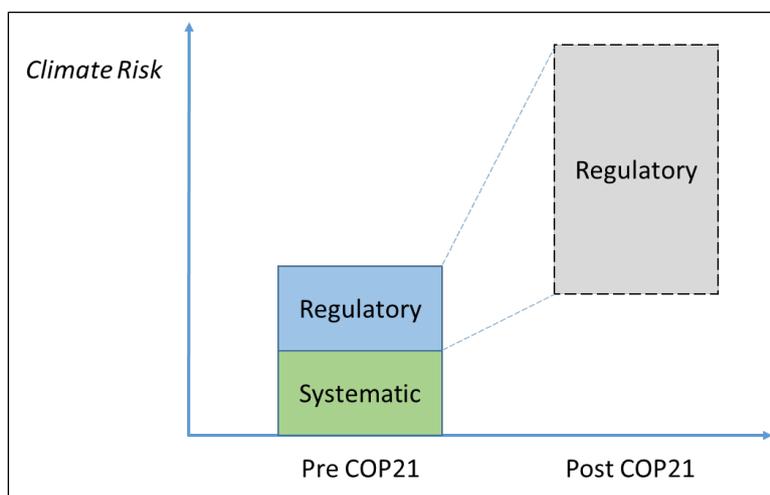
In this framework, a trend toward comprehensive climate legislation and technological progress toward cheaper renewables and clean technologies are emerging robustly across the globe. These developments already affect the relative prices of fossil and non-fossil-fuel sources, thus creating "stranded assets". In all, the growing evidence of the increasing physical impacts of climate change is making the current lack of adequate response more and more unsustainable and therefore forces governments to take decisive actions.

As a consequence, investors and financial regulators are debating on whether the implementation of climate policies to meet the 1.5 C COP21 agreement target will generate systemic risks or, instead, opportunities for low-carbon investments. Therefore, assessing the impact of climate risks and climate policies on the financial system is easily ranked among the most urgent and prominent societal issues (Battiston et al. 2016).

From a purely financial point of view, the question becomes whether climate risks are diversifiable or not. In other words, using portfolio theory jargon, climate risk can be broken down into two components that together make up a portfolio's total climate risk exposure, systematic risk, and unsystematic (idiosyncratic) risk.

Systematic risk is associated with macroeconomic concerns and climate change (and the policies to combat its impacts) will create systematic risk across the entire economy, affecting energy prices, national income, and all the industries, regardless of their direct exposure to carbon policies. On the other hand, unsystematic climate risk is the component of investment risk specifically attached to an individual security. This component of climate risk can be cancelled by diversification. In the framework of climate change, there is a systematic risk related to natural disastrous event and erosion of the living standards on the planet, which in turn can provoke instability in societies and economies. The unsystematic risks mostly refer to the regulatory risks associated with the implementation of policies (i.e. carbon tax, cap-and-trade systems, new regulations against carbon emissions) that could affect especially the companies which have a relevant carbon footprint. This latter component of risk is assumed to be increased following the COP21 agreement (see Figure 1).

Figure 1: The Components of Climate Risk



Source: Gianfrate (2018).

4. INCREASING NBFI FOCUS ON GREEN INVESTMENT THEMES

NBFIs are increasingly more focused on green investment themes for several reasons. We discuss these reasons in the sections below.

Impact on Investment Risks and Returns

NBFIs increasingly recognize that the generation of long-term, sustainable financial returns is dependent on stable, well-functioning and well-governed social, environmental, and economic systems. Public and private pension schemes, insurance companies, sovereign wealth funds, mutual funds, and other institutional asset managers have a long-term investment horizon. For them, the reduction of medium to long-term risks, such as climate change, is of paramount concern. Some NBFIs also have substantial direct and indirect exposure to sectors that are particularly exposed to climate risks, such as infrastructure and energy. Increasing anecdotal and statistical evidence points to a positive correlation between companies' environmental compliance and their operating and financial performance.

Pressure from Savers

Climate sustainability concerns are increasingly affecting the saving and investment decisions of individuals, the same way they affect consumption decisions. This trend is particularly visible in advanced economies and among younger generations. Savers, as ultimate clients of NBFIs, are demanding stricter compliance with ESG standards as well as the broadening of product offerings to include more environmentally responsible investment options. The inclusion of Socially Responsible Investment (SRI) products in their product offering is becoming compelling from a business perspective.

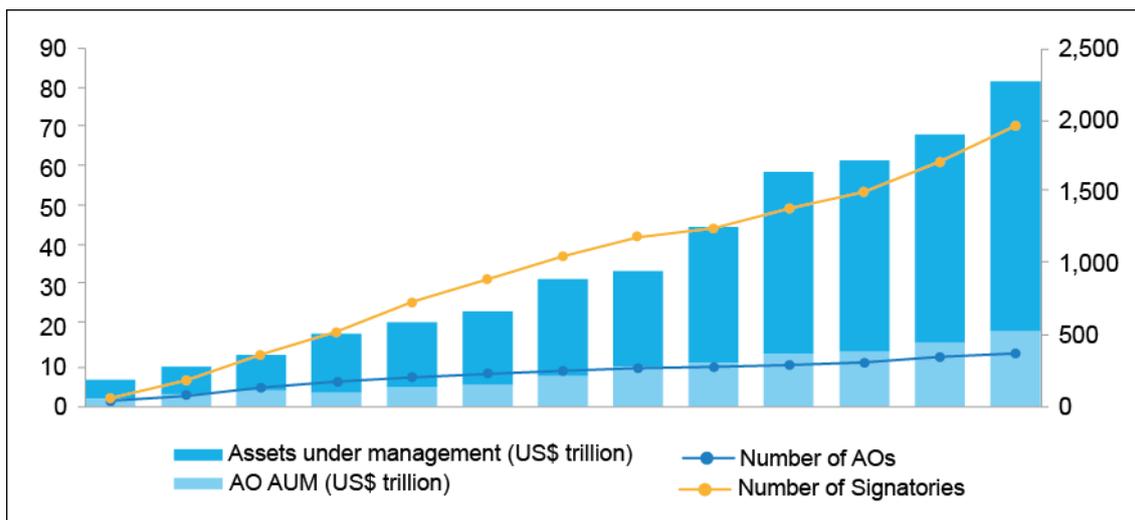
Pressure from Regulators

In some jurisdictions, it is debated whether financial institutions should be mandatorily required to integrate ESG issues into their investment decisions policies. While such debate mostly concerns banks, the repercussions on the NBFIs would be immediate and straightforward. As an example, the Financial Stability Board (FSB) has created the Task Force on Climate-related Financial Disclosures (TCFD). The Task Force has recommended global organizations to enhance their financial disclosures related to the potential effects of climate change.

Pressure from Industry and Advocacy Organizations

In other jurisdictions, there are industry-sponsored initiatives that, although not legally binding, strongly encourage asset owners to mandate their trustees to adopt a more active stewardship approach through direct engagement, proxy voting, or impact investing. The leading initiative in the field is the United Nations-sponsored Principles for Responsible Investment (UNPRI), a non-profit organization that studies the investment implications of ESG factors and supports a broad network of international investor signatories in incorporating these factors into their investment and ownership decisions.

Figure 2: The Growth of “Responsible” Assets Globally



Source: UNPRI, www.unpri.org/about-the-pri.

Other examples include the UK Stewardship Code, issued in 2010¹ by the Financial Reporting Council, which sets transparency standards on how institutional investors enhance the sustainability of their portfolio companies, and the *Portfolio Decarbonization Coalition*, a multi-stakeholder initiative that seeks to encourage and mobilize institutional investors to decarbonize their investment portfolios.

As a result of these factors, the integration of ESG information into NBFi investment decisions is becoming common practice. And failure to consider sustainability factors in long-term investment practices is considered being a failure of fiduciary duty.

5. AVENUES FOR NBFi PARTICIPATION IN GREEN INVESTMENTS

The possible approaches for NBFIs to participate in green investments can vary greatly. Some try to “greenify” existing investments, others to mitigate climate risks, others to channel capital directly to green investments. In the following sections we discuss the most widespread ones. We also suggest ways for governments to proactively incentivize NBFi investments in green projects.

5.1 Negative Screening

NBFIs that invest in listed securities apply exclusion mechanisms to avoid investments in companies involved in the production of either certain products (e.g., weapons, tobacco, alcohol), or when there is a risk that a company might be responsible for or contribute to unethical conduct (e.g., exploitation of child labor). When the exclusion criteria are defined and implemented, investors are expected to divest from the portfolio investments that fall under the scope of the exclusion. This mechanism is often adopted on the basis of ethical considerations and can vary depending upon the cultural and religious beliefs of the asset manager and/or its clients. Exclusion criteria can be either “product-based,” when an asset is excluded solely on the basis of what

¹ A subsequent revision of the Code was released in September 2012.

its operations produce, or “conduct-based,” when a financial asset is associated with an issuer whose conduct is not consistent with the stated ethical principles.

Negative screening can apply to a variety of social and environmental domains and is not exclusively a green strategy. Sectors and assets with a negative carbon footprint, however, are increasingly prominent candidates for exclusion lists. According to Fossil Free, a global advocacy initiative aimed at accelerating the transition to 100% renewable energy,² the value of assets represented by institutions and individuals committing to some sort of divestment from fossil-fuel companies reached \$5 trillion as of December 2016; to date, 688 institutions and 58,399 individuals across 76 countries have committed to divesting from fossil fuel.

When evaluating carbon-related investments, the issue is whether the products alone may warrant exclusion, or whether other aspects of the productive process should also be taken into account. Currently, energy is, to a large extent, derived from fossil-fuel sources—coal being the least eco-sustainable. Even recognizing the negative consequences of a slow transition to renewables, an abrupt transition could generate very high social and economic costs, for instance in emerging and developing countries that rely on fossil fuels for growth and employment, or that cannot afford to pay for expensive renewable sources.

Recognizing this dilemma, the Council of Ethics that sets the investment policy of the Norwegian Government Pension Fund recommends that “fossil fuel companies’ energy production, energy use, or CO₂ emissions cannot per se be said to be contrary to generally accepted ethical norms, as these products and activities constitute an important basis for our society”.³ The Interfaith Center on Corporate Responsibility (ICCR) holds a similar view: “the energy industry should not be seen as sole creators of the problem as long as global markets remain inextricably linked to fossil fuels to propel growth.”⁴

Underinvesting in carbon producers is of little effect when there is continued market demand for their products. While exclusion criteria can be easily implemented for coal or petroleum producers, the same cannot be said for the many industries that ultimately rely on coal and petroleum as energy sources. First, these industries represent a very large portion of the entire global economy. Second, they may not be fully aware of the origin of their energy sources (e.g. the energy mix of the utilities that supply them with electricity). Third, even further downstream, consumers may not be aware of or concerned about the implicit energy mix of the products they purchase from such industries. It would be unrealistic and harmful to compile exclusion lists so broad as to incorporate any indirect user of fossil fuels. By design, exclusion lists are meant to capture only the first-order effects of fossil-fuel production.

At a very minimum, negative screening forces more transparent reporting of environmental metrics by companies at risk of falling into exclusion lists. In a more optimistic scenario, companies with residual non-green assets and operations may divest of them in order not to fall in exclusion lists. In the long term, negative screening will divert NBFIs’ asset allocation toward sustainable sectors. Increased supply of capital, relative to non-green sectors, could reduce the long-term cost of capital for sustainable companies, which will facilitate their investment activities and implementation of growth plans.

² Website: <https://gofossilfree.org>.

³ From website: <http://etikkradet.no/en/recommendations>.

⁴ From website: http://www.iccr.org/sites/default/files/page_attachments/ICCRInsightsOnClimateChange2013.pdf.

On the flip side, it is unlikely that negative screening alone will be able to “kill” non-green sectors. Capital will continue to be attracted to sectors that generate high financial returns. NBFIs are one step between individual savers and the investment opportunities. Many savers are not sophisticated enough to delve into the portfolio decisions of the institutional funds to whom they have entrusted their savings. They will instead focus on headline performance figures. At the same time, many fund managers operate under the simple fiduciary duty to maximize risk-adjusted returns for their clients and are incentivized accordingly.

Government Role

In many countries, especially emerging ones, some NBFIs are under direct government ownership or management (“public NBFIs”). Examples include sovereign wealth funds, strategic development funds, or pension funds that manage the savings of civil servants. These NBFIs are very often large, if not the largest, capital market participants in a given country. In Malaysia, for instance, Khazanah owns a large portfolio of stakes in government-linked companies, including the national electricity provider, a telecom operator, a large bank, and many infrastructure businesses. Governments with such exposure and influence over local capital markets can apply negative screening to their portfolios, build awareness of their screening criteria, and try to mainstream them to the broader NBFIs sector.

5.2 Active Ownership

Active ownership by institutional investors encompasses both engaging with the management and boards of directors of investee companies and proxy voting on issues concerning governance and performance, including those related to the environmental strategy. From a theoretical perspective, active ownership is a way to address principal-agent problems arising when there is an incomplete alignment of interests between the asset owner (principal) and the person charged with managing the asset (agent). Practically, active ownership is based on the full exercise of the rights attached to the status of “owner” of the securities issued by companies or other entities.

The effectiveness of active ownership is receiving increasing attention in literature. For example, Dimson et al. (2015) report enhanced financial performance (about 2% yearly abnormal returns) of investee companies after structured engagement activities by asset managers.

While most active ownership initiatives focus on the investee’s business and financial performance, some initiatives try to affect the investee’s environmental performance. The latter usually involve mobilizing the public opinion and the media, in particular to bring attention to proxy votes on environmental-related issues at upcoming shareholders’ meetings. Other active ownership initiatives are carried out behind the scenes and consist of discreet dialogs and interactions between investors and management and/or board directors.

Climate-focused active ownership engagements are conducted either independently or through collaborative platforms. These include the Carbon Disclosure Project (CDP) and major investor networks focused on climate change, such as the European Institutional Investors Group on Climate Change (IIGCC), the Asia Investor Group on Climate Change (AIGCC), the Australia/ New Zealand Investor Group on Climate Change (IGCC), and the Investor Network on Climate Risk (INCR). These collaborative engagements aim to encourage companies to disclose their climate change strategies

(e.g. the CDP information requests) in order to set emission reduction targets and to take action on sector-specific issues such as gas flaring in the oil and gas sector.

Successful engagements on specific environmental issues typically aim at punctual objectives. They are not limited to requesting corporate boards to consider certain sustainability issues, but they explicitly call for defined environmental targets to be delivered on. However, just as important as overcoming agency issues between an owner and manager is avoiding micromanagement of companies while expecting full accountability from board and senior executives. As for carbon risks, the lack of a robustly defined long-term price for CO₂ emissions can definitely create incentives for non-optimal investment behavior by corporate leaders. Examples of engagement objectives in this area include ensuring compensation policies are consistent with environmental targets or requiring improved disclosure from companies on their carbon price assumptions. As a recent example of collaborative engagement on climate-related risks, in May 2017, 63% of Exxon Mobil shareholders approved a proposal at the company's annual meeting calling for the world's largest listed oil producer to improve its disclosure on business risks through global climate change policies.

Active ownership builds on the assumption that it is the responsibility of a long-term shareholder to question the robustness of financial analyses behind significant new investments made by investee entities. Since fossil-fuel companies face the prospect of business decline and must adapt to new circumstances to survive, active ownership by investors may push them to leverage their present strengths toward a low-carbon energy productive system. Since this transition will take time, those entities exposed to carbon risks will need the engagement and support of large long-term investors. By engaging with climate resilience and transition strategies for fossil-fuel companies, the investors adopting active ownership can manage their portfolio exposure to climate change risks and protect the long-term value of their investments.

Government Role

Public NBFIs are ideally positioned to champion green active ownership in their domestic financial markets. They often own large, if not controlling stakes in listed national champions and have the power to steer corporate strategies (e.g., through board representation and appointment of senior management). Unlike NBFIs, which are more focused on short-term stock price appreciation, such as activist hedge funds, public NBFIs are long-term investors that can pursue long-term transformational objectives. Evidence of success of public NBFIs practicing active ownership should encourage other NBFIs to pursue similar strategies.

5.3 Sustainability Ratings

Sustainability research assesses the environmental, social, and governance performance of corporations and other security issuers, such as central and local governments. This research translates into a range of ESG ratings, rankings, and indices aimed at capturing external costs and benefits disregarded by financial accounting and reporting.

Rising investor demand has fueled the strong growth of the ESG information market over last two decades. A range of asset managers use sustainability analyses and ratings to manage and map their portfolios, by benchmarking issuers on various quantitative metrics.

Sustainability ratings rely on the data, information, and analyses provided by the issuers themselves and, as such, their quality and reliability vary. Company-level ESG disclosure does not necessarily feature materiality aspects or predictive data, and thus bears the risk of being incomplete, inconsistent, and difficult to compare between different industries, markets, and rating schemes. To compensate for this deficit, ESG research providers, analysts, and asset managers would need to proactively investigate the sources, something they are not fully able to do due to resource constraints. With regards to carbon emissions, the data available and environmental ratings do not appear yet to be reliable enough to enable investors to set *decarbonization* targets or measure their performance against rating-based targets.

A further practical consideration is that it takes time for investors to set up their data-gathering processes and to educate their analysts and fund managers about how these ratings may be interpreted and adopted in the investment process. Moreover, there is often a time lag between data being available, ratings being issued, and that ratings being integrated into investment research and decision-making processes.

Government Role

Governments can implement regulations that promote rigorous ESG monitoring and disclosure by companies listed on the domestic stock exchange as well as any NBFIs operating under domestic financial regulation. In consultation with NBFIs, governments should define best practices concerning the selection of sustainability metrics, measurement procedures, consistence of definitions, and, importantly, frequency and detail of disclosure to NBFIs and company investors and the broader public.

This effort would raise awareness of sustainability issues among investors in NBFIs and potentially ignite a virtuous circle in which savers proactively demand more rigorous ESG compliance, and reporting from companies or funds in their investment portfolios. By promoting standardization, it should also lower the cost of ESG monitoring over time—listed companies and NBFIs would not need to “reinvent the wheel” and could adopt off-the-shelf methodologies. Standardization of metrics would also help “green benchmarking” horizontally, across portfolios of stocks or NBFIs, and over time for a single stock or fund holding.

5.4 Hedging

In a context of carbon that is dynamically priced, the hedging of carbon exposure for NBFIs would be, at least in theory, a viable strategy. Formally, a risk is hedged off when the action taken to reduce investments' exposure to a loss also causes the investor to give up of the possibility of a gain from a favorable configuration of the risk source. Hedging therefore usually involves “linear” instruments whose contractual payoffs move one-for-one with the value of the underlying asset. Those linear contracts tend to be obligations or commitments usually in the form of forward, futures, and swaps (Gianfrate 2018), but the construction of synthetic positions that deliver the same payoff of a hedging strategy is also possible. Andersson et al. (2016) for example shows that an alternative strategy to hedge off climate is feasible. This strategy can optimize the composition of a low-carbon portfolio index so as to minimize the tracking error with the reference benchmark index. They show that tracking error can be almost eliminated even for a low-carbon index that has 50% less carbon footprint. By investing in such an index, investors are holding, in effect, a “free option on carbon”: as long as the introduction of significant limits on carbon emissions is postponed, they are essentially able to obtain the same returns as on a benchmark index, but the day when

carbon emissions are priced, the low-carbon index will outperform the benchmark (Andersson et al. 2016).

More traded green assets should emerge in order to make the hedging of climate risks more viable. Interestingly, carbon-negative assets do exist already but, mostly, they cannot be employed by investors yet. Carbon permits in cap-and-trade systems or the financial contracts related to the REDD and REDD+ schemes are some examples. If the financial system moves—autonomously or because of direct regulation of the climate exposures—toward the implementation of effective risk management policies for such risks, financial innovations—for instance, the securitization of the REDD schemes or the creation of climate and carbon-related derivative securities, could become an avenue to explore. Moreover, financial engineering could be used to design new carbon-neutral vehicles and indexes that make climate risks hedging more effective, and accessible to institutional and individual investors.

Government Role

The adoption, cost, and effectiveness of hedging—any hedging, not just green—are affected by the availability, transparency, and liquidity of financial instruments and contracts used in hedging strategies. While hedging remains a decision taken individually by NBFIs in light of their fiduciary duty to maximize risk-adjusted returns for investors, governments could facilitate green hedging by promoting the creation of markets for carbon-negative assets and related financial contracts.

5.5 Green Asset Classes

New asset classes are emerging whose direct and primary objective is to address climate issues. The list below—while not exhaustive—includes asset classes that, while prioritizing the achievement of climate objectives, do not sacrifice financial returns. Since NBFIs have a fiduciary duty to maximize risk-adjusted returns for their clients, this section does not cover asset classes that accept sub-market financial returns (frequently referred to as “concessional returns”) as trade-off for higher environmental impact.

A detailed discussion of each asset class is beyond the scope of this chapter. Instead, this section attempts to highlight common barriers to the development and widespread acceptance of these new products, as a basis for future policy action.

Green Bonds

Green bonds are bonds whose proceeds are devoted to financing or refinancing green projects, assets, or business activities. Both companies and public entities can issue them. They can be structured as asset-backed securities whose returns are tied to specific projects, but, in practice, most green bonds issued to date are, from a credit standpoint, equivalent to any other bond issued by the same entity. What differentiates them is the commitment to use the proceeds specifically for green purposes.

Green bonds represent a small but increasing segment of the global fixed income market. The OECD estimates that annual issuance of green bonds increased from \$3 billion in 2011 to \$95 billion in 2016 (OECD 2017b). Despite a number of normative initiatives, such as the Green Bond Principles, the industry still lacks generally accepted standards, especially as it pertains to measurement and monitoring of environment impact. This dilutes the effectiveness of green bonds in tackling climate problems and their appeal as investment products. On the supply-side, compliance

with the bonds' green requirements generates additional transaction costs and can be a disincentive for prospective issuers.

Green Banks

Green banks are a relatively new phenomenon and it is perhaps premature to speak of them as an asset class. They are a heterogeneous group of public or quasi-public entities that aim to stimulate private financing of green projects, assets, or businesses through a variety of lending, de-risking, and investment tools. More than 10 institutions call themselves green banks, in countries including the US (New York, New Jersey, California, and other states and counties), UK, Australia, Japan, Malaysia, Switzerland, and United Arab Emirates.

In December 2015, five green banks launched the Green Bank Network, a membership organization that fosters collaboration and sharing of best practices. Despite this initiative, there is still a notable lack of standard definitions and industry guidelines. The “bank” definition does not properly capture the large variety of business models and funding sources. Some green banks (notably, the UK Green Investment Bank) were set up by governments with the mandate to act as private-sector lenders/investors and be ultimately spun-off as independent entities funded by the capital markets. Other green banks are little more than a separate budget window for relevant ministries, offering financial subsidies and de-risking that are more typical of development rather than commercial finance. The blurred distinction between private and public finance models can lead to market distortions, in particular the “crowding out” of private lenders and investors by those green banks that are subsidized public vehicles.

Private Equity

Private equity funds make long-term equity investments in unlisted companies, after securing capital commitments from their investors typically for a 10-year period. As of mid-2016, private equity funds globally managed \$2.5 trillion (Prequin 2017a). Private equity funds usually acquire control of companies by purchasing the majority of the equity and funding the remaining portion of the transaction through loans and high-yield bonds. They target companies with stable cash flows, which can be used to pay down the acquisition debt over time. The complexity of private equity transactions calls for a strong business-enabling environment with high standards of corporate governance, disclosure, and shareholder protection. Fund managers are remunerated with an annual management fees, usually set at 2% of AuM, and a 20% share of the fund's capital gains, known as “carried interest” or “carry”.

Renewable energy is one area of focus for private equity funds. The trend of fund launches focused on the sector is affected by a variety of cyclical, structural, and regulatory factors. These include the price of energy from conventional sources, which is linked to the oil and gas cycle, the manufacturing cost of renewable equipment and infrastructure, such as solar panels, and evolving subsidy regimes for renewables, which reflect fiscal and not just environmental considerations. Prequin reports of a recent increase in renewables fund-raising, with \$14 billion and \$13 billion raised in 2015 and 2016, respectively, versus an average of \$8 billion raised annually in the previous 7 years. Funds with a mixed mandate, targeting both conventional and renewable energy investments, have witnessed even faster growth (Prequin 2017b).

The DFI Incentives to Private Equity

Development finance institutions (DFI) have a long track record of promoting the launch and operations of private equity funds. They do so to (i) direct capital to specific sectors and geographies that are consistent with their development objectives, (ii) achieve efficient capital allocation by delegating the investment decisions to a professional, private-sector fund manager, (iii) overcome some of the barriers to private equity investment in nascent or niche markets (as described above) and (iv) demonstrate the viability of private equity in new markets and spearhead market growth.

Many DFIs invest in private equity funds and, alternatively or in addition, use a variety of other tools to facilitate fund set-up and operations. To avoid market distortions, in particular the “crowding out” of private equity funds that do not receive any support from the development finance community, the use of these tools must be carefully balanced. Crucially, the fund manager must retain full independence over investment decisions, so that market incentives—rather than policy objectives—drive capital allocation to portfolio companies.

The tools described below can apply to private equity funds targeting any sector, including the green economy.

Fund investment. DFIs invest in private equity funds launched and managed by professional third-party managers, with the expectation to realize market returns. DFIs usually limit their investments to a minority of the fund’s capital—several institutions have set the threshold at 20%. To qualify for DFI money, funds must comply with the ESG requirements of the funding institutions. DFI investors may require a seat on the fund’s investment or advisory committee.

The International Finance Corporation (IFC), the private-sector funding unit of the World Bank Group, is a prominent investor in private equity funds targeting emerging markets. It had an active portfolio of 291 funds at the end of 2016, representing a total capital commitment of \$5.6 billion. It commits approximately \$500 million annually to 20–30 new funds, targeting four strategies: growth equity (representing 60%–75% of commitments), venture capital (10%–15%), small and medium enterprises (5%–10%) and sector funds (10%–15%); the latter include renewable energy. The European Bank for Reconstruction and Development (EBRD) invests between Eur150–Eur250 million each year in private equity funds. It is the largest investor in private equity funds in Eastern Europe and Central Asia, having provided capital to more than 170 funds and benefiting, indirectly, over 1,400 underlying investee companies.⁵ The African Development Bank (AfDB) is also an active investor in private equity funds, with a reported portfolio of 37 funds in 2012 and \$836 million committed capital (AfDB 2012). Many other national and multinational DFIs also invest in private equity funds.

Fund manager selection. A more proactive approach encompasses the DFI, providing seed capital for a private equity fund and also selecting the fund manager through competitive procurement. The seed capital commitment incentivizes qualified managers to tender for the role. The fund manager selection is based on factors such as experience of the investing team, country/sector knowledge, previous investment track record, prospective deal pipeline, and ability to attract other investors to the fund. This approach is used typically for countries and sectors where private equity is a novelty and the DFI intends to spearhead the industry.

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⁵ From the EBRD website: <https://www.ebrd.com/what-we-do/strategies-and-policies.html>.

Box continued

Return enhancement. Private equity funds typically target a 15%–20% internal rate of return (IRR) on portfolio company investments. In some sectors and markets, such returns may be unrealistic. In many emerging markets, for instance, returns on infrastructure investments—including renewable energy projects—are constrained by the low affordability of tariffs charged for infrastructure use (e.g. electricity tariffs). Some institutions offer cheap leverage at the fund level to enhance the returns for the fund's investors. For instance, OPIC offers low-interest, non-amortizing loans to competitively selected private equity/debt funds, for an amount up to 25% of the fund's capital base; this boosts the returns of other fund investors, who capture all the upside above the OPIC interest rate.

Operating subsidies. As previously noted, scale is essential to make funds a viable business option for their managers, since management fees are charged as a percentage of AuM. For this reason, small markets (countries or sectors) are inherently less attractive for fund managers. To overcome this barrier, DFIs sometimes offer subsidies to cover part of the operating expenses of the fund. This could take the form of a set annual payment in the first few years after fund launch. The size of such payment is determined on the basis of a realistic estimate of a fund's running costs.

Technical assistance. As an alternative or in addition to operating subsidies, a DFI may choose to subsidize deal-making costs. A private equity deal involves an extensive phase of due diligence, covering the target company's business, historic, and projected financials; accounting information; and systems and legal documentation, followed by valuation and financing work, bidding, and negotiations with the selling shareholders. This process is time-consuming for the fund's investing team and costly insofar as legal, financial, and accounting experts are involved. Some DFIs provide funds with technical assistance lines, whose size can be determined on the basis of a set amount per target portfolio company. Private equity funds investing in SMEs are great beneficiaries of this technical assistance support—in SME investing, transaction costs can be disproportionately high compared to the small deal value.

DFIs' convening power. DFIs that invest in funds are usually happy to share their network with the fund manager, to increase the likelihood of success. This may involve presenting pipeline transactions, based on the DFI's technical expertise on the ground in the targeted sectors, or introducing fund managers to other DFIs that could be prospective investors during the fund-raising process. Especially with regards to deal selection, however, the fund manager will want to retain full independence—a DFI that is too intrusive may be a distraction.

All the incentives previously described apply at fund level. This does not prevent DFIs from becoming involved at portfolio company level with the full array of typical DFI products. For instance, a DFI may choose to lend to a portfolio company or make a direct equity investment in conjunction with the private equity fund. DFIs with credit guarantee or political risk insurance units (e.g., MIGA within the World Bank Group) may use these tools to de-risk loans to portfolio companies, attracting lenders and lowering the cost of debt.

The last observation reflects an important feature of private equity and also, potentially, a limiting factor when it comes to its involvement in renewables and other green investments. Funds investing in private companies have much higher operating costs than funds investing in a liquid portfolio of listed companies. Private transactions require lengthy due diligence, financial structuring and negotiations; once companies are part of a private equity portfolio, the fund manager is represented on the board of directors and takes an active role in strategy and management. Small funds may not produce sufficient fees (usually 2% of the assets under management) to cover these operating costs. This may be the case for private equity funds targeting specific renewable technologies and/or geographies. In addition, private equity funds that raise capital from development finance institutions may face further costs for impact measurement and ESG compliance.

Venture Capital

Venture capital funds invest in early-stage innovative companies whose business model is not yet fully tested. By definition, the risk profile of such investments is more pronounced than that of a later-stage private equity investments. On the back of its early success in the Silicon Valley IT sector, venture capital has expanded to a wide range of “-techs”. Clean energy innovation, or “clean-tech”, is one of them. Large amounts of capital were raised by clean-tech funds in the years preceding the global financial crisis, reflecting the capital markets’ exuberance of the time, as well as very high oil and gas prices. At the peak in 2008, VC clean-tech investments surpassed \$8 billion. The subsequent drop in energy prices triggered by fracking, commoditization of certain technologies such as solar panels, and general failure to identify truly innovative business models, however, decimated the large majority of clean-tech startups set up in the boom years, causing a major contraction in clean-tech VC investment. Gaddy et al. (2017) estimate that investment dropped to \$2 billion in 2013 and has remained at that level since.

Clean-tech startups are particularly risky, especially when they develop hardware requiring a high upfront investment. They may also take longer to reach financial sustainability than software startups (Gaddy et al. 2017). These specificities notwithstanding, clean-tech VC is broadly subject to the same dynamics as the VC industry as a whole. VC funds, regardless of the target industry sector, realize the majority of returns from a small number of “star” investments that more than offset losses in the rest of the portfolio. While it may remain a niche, clean-tech VC is unlikely to disappear altogether as an asset class.

Government Role

Governments can, and in some countries already do, back the launch and expansion of new green asset classes. Green banks, mentioned above, are one example. Development finance institutions and development banks (backed by one or more countries) routinely invest in private equity funds that fit within their development mandates and meet their eligibility criteria, often with a focus on green themes. The European Commission, for instance, set up the Global Energy Efficiency and Renewable Energy Fund (GEEREF) to invest in private equity funds with a green mandate. The European Union, Germany, and Norway provided the initial capital in 2008, complemented by subsequent fund-raising from private-sector investors. With assets under management of EUR222 million as of May 2015, GEEREF invested in 12 funds across Africa, Asia, Latin America, and the Caribbean by December 2016.

An important question when governments play an active role as investors in green funds, projects, or securities is that of additionality. To avoid distorting markets and crowding out private investors, governments should only deploy capital when private capital would not get involved on its own. The application of the additionality principle is easier said than done; for instance, not all investment opportunities are marketed through a thorough auction process that allows for screening of all potential sources of capital. Still, additionality remains a key principle and should be explicitly embedded in any government strategy that involves deploying capital in potentially profit-making projects and opportunities.

Summary Considerations

These emerging asset classes have the advantage of funneling private capital directly and exclusively into projects, assets, and businesses with a green focus. With the exception of green banks, some of whom are still heavily influenced by public finance models, these new asset classes operate strictly under market criteria. Green bonds bear the same credit risk—and cost for the issuer—of conventional bonds. Green private equity and VC funds operate under the same performance criteria and management incentives as any other fund, a model that some green banks (e.g., in the UK) have tried to follow closely.

On the other hand, the green mandates and investment guidelines of some of the asset classes above are still poorly or too broadly defined. The definition of green bond, for instance, can be stretched to include any general obligation of a company that deems its business as green, as opposed to a security whose proceeds are applied to a specific, pre-defined green project (so-called risk of “greenwashing”). Green banks that are funded from budget allocations and managed as ministerial units may not be as efficient capital allocators as the ones operating under private-sector frameworks.

Measurement and monitoring of environmental impact is, in most cases, left to the discretion of issuers and fund managers. While most of them will show evidence of green impact, the heterogeneity of metrics and methods used makes benchmarking of environmental performance difficult. Increasing transparency and accountability is key to steering private capital toward issuers and fund managers that deliver on both the financial and environmental front.

The standardization of green mandates, investment guidelines, and impact metrics is an important step to the creation of proper asset classes, able to attract more capital from pension funds, insurance companies, and other institutional investors.

Green banks, renewable private equity funds, and clean-tech VC are niche products, especially when a specific regional or country focus is layered on top of the green investment mandate. As noted above, size matters when launching a new fund, since the investment management industry earns fees as a percentage of assets under management. Large global or regional funds are, on paper, an appealing solution. In practice, green investments are often so country-specific (for instance because of regulation) that a global investment team with limited presence on the ground would not be able to execute them.

Table 1: Advantages and Issues of Existing Green Strategies

Strategy	Advantages	Issues
Negative screening	<ul style="list-style-type: none"> • Promotes more transparent reporting of environmental compliance • May lead some companies to divest from non-green assets • In the long term, may divert more NBF1 capital to green sectors 	<ul style="list-style-type: none"> • Focus on product-based more than conduct-based screening • Screening criteria still, to a large extent, discretionary • Works on the basis of limited parameters (e.g. green but not economic considerations) • Many NBF1s will continue to avoid screening to maximize financial returns for their investors
Active ownership	<ul style="list-style-type: none"> • Increasing evidence that active ownership improves financial performance • Keeps management accountable for a variety of corporate decisions • Effective in improving corporate disclosure • Catalyzes media and public attention to specific corporate issues 	<ul style="list-style-type: none"> • Still mostly focused on financial metrics • Effective in tackling specific issues, not broad strategic repositioning (e.g. toward green sectors)
Sustainability ratings	<ul style="list-style-type: none"> • Allows benchmarking of investments based on a range of non-financial metrics • Provides a quantitative basis for negative screening and active ownership 	<ul style="list-style-type: none"> • Ratings rely on information provided by the issuers, hard to control quality, and sources • Lack of generally accepted green metrics and indices prevents benchmarking of companies and securities • Ratings need to be integrated into NBF1s systems and investing processes—may require upgrade of IT and human resources
Hedging	<ul style="list-style-type: none"> • Protects investors from financial downside of climate exposure 	<ul style="list-style-type: none"> • Passive strategy, does not address underlying climate problems • Mostly financial • Non-financial hedging not very developed yet • Hard to do (esp. non-financial) if climate metrics not accurately disclosed by companies
Green asset classes	<ul style="list-style-type: none"> • Direct avenue for NBF1s to invest in green • Wide range of financial products to match NBF1s' different risk/return and liquidity objectives • Product definitions usually include explicit measurement and monitoring of green impact 	<ul style="list-style-type: none"> • Some asset classes are very broadly defined; risk of "greenwashing" • Rigorousness of impact measurement varies by asset class • Some asset classes have a limited track record • Scalability is an issue for certain investment strategies

6. POLICY RECOMMENDATIONS

This section discusses several high-level lessons that have been learned and guidelines that can inform specific policy actions aimed at stimulating NBF participation in green investments. Detailed recommendations, based on the proposed guidelines, must take into account the individual features and goals of different types of NBFs—a private equity fund investing in unlisted companies is different from a pension fund investing in liquid securities. In addition, NBFs' strategies and operations vary significantly depending on their countries or regions of domiciliation and, more broadly, their target investment geographies. NBFs are not subject to banking regulations, but this does not mean that they are exempt from regulation altogether. For instance, most countries and regional organizations (e.g., the European Union) have rules protecting savers from risks such as fraud and poor fund disclosure; the insurance industry is also heavily regulated. When it comes to investment targets, each region poses different challenges. Advanced economies tend to have more developed corporate governance, minority investor protection, and bankruptcy regimes, which makes them suitable targets for private equity, and large and liquid financial markets, which makes them suitable targets for pension funds, for instance. On the other hand, the business and legal environment of many emerging and developing economies and the smaller size of their financial markets and investment opportunities pose a significant challenge to most types of NBFs; these issues are compounded when one restricts the investment mandate to specific and sometimes untested sectors, such as some in the green economy.

With these caveats in mind, the following lessons learned and policy guidelines can find applications across a broad spectrum of NBF types, geographies, and regulatory environments.

First, a concerted and coordinated effort should be undertaken to further promote the standardization of definitions of green investments and financing tools. Too often the initiative is left to individual NBFs or issuers—a problem that is evident for green bonds and green banks. Not only does this risk diluting green goals, in favor of generic “green PR”, but also hinders the widespread acceptance of green financial products among savers and asset managers.

Second, a similar effort should be undertaken to further promote the standardization of environmental impact metrics, assessment methodologies, and reporting standards. This would introduce greater green visibility in both the public and private investment spheres and facilitate the “environmental benchmarking” of portfolio companies and funds. One could imagine a system of environmental ratings applied to listed companies and generally recognized by the public and the investment community, with the same level of recognition of the ratings issued by the main rating agencies. Similarly, a set of generally accepted *environmental* principles could be introduced for impact measurement, the same way that generally accepted *accounting* principles (GAAP) exist. As previously discussed, some efforts are ongoing on these fronts, but the NBF industry is still far from having adopted standardized solutions. Standardization, besides increasing transparency, would also reduce the costs incurred by NBFs to design and apply their own environmental impact models.

Third, governments should continue to promote the adoption of new financial tools, such as carbon credits. The novelty of some of these products and limited trading volumes are obstacles to the widespread acceptance by NBFs. This limits the viability and effectiveness of, for instance, carbon credits as a hedging tool for climate-affected portfolios. With the People's Republic of China—the world's biggest source of climate-

warming greenhouse gases—considering launching a national carbon trading scheme, the potential for the securitization of carbon allowances could be of primary importance *per se* and for the related financial products.

Last, governments should continue to incentivize the set-up and operations of funds targeting niche investment opportunities. These funds may not be large enough to be economically viable for the respective fund managers. The capital allocation expertise of the private sector, however, should not go wasted or diverted to non-green causes. Through seed investments, competitive fund manager selection, small operating subsidies, and technical assistance, governments and DFIs can incentivize fund managers to take on investment mandates that they would otherwise disregard. This is particularly useful for attracting fund money to green investment opportunities that are of limited size because of the technology, infrastructure, or geography involved. To avoid market distortions and “policy creep-in,” it is crucial that governments and DFIs leave full independence over investment decisions to the fund manager, within pre-agreed parameters and subject to the DFI’s overall ESG criteria. Importantly, all the incentives mentioned above are already in use among DFIs. This guideline should therefore find easy application among climate and development finance players. To the extent that a certain mix of incentives proves particularly effective, DFIs and governments should consider making it a template for similar interventions in other green sectors or regions.

Table 2: Summary of Policy Recommendations

Area	Policy Guidelines	Advantages
Definition of green asset classes	<ul style="list-style-type: none"> • Build on existing efforts to improve and standardize definitions of green products and asset classes (e.g. green bonds, green banks) 	<ul style="list-style-type: none"> • Narrow down green goals to a workable level • Increase asset class acceptance among investors
Environmental impact metrics, measurement, and reporting	<ul style="list-style-type: none"> • Build on existing efforts to standardize metrics, methodologies, and reporting standards 	<ul style="list-style-type: none"> • Increased transparency • Easier benchmarking between investments • Reduced measurement costs
New financial tools	<ul style="list-style-type: none"> • Promote adoption of new products such as carbon credits 	<ul style="list-style-type: none"> • Increased trading volumes and product acceptance among NBFIs • Expanded climate hedging toolset
Niche green funds	<ul style="list-style-type: none"> • Incentivize fund managers to launch and operate small funds targeting green niches • Governments to remain passive when it comes to the fund’s investment decisions (within pre-agreed parameters) • Seed investments, fund manager selection, operating subsidies, and technical assistance are some of the tools 	<ul style="list-style-type: none"> • Attract professional fund managers to green investing • Minimize market distortions • Use a well-established DFI toolset of incentives (no re-inventing the wheel) • Create template for similar interventions in other green sectors/regions

Focusing on Asian economies, most Asian economies are bank-dominant and the share of the capital market in their financial systems is very small (Yoshino and Taghizadeh–Hesary 2017). For smaller-sized green projects, innovative financing tools such as crowdfunding (Bento et al. 2018), hometown investment trust funds, and village funds should be fostered (Yoshino and Taghizadeh–Hesary 2017).

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