SOVEREIGN WEALTH FUNDS: GREEN CAPITAL FLOWS FOR A CLIMATE SOLUTION

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Abstract. *Sovereign Wealth Funds (SWF) have displayed rapid growth over the last decade, both in terms of the size of their assets under management and the number of funds established worldwide. Despite holding considerable long-term assets under management, the participation of sovereign wealth funds in green finance has remained very low. Sovereign wealth funds have a high potential to address the finance gap towards a green economy transition. The flows of capital stemming from SWFs could provide a reliable climate finance solution, as well as support financing many of the Sustainable Development Goals (SDGs). More and more institutional investors are becoming aware of the importance of socially responsible investment and are incorporating environmental, social, and governance factors into decision-making. This article reviews the status-quo and latest trends of sovereign wealth funds with regards to environmental sustainability and green investments and highlights the key role these investment vehicles may play in addressing climate change issues.*

Keywords*: Sovereign Wealth Funds, SWFs, Climate Change, Sustainable, Climate Finance, Green Capital, Green Investments*

JEL Classification*: G15, G18, G23, G30, G38, G39, O16, Q01.*

1. Introduction

Sovereign wealth funds (SWFs) have showcased an increase in popularity since the 1990s, becoming important key players in the international finance arena. The total number of SWFs has more than tripled since 2000, rapidly approaching the US$8 trillion threshold in total assets under management (AUM). These multi-purpose financial vehicles could play a key role in supporting the transition towards low greenhouse gas emissions economies, enhancing resilience against climate change. However, much is yet to be learned and developed within the research field of SWFs and their green affairs.

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This article is divided in six parts. After the introduction, the second part briefly presents the current status of sovereign wealth funds. The third part describes some of the recent international events that are shaping the adoption of greener capital flows by SWFs. The fourth part highlights some recent research on the willingness of SWFs to go green. The fifth part presents some of the steps taken by SWFs for greener investments, as well as some of the key barriers encountered to scale those up. The sixth part draws the conclusions of this article.

2. Current status of SWFs

The International Working Group of Sovereign Wealth Funds, created with the support of the International Monetary Fund, define sovereign wealth funds as "special purpose investment funds or arrangements, owned by the general government. Created by the general government for macroeconomic purposes, SWFs hold, manage, or administer assets to achieve financial objectives, and employ a set of investment strategies which include investing in foreign financial assets. The SWFs are commonly established out of balance of payments surpluses, official foreign currency operations, the proceeds of privatizations, fiscal surpluses, and/or receipts resulting from commodity exports" (IWGSWF, 2008, p. 27). Furthermore, the IMF has identified five different typologies of sovereign wealth funds (IMF, 2008): i) stabilization funds; ii) savings funds; iii) reserve investment funds; iv) development funds; and v) contingent pension reserve funds.

The first recognized state-owned SWF (Kuwait Investment Authority) was established by the government of Kuwait in 1953 and was followed by Kiribati (in 1956). Since then, there was a steady and rather linear increase in the number of total SWFs up until 2000, when a sharp increase in the total number of SWFs and the total assets under management (AUM) began and spread all over the world. As of April 2018, there are 80 sovereign wealth funds managing assets estimated at US$7.861 trillion (Sovereign Wealth Fund Institute Rankings, 2018). 55 out of the total 80 SWFs have been launched over the past 18 years. A representation of total SWFs by year of establishment is showcased in Figure 1.

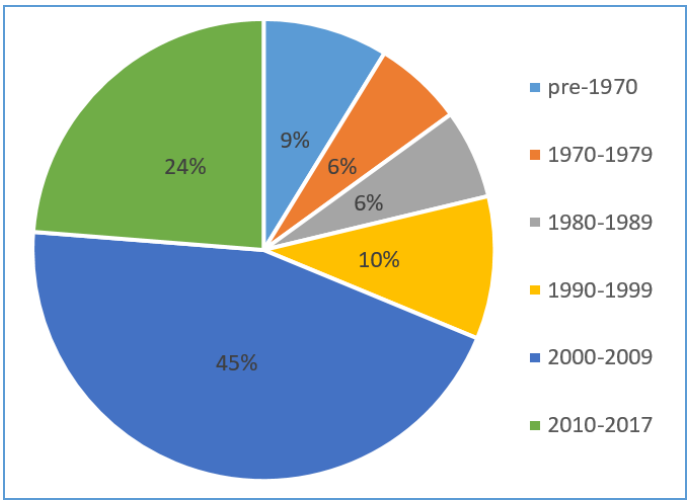

Figure 1. Percentage of Sovereign Wealth Funds established per decades.

Source: authors' compilation, based on Sovereign Wealth Fund Institute, April 2018 data

The ten largest SWFs manage assets of approximately US$5.709 trillion representing around 72.6 percent of the total SWFs AUM. Table 1 showcases a list of the twenty-five largest SWFs (each with assets over US$40 billion), which amount for a total of US$7.45 trillion assets under management, representing a total of 94.8 percent of the total estimated AUM of SWFs. Table 1 also reveals the origins of assets, the foundation year of SWFs and the Linaburg-Maduell Transparency Index ratings. Historically, most SWFs have been developed by countries rich in natural resources (i.e. oil, gas, diamonds, copper or coal). Other SWFs (such as the Chinese ones) rely on non-commodities and aim to "transfer assets directly from official foreign exchange reserves and in some cases, government budget surpluses and pension surpluses" (Butt et. al., 2008). The largest SWF by total AUM in 2018 is Norway's Government Pension Fund – Global (established in 1990 and mostly capitalizing on the country's offshore oil and gas resources); the second largest is Abu Dhabi's Investment Authority (capitalizing on oil resources). China has several SWFs (all based on non-commodities) and leads the race of total AUM per country.

Table 1.
Largest Sovereign Wealth Funds by Assets Under Management

No.	Country	SWF Name	Assets (USD) in billions	Inception Year	Origin	Linaburg-Maduell Index
1	Norway	Government Pension Fund - Global	1035.24	1990	Oil	10
2	China	China Investment Corporation	900	2007	Non-commodity	8
3	UAE – Abu Dhabi	Abu Dhabi Investment Authority	828	1976	Oil	6
4	Kuwait	Kuwait Investment Authority	524	1953	Oil	6
5	Saudi Arabia	SAMA Foreign Holdings	494	1952	Oil	4
6	China – Hong Kong	Hong Kong Monetary Authority Investment Portfolio	456.6	1993	Non-commodity	8
7	China	SAFE Investment Company	441	1997	Non-commodity	4
8	Singapore	Government of Singapore Investment Corporation	390	1981	Non-commodity	6
9	Singapore	Temasek Holdings	320.8	1974	Non-commodity	10
10	Qatar	Qatar Investment Authority	320	2005	Oil and Gas	5
11	China	National Social Security Fund	295	2000	Non-commodity	5
12	Saudi Arabia	Public Investment Fund	250	2008	Oil	5
13	UAE – Dubai	Investment Corporation of Dubai	229.8	2006	Non-commodity	5
14	South Korea	Korea Investment Corporation	134.1	2005	Non-commodity	9
15	UAE – Abu Dhabi	Mubadala Investment Company	125	2002	Oil	10
16	UAE – Abu Dhabi	Abu Dhabi Investment Council	123	2007	Oil	n/a
17	Australia	Australia Future Fund	105.4	2006	Non-commodity	10
18	Iran	National Development Fund of Iran	91	2011	Oil & Gas	5
19	Russia	National Welfare Fund	66.3	2008	Oil	5
20	Libya	Libyian Investment Authority	66	2006	Oil	4
21	US – Alaska	Alaska Permanent Fund	61.5	1976	Oil	10
22	Kazakhstan	Samruk-Kazyna JSC	60.9	2008	Non-commodity	10
23	Kazakhstan	Kazakhstan National Fund	57.9	2000	Oil	2
24	Brunei	Brunei Investment Agency	40	1983	Oil	1
25	Turkey	Turkey Wealth Fund	40	2016	Non-commodity	n/a

Source: Sovereign Wealth Fund Institute (SWFI), April 2018 data

Overall, the SWFs' arena is dominated by four oil exporter countries of the Arab world (UAE, Qatar, Saudi Arabia, and Kuwait), three non-Arab oil exporters (Norway, Russia and Kazakhstan) and four export-led economies of Eastern Asia (China, Singapore, Hong Kong, and South Korea) – all representing more than 92 percent of the total SWFs' AUM. Several new SWFs are currently planned across the world by various governments. SWFs encounter significant differences with regards to asset allocation, sources of financing, investment horizons and mandates or institutional and legal frameworks. "SWFs' degree of transparency and openness can also significantly differ, providing both challenges and opportunities. Transparency provides confidence and trust in markets, while limited sharing of information may lead to market abuse and undermine market confidence" (Buteică and Huidumac, 2017).

3. Recent international events favoring greener capital flows of SWF

Large institutional investors (including sovereign wealth funds) have recently started to consider incorporating climate-related risks into their corporate frameworks and risk management tools, in order to pursue a more responsible and sustainable ownership and economic growth. Several recent international events have helped steer early adopters to develop such mechanisms to address the topics of sustainable development and climate change.

First, in 2015 (September), the United Nations agreed on the 2030 Agenda for Sustainable Development, enlisting 17 Sustainable Development Goals (SDGs), a continuation of the precursor Millennium Development Goals (MDGs), which became obsolete at the end of 2015. The SDGs are a universal call "universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity" (UNDP). The formulation of the SDGs built upon the MDGs era, adding elements that were previously underrepresented or missing, such as environmental sustainability, climate action, affordable and cleaner energy and highlighted the need for risk-informed development and more "inclusive and sustainable business models without undermining profitability" (UNDP, 2016).

Second, in December 2015, the 21st session of the Conference of the Parties (COP 21) of the United Nations Framework Convention on Climate

Change (UNFCCC) was held in Paris. During the conference, a "landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future" (UNFCCCa) was reached. The text of the agreement by reached by consensus of the representatives of the 196 parties that attended the conference. By June 2018, 178 countries have ratified the agreement within their own legal systems, out of 197 Parties to the Convention (UNFCCCb).

Third, in November 2016, the eight annual meeting of the International Forum of Sovereign Wealth Funds was held in Auckland, New Zealand. This group of SWFs, with more than 30 SWFs representing approximately 5 trillion USD (roughly 65% of the total AUM of total SWFs), decided "to explore the investment implications for sovereign wealth funds of the global commitment to curb greenhouse gas emissions and to identify the most relevant and pressing challenges and opportunities with a view to establishing a long-term programme on this subject" (IFSWFa).

Finally, in December 2017, the President of the French Republic, Emmanuel Macron, the President of the World Bank Group, Jim Yong Kim, and the Secretary-General of the United Nations, António Guterres called for the One Planet Summit in Paris, reuniting world leaders, public and private finance actors to discuss ways to finance climate action. The summit was an important milestone after the U.S. withdrawal from the Paris Agreement in June 2017 and its immediate halt to implementing the agreement, as well as the Nationally Determined Contributions (NDCs) and financial contributions. Among the key topics debated during the One Planet Summit were: the role of finance to transform businesses in the light of climate risks and opportunities; the need for improving financial disclosure and inclusion on climate related topics; and ways to mobilize investors on climate issues and develop new green financing instruments to accelerate the reduction of GHGs and adapt to climate change (One Planet Summit). The summit launched an ambitious program to tackle climate change and twelve international commitments were recorded. Notably among them was the commitment of the One Planet Sovereign Wealth Fund Working Group.

The Sovereign Wealth Fund Working Group was established with the goal of accelerating efforts "to integrate the opportunities in the transition to a low greenhouse gas emissions economy and address the risks related to climate change in the management of large, long-term and diversified

asset pools" (One Planet Summit SWF, 2018, p. 3). This is the first time such joint-platform for addressing the risks of climate change is developed among SWFs. The founding members of the One Planet SWF Working Group included: the Abu Dhabi Investment Authority, Kuwait Investment Authority, the New Zealand Superannuation Fund, Norges Bank Investment Management, the Public Investment Fund of the Kingdom of Saudi Arabia, and the Qatar Investment Authority (IFSWFb). These six SWFs total US$2.985 trillion (April 2018 SWFI data) and represent around 38% of the total AUM of the total SWFs. At the summit, the One Planet SWF Working Group committed to develop and publish in 2018 an environmental, social and governance (ESG) framework "to address climate change issues including methods and indicators that can inform investors' priorities as shareholders and participants in financial markets" (IFSWFb). Such an ESG framework could help SWFs identify climate risks and might prove that integrating ESG indicators in long-term asset management could both optimize profits and support COP21 objectives. Six months later, in July 2018, President Emmanuel Macron of France and Prime Minister Erna Solberg of Norway convened a roundtable discussion with the One Planet Sovereign Wealth Fund Working Group at the Elysée Palace. With this occasion, the One Planet SWF Working Group officially published the Framework on Climate Change. The Framework is the outcome of consultations among the founding members and various institutional stakeholders and investors that are working towards integrating climate change issues in their asset management. Even though the adoption of this Framework is voluntary and non-binding, it is an important milestone, as it sets a clear direction and promotes best practices that should help develop similar mindsets for other SWF adopters to follow. The principles encompassed in this Framework are presented in Table 2.

The One Planet SWF Framework recommends SWF to factor-in climate change risks and opportunities in their decision-making practices and investment strategies in order to build resilience for their portfolios. Furthermore, SWFs should motivate the companies in which they invest in as shareholders, to factor-in climate change in their governance structures, as well as in their business strategizing and planning operations. No less important, SWFs should also actively report on their approach and steps to address climate change. While the Framework represents an important milestone, the main challenges that lie ahead are the accelerated adoption and progressive implementation of its principles.

Table 2.
The One Planet Sovereign Wealth Fund Framework

Principle 1: Allingment
Principle 1.1. SWFs recognise that climate change will have an impact on financial markets.
Principle 1.2. Due to their long-term investment horizon and diverse investment portfolios, SWFs recognise that climate change presents financial risks and opportunities which should be incorporated into the investment framework.
Principle 1.3. In accordance with their respective mandates, SWFs should report on their approach to climate change.
Principle 2: Ownership
Principle 2.1. SWFs expect company boards to understand the consequences of their business practices for climate emissions and to set clear priorities for the company to address relevant climate change issues.
Principle 2.2. SWFs expect companies to plan for relevant climate scenarios and incorporate material climate risks in their strategic planning, risk management and reporting. SWFs may wish to engage with companies as a shareholder to understand: 1. the risks and opportunities associated with the climate change issues that the Paris Agreement is seeking to address; 2. whether companies have devised any related metrics for monitoring such risks and exploring such opportunities; and 3. how this information is incorporated into their business strategies and planning.
Principle 2.3. SWFs encourage public disclosure by companies to understand how climate change may affect their future performance, and what actions they are taking.
Principle 2.4. SWFs should encourage the development and adoption of agreed standards and methods that promote the disclosure of material climate-related data.
Principle 3: Integration
Principle 3.1. SWFs should identify, assess and manage portfolio risks generated by the expected transition to a low-emissions economy and from the potential physical impacts of climate change.
Principle 3.2. SWFs can draw on, and develop, analytical tools to inform portfolio allocation and investment decisions.
Principle 3.3. SWFs should consider investment opportunities that arise from the global effort to address climate change.
Principle 3.4. SWFs should consider approaches to reducing portfolio exposure to climate-related risks.
Principle 3.5. SWFs can promote research on issues related to the financial implications of climate change.

Source: One Planet Summit SWF Framework, 2018

4. Observed willingness of SWFs to go green

The Principles for Responsible Investment (PRI) were developed by an international group of institutional investors and were officially launched in 2006; the entire process was convened by the United Nations Secretary-General. Since its inception, the PRI has gathered "more than 1,400 signatories from over 50 countries representing US$59 trillion of assets" (PRI, 2016, p.4). Recently, the PRI commissioned Novethic to "assess the extent to which global investors see climate change as a long-term factor for investment" (PRI-Novethic, 2017). The research covered over 1,200 respondents, including investors, asset owners and managers. The conclusions reveal that, overall, global investors are progressing in action on climate change in 2017. This was showcased by higher asset owner awareness of relevance of climate change to investments than in previous years. However, there is plenty of room from improvement. Findings of the PRI-Novethic 2017 assessment reveal that 74 percent of the asset owners are taking action on climate change and perceive it as an important long-term trend for investments; out of these, 53 percent report that they focus on low-carbon or climate resilient and investments. The

assessment also reveals that only 17 percent of asset owners incorporate climate change into asset allocation, indicating still a long road ahead. Among the range of activities used by the respondents to assess and manage climate-related risks and opportunities are: (i) factoring climate change into the asset mix; (ii) active ownership; (iii) portfolio carbon footprinting; (iv) scenario testing; and (v) manager engagement and contracts. Portfolio carbon footprinting is among the most popular (used by 59 percent of asset owners and 55 percent of asset managers), as it helps measure emissions; however, tools such as scenario analysis could complement and help better assess climate-related issues. Finally, while 54 percent of asset owners encourage portfolio managers to monitor emissions, only "8 percent of asset owners formalize emissions risk monitoring and reporting into contracts when appointing managers" (PRI-Novethic 2017). This indicates an urgency for the overall industry to develop and mainstream reporting frameworks and improved metrics, including methodologies to encourage portfolio managers to factor-in climate related issues into investment strategies and products. The One Planet SWF Framework mentioned earlier partially addresses this need and its wider adoption by SWFs would lead to more responsible investments.

5. Traces of SWFs' investments in green assets and barriers for wider adoption

In the academic literature, definitions for green investments are abundant, being either broad or narrow, with no clear consensus so far. An IMF Working Paper by Eyraud et. al. (2011, p. 5) refers to green investment as to "the investment necessary to reduce greenhouse gas and air pollutant emissions, without significantly reducing the production and consumption of non-energy goods". According to the authors, there are three main components of green investments: (i) low-emission energy supply, including renewable energy, biofuels and nuclear; (ii) energy efficiency, mostly in energy supply and energy-consuming sectors; and (iii) carbon capture and sequestration, including agriculture and deforestation. OECD (Golub, Kauffmann and Yeres, 2011) tried defining and measuring green foreign direct investments; according to them, "there is general agreement that the production of renewable energy is a green activity, including wind, solar, hydropower, biomass, geothermal and ocean energy", excluding nuclear power. Green FDI services also "include water and wastewater treatment and waste management, air pollution

control, soil and water remediation and noise abatement" (Inderst, Kaminker and Stewart, 2012).

The different types of definitions encountered across the academic literature and across the industry makes the overall analysis of SWFs green investments a difficult task. According to preliminary estimates from the World Bank Group that served as inputs to a recent OECD report (OECD, 2016), between 2006 and 2016, green investments accounted for only 0.7 percent of the total value of all reported SWF deals (the analysis primarily focus on infrastructure and energy). A recent United Nations Environment Working Paper (UNEP, 2017), prepared by Javier Capapé, attempted to conduct a new analysis, considering six types of green actions for SWFs: "i) green debt funds & platforms, representing commitments to green-certified platforms; ii) renewable energy: direct investments in renewable energy companies and projects; iii) green infrastructure: Commitments and limited partnerships on green infrastructure investment funds or companies; iv) green startups: Investments on fundraising rounds in privately-held innovative green companies; v) green agriculture funds: investments and commitments to green-labelled agri-funds; vi) decar-bonization: the total value of divestments of highly polluting and/or companies with high carbon exposure". According to Capapé, the total value of sovereign wealth funds' green investments totalized US$11 billion during 2015-2017. Overall, this represents a very small fraction of the total AUM of SWFs (less than 0.15% of total AUM). The breakdown is showcased in Table 3, revealing that, overall, SWFs opted for investments in green assets by committing to green debt platforms, followed by investments in renewable energy projects and green infrastructure funds.

Table 3.

Allocation of recent SWFs green investments from 2015 to November

Investments	US$ Millions
Green debt fund & platform	4,300
Renewable energy	3,465
Green infrastructure	2,237
Green startups	375
Green agriculture funds	266
Others	460
TOTAL	**11,103**

Source: UNEP (2017)

A total of 21 sovereign wealth funds have developed the green strategies that led to the investments highlighted in table 2. In terms of total value, China is the leading country, with US$4.6 billion (out of which

US$4 billion represent commitments to support green debt and investment platforms). Abu Dhabi, with its Mubadala SWF, ranks second, with green investments of US$2.7 billion. Norway is placed third, with an estimated value of its decarbonization strategy of US$2.1 billion. Singapore is the fourth country, with a total combined value of US$1.3 billion. SWFs for developing economies (China, United Arab Emirates, Singapore, or Saudi Arabia), including economies in transition, represented approximately 75% of the green investments over the 2015-2017 period, compared to developed-based SWFs (such as Norway, New Zealand, Australia, France and Ireland) with roughly 25% (UNEP, 2017).

Some SWFs from developed countries have started to pursue an active role with regards to the decarbonization of their portfolios. According to the UN Portfolio Decarbonization Coalition (PDC), "portfolio decarbonization refers to systematic efforts by investors to align their investment portfolios with the goals of a low-carbon economy. It includes, but is not limited to, efforts to reduce the carbon footprint of investment portfolios, to increase investment in areas such as renewable energy, to withdraw capital from high energy consumption activities and to encourage companies and other entities to reduce their emissions and support the transition to a low carbon economy" (PDC, 2017, p. 9). Concrete examples of decarbonization steps taken by SWFs from developed countries include the thermal coal divestments of Norway's SWF (divestment of 52 thermal coal-based firms, with an estimated value of US$2.1 billion) and the low carbon portfolio strategy of the New Zealand Superannuation Fund (divesting passive holdings of up approximately US$0.7 billion). Both SWFs have divested companies with high emissions totaling US$2.8 billion (UNEP, 2017).

Despite these positive steps for greener investments, there are several challenges for their wider adoption by SWFs. A recent policy brief from the UN Environment (2017) highlights some of the main barriers that SWFs face in their path to greening their portfolios. First, there are considerable difficulties in identifying green investment opportunities, given the poor availability of environmental information, adequate metrics and lack of transparency. Green investments prove difficult to integrate into SWFs asset allocation strategy, because of poor environmental information and measurement (benchmarking), the costs of engaging with companies (e.g. participating as active owners, exercising voting rights) and the high costs of collecting data (e.g. lacking consistent databases to conduct in-depth research; or analyzing a portfolio's carbon footprint, given the lack of disclosure frameworks and measuring techniques).

Second, some SWFs fear that focusing on environmental, social and governance criteria might undermine healthy financial returns and will hurt the overall performance. This perception might be the consequence of existing conflicting indications on ESG so far. While some SWFs seem to be hesitant to follow the lead and consider divesting from high carbon emitting sectors such as oil and gas, recent research (In, Park and Monk, 2018) indicates that greener portfolio might provide higher returns. The study conducted by In, Park and Monk (2018) empirically investigated the risk-return relationship of low-carbon investment and characteristics of carbon-efficient firms. Using the data based on firm-level greenhouse gas (GHG) emissions, the study provided empirical evidence about firms' carbon efficiency, stock market performance and other characteristics in order to clarify the risk-return relationship of low-carbon investment. The main data set consisted of 74,486 observations of 736 US firms during the period from January 2005 to December 2015. The findings suggest greener portfolios (with more carbon-efficient firms) could lead to higher returns. Such research should be expanded and could provide a good rationale to convince SWFs to reconsider their hesitating approach for low-carbon investment.

Third, the lack of clarity on governments' investment policies for climate actions is also detrimental for greener investments. SWFs may be highly scrutinized for their decisions to go green, especially in countries that do not place climate change high on their political priority agenda or do not perceive climate risks as financial risks. However, the recent international events highlighted earlier, including the more recent One Planet Sovereign Wealth Fund Working Group and its development of a Framework on Climate Change, help raise more awareness for decision-makers on climate risks and the importance of their integration within the decision frameworks of SWFs. The lack of national sustainable development policies translates in weak political demand for greener portfolios. Educating stakeholders (decision-makers, government representatives, shareholders) about green options and positive impact finance frameworks should be prioritized.

6. Conclusions

Sovereign wealth funds are likely to continue to develop, both in terms of total number of funds and total assets under management. Established SWFs and newcomers on this market should develop their corporate governance frameworks to adequately respond to climate-related

risks, as these will impact the value of SWF investments and portfolios. So far, despite holding considerable long-term assets under management, the participation of sovereign wealth funds in green investments is limited, even though some SWFs investments cannot be easily traced, as they are invested through third-party asset managers. Additional in-depth research on the scarce topic of green investments of SWFs is necessary, especially because SWFs have a high potential to address the finance gap towards a green, low-carbon economy transition.

Depending on their typology and objectives, some SWFs might be more suitable for financing green activities related to SDGs, correlated with the risk profile and corresponding investment drive (Sharma, 2017). Savings funds usually have longer investment horizons and higher risk tolerance than other types of SWFs, conferring them a key role in financing low-carbon, green investments for enhancing climate resilience. Furthermore, SWFs are an optimal vehicle to support the implementation of the SDGs, "by helping to improve the quality of public spending, strengthening international competitiveness, earmarking spending for high impact projects and promoting green or ethical investments. Expanding the investment mandate of SWFs to include green investment (particularly green infrastructure projects) can support long-term sustainable development by diversifying the economy away from hydrocarbons, tapping into burgeoning sectors such as clean technology, renewable energy, and low-carbon transport, and enhancing resilience against climate change" (UN Environment, 2017).

Finally, the publication of the One Planet SWF Framework could lead to wider industry adoption of its principles, as more institutional investors are becoming aware of the importance of socially responsible investment and of the need to factor-in climate risks within decision-making processes.

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