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The global sustainability footprint of sovereign wealth funds

Hao Liang* and Luc Renneboog**

Abstract: With the emergence of sovereign wealth funds (SWFs) around the world managing equity of over \$8 trillion, their impact on the corporate landscape and social welfare is being scrutinized. This study investigates whether and how SWFs incorporate environmental, social, and governance (ESG) considerations in their investment decisions in publicly listed corporations, as well as the subsequent evolution of target firms' ESG performance. We find that SWF funds do consider the level of past ESG performance as well as recent ESG score improvement when taking ownership stakes in listed companies. These results are driven by the SWF funds that do have an explicit or implicit ESG policy and are most transparent, and by SWF originating from developed countries and countries with civil law origins. In relation to engagement, we find by means of two natural experiments with exogenous shocks (the Deepwater Horizon catastrophe and Volkswagen diesel scandal) that the ESG scores do not change significantly more for firms in which SWFs have ownership stakes. This potentially suggests that SWFs in general do not actively steer their target firms towards higher levels of ESG.

Keywords: sovereign wealth funds, institutional ownership, corporate social responsibility, socially responsible investments, sustainability, shareholder engagement, ESG, environmental policy, social policy, corporate governance, exogenous shock

JEL classification: G11, G18, G15, G28, Q01, M14

I. Introduction

Over the last 15 years and especially around the time of the financial crisis, interest in and attention to the investment policies of sovereign wealth funds (SWFs) have grown. According to the SWF Institute, global assets under management by SWFs have exceeded US\$8 trillion, and the Norway Government Pension Fund Global manages over US\$1 trillion of wealth. While SWFs have been in existence for many

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decades,¹ they have attracted attention only in recent years, especially since the global financial crisis (Das, 2009). The purchase of US\$3 billion in equity in the Blackstone Group in 2007 by China Investment Corporation (CIC)—the SWF of China—sparked public interest (Bortolotti *et al.*, 2009). Several Asian and Persian Gulf-based SWFs bought US\$60 billion of newly issued equity in large American and European banks in 2008, thereby playing a critical stabilizing role in the aftermath of the crisis. Still, the lack of transparency and political motivations led host country governments and firms to react cautiously to SWFs' investments (Mezzacapo, 2009). As SWFs are government-owned, they do not need to focus exclusively on financial returns, but can also add a stakeholder perspective to their investment goals. Examples of SWFs which explicitly have a corporate social responsibility (CSR) perspective include the Norwegian Oil fund, as well as the SWFs of New Zealand and France (United Nations Environment Programme, 2017). It is challenging to investigate SWFs considering that many lack transparency and differ significantly in terms of their purpose, geographical focus, and funding source, etc. (Bernstein *et al.*, 2009; Monk, 2011; Gangi *et al.*, 2019).

Since the global financial crisis of 2007–8, more than 30 new SWFs have been established, such as the Turkey Wealth Fund in 2016 and the Japan Investment Corporation in 2018. Currently, SWFs are among the largest investors in the world, with Norway's Government Pension Fund Global (or Norges Bank Investment Management) controlling more than US\$1 trillion in assets under management (AUM) (SWF Institute, 2019).

Do SWFs, which typically aim at accumulating national wealth for the future generations thus have a long-term investment horizon without short-term liabilities (PricewaterhouseCoopers, 2016), with a stronger focus on stakeholder welfare rather than mere shareholder return orientation, compared to other institutional investors? Given their focus on the long term and immunity from pursuing short-term financial returns, it is reasonable to expect that SWFs may be in a prime position to focus on long-term corporate and societal sustainability by taking environmental, social, and governance (ESG) issues into account in their investment decisions. Such a stakeholder-orientation does not necessarily mean a sacrifice to shareholder returns, as a modest positive relation between socially responsible investing (SRI) and corporate financial performance has on average been documented in academic research. However, aside from some case studies on specific funds, extensive research on the trade-off between ESG-focus and pursuit of financial returns by SWFs is still scarce.

This paper examines the relationship between SWFs' investments and the ESG practice at the ownership stake level. We distinguish between SWFs' selection (i.e. whether the ESG performance of potential target firms affects SWF investment decisions) and engagement (i.e. whether SWF investment affects the ESG performance of target firms). To this end, we also distinguish between SWFs with an explicit ESG policy and those without. Specifically, we aim to answer the following research questions: (1) Do SWFs incorporate ESG considerations in their investment decisions? (2) If so, does the effect differ across types of SWFs (e.g. by SWFs' countries

¹ The first SWF was the French Caisse des Dépôts et Consignations that was founded in 1816 (Hildebrand, 2007). The oldest, still prevailing SWF was established in 1953 as the Kuwait Investment Authority (KIA) (Alhashel, 2015).

of origin)? (3) Do SWFs also engage the target firm at the level of CSR? In other words, do SWFs' investment lead to an improvement of the ESG performance of the target firms?

Using a global sample of 24 SWFs (representing over 80 per cent of the total AUM by SWFs globally) that invest in 7,693 listed firms over the period of 2009 to 2018, we find that about half of the SWFs with a high level of transparency formally disclose their ESG policies in their annual statements, which are related to higher value-weighted ESG ratings of the public equity portion of their portfolio. At the portfolio company level, the ESG score of target firms is a strong predictor of its SWF ownership (both of the probability of being invested in and of the ownership stakes held). This relation holds not only for the aggregate ESG score but also for each component score. The ESG relation to SWF ownership is driven by SWFs originating from developed countries and civil law countries and by SWFs that explicitly adopt an ESG policy.

To disentangle the selection effect from the engagement effect, we exploit the occurrence of some exogenous shocks (namely, the Deepwater Horizon oil spill catastrophe and the Volkswagen diesel scandal) which primarily influence the incentive to engage rather than the selection. We then conduct a difference-in-difference analysis around those events. We do not find evidence that SWF ownership increases the ESG performance of the firms belonging to the industries concerned, even when we focus on the constituents of the E, S, and G subscores. Therefore, our results show no evidence of engagement of SWFs in the ESG policy of target firms, and instead suggest that SWFs seem to select companies with better ESG performance to invest.

The remainder of this paper is organized as follows: section II comprises the literature review on SWFs and corporate ESG issues. Sections III and IV discuss the data, the sample selection, and descriptive statistics, as well as the empirical methodology. Section V presents the results. Section VI concludes.

II. Sovereign wealth funds: types and purpose

(i) Definition, purpose, and proliferation of SWFs

Whereas SWFs have been in existence for many decades, the term 'sovereign wealth fund' was only recently coined to describe distinct investment entities, 'neither traditional public pension funds nor reserve assets supporting currencies, but a different type altogether' (Rožanov, 2005). Formally, SWFs are special purpose investment funds or arrangements that are owned by the general government, usually created from balance of payments surpluses, official foreign currency operations, the proceeds of privatizations, governmental transfer payments, fiscal surpluses, and/or receipts resulting from resource exports (SWF Institute).² SWFs are operated mostly for macroeconomic purposes by holding, managing, or administering assets

² In order to address issues with the proliferation of definitions and lack of regulation, The International Working Group (IWG) of Sovereign Wealth Funds gathered in October 2008 to adopt a set of 'generally accepted principles and practices' (GAPP) for SWFs; in short, the 'Santiago Principles'. Their purpose is to identify a framework that properly reflects appropriate governance and accountability rules as well as the conduct of investment practices by SWFs on a prudent and sound basis.

to achieve financial objectives, and employ a set of investment strategies that include investing in foreign financial assets. Das (2009) defines an SWF as a fund owned and run by the government of a sovereign nation that manages national savings, budget surplus, and excess foreign exchange reserves by investing them globally into corporate stocks and bonds and other financial instruments. Similarly, Gieve (2008) considers SWFs as government investment vehicles that manage foreign assets with a higher risk tolerance and higher expected return than for central bank foreign currency reserves.

According to the SWF Institute (February 2019), 78 large SWFs hold assets worth over US\$8.1 trillion, which accounts for more than 10 per cent of assets under management (AUM) worldwide. The SWF landscape is concentrated, as the top 10 SWFs own about two-thirds of the total AUM by all SWFs, and the top 20 funds hold 89 per cent. SWFs are holding shares in more than 20 per cent of the listed firms around the world (Fernandes, 2009), and they account not only for about 2 per cent of the worldwide market capitalization but also of the global bond markets (Gieve, 2008). According to the SWF Institute, the AUM of SWFs has more than doubled since 2007. This strong growth has been fuelled by increases in oil prices, financial globalization, and national budget surpluses. The SWF Institute expects the total AUM of SWFs to reach US\$13 trillion over the coming decade.

SWFs are usually created as a result of national budget surpluses which have accumulated due to favourable economic conditions (Rozanov, 2005). In the case of resource-rich countries, the funds are recurrently replenished with revenues from commodities, primarily oil and gas, which are owned or taxed by the state (Rataj, 2018). Chambers *et al.* (2012) discuss several reasons for resource-rich countries to establish SWFs. First, founding an SWF can be a device for resource-rich countries to avoid that too high a distribution of funds by a government would discourage of citizens from working and developing their human capital. Second, a SWF can overcome the ‘Dutch disease’, a scenario in which a sudden increase in wealth (usually due to the discovery of natural resources) triggers rapid inflation of domestic prices and a stronger currency that decreases international competitiveness, resulting in de-industrialization. These reasons have been supported by the strong correlation between the number of new SWFs and the evolution of oil prices (Amar, 2016). In Latin America, SWFs are often replenished by a positive trade balance due to exports even while countries are facing budget deficits, which signifies that those SWFs contain essentially ‘borrowed reserves’ (Das, 2009).

The main objectives of SWFs include stabilizing government and export revenues, accumulating savings for future generations in resource-rich countries to offset the future lack of natural resources, and/or to managing foreign reserves (Alhashel, 2015). For example, the purpose of the world’s largest and best performing SWF, the Norway Government Pension Fund-Global (NGPF-G), as stated in the Government Pension Fund Regulation, is to serve as ‘an instrument for ensuring that a reasonable portion of the country’s petroleum wealth benefits future generations’. More generally, Mohseni-Cheraghloo (2017) states that SWFs have as primary objective to maximize financial returns and minimize risks and losses, while also taking into

account the additional objective of long-term development and stability of their own countries.³

(ii) Regulation and governance of SWFs

As SWFs are substantial state-owned entities actively investing in global assets, they create a friction between market capitalism and state capitalism. The former is concerned with maximizing investment returns whereas state capitalism focuses on maximizing the value of a country's economy as a whole (Gilson and Milhaupt, 2009). Expansionary investment policies and a lack of transparency give rise to suspicions about the motives behind their investments and their potential contribution to economic, financial, or political disruption (Truman, 2017). To underline the need for greater transparency and accountability, Truman first published a 'SWF scoreboard' in 2007 (which was updated in 2009, 2012, and 2016) to provide a benchmark to compare different funds. This scoreboard is based on 33 elements from four categories: structure, governance, accountability and transparency, and behaviour of the fund. The author argues that the international investment activities of governments have achieved a sufficient scale and scope, and, as a result, an internationally agreed standard is needed to guide the management by governments of their cross-border investments (Truman, 2007, 2009). The SWF scoreboards and the GAPP were intended to exert some pressure on the SWFs such that they increase their transparency and accountability (Truman, 2017). While the GAPP cannot be legally enforced, most countries have regulations that can terminate SWF deals on the basis of a supposed threat to national security (Alhashel, 2015). For example, the US has regulatory constraints on SWFs' investments to avoid not only controlling stakes but also to prevent them exercising significant influence over the US companies in their portfolio.

Gilson and Milhaupt (2009) notice the significant controversy around acquisitions of significant but non-controlling stakes by investors affiliated with foreign governments, and argue that regulation should attempt to reduce national industrial threats while not eliminating any benefits bestowed on the markets by having such players. They suggest

³ Other guiding objectives identified by the IWG of SWFs (2008) to underpin the GAPP are: (i) to help maintain a stable global financial system and free flow of capital and investment; (ii) to comply with all applicable regulatory and disclosure requirements in the countries in which they invest; (iii) to invest on the basis of economic and financial risk and return-related considerations; and (iv) to have in place a transparent and sound governance structure that provides for adequate operational controls, risk management, and accountability. According to GAPP principle 2 (Appendix II), SWFs should clearly define and publicly disclose their policy purpose. In 2008, the International Monetary Fund (IMF) identified five categories of SWFs based on their purposes: (i) stabilization funds; (ii) savings funds; (iii) reserve investment corporations; (iv) development funds; (v) contingent pension reserve funds. Petrova *et al.* (2011) recognized a shift in SWF's asset allocations after the global financial crisis and revised the list of the IMF to four categories: (i) macro stabilization; (ii) savings; (iii) reserve investments; (iv) pension reserves. The SWF Institute adds another category to the classification by Petrova *et al.* (2011): (v) strategic development sovereign wealth funds. The majority of SWFs are either fiscal stabilization funds or savings funds for future generations. There are only a handful of pension reserve funds and even fewer reserve investment corporations. Some SWFs have multiple objectives; development funds for instance do not have a primary commercial objective, but rather promote national economic or development goals, such as domestic asset or firm stabilization or industry job creation.

that the stakes acquired by SWFs should be non-voting, such that they do not have substantial control yet can still realize financial returns. [Epstein and Rose \(2009\)](#) argue against imposing any additional burden on investment by SWFs, as the result of enforcement of special restrictions on SWFs is that SWFs will redirect their investments to less restrictive markets. Therefore, a policy of watchful waiting is preferable over an immediate effort to impose special restrictions on SWFs. [Rose \(2008\)](#) identifies agency costs induced by SWFs' passivity in that they decrease the overall shareholder monitoring of management. Also, [Kratsas and Truby \(2015\)](#) suggest that a limited form of regulation may be warranted to ease protectionist pressures and maintain consumer confidence.

To overcome the suspicion created by the friction between state capitalism and market capitalism in which SWFs operate, governance structures are vital. [Monk \(2011\)](#) concludes that SWFs match, mimic, or approximate the management structure and governance practices of Western institutional investors. Also, good governance is important for SWFs aiming at achieving a better performance, as government ownership is often associated with inferior performance compared to private ownership ([Wang and Shailer, 2018](#)). [Ang \(2010\)](#) uses four benchmarks to analyse SWF governance: (i) legitimacy (which is closely tied to transparency and accountability); (ii) integrated policy benchmark (which is tied to the government's fiscal and other macro policies); (iii) governance structure and performance measures; and (iv) recognition of long-run externalities. Take NGPF-G, one of the largest and best performing SWFs worldwide, as an example. [Truman \(2010\)](#) ranks the NGPF-G the highest (97 per cent) in terms of structure, governance, and transparency on his SWF scoreboard. In relation to the fund's transparency, [Chambers et al. \(2011\)](#) conclude that in order to earn support and public understanding, especially through financial downturns, the NGPF-G aims to be very transparent.⁴ On the topics of transparency and accountability, the NGPF-G obtained a score of 98 per cent in 2012 ([Bagnall and Truman, 2013](#)).

(iii) Value creation, investor behaviour, and strategies of SWFs

In terms of SWFs' investing behaviour, [Alhashel \(2015\)](#) finds evidence supporting the notion that SWFs are mainly driven by economic motives (and not political ones), as they behave as economic entities maximizing their financial returns. Also, [Epstein and Rose \(2009\)](#) argue that SWFs act as model investors and are unlikely to invest opportunistically. [Kratsas and Truby \(2015\)](#) and [Avendaño and Santiso \(2009\)](#) find that SWF investment decisions do not differ greatly from those of other asset managers (e.g. mutual funds), thus the fear of SWFs' politically motivated investment decisions seems to be unfounded. Along this line, [Knill et al. \(2012\)](#) argue that SWFs prefer to invest in nations with which they have weaker political relations.

With regards to their investment strategies, SWFs tend to be opaque. [Chhaochharia and Laeven \(2009\)](#) show that SWFs largely invest to diversify away from the main

⁴ For example, it provides much more information on strategy, investment philosophy, results, and risk than most SWFs and pension funds in jurisdiction. The Norges Bank publishes quarterly financial reports and an annual listing of all investments. External consultant reports and Strategy Council's recommendations are published. Also, the ministry provides to parliament detailed annual reports including information on investment returns, strategy, and implementation of ethical guidelines.

industries at home, but bias their investments toward financially constrained firms in countries that share the same culture. This suggests that the determinants of SWF investment strategies are not entirely driven by profit-maximizing objectives. [Fotak et al. \(2008\)](#) find evidence that SWFs almost always purchase minority stakes directly from target companies, of which roughly half are unlisted and very frequently located in the SWF's home country. In terms of country focus, [Fernandes \(2009\)](#) documents that SWFs invest mostly in large profitable firms with broad analyst coverage and located in countries with high investor protection and strong corporate governance. He also concludes that SWFs invest more than proportionally in countries with a higher degree of economic development, larger and more liquid financial markets, institutions that offer better protection of legal rights, and a more stable macroeconomic environment. Occasionally, SWFs seem to engage in 'contrarian' investment behaviour, i.e. increasing their acquisitions in countries where crises hit. [Kotter and Lel \(2008\)](#) find a bias of SWF investments towards firms facing financial difficulties. In terms of sector preference, [Mohseni-Cheraghloo \(2017\)](#) shows that the most popular sectors SWFs invest in are the financial and real estate sectors because of their greater liquidity, and the energy sector for its strategic importance.

Existing studies also find conflicting evidence on whether SWFs play a passive or active role in target firms. According to [Rose \(2008\)](#), [Kotter and Lel \(2008\)](#), and [Ghahramani \(2013\)](#), most SWFs appear to be passive investors. This may also result from the fact that many countries have adopted regulations that prevent foreign investment funds from acquiring controlling stakes in domestic firms. However, [Mehrpooya et al. \(2009\)](#), [Dewenter et al. \(2010\)](#), [Alhashel \(2015\)](#), and [Mehrpooya \(2015\)](#) find that SWFs seem to behave increasingly more as active investors. SWFs' activism is described as 'defensive' activism, namely, actively monitoring the target firm, not seeking ways to force value-creating changes, but preventing losses from mismanagement ([Rose, 2014](#)).

The long-run performance of SWFs' equity investments tends to be poor due to imperfect portfolio diversification and poor corporate governance ([Chhaochharia and Laeven, 2009](#)). [Bortolotti et al. \(2015\)](#) show that the announcement-period abnormal returns of SWFs equity investments in publicly traded firms are positive, but the reaction is weaker than for comparable stock purchases by private investors. Additionally, they find that targets suffer from declining return on assets (ROA) and sales growth over the subsequent 3 years. [Knill et al. \(2011\)](#) also find a positive short-term effect on target firms' returns, but a negative 1-year effect following SWF acquisitions. SWF investment is believed to reduce risk, but the reduction is still not sufficiently large to justify the lower return. Other studies supporting the positive short-term response to SWF investment are by [Kotter and Lel \(2008\)](#) and [Dewenter et al. \(2010\)](#), who show that the announcement cumulative abnormal returns (CARs) are higher when the SWF investor is more transparent.

[Fernandes \(2014\)](#) reports that companies experience increases in value both at the time of and after large investments by SWFs by showing a highly significant improvement of operating performance (return on equity (ROE), ROA, and earnings before interest, taxes, depreciation, and amortization (EBITDA)-to-assets ratio) for companies receiving large SWF investments. It is suggested that the channels towards this superior performance are higher levels of CEO turnover in target firms, increased ability to raise more capital, and increases in their proportion of foreign sales.

(iv) Relationship between SWFs and CSR

By nature, SWFs act as long-term investors with the aim of leaving a legacy and safeguarding national wealth for future generations. Therefore, it is reasonable to expect that SWFs' investment policy is geared towards more responsible firms which have *de facto* policies aiming at sustainability. Due to their size and significant market power, SWFs have the potential to catalyse change with regard to eliminating pollution, improving working conditions, pursuing gender equality, and reducing corruption.

In addition, responsible and sustainable investing has been increasingly becoming part of the societal preferences, and by investing the state's assets, SWFs need to respond to societal demand. The Public Funds Investment Policy Survey of [Mullen and Rose \(2018\)](#), covering the policies of the 26 largest SWFs, discloses that 15 per cent of the SWFs are subject to ESG restrictions prohibiting the fund from unethical investing; 8 per cent take into account ESG in their investment policy; and 15 per cent face asset class restrictions. In addition, 58 per cent disclose a code of ethics to ensure that investments are made in accordance with the fund's policies and any other relevant regulations.

Moreover, with regard to the relationship between CSR and corporate financial performance, [Gerard \(2018\)](#) reviews the CSR literature and formulates a general consensus that ESG has a positive impact on equity and bond performance. Stronger CSR leads to higher corporate value, higher equity returns, and lower risk. However, due to increasing ESG awareness, the performance edge of CSR investments has largely disappeared as broader awareness of the importance of ESG concerns is recognized in the stock prices, such that a portfolio strategy to reach consistently superior returns may be precluded. The positive correlation between ESG and corporate financial performance is supported by [Friede et al. \(2015\)](#) who examine ESG and corporate financial performance across over 2,000 academic studies since 1970. Of reviewed studies, 62.6 per cent indicate a positive correlation between ESG factors and financial performance, whereas only 10 per cent display a negative relationship. Another meta-study by [Clark et al. \(2015\)](#) concludes that 80 per cent of the 200 academic studies categorized reveal that prudent sustainability practices have a positive influence on investment performance, 90 per cent of the studies on the cost of capital show that sound sustainability standards lower firms' cost of capital, and 88 per cent disclose that solid ESG practices result in better operational performance. Additionally, some find that active ownership enables investors to influence corporate behaviour and benefit from improvements in sustainable business practices ([Barko et al., 2018](#)).

From an investor perspective, investing in high ESG portfolios usually does not yield superior expected returns. For instance, [Renneboog et al. \(2008\)](#) find that socially responsible investments (SRI) funds underperform their domestic benchmarks by -2.2 per cent to -6.5 per cent, but in terms of risk-adjusted returns most SRI funds' performance is not statistically different from that of conventional funds. They do not find evidence of a 'smart money' effect driving the results, as SRI investors are unable to identify the funds that will outperform in the future. Similarly, the meta-study by [Friede et al. \(2015\)](#) concludes that portfolio studies, comprising those on mutual funds, indices, and long/short portfolios, exhibit a weaker relation between ESG and financial performance in comparison to firm-level studies. Possible explanations are that many ESG funds follow a mix of negative and positive ESG screening, which attracts a broad

array of value-driven and profit-seeking investors. As a result, intensive screening limits the investment universe of SRI funds, and the fact that SWFs may try to unify different ESG perspectives may come at a cost. Moreover, it is shown that active fund management is costly in terms of fees which may wipe out a possible ESG alpha.

Overall, SWFs may have multiple incentives to care about their portfolio companies' ESG practices. First, as SWFs are long-term investors aiming to create and safeguard an inheritance for future generations. Second, responsible investing has increasingly become part of the societal preferences. Third, research shows that ESG is positively related to corporate financial performance and SWFs may try to exploit this using an ESG-based strategy. In the next sections, we formally test the relationship between SWF ownership and portfolio companies' ESG performance.

III. Data

(i) Sample and variable description

We adopt a definition of SWF that contains the core characteristics included in the plethora of definitions, namely that SWFs are investment vehicles run by governments, invest globally, and do not have explicit pension liabilities (Capapé and Guerrero Blanco, 2013). Specifically, SWFs are more specifically defined as: (i) investment funds rather than operating companies; (ii) entities wholly owned by a sovereign government, yet organized separately from a central bank or ministry of finance; (iii) funds making both international and domestic investment in different risky assets; (iv) funds with the pursuit of a commercial return as their main objective; and (v) wealth funds rather than pension funds, in the sense that the proceeds do not stem from pensioners' contributions and that these have hence no liabilities to individual citizens. This definition yields a list of 140 funds (see Table 1). However, many funds are opaque and do not provide any data on their holdings. Our primary data source for SWF investments is FactSet, in which we only find holdings data for a sample of 24 SWFs. The 24 retained SWFs as shown in Table 1 represent 83.75 per cent of the total AUM by SWFs globally, and have invested in 7,693 listed firms over the period from 2009 until 2018.

In Table 1, we also show each fund's inception year, region of origination, origin of the funding (i.e. commodity or non-commodity; Boubakri *et al.*, 2013, 2016), size (AUM as collected from the Sovereign Wealth Fund Institute, the fund's website, or its annual report), legal origin of the home country (La Porta *et al.*, 2008), level of economic development of the home country (developed, emerging, frontier economy), the transparency score (Stone and Truman, 2016), and the presence of a CSR policy. To identify the presence of an ESG policy, we analyse annual reports and web pages of SWFs on statements about responsible investing objectives (environmental, social, and governance issues) and search for key words such as 'responsible', 'sustainability', 'ethics', 'ESG', 'CSR', etc.

The total AUM of all SWFs identified in the list in Table 1 amounts to US\$8,484 billion and the subsample of 24 SWFs for US\$7,105 billion. Figure 1 shows that, geographically, SWFs are most prominent in the Middle East (many of which are oil-exporting countries) and in Asia (mostly export-led countries), particularly China. Approximately

Table 1: List of sovereign wealth funds by assets under management

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|---|---------------------|---------------------------|---------------|---------------------|------------------------------------|-----------------------------------|-----------------|---------------|-------------------------|---------------------------------|
| Government Pension Fund Global / Norges Bank Investment Management* | GPFG/NBIM | 1990 | Commodity | Saving | 1,059.080 | 11.7518% | Norway | Europe | Scandinavian Civil Law | Developed |
| China Investment Corporation* | CIC | 2007 | Non-commodity | Reserve investment | 941.417 | 10.4462% | China | Asia | Socialist Law | Emerging |
| Abu Dhabi Investment Authority* | ADIA | 1976 | Commodity | Reserve investment | 696.660 | 7.7303% | UAE (Abu Dhabi) | Middle East | Common Law | Emerging |
| Kuwait Investment Authority* | KIA | 1953 | Commodity | Reserve investment | 592.000 | 6.5690% | Kuwait | Middle East | French Civil Law | Frontier |
| SAMA Foreign Holdings* | SAMA | 1952 | Commodity | Reserve investment | 515.600 | 5.7212% | Saudi Arabia | Middle East | Common Law | Emerging |
| Hong Kong Monetary Authority Investment Portfolio* | HKMA | 1993 | Non-commodity | Macro-stabilization | 509.353 | 5.6519% | Hong Kong | Asia | Common Law | Developed |
| SAFE Investment Company* | SAFE | 1997 | Non-commodity | Macro-stabilization | 439.837 | 4.8805% | China | Asia | Socialist Law | Emerging |
| GIC Private Limited (Gov't of Singapore Investment Corporation)* | GIC | 1981 | Non-commodity | Reserve investment | 390.000 | 4.3275% | Singapore | Asia | Common Law | Developed |
| Temasek Holdings* | TH | 1974 | Non-commodity | Reserve investment | 374.896 | 4.1599% | Singapore | Asia | Common Law | Developed |
| National Social Security Fund* | NSSF | 2000 | Non-commodity | Saving | 341.354 | 3.7878% | China | Asia | Socialist Law | Emerging |
| Qatar Investment Authority* | QIA | 2005 | Commodity | Reserve investment | 320.000 | 3.5508% | Qatar | Middle East | French Civil Law | Emerging |
| Public Investment Fund/Sanabil Investments | PIF/Sanabil | 1971 | Commodity | Development | 290.000 | 3.2179% | Saudi Arabia | Middle East | Common Law | Emerging |
| Investment Corporation of Dubai* | ICD | 2006 | Commodity | Reserve investment | 233.801 | 2.5943% | UAE (Dubai) | Middle East | Common Law | Emerging |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|--|--------------|-------------------|-------------------|---|---------------------------|---------------------------|---------------------|--------------------------|---------------------|-------------------------|
| Mubadala Investment Company (formerly Mubadala Development Company until 2017) | MDC | 2002 | Commodity | Development | 226.484 | 2.5131% | UAE (Abu Dhabi) | Middle East | Common Law | Emerging |
| Public Investment Corporation* | PIC | 1911 | Non- commodity | | 143.390 | 1.5911% | South Africa | Africa | Common Law | Emerging |
| Korea Investment Corporation* | KIC | 2005 | Non- commodity | Reserve investment | 134.100 | 1.4880% | South Korea | Asia | German Civil Law | Emerging |
| Australian Future Fund* | AFF | 2006 | Non- commodity | Saving | 103.390 | 1.1472% | Australia | Australia and Pacific | Common Law | Developed |
| National Development Fund (of Iran) [formerly Oil Stabilization Fund until 2011] | NDF | 2000 | Commodity | Saving | 91.000 | 1.0098% | Iran | Middle East | French Civil Law | no data |
| Her Majesty the Queen in Right of the Province of Alberta as represented by AIMco | | | | | 83.003 | 0.9210% | Canada (Alberta) | North America | Common Law | Developed |
| Bpifrance | Bpifrance | 2009 | Non- commodity | | 72.360 | 0.8029% | France | Europe | French Civil Law | Developed |
| Samruk-Kazyna JSC | S-K JSC | 2008 | Non- commodity | Macrostabilization, development | 71.344 | 0.7917% | Kazakhstan | Asia | French Civil Law | Frontier |
| Russian National Welfare Fund | RNWF | 2004 | Commodity | Macrostabilization | 68.550 | 0.7606% | Russia | Europe | Socialist Law | Emerging |
| Alaska Permanent Fund* | APF | 1976 | Commodity | Saving | 66.165 | 0.7342% | USA (Alaska) | North America | Common Law | Developed |
| Libyan Investment Authority | LIA | 1981 | Commodity | Macrostabilization, saving, development | 60.000 | 0.6658% | Libya | Africa | French Civil Law | no data |
| Brunei Investment Agency* | BIA | 1983 | Commodity | Reserve investment | 60.000 | 0.6658% | Brunei | Asia | Common Law | Frontier |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|---|--------------|-------------------|---------------|---------------------------------|---------------------------|---------------------------|------------------|-----------------------|------------------|-------------------------|
| Kazakhstan National Fund | KNF | 2000 | Commodity | Macro-stabilization | 57.628 | 0.6395% | Kazakhstan | Asia | French Civil Law | Frontier |
| (Texas) Permanent School Fund* | PSF | 1854 | Commodity | Saving | 46.521 | 0.5162% | USA (Texas) | North America | Common Law | Developed |
| Emirates Investment Authority | EIA | 2007 | Commodity | Reserve investment | 45.000 | 0.4993% | UAE (Federal) | Middle East | Common Law | Emerging |
| Turkey Wealth Fund | TWF | 2016 | | | 40.000 | 0.4439% | Turkey | Middle East | French Civil Law | Emerging |
| State Oil Fund of the Republic of Azerbaijan | SOFAZ | 1999 | Commodity | Macro-stabilization, saving | 38.988 | 0.4326% | Azerbaijan | Asia | French Civil Law | no data |
| Khazana Nasional (Bernhad)* | KN | 1993 | Non-commodity | Reserve investment, development | 32.728 | 0.3632% | Malaysia | Asia | Common Law | Emerging |
| Nuclear Waste Disposal Fund | NWDF | 2017 | | | 26.958 | 0.2991% | Germany | Europe | German Civil Law | Developed |
| New Zealand Superannuation Fund* | NZSF | 2001 | Non-commodity | Saving | 25.069 | 0.2782% | New Zealand | Australia and Pacific | Common Law | Developed |
| Ireland Strategic Investment Fund (formerly National Pensions Reserve Fund) | ISIF/NPRF | 2001 | Non-commodity | Development | 24.522 | 0.2721% | Ireland | Europe | Common Law | Developed |
| New Mexico State Investment Council / New Mexico State Investment Office Trust Fund [Severance Tax Permanent Fund part of this] | NMSIC | 1973 | Commodity | Reserve investment | 23.247 | 0.2580% | USA (New Mexico) | North America | Common Law | Developed |
| Permanent University Fund (managed by UTMCO) | PUF | 1876 | Commodity | Development | 21.770 | 0.2416% | USA (Texas) | North America | Common Law | Developed |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|---|--------------|-------------------|-------------------|---|---------------------------|---------------------------|------------------------|--------------------------|---------------------------|-------------------------|
| Fund for Reconstruction and Development | FRD | 2006 | Non- commodity | | 20.000 | 0.2219% | Uzbekistan | Asia | French Civil Law | no data |
| State General Reserve Fund* | SGRF | 1980 | Commodity | Saving, reserve investment, development | 18.100 | 0.2008% | Oman | Middle East | French Civil Law | Frontier |
| Alberta Heritage (Savings Trust) Fund | AHSTF | 1976 | Commodity | Saving, reserve investment | 17.600 | 0.1953% | Canada (Alberta) | North America | Common Law | Developed |
| Timor Leste Petroleum Fund | TLPF | 2005 | Commodity | Macro-stabilization | 16.799 | 0.1864% | Timor Leste | Australia and Pacific | French Civil Law | no data |
| Mumtalakat Holding Company | MHC | 2006 | Non- commodity | Reserve investment | 15.199 | 0.1687% | Bahrain | Middle East | Common Law | Frontier |
| Economic and Social Stabilization Fund | SESF | 1985 | Commodity | Macro-stabilization | 14.769 | 0.1639% | Chile | Latin America | French Civil Law | Emerging |
| Russian Direct Investment Fund | RDIF | 2011 | Non- commodity | Development | 13.000 | 0.1443% | Russia | Europe | Socialist Law | Emerging |
| Pension Reserve Fund | PRF | 2006 | Non- commodity | Macro-stabilization, saving | 10.155 | 0.1127% | Chile | Latin America | French Civil Law | Emerging |
| Permanent Wyoming Mineral Trust Fund | PWMTF | 1974 | Commodity | Macro-stabilization, saving | 8.023 | 0.0890% | USA (Wyoming) | North America | Common Law | Developed |
| CDP Equity (formerly known as Italian Strategic Fund) | | 2011 | Non- commodity | Development | 6.763 | 0.0750% | Italy | Europe | French Civil Law | Developed |
| Oman Investment Fund | OIF | 2006 | Commodity | Reserve investment | 6.000 | 0.0666% | Oman | Middle East | French Civil Law | Frontier |
| Heritage and Stabilization Fund | HSF | 2007 | Commodity | Macro-stabilization, saving | 5.875 | 0.0652% | Trinidad and Tobago | Latin America | Common Law | Frontier |
| North Dakota Legacy Fund | NDLF | 2011 | Commodity | Saving | 5.791 | 0.0643% | USA (North Dakota) | North America | Common Law | Developed |
| Fiscal Stabilization Fund | FSF | 1999 | Non- commodity | Macro-stabilization | 5.770 | 0.0640% | Peru | Latin America | French Civil Law | Emerging |
| Solidium Oy | | 2008 | | | 5.762 | 0.0639% | Finland | Europe | Scandinavian Civil Law | Developed |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|--|--------------|-------------------|-------------------|---------------------------------------|---------------------------|---------------------------|--------------------|------------------|---------------------|-------------------------|
| Pula Fund | PF | 1993 | Commodity | Reserve investment | 5.517 | 0.0612% | Botswana | Africa | Common Law | Frontier |
| China-Africa Development Fund* | CADF | 2007 | Non- commodity | Reserve investment | 5.000 | 0.0555% | China | Asia | Socialist Law | Emerging |
| Fundo Soberano de Angola | FSDEA | 2012 | Commodity | Reserve investment | 4.270 | 0.0474% | Angola | Africa | French Civil Law | no data |
| Colombia Savings and Stabilization Fund | CSSF | 1995 | Commodity | Macro-stabilization, saving | 3.470 | 0.0385% | Colombia | Latin America | French Civil Law | Emerging |
| Alabama Trust Fund | ATF | 2000 | Commodity | Saving | 3.116 | 0.0346% | USA (Alabama) | North America | Common Law | Developed |
| Federal Holding and Investment Company | | 2006 | | | 2.690 | 0.0298% | Belgium | Europe | French Civil Law | Developed |
| Japan Investment Corporation | JIC | 2018 | | | 2.680 | 0.0297% | Japan | Asia | German Civil Law | Developed |
| Utah State School and Institutional Trust Funds Office | SITFO | 1896 | Non- commodity | | 2.491 | 0.0276% | USA (Utah) | North America | Common Law | Developed |
| Idaho Endowment Fund Investment Board | IEFIB | 1969 | Non- commodity | | 1.884 | 0.0209% | USA (Idaho) | North America | Common Law | Developed |
| Hellenic Corporation of Assets and Participations | HCAP | 2016 | | | 1.555 | 0.0173% | Greece | Europe | French Civil Law | Emerging |
| Nigeria Sovereign Investment Authority | NSIA | 2011 | Commodity | Reserve investment, development | 1.470 | 0.0163% | Nigeria | Africa | Common Law | Frontier |
| Louisiana Education Quality Trust Fund | LEQTF | 1986 | Commodity | Development | 1.417 | 0.0157% | USA (Louisiana) | North America | Common Law | Developed |
| Fondo de Ahorro de Panama | FAP | 2012 | Non- commodity | Macro-stabilization, saving | 1.396 | 0.0155% | Panama | Latin America | French Civil Law | Frontier |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|---|--------------|-------------------|-------------------|--------------------------------|---------------------------|---------------------------|-----------------------|--------------------------|---------------------|-------------------------|
| Oklahoma Tobacco Settlement Endowment Trust | | 2000 | Non- commodity | | 1.360 | 0.0151% | USA (Oklahoma) | North America | Common Law | Developed |
| Fund for Productive Industrial Revolution (FINPRO) | FINPRO | 2012 | Non- commodity | Development | 1.200 | 0.0133% | Bolivia | Latin America | French Civil Law | no data |
| Senegal Strategic Investment Fund—FONSIS | SSIF | 2013 | Non- commodity | Development | 1.000 | 0.0111% | Senegal | Africa | French Civil Law | Frontier |
| Western Australian Future Fund | WAFF | 2012 | Commodity | Saving | 0.923 | 0.0102% | Australia | Australia and Pacific | Common Law | Developed |
| Development Fund for Iraq | DFI | 2003 | Commodity | Development | 0.900 | 0.0100% | Iraq | Middle East | French Civil Law | no data |
| Palestine Investment Fund* | PIF | 2003 | Non- commodity | Development | 0.856 | 0.0095% | State of Palestine | Middle East | no data | Frontier |
| Colorado School Trust Endowment | | 2001 | Non- commodity | | 0.824 | 0.0091% | USA (Colorado) | North America | Common Law | Developed |
| Sharjah Asset Management | SAM | 2008 | | | 0.793 | 0.0088% | UAE (Sharjah) | Middle East | Common Law | Emerging |
| Revenue Equalization Reserve Fund | RERF | 1956 | Commodity | Macro-stabilization | 0.609 | 0.0068% | Kiribati | Australia and Pacific | Common Law | no data |
| Ghana Petroleum Funds | GPF | 2011 | Commodity | Macro-stabilization, Saving | 0.556 | 0.0062% | Ghana | Africa | Common Law | Frontier |
| Oil Revenue Stabilization Fund of Mexico | ORSFM | 2000 | Commodity | Macro-stabilization | 0.540 | 0.0060% | Mexico | Latin America | French Civil Law | Emerging |
| Native Hawaiian Trust Fund | | | | | 0.409 | 0.0045% | USA (Hawaii) | North America | Common Law | Developed |
| National Development and Social Fund | | 2015 | Non- commodity | | 0.366 | 0.0041% | Malta | Europe | no data | no data |
| Luxembourg Intergenerational Sovereign Fund | FSIL | 2014 | | | 0.230 | 0.0026% | Luxembourg | Europe | French Civil Law | Developed |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|---|--------------|-------------------|-------------------|-------------------------------------|---------------------------|---------------------------|----------------------|--------------------------|---------------------|-------------------------|
| State Capital Investment Corporation* | SCIC | 2005 | Non- commodity | Development | 0.188 | 0.0021% | Vietnam | Asia | French Civil Law | Frontier |
| Fund for Future Generations | FFG | 2006 | Commodity | Saving | 0.166 | 0.0018% | Equatorial Guinea | Asia | French Civil Law | no data |
| Tuvalu Trust Fund | | 1987 | Non- commodity | | 0.161 | 0.0018% | Tuvalu | Australia and Pacific | no data | no data |
| Sovereign Fund of the Gabonese Republic (Gabon Sovereign Wealth Fund) | GSWF | 2012 | Commodity | Development | 0.143 | 0.0016% | Gabon | Africa | French Civil Law | no data |
| National Investment Corporation | NIC | 2012 | Commodity | Saving | 0.126 | 0.0014% | Kazakhstan | Asia | French Civil Law | Frontier |
| Uganda Petroleum Fund | | 2015 | Commodity | | 0.117 | 0.0013% | Uganda | Africa | Common Law | no data |
| Agaciro Development Fund | AGDF | 2012 | Non- commodity | Macro-stabilization, development | 0.059 | 0.0007% | Rwanda | Africa | French Civil Law | no data |
| National Fund for Hydrocarbon Reserves | NFHR/FNRH | 2006 | Commodity | Macro-stabilization, saving | 0.034 | 0.0004% | Mauritania | Africa | French Civil Law | no data |
| FEM— Macroeconomic Stabilization Fund | FEM | 2003 | Commodity | Macro-stabilization | 0.003 | 0.0000% | Venezuela | Latin America | French Civil Law | no data |
| Bhutan Economic Stabilization Fund | | 2018 | | | 0.001 | 0.0000% | Bhutan | Asia | Common Law | no data |
| Fonds stratégique d'investissement / Strategic investment fund | FSI | 2008 | Non- commodity | Development | NA | NA | France | Europe | French Civil Law | Developed |
| Russian Reserve Fund | RRF | 2004 | Commodity | Macro-stabilization | NA | NA | Russia | Europe | Socialist Law | Emerging |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|---|--------------|-------------------|-------------------|--|---------------------------|---------------------------|--------------------------|--------------------------|---------------------|-------------------------|
| Revenue Regulation Fund | RRF | 2000 | Commodity | Macro-stabilization | NA | NA | Algeria | Africa | French Civil Law | no data |
| Sovereign Wealth Fund of Brazil | SFB | 2008 | Non- commodity | Macro-stabilization, saving, development | NA | NA | Brazil | Latin America | French Civil Law | Emerging |
| Bayelsa Development and Investment Corporation | BDIC | 2012 | Non- commodity | Development | NA | NA | Nigeria | Africa | Common Law | Frontier |
| Fiscal Stability Fund | FSF | 2010 | Commodity | Macro-stabilization | NA | NA | Mongolia | Asia | German Civil Law | no data |
| Papua New Guinea Sovereign Wealth Fund | PNGSWF | 2012 | Commodity | Macro-stabilization, saving, development | NA | NA | Papua New Guinea | Australia and Pacific | Common Law | no data |
| Turkmenistan Stabilization Fund | TSF | 2008 | Commodity | Macro-stabilization | NA | NA | Turkmenistan | Asia | French Civil Law | no data |
| West Virginia Future Fund | WVFF | 2019 | Commodity | Saving, development | NA | NA | USA (West Virginia) | North America | Common Law | Developed |
| Fondo Mexicano del Petroleo para la Estabilizacion y el Desarrollo | FMP | 2014 | Commodity | Macro-stabilization, development | NA | NA | Mexico | Latin America | French Civil Law | Emerging |
| International Petroleum Investment Company | IPIC | 1984 | Commodity | Reserve investment | NA | NA | UAE (Abu Dhabi) | Middle East | Common Law | Emerging |
| Excess Crude Account | ECA | 2004 | Commodity | | NA | NA | Nigeria | Africa | Common Law | Frontier |
| Istithmar World (Dubai World) | | 2003 | Commodity | | NA | NA | UAE (Dubai) | Middle East | Common Law | Emerging |
| RAKIA (RAK Investment Authority) | RIA | 2004 | Commodity | Development | NA | NA | UAE (Ra's al Khaymah) | Middle East | Common Law | Emerging |
| Government Pension Fund Norway | GPF | 1967 | | | NA | NA | Norway | Europe | German Civil Law | Developed |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|--|--------------|-------------------|---------------|---------------------------------|---------------------------|---------------------------|-----------------|-----------------------|------------------------|-------------------------|
| Oregon Common School Fund | CSF | | | | NA | NA | USA (Oregon) | North America | Common Law | Developed |
| Abu Dhabi Investment Council | ADIC | 2007 | Commodity | Reserve investment, development | NA | NA | UAE (Abu Dhabi) | Middle East | Common Law | Emerging |
| Oil Revenue Stabilization Account | | 2002 | Commodity | Reserve investment | NA | NA | Sudan | Africa | Common Law | no data |
| DIFC Investments | DIFC | 2006 | Commodity | | NA | NA | UAE (Dubai) | Middle East | Common Law | Emerging |
| Dubai International Capital | DIC | 2004 | Commodity | | NA | NA | UAE (Dubai) | Middle East | Common Law | Emerging |
| National Disaster Fund | FONDEN | 2005 | Commodity | Development | NA | NA | Venezuela | Latin America | French Civil Law | no data |
| Queensland Investment Corporation | FNI | 1991 | Non-commodity | Development | NA | NA | Australia | Australia and Pacific | Common Law | Developed |
| Victorian Funds Management Corporation | | 1994 | Non-commodity | Saving, development | NA | NA | Australia | Australia and Pacific | Common Law | Developed |
| National Development Fund of the Executive Yuan | | 1973 | Non-commodity | | NA | NA | Taiwan | Asia | German Civil Law | Emerging |
| National Stabilization Fund | | 2000 | Non-commodity | Macrostabilization | NA | NA | Taiwan | Asia | German Civil Law | Emerging |
| 1Malaysia Development Berhad (previously: Terengganu Investment Authority) | | 2008 | Non-commodity | Development | NA | NA | Malaysia | Asia | Common Law | Emerging |
| Fonds National d'Investissements | FNI | 2000 | | | NA | NA | Algeria | Africa | French Civil Law | no data |
| Government Petroleum Insurance Fund | | 1986 | Commodity | | NA | NA | Norway | Europe | Scandinavian Civil Law | Developed |

Table 1: Continued

| SWF name * = included in sample | Abbreviation | Inception year | Origin | Purpose | AUM (billions US\$) | Percentage AUM of list | Country | Region | Legal origin | Economic development |
|--|--------------|-------------------|---------------|-------------|---------------------------|---------------------------|-----------------------|-----------------------|------------------|-------------------------|
| Shanghai Financial Holdings | | 2007 | Non-commodity | | NA | NA | China | Asia | Socialist Law | Emerging |
| Fonds des générations | | 2006 | Commodity | | NA | NA | Canada | North America | Common Law | Developed |
| Poverty Action Fund | | 1998 | Non-commodity | | NA | NA | Uganda | Africa | Common Law | no data |
| Compact Trust Fund of Micronesia | | 2004 | Non-commodity | | NA | NA | Micronesia | Australia and Pacific | no data | no data |
| RMI Trust Fund | | 2004 | Non-commodity | | NA | NA | Marshall Islands | Australia and Pacific | no data | no data |
| Phosphate Royalties Stabilization Fund | | 1968 | Commodity | | NA | NA | Nauru | Australia and Pacific | no data | no data |
| Tonga Trust Fund | | 1988 | Non-commodity | | NA | NA | Tonga | Australia and Pacific | no data | no data |
| National Oil Account | | 2004 | Commodity | Development | NA | NA | Sao Tomé and Príncipe | Africa | French Civil Law | no data |
| Guyana Natural Resource Fund | | 2019 | | | NA | NA | Guyana | Latin America | Common Law | no data |
| Savings and Stabilization Fund | SSSF | 2018 | Commodity | | NA | NA | Suriname | Latin America | French Civil Law | no data |
| Ontario First Nations Sovereign Wealth | | 2018 | | | NA | NA | Canada (Ontario) | North America | Common Law | Developed |
| Polish Development Fund | PFR | 2016 | | | NA | NA | Poland | Europe | Socialist Law | Emerging |
| Israeli Citizen's Fund | | n/a | | | NA | NA | Israel | Middle East | Common Law | Developed |
| Misr Fund | | n/a | | | NA | NA | Egypt | Middle East | French Civil Law | Emerging |
| Saudi Technology Development and Investment Company (Taqnia) | | 2011 | | | NA | NA | Saudi Arabia | Middle East | Common Law | Emerging |

half of the SWFs come from emerging countries and only a small number are from ‘frontier countries’ (based on SWF Institute’s classification; see [Figure 2](#) and [Table 1](#)). [Figure 3](#) shows the legal origin of the sample SWFs: SWFs primarily originate from English common law countries and the SWFs originating from socialist law countries are all from China. About 40 per cent of the SWFs source their funds from the government’s sales of commodity resources ([Figure 4](#)). Only about one-third of SWFs are highly transparent according to Truman’s transparency scores ([Figure 5](#)).

The coverage of the holding (ownership) data of the SWFs prior to 2009 is not complete and many of the target firms do not have an ESG score⁵ (collected from Thomson Reuters’ Asset4 ESG ratings) at that time. For this reason, our sample period spans the period from 2009 to 2018 (nevertheless, we also show results for the full sample period of 2004–18 for robustness). Availability of equity ownership data for the 24 SWFs leads to a sample of 7,784 target firms. When we restrict the sample to all firm-years for which ESG scores are available in Asset4, we retain 30,879 firm-year observations. For 25,507 firm-years (or 82.6 per cent), SWF ownership can be collected. FactSet’s source for ownership of US and Canadian traded equities are mandatory quarterly 13F filings with the Securities and Exchange Commission (SEC). For non-North American equities, institutional ownership is collected from national regulatory agencies, stock exchange announcements, company proxies, or annual reports.

It is important to note that although SWFs invest in multiple asset classes, we only analyse their positions in public equity (investments in listed companies) because price and ESG information on their other investments such as private equity, bonds, real estates, or commodities is usually not available. The ownership data enable us to construct the listed equity portfolio of SWFs and study the role of their presence in the ownership structure of target firms.

(ii) Control variables

When studying the determinants of an SWF investment decision in a target firm, we also consider a set of control variables. First, as [Chhaochharia and Laeven \(2009\)](#), [Kotter and Lel \(2008\)](#), and [Fernandes \(2009\)](#) document that SWFs prefer to invest in large organizations, we take the logarithm of market capitalization ($\log MCAP$) of a portfolio company as a proxy for firm size. Second, firm performance is measured by return on assets (*ROA*), sales growth (*Sales Growth*), annual stock returns (*Annual Return*), and the market-to-book ratio of equity (*Market to Book ratio*). In addition to a firm’s financial performance, we also control for operational efficiency (*Operating*

⁵ The score ranges from 0 to 100 and comprises three pillars (E, S, and G), each counting for about one-third. The environmental pillar is based on subscores related to resource use, emissions, environmental innovation; the social pillar concentrates on workforce, human rights, community orientation, and product responsibility; the governance pillar evaluates management quality, shareholder involvement, and CSR strategy. Additionally, firms are penalized when involved in a scandal captured by means of 23 ESG controversy topics. The data are processed by over 150 content research analysts and incorporate over 400 ESG metrics for 178 critical ESG measures in the ESG scoring, based upon more than 400 data points, ratios, and analytics. The ESG data are retrieved from company reports covering over 7,000 public companies globally, which in most cases disclose ESG information on a yearly basis. Out of the 7,000 firms that are assigned an ESG score, approximately 2,300 firms are located in North America, 1,200 in Europe, 970 in Asia (excluding Japan), 430 in Japan, 450 in Oceania, 370 in Latin America, and approximately 230 in Africa.

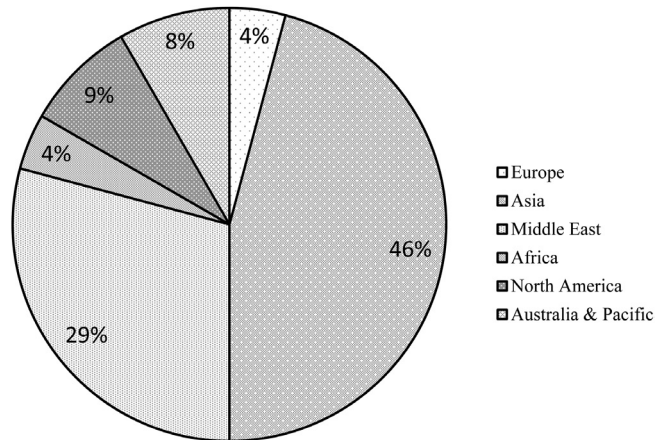
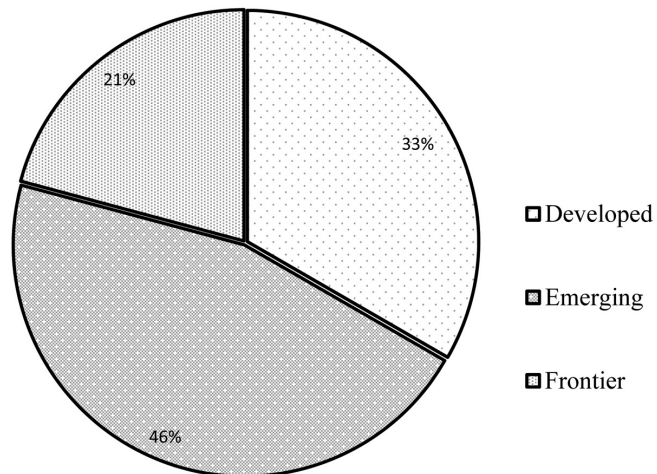
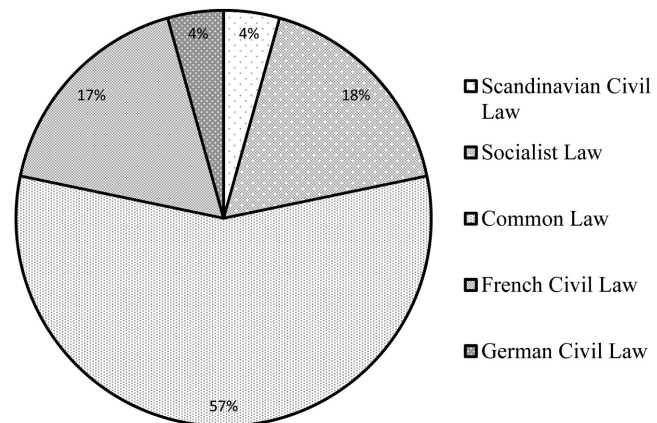
Figure 1: Regions of sample SWFs (number of SWFs)**Figure 2:** Economic development of sample SWFs' home country (based on number of SWFs)**Figure 3:** Legal origin of SWFs in sample by number of SWFs

Figure 4: Source of funding (the numbers in the figure refer to the number of SWFs)

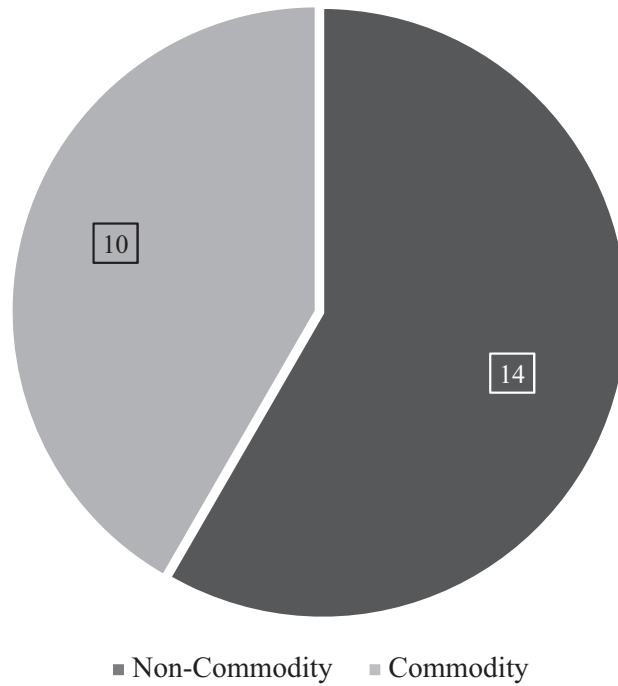


Figure 5: Truman's transparency score (the numbers in the figure refer to the number of SWFs)

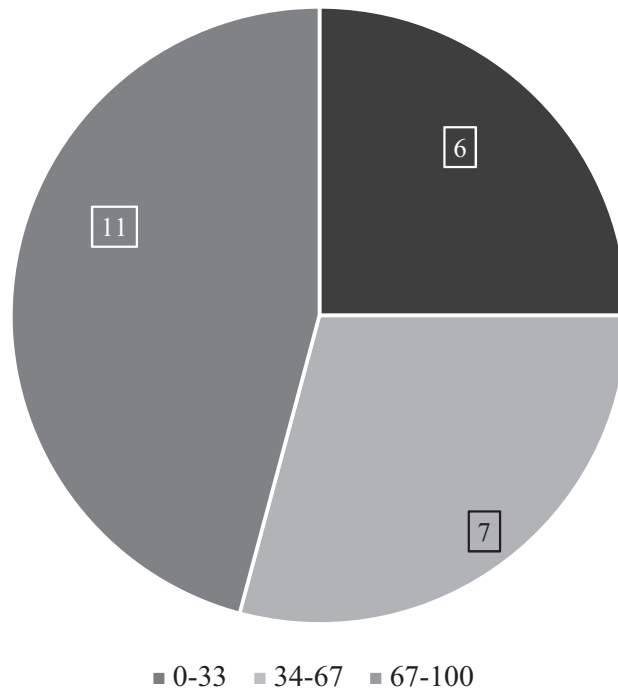


Table 2: Number of listed firms with ownership stakes by SWFs

| Year | Firms in sample | Firms with SWF ownership | Percentage of total sample | Firms with >1% SWF ownership | Percentage of total sample | Average SWF ownership (%) |
|------|-----------------|--------------------------|----------------------------|------------------------------|----------------------------|---------------------------|
| 2009 | 7,693 | 4,872 | 63.3303 | 1,206 | 15.6766 | 1.182 |
| 2010 | 7,693 | 5,238 | 68.0879 | 1,721 | 22.3710 | 1.524 |
| 2011 | 7,693 | 4,949 | 64.3312 | 1,381 | 17.9514 | 1.165 |
| 2012 | 7,693 | 5,113 | 66.4630 | 1,526 | 19.8362 | 1.298 |
| 2013 | 7,693 | 5,105 | 66.3590 | 1,754 | 22.7999 | 1.474 |
| 2014 | 7,693 | 5,413 | 70.3627 | 2,351 | 30.5602 | 1.654 |
| 2015 | 7,693 | 5,747 | 74.7043 | 2,803 | 36.4357 | 1.695 |
| 2016 | 7,693 | 6,154 | 79.9948 | 3,338 | 43.3901 | 1.737 |
| 2017 | 7,693 | 6,821 | 88.6650 | 4,170 | 54.2051 | 1.874 |
| 2018 | 7,693 | 7,209 | 93.7086 | 4,739 | 61.6015 | 2.068 |

Margin) which captures how much profit a company generates from a dollar of sales, the value of sales relative to assets (*Asset Turnover ratio*), the goodwill to assets ratio (*Goodwill to Assets ratio*) which captures the know-how and uniqueness of the target firm (Kotter and Lel, 2011), and the capital expenditure to sales ratio (*Capex to Sales ratio*) is used as a proxy for the target firm's investment intensity. We also control for dividend yield (*Div Yield*) to proxy for payout policy of target firms, the capital structure (*Leverage*), the ratio of cash to total assets (*Cash Assets ratio*), and the fixed charge coverage ratio (*Fixed Charge Coverage ratio*) that measures the ability to pay all fixed charges or expenses by means of the EBIT.

(iii) Descriptive statistics

The summary statistics of SWFs' holdings (ownership in target firms) are displayed in [Table 2](#). The statistics show that the number of firms in the sample in which SWFs have an ownership stake increases significantly during our sample period, from 4,872 (63.33 per cent) in 2009 to 7,209 (93.71 per cent) in 2018. Also, the average ownership stake SWFs have in their target firms increases throughout the sample period, from 1.18 per cent in 2009 to 2.07 per cent in 2018. Additionally, the number of firms of which SWFs hold 1 per cent or more of the ownership increases rapidly, from 1,206 (15.68 per cent) firms in 2009 to 4,739 (61.60 per cent) firms in 2018. The total number of firm-year observations in the sample in which SWFs have 1 per cent or more ownership in the firm amounts to 32.60 per cent of the firm-years. However, this amount rapidly decreases when the ownership threshold increases. For example, the firm-year observations in the sample in which SWFs have a stake of 5 per cent or more ownership in the target firm is only 3.57 per cent and a stake of 10 per cent or more only accounts for 1.50 per cent of the total observations. Overall, we can state that SWF ownership during the period from 2009 to 2018 rapidly increased in many of the firms included in the sample, through either buying new firms or buying more shares in the companies already included in their portfolios. The descriptive statistics of the dependent and independent variables are presented in [Table 3](#).

Table 3: Summary statistics of main and control variables

This table reports summary statistics on the main variables and control variables for the period 2009–18. Market capitalization is displayed in million US\$. To mitigate the impact of outliers, continuous variables are Winsorized at the top and bottom 1 percentile. All variables are defined in the Variable Definition section.

| | Obs. | Mean | St. Dev. | Min | P25 | Median | P75 | Max |
|---------------------------------------|--------|-----------|------------|----------|-----------|-----------|-----------|------------|
| Main variables | | | | | | | | |
| % SWF ownership | 30,879 | 1.433 | 2.760 | 0.000 | 0.242 | 0.797 | 1.523 | 74.310 |
| Δ SWF ownership | 30,866 | 0.120 | 1.259 | -39.655 | -0.050 | 0.008 | 0.247 | 74.299 |
| ESG score | 30,879 | 46.694 | 16.779 | 7.060 | 34.050 | 44.710 | 59.080 | 95.660 |
| Δ ESG | 27,893 | 0.878 | 12.199 | -66.650 | -3.590 | 0.720 | 5.560 | 62.610 |
| E score | 30,860 | 53.774 | 31.680 | 8.300 | 19.750 | 56.440 | 86.730 | 95.520 |
| S score | 30,792 | 53.642 | 31.158 | 3.680 | 22.550 | 56.420 | 84.800 | 98.140 |
| G score | 30,799 | 47.394 | 30.589 | 1.030 | 16.930 | 49.220 | 75.640 | 98.200 |
| Control variables | | | | | | | | |
| Annual return (%) | 30,210 | 11.473 | 45.452 | -75.000 | -13.951 | 6.166 | 29.411 | 259.383 |
| Market capitalization (US\$ millions) | 30,575 | 8,245,712 | 12,534,550 | 21,290 | 1,629,120 | 3,641,480 | 8,527,360 | 63,647,090 |
| Dividend yield (%) | 30,602 | 2.494 | 2.393 | 0.000 | 0.640 | 1.980 | 3.670 | 11.540 |
| Leverage (debt to equity ratio) | 30,760 | 104.047 | 167.894 | -184.400 | 19.220 | 55.275 | 117.320 | 1,055.600 |
| ROA (%) | 30,274 | 5.307 | 8.829 | -40.350 | 1.650 | 4.790 | 8.810 | 34.630 |
| Sales growth (%) | 30,182 | 10.756 | 31.337 | -47.810 | -1.420 | 5.735 | 15.300 | 261.230 |
| Cash assets ratio (%) | 25,051 | 36.540 | 23.544 | 0.920 | 17.710 | 31.920 | 52.180 | 97.170 |
| Market to book ratio (equity) | 30,069 | 2.685 | 3.054 | -0.540 | 1.050 | 1.710 | 3.080 | 19.360 |
| Fixed charge coverage ratio (%) | 26,003 | 85.292 | 429.644 | -112.890 | 2.690 | 6.860 | 20.330 | 3,930.470 |
| Operating margin ratio (%) | 30,587 | 11.277 | 31.471 | -260.460 | 5.044 | 11.295 | 21.589 | 63.773 |
| Capex to sales ratio (%) | 30,587 | 12.638 | 28.085 | 0.000 | 2.023 | 4.339 | 10.390 | 215.062 |
| Asset turnover ratio (%) | 21,899 | 2.288 | 1.525 | 0.000 | 1.286 | 1.958 | 2.897 | 8.383 |

(iv) Methodology

Our unit of empirical analysis is at the holding level, i.e. a firm that receives an SWF investment. We first test the relation between the level of investment by an SWF (i.e. SWF ownership) in a target firm and the firm's (change in) ESG performance. As the level of investment by SWF in a portfolio company is conditional on the SWF's decision to invest in the company in the first place (i.e. a SWF first decides to invest in a company, then decides how much to invest in the company), there may be a potential selection bias if we directly regress firm-level ESG ratings on firm-level SWF ownership. In order to take into account such potential selection bias, we first estimate a Heckman selection model. This is essentially a two-stage model, with the first stage testing the determinants of whether to invest in a firm or not (i.e. a selection model, which is a probit regression with the dependent variable as a dummy capturing whether or not the SWF takes a stake in the target), and the second stage testing how much the SWF invests in the firm in terms of ownership stakes (with the dependent variable being a continuous variable capturing the percentage SWF ownership stakes).⁶ The models are firm-level random effects in combination with year and sector fixed-effects and standard errors are clustered at the firm level. The independent variables include the level ESG score of target firms and the changes in ESG performance, in addition to a set of control variables, all of which are lagged by 1 year. The estimated equations are shown as follows, whereby the definitions of the variables are given in Appendix I:

$$\begin{aligned} \% / Dum \text{ SWF Ownership}_{i,t} = & \alpha + \beta_{1a} ESG \text{ score}_{i,t-2} + \beta_{1b} \text{Change in ESG score}_{i,(t-2,t-1)} \\ & + \beta_2 \log(MCAP)_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 \text{Sales Growth}_{i,t-1} \\ & + \beta_5 \text{Annual Return}_{i,t-1} + \beta_6 \text{Market to Book ratio}_{i,t-1} \\ & + \beta_7 \text{Operating Margin ratio}_{i,t-1} + \beta_8 \text{Asset Turnover ratio}_{i,t-1} \\ & + \beta_9 \text{Goodwill to Assets ratio}_{i,t-1} + \beta_{10} \text{Capex to Sales ratio}_{i,t-1} \\ & + \beta_{11} \text{Div Yield}_{i,t-1} + \beta_{12} \text{Leverage}_{i,t-1} \\ & + \beta_{13} \text{Cash Assets ratio}_{i,t-1} \\ & + \beta_{14} \text{Fixed Charge Coverage ration}_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

In addition, we also test whether SWFs put a higher emphasis on one particular ESG pillar relative to the others, by replacing the general ESG score in Equation (1) by the environment, social, and corporate governance subscores respectively in multivariate panel models.

While the above equations focus on selection, i.e. whether a fund selects target firms based on firms' ESG performance, it may be that the ESG scores are affected by the existing SWF ownership, which would be an engagement effect. The selection versus engagement effects boil down to an endogeneity issue to which our models may be liable and which would prevent causal claims. In order to address this issue, we use exogenous events leading to a shock in ESG score. We use a difference-in-difference method based on two major global ESG shocks, namely the Deepwater Horizon oil spill in April 2010 and the Volkswagen emissions scandal in September 2015. In the

⁶ We also conduct a set of robustness tests using probit models with dummies taking the value of 1 if SWFs take at least an ownership stake of 0.5%, 1%, 2%, or larger.

difference-in-difference regressions, we use 15 ESG subscores from Asset4, which are more granular measures of a firm's ESG performance, because these measures (such as product safety indicators) are more sensitive to the above shocks. We study the effect of the shocks on a sample of publicly listed firms active in the above-mentioned industries and with a market capitalization of at least US\$500m. Additional firms that do not have SWF ownership and fit the sample criteria are added to the database to form the control group. The key variable of interest is the interaction between an event dummy and an SWF ownership dummy.

IV. Results

(i) ESG statements by SWFs

In order to gain the first insights on the relationship between SWFs and ESG, we study SWF statements concerning ESG investment policies of the SWFs managing more than US\$100 billion (which represents 15 SWFs owning 96.42 per cent of all AUM covered in our sample). The websites, and if available annual reports and ESG reports of the SWFs, are analysed by searching for keywords such as: 'responsible,' 'sustainability,' 'ethics,' 'ESG,' 'CSR,' etc. Subsequently, we also examine the statements of each SWF using a similar approach based on these keywords. Seven out of the 15 analysed SWFs disclose the use of ESG metrics in their investment decision process. In terms of ethical investing, the NGPF-G is considered a pioneer as it not only selects target firms that meet its ethical guidelines, but also explicitly claims to exercise its ownership rights to engage with target firms in order to improve their ESG policy. Also, the South-African PIC has an extensive ESG policy and aims at meeting its investment objectives while investing for sustainable growth, inclusivity, and transformation. PIC uses ESG metrics to measure investee companies' ESG compliance and identify areas for engagement. It engages in target firms' ESG issues through shareholder activism via proxy-voting. The NZSF has a stated climate change strategy factoring in the risks and opportunities stemming from climate change in its investment strategies and ownership practices. Besides these three SWFs, we also discovered that the HKMA, GIC, TH, KIC, and AFF explicitly state that they incorporate ESG measures in their investment decision process. A common belief among the SWFs with an ESG policy is that effective management of ESG risks and opportunities supports return maximization. CIC does not state a specific ESG policy, but mentions respect for local social norms and public opinion. SAMA is active in social projects supporting education and research on autism.

We calculate the value-weighted ESG score per SWF per year based on target firms' ESG ratings, the market value of the ownership stake an SWF has in a target firm, and the market value of its portfolio in a specific year. We show the value-weighted ESG scores of the NGPF-G, GIC, PIC, NZSF, KIA, PSF, and KIC in [Table 4](#). On average, the SWFs have a value-weighted ESG score of 48, which is slightly higher than the average ESG score of the sample (by almost 2 points). The average value-weighted ESG score of all SWFs combined per year varies between 45 in 2009 and 53.55 in 2016. Overall, the value-weighted ESG scores of the individual SWFs seem in line with their disclosed

Table 4: Value-weighted ESG score per SWF per year

This table reports the value-weighted ESG score for the SWFs in the sample having at least 100 holdings each year. The value-weighted ESG scores is calculated based on the market value of a target firm and the SWF ownership stake in this firm. By multiplying the ownership stake and the firm's market value, we calculate the value of the ownership stake. By doing so for all firm-year observations and summing the value of the ownership stakes per year we generate the value of the portfolio of a SWF each year. The stakes are then value-weighted by dividing the value of the ownership stake in the target firm by the value of the portfolio of the SWF that year. Subsequently, by multiplying the ESG score of the firm in that year times the weight of the ownership stake that year, the value-weighted ESG score of each SWF each year is determined.

| Year | NGPFG | # Obs. | GIC | # Obs. | PIC | # Obs. | NZSF | # Obs. | KIA | # Obs. | PSF | # Obs. | KIC | # Obs. |
|---------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|
| 2009 | 48.25 | 3,538 | 46.79 | 158 | 44.50 | 105 | 49.45 | 1,369 | 43.19 | 100 | 40.89 | 431 | 41.94 | 121 |
| 2010 | 49.68 | 3,801 | 49.88 | 155 | 53.47 | 112 | 56.21 | 2,781 | 44.30 | 105 | 41.38 | 461 | 44.05 | 127 |
| 2011 | 47.73 | 3,810 | 46.51 | 143 | 51.78 | 102 | 54.29 | 2,947 | 43.83 | 127 | 38.63 | 348 | 40.20 | 115 |
| 2012 | 49.23 | 3,822 | 49.45 | 165 | 57.94 | 109 | 53.45 | 3,106 | 47.78 | 136 | 42.29 | 364 | 44.04 | 216 |
| 2013 | 48.98 | 3,766 | 49.02 | 194 | 54.60 | 111 | 49.65 | 3,214 | 48.62 | 137 | 41.01 | 392 | 41.70 | 184 |
| 2014 | 47.17 | 4,109 | 49.98 | 215 | 48.13 | 119 | 47.91 | 3,288 | 47.03 | 147 | 40.76 | 409 | 42.89 | 226 |
| 2015 | 49.81 | 4,426 | 53.32 | 222 | 52.13 | 120 | 49.56 | 3,404 | 50.34 | 172 | 45.22 | 427 | 46.35 | 210 |
| 2016 | 55.91 | 4,671 | 57.09 | 265 | 55.28 | 130 | 54.28 | 3,527 | 54.59 | 171 | 47.19 | 459 | 50.52 | 279 |
| 2017 | 52.51 | 4,869 | 51.52 | 300 | 49.34 | 129 | 51.55 | 3,735 | 48.93 | 131 | 45.39 | 487 | 47.14 | 268 |
| 2018 | 50.12 | 5,185 | 48.79 | 325 | 40.45 | 153 | 48.64 | 3,747 | 46.75 | 122 | 42.84 | 513 | 43.83 | 322 |
| Average | 49.94 | | 50.24 | | 50.76 | | 51.50 | | 47.54 | | 42.56 | | 44.27 | |

Table 5: The effect of portfolio company's ESG performance on SWF ownership

This table displays the Heckman method regressions in Panels A (Models (1)–(4)), B, and C. The dependent variable is either a continuous percentage of SWF ownership in a target firm or a dummy of specific percentages ownership of SWFs. In Panel A, Model (1) is the selection equation of a Heckman model and Model (2) is its regression model. Item for Models (3) and (4), respectively. The primary variable that is of interest is the level ESG score. Besides this, multiple control variables are added in the regression. The main- and control variables are defined in the Variable Definitions section and Appendix III. The regression includes year-level and industry level fixed-effects or a probit panel regression with firm-level random effects in combination with year and sector fixed effects and clustered standard errors. The results of the regression using multiple subsamples are displayed. Control variables are winsorized at the top and bottom 1 percentile. The t-statistics are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

| | Panel A: Samples including all SWF ownership data | | | | | | |
|----------------------------------|---|----------------------|----------------------|----------------------|---------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Sample Period: | All SWFs 2004–18 | All SWFs 2004–18 | All SWFs 2009–18 | All SWFs 2004–18 | All SWFs 2009–18 | All SWFs 2009–18 | All SWFs 2009–18 |
| Model: | | | Heckman Model | | | | |
| Dependent variable: | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum 0.5% Own. | Dum 1% Own. | Dum 2% Own. |
| ESG score (t–1) | 0.011*** (7.70) | 0.009*** (7.29) | 0.013*** (8.27) | 0.010*** (5.50) | 0.004** (2.33) | 0.004*** (2.90) | 0.005*** (2.60) |
| Log(market capitalization) (t–1) | 0.209*** (11.10) | –0.162*** (–7.76) | 0.115*** (5.49) | –0.182*** (–8.38) | 0.083** (2.50) | –0.067** (–2.08) | –0.189*** (–4.70) |
| ROA (t–1) | –0.0014 (–0.44) | 0.012*** (4.30) | –0.000 (–0.04) | 0.015*** (4.51) | 0.002 (0.56) | 0.015*** (4.36) | 0.014*** (3.23) |
| Sales growth (t–1) | –0.0005 (–0.73) | 0.002** (2.18) | 0.000 (–0.015) | 0.002** (1.97) | –0.000 (–0.56) | –0.001 (–1.39) | –0.001 (–0.95) |
| Annual return (t–1) | –0.000 (–0.68) | 0.001 (1.49) | 0.000 (0.54) | 0.001* (1.66) | 0.001 (1.10) | 0.002*** (3.49) | 0.001 (1.55) |
| Market to book ratio (t–1) | –0.035*** (–4.77) | 0.027*** (3.64) | –0.037*** (–4.38) | 0.030*** (3.14) | –0.023** (–1.96) | –0.030*** (–2.62) | 0.004 (0.34) |
| Operating margin ratio (t–1) | –0.001 (–1.07) | 0.001 (1.35) | –0.001 (–0.65) | 0.002 (1.45) | 0.001 (0.92) | –0.001 (–0.23) | 0.003 (1.01) |
| Asset turnover ratio (t–1) | 0.055*** (3.14) | –0.012 (–0.79) | 0.055*** (2.60) | –0.013 (–0.71) | –0.009 (–0.31) | 0.023 (0.81) | 0.021 (0.65) |
| Goodwill to assets ratio (t–1) | 0.000 (0.92) | 0.000 (0.46) | 0.001 (1.60) | 0.000 (0.23) | 0.001*** (3.65) | 0.001*** (3.84) | 0.001** (2.54) |
| Capex to sales ratio (t–1) | 0.000 (0.23) | –0.001 (–0.60) | 0.001 (0.85) | –0.001 (–0.51) | –0.001 (–0.93) | –0.005*** (–3.62) | –0.003* (–1.75) |
| Dividend yield (t–1) | –0.010 (–0.99) | 0.083*** (9.40) | –0.007 (–0.66) | 0.084*** (8.55) | 0.018 (1.48) | 0.037*** (3.41) | 0.043*** (3.08) |
| Leverage (t–1) | 0.000 (1.31) | –0.000* (–1.80) | 0.000 (0.06) | –0.000* (–1.65) | –0.000 (–1.07) | –0.000 (–0.27) | –0.000 (–1.25) |

Table 5: Continued

| Panel A: Samples including all SWF ownership data | | | | | | | |
|---|----------------------|----------------------|-------------------|----------------------|--------------------|---------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Cash assets ratio ($t-1$) | 0.002 (1.44) | -0.006*** (-6.15) | 0.001 (0.94) | -0.007*** (-6.37) | -0.003* (-1.76) | -0.003** (-2.11) | -0.006*** (-2.95) |
| Fixed charge coverage ratio ($t-1$) | 0.000 (1.26) | -0.000*** (-4.64) | 0.000 (1.22) | -0.000*** (-4.26) | -0.000 (-1.11) | -0.000 (-0.22) | -0.000 (-1.54) |
| Constant | -1.145*** (-5.85) | 1.198*** (3.36) | 0.563** (2.00) | 1.822*** (5.74) | 0.024 (0.07) | -0.237 (-0.70) | -1.923*** (-4.26) |
| Lambda | | -0.711 (-1.09) | | -0.601 (-0.50) | - | - | - |
| Firm RE | No | | No | | Yes | Yes | Yes |
| Year FE | Yes | | Yes | | Yes | Yes | Yes |
| Industry FE | Yes | | Yes | | Yes | Yes | Yes |
| Firm-level clustered std. error | No | | No | | Yes | Yes | Yes |
| No. observations | 19,150 | 19,150 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 |
| No. of clusters | | | | | 2,583 | 2,583 | 2,583 |
| Wald chi-squared | 1722 | | 1087 | | 1309 | 1514 | 714.5 |

Panel B: Alternative SWF selection with definitions based on economic development or legal origin (sample period 2009–2018)

| Sample | Developed SWFs | | | Emerging SWFs | | | Frontier SWFs | | | Civil Law SWFs | | | Common law SWFs | | |
|---------------------|--------------------|--------------------|-------------------|--------------------|--------------------|-----------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| Dependent variable: | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | % SWF |
| ESG Score ($t-1$) | 0.013*** (9.11) | 0.005*** (6.71) | -0.000 (-0.37) | 0.019*** (3.73) | 0.006*** (5.15) | 0.004 (0.28) | 0.0084*** (7.91) | 0.005*** (6.02) | 0.010*** (11.70) | 0.006*** (3.29) | 0.010*** (11.70) | 0.006*** (3.29) | 0.010*** (11.70) | 0.006*** (3.29) | 0.006*** (3.29) |
| Lambda | | 0.242 (0.60) | | -0.440 (-0.10) | 1.955 (0.62) | 1.955 (0.62) | | -0.605* (-1.75) | | -0.605* (-1.75) | | 0.238 (0.53) | | 0.238 (0.53) | 0.238 (0.53) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| No. observations | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 |
| Wald chi-squared | 1343 | | 819.2 | | 194.3 | | 1430 | | 785.9 | | 785.9 | | 785.9 | | 785.9 |

Table 5: Continued

| Panel C: Alternative SWF selection with definitions based on disclosed ESG statements, Truman's transparency scoreboard, and SWF ownership data | | | | | | | | | | |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|----------------------|----------------------|
| Sample | ESG policy SWFs | | non-ESG SWFs | | Transparent SWFs | | Excl. NGPF-G & PIC | | NGPF-G | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Dependent variable: | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF | Dum SWF Own. | % SWF |
| ESG Score (t-1) | 0.013*** (6.65) | 0.011*** (9.57) | 0.002** (2.52) | -0.018 (-0.49) | 0.011*** (8.35) | 0.004*** (5.90) | 0.007*** (8.20) | -0.001 (-0.71) | 0.009*** (8.04) | 0.004*** (5.64) |
| Lambda | 1.142 (1.30) | 1.142 (1.30) | -10.590 (-0.53) | -10.590 (-0.53) | -0.497 (-1.33) | -0.497 (-1.33) | -0.497 (-1.33) | -0.028 (-0.12) | -0.919*** (-3.21) | -0.919*** (-3.21) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| No. observations | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 | 16,187 |
| Wald chi-squared | 1,171 | 1,171 | 29.79 | 16,187 | 1,416 | 16,187 | 220.6 | 16,187 | 1,672 | 16,187 |

statements concerning CSR on websites and reports. The NZSF, PIC, and NGPF-G have a relatively high ESG score of 50 or above. In spite of their explicit ESG statements, PSF and KIC have lower weighted-average ESG scores than the sample average.

(ii) Multivariate results

Selection of target firms

In the Heckman selection models of Panel A of Table 5, the dummy variable SWF ownership (with 1 representing an investment in a target firm and 0 otherwise) is the dependent variable of the first-stage probit regression, and the percentage SWF ownership, a continuous variable, is the dependent variable of the second-stage OLS regression. Columns (1) and (2) show the first- and second-stage results from the Heckman model estimation for the full sample (from 2004 to 2018), and Columns (3) and (4) show the results from the same test on the subsample covering the post-crisis period (2009–18). The independent variable of interest is the lagged ESG score, which in almost all regressions has a positive coefficient that is significant at the 1 per cent level for both stages across columns (1)–(4). This indicates that firms with higher ESG ratings are more often a target firm of an SWF, and SWFs take larger ownership stakes in those firms. The insignificant inverse Mill's ratio indicates that there may not be a selection bias as the error terms of both equations are not significantly correlated. Columns (5)–(8) of Panel A also show results from (probit) random effects models explaining SWF investments above the 0.5, 1, and 2 per cent ownership levels in target firms and confirm that better ESG performance is associated with higher likelihood of SWFs making such investments.

In Panel B, we explore the cross-country variations in the effects reported in Panel A. We note that a firm's ESG score is positively and significantly correlated with its SWF ownership in both stages of the Heckman model if the SWF is from a developed economy, whereas it is only significant in the second-stage for SWFs from emerging economies, and only significant in the first-stage for SWFs from frontier economies. Focusing on the legal origin and disentangling SWFs originating from common- and civil-law countries, we find that the ESG score of a firm is positively and significantly correlated with SWF ownership in both stages of the Heckman model and the parameter estimates are similar in models (7)/(8) and (9)/(10). In Panel C, we compare the results for SWFs that have an explicit ESG policy (columns (1)–(2)) with those without ESG statements (columns (3)–(4)). As expected, we find that the ESG score has a much stronger correlation with the SWF's decision to invest and the ownership stakes for the SWFs with an explicit ESG policy. In other words, SWFs seem to put their money where their mouth is. The relation between firm ESG performance and SWF investment is also strong for transparent SWFs (columns (5)–(6)). We also perform a few robustness tests whereby we exclude the NGPF-G and PIC SWFs from the sample as these two funds have explicit ESG focus in their investment policies and represent a vast part of the firm-year observations. We note that in columns (7)–(8), as expected, the elimination of these funds reduces the relation between ESG and SWF ownership, but ESG still predicts the likelihood of a firm being targeted by SWF (i.e. significance in the first stage). Focusing solely on the ownership data of the NGPF-G, the ESG activist Norwegian fund (columns (9) and (10)), we observe a significant positive effect in both stages of the model.

Table 6 (Panel A) exhibits the multivariate panel regression results with percentage SWF ownership as the dependent variable and both the absolute ESG score (i.e. the level of ESG) and the change of ESG score from $t-2$ to $t-1$ as explanatory variables for different sample periods. The first two models in columns (1) and (2) point out that not only the levels of ESG (measured at $t-2$) but also the subsequent changes in ESG affect the SWFs' investment decision and the size of the investment. The probit random effects models in columns (3)–(5) show that changes in ESG lead to a significant increase in investments of more than 1 per cent (of the equity) in target firms. In Panel B, we find that it is mainly the SWFs from developed countries (column (1)) that invest in firms with high ESG scores and respond to ESG performance increases. This is not the case for SWFs from emerging or frontier countries (columns (2)–(3)). The coefficients of lagged level ESG score and lagged changes in ESG score of civil law SWFs are positive and significant, but those for SWFs from common law countries are not. This is in line with [Liang and Renneboog \(2017\)](#) who show that firms in civil-law countries are more sensitive to ESG issues. Expectedly, when comparing SWFs with and without an ESG policy, the former respond more strongly to both levels and changes in firms' ESG. Panel C of **Table 6** confirms the results of **Table 5**.⁷

Engagement with target firms

While the above analysis focuses on selection (i.e. how a firm's ESG performance affects its SWF's decision to invest in it), we also examine the effects of SWF engagement as it may be that an SWF investment affects the ESG policy of firms which will then be reflected in the ESG scores. To do so, ideally, we would have a setting which exogenously intensifies the costs or benefits of ESG in the portfolio company to existing investors, but does not directly drive their decision to invest in or divest the company. As most SWFs invest in the market index, whereas the ESG scores are also given to companies on major equity indices (i.e. public companies with large market capitalization), completely divesting companies from their portfolios is not usually feasible. As a result, the change in the correlation between SWF ownership and its portfolio companies' ESG scores following an exogenous 'shock' mostly reflects whether the SWF actively engages with target companies. Therefore, we employ a difference-in-difference analysis exploiting some exogenous shocks to ESG issues. We focus on two major environmental shocks: the Deepwater Horizon oil spill and the Volkswagen emissions scandal. The former refers to the BP oil platform that exploded in the Gulf of Mexico, and created a shockwave in the oil and gas extraction and petroleum refining industries. The latter refers to the disclosure that Volkswagen had installed devices in its diesel engines to manipulate test results in order to cheat in the emissions tests in the US, leading to a shock in the motor vehicles and passenger car bodies industry. We use detailed ESG measures (the components of the general ESG score), which are expected to capture aspects that are most affected by

⁷ When we repeat the analysis in **Tables 5** and **6**, replacing the total ESG score by the environmental, social, and corporate governance subcomponent scores, we find that the lagged ESG subscore coefficients are all positive and statistically significant, which suggests that SWFs invest primarily in firms with higher levels of E, S, and G practice, but that there is no bias towards specific E, S, and G pillars. The results for the ESG subscores are also upheld when we use different sample periods (2004–18 or 2009–18) and different SWF ownership dummies (0.5%, 1%, 2%). The E, S, and G pillar scores are also significant and positive for SWFs originating from developed countries, whereas they are insignificant for SWFs from emerging and frontier countries.

Table 6: The effects of portfolio company's past ESG level and change on SWF ownership

This table reports the multivariate (probit) panel regression in panels A, B, and C. The dependent variable is either a continuous percentage of SWF ownership in a target firm or a dummy of a specific percentage ownership of SWFs. The main variables of interest are level ESG score at $t=2$ and change in ESG score between $t=1$ and $t=2$. Besides this, multiple control variables are added in the regression. The main- and control variables are defined in the Variable Definitions section. The regression includes firm-level fixed effects or firm-level random effects in combination with year and sector fixed effects, and clustered standard errors. Control variables are winsorized at the top and bottom 1 percentiles. The t-statistics are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

| Sample | Panel A: Samples including all SWF ownership data | | | |
|--|---|--------------------------------------|--------------------------|--|
| | All SWFs (1) | All SWFs (2) | All SWFs (3) | All SWFs (4) |
| Period: | 2004–18 | 2009–18 | 2009–18 | 2009–18 |
| Model: | Panel fixed-effects model | 2009–18 Panel fixed-effects model | 2009–18 Dum 0.5% Own. | 2009–18 Probit panel random-effects model |
| Dependent variable: ESG Score ($t-2$) | % SWF ownership 0.007*** (3.96) | 0.004* (1.86) | 0.005** (2.09) | Dum 2% own. 0.008*** (3.55) |
| Δ ESG Score ($t-1, t-2$) | 0.004*** (4.45) | 0.002* (1.77) | 0.002 (1.04) | 0.003** (2.15) |
| Control variables | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | No | No |
| Firm RE | No | No | Yes | Yes |
| Year FE | No | No | Yes | Yes |
| Sector FE | No | No | Yes | Yes |
| Firm-level clustered std. error | Yes | Yes | Yes | Yes |
| No. observations | 20,013 | 17,387 | 14,930 | 14,930 |
| No. of clusters | 2,681 | 2,679 | 2,379 | 2,379 |
| Adjusted R-squared | 0.019 | 0.004 | 1154 | 1415 |
| Wald chi-squared | | | | 687.8 |

Table 6: Continued

| Panel B: Alternative SWF selection with definitions based on economic development or legal origin | | | | | |
|---|--------------------|-------------------|--------------------|--------------------|--------------------|
| | Developed SWFs | Emerging SWFs | Frontier SWFs | Civil law SWFs | Common law SWFs |
| Sample | (1) | (2) | (3) | (4) | (5) |
| Dependent variable: ESG Score ($t-2$) | 0.005*** (4.77) | -0.002 (-1.05) | 0.000 (0.45) | 0.004*** (4.47) | -0.000 (-0.20) |
| Δ ESG Score ($t-1, t-2$) | 0.002*** (3.65) | -0.000 (-0.71) | -0.000 (-0.92) | 0.002*** (3.49) | -0.000 (-0.60) |
| Control variables | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes |
| Firm-level clustered std. error | 17,387 | 17,387 | 17,387 | 17,387 | 17,387 |
| No. of clusters | 2,679 | 2,679 | 2,679 | 2,679 | 2,679 |
| Adjusted R-squared | 0.009 | 0.001 | 0.002 | 0.008 | 0.001 |
| Panel C: Alternative SWF selection with definitions based on disclosed ESG statements, Truman's transparency scoreboard, and SWF ownership data | | | | | |
| | ESG policy SWFs | Non-ESG SWFs | Transparent SWFs | Excl. NGPF-G & PIC | NGPF-G |
| Sample | (1) | (2) | (3) | (4) | (5) |
| Dependent variable: ESG Score ($t-2$) | 0.006*** (4.70) | -0.001 (-0.98) | 0.005*** (4.56) | -0.001 (-0.65) | 0.004*** (5.15) |
| Δ ESG Score ($t-1, t-2$) | 0.002*** (3.09) | -0.000 (-0.35) | 0.002*** (3.27) | -0.000 (-0.06) | 0.002*** (3.67) |
| Control variables | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes |
| Firm-level clustered std. error | 17,387 | 17,387 | 17,387 | 17,387 | 17,387 |
| No. of clusters | 2,679 | 2,679 | 2,679 | 2,679 | 2,679 |
| Adjusted R-squared | 0.008 | 0.001 | 0.010 | 0.001 | 0.010 |

the shock, as dependent variables in the difference-in-difference regressions. We estimate the difference-in-difference regressions for different SWF ownership (holding a stake of any size, or stakes of minimal levels at, for example, 0.5 per cent) for different samples (all SWFs, or only the most prominent SWFs in terms of CSR commitment and size such as NGPF-G and NZSF). We are primarily interested in the interaction term $Dum\ SWF \times Post-Year$ that captures the difference in the average change in the ESG measures from before to after the event for firms with SWF ownership relative to firms without SWF ownership. The dummy SWF ownership estimates the mean difference in the ESG measure between firms with and without SWF ownership prior to the event. The event dummy estimates the average change in the more granular ESG measures before and after the event for the firms without SWF ownership. Engagement of SWFs in ESG policies of target firms can be assumed when the interaction dummy is significant and positive.

Panel A of [Table 7](#) exhibits the results from analysing the Deepwater Horizon shock for the whole sample of all SWFs. We use a range of subcomponent ESG variables capturing different aspects of a firm's ESG engagement from the Asset4 database. These variables include management commitment towards best practice corporate governance principles (CGSR as named in the Asset4 database), effectiveness of a firm's processes geared towards long-term shareholder value (CGVS), measures proportionate management compensation (CGCP), principles related to a well-balanced membership of the board ('CGBS'), the presence of board committees (CGBF), effectiveness towards creating value-added products and services upholding the customer's security (SOPR), reputation protecting public health and respecting business ethics (SOCO), guaranteeing the freedom of association and excluding child, forced, or compulsory labour (SOHR), maintenance of diversity and equal opportunities in the workforce (SODO), provision of high-quality employment benefits and job conditions (SOEQ), commitment to healthy and safe workplace (SOHS), investment in training and development for the workforce (SOTD), effectiveness towards reducing environmental emission (ENER), R&D investment in eco-efficient products or services (ENPI), and the efficient use of natural resources in the production process (ENRR) (more detailed definitions are provided in the [Appendix III](#) with variable definitions). The Deepwater Horizon shock mostly concerns environmental issues, and other ESG variables (such as those measuring social and governance issues) are included as placebo tests for comparison.

First, we note that the event has a strong, significant, and lasting impact on most of the subcomponent ESG variables. Second, however, we observe that none of the interaction terms between an SWF ownership stake and the period subsequent to the shock is significant for different subcomponent ESG scores as any of the dependent variables, which implies that firms with an SWF investment and belonging to the sector of the oil and gas extraction and petroleum refining do not change their ESG policies relatively more than firms without such a stake and being part of the same industry. When we limit the sample to the Norwegian (NGPF-G) and New Zealand (NZSW) SWFs, the results do not differ ([Panel B](#)). The interaction term is not significant either when we limit the impact period to the years 2010 and 2011 (when the event happened), nor when we test the impact of larger SWF stakes (a holding of 0.5 per cent of the equity or larger).

The difference-in-differences results for the Volkswagen shock, as shown in [Table 8](#), also yield an insignificant effect of the interaction dummy for companies in the industry of motor vehicles and passenger cars. In line with the analysis of the Deepwater Horizon shock, the dummy capturing the period of the diesel scandal and the subsequent period

Table 7: Difference-in-difference analysis—DeepWater Horizon shock

This table reports the multivariate Deepwater Horizon difference-in-difference panel regression. The dependent variable is a deeper-level ESG measure. The main variables of interest are the interaction dummy, event dummy, and SWF ownership dummy, as described in section X. Multiple control variables are added in the regression. The main- and control variables are defined in the Variable Definitions section and in Appendix III. The sample period is 2004–2018. The regression includes firm-level fixed effects and clustered standard errors. The panels report different event dummies, lasting and not lasting, different SWF Ownership dummies, 0% and 0.5%, and different samples, including all SWF ownership data and only including the NGPF-G and NZSF ownership data. The t-statistics are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

| Panel A: For all firms with ownership stakes held by SWFs | | | | | | | | | | | | | | | |
|---|--|---------------------|--------------------|-------------------|-------------------|------------------|-------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|--------------------|---------------------|
| Sample | Firms: Publicly listed—Oil and Gas Extraction or Petroleum refining and Related Industries—Mcap min. 500M US\$ | | | | | | | | | | | | | | |
| Dependent variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| <i>Dum SWF ownership</i> | -0.069 (-0.01) | 12.280*** (2.66) | -5.101* (-1.69) | 4.539 (1.24) | -2.621 (-0.94) | 2.648 (0.70) | -0.282 (-0.07) | -2.764 (-0.60) | 0.758 (0.17) | 2.491 (0.46) | 8.977** (2.15) | 1.396 (0.25) | -1.677 (-0.42) | -5.279* (-1.76) | 2.769 (0.81) |
| <i>Event (Post-2010)</i> | 6.872* (1.67) | 15.330*** (4.33) | -1.543 (-0.60) | 5.998** (2.13) | 1.111 (0.42) | 7.426* (1.91) | 4.330 (1.35) | 10.430*** (3.12) | 12.550*** (4.64) | 13.470*** (3.30) | 12.150*** (3.75) | 12.350*** (4.02) | 9.338*** (3.78) | 4.125 (1.24) | 12.510*** (4.22) |
| <i>Dum SWF × Post-2010</i> | 6.865 (1.37) | -5.915 (-1.37) | 8.494** (2.50) | -3.393 (-0.97) | 3.833 (1.08) | 3.247 (0.66) | 5.682 (1.29) | -3.143 (-0.65) | 2.666 (0.77) | -5.978 (-1.15) | -2.903 (-0.72) | -1.762 (-0.45) | 0.0865 (0.03) | 1.019 (0.21) | -4.900 (-1.29) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,154 | 1,141 |
| Number of firms | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |
| Adjusted R-squared | 0.094 | 0.142 | 0.042 | 0.018 | 0.008 | 0.085 | 0.089 | 0.058 | 0.192 | 0.087 | 0.094 | 0.140 | 0.119 | 0.038 | 0.114 |

Table 8: Difference-in-difference analysis—Volkswagen diesel scandal

This table reports the multivariate Volkswagen difference-in-difference panel regression. The dependent variable is a deeper-level ESG measure. The main variables of interest are the interaction dummy, event dummy, and SWF ownership dummy, as described in section 5.4.2. Besides this, multiple control variables are added in the regression. The main- and control variables are defined in the Variable Definitions section and in Appendix III. The sample period is 2004–2018. The regression includes firm-level fixed effects and clustered standard errors. The panels report different event dummies, lasting and not lasting, different SWF Ownership dummies, 0% and 0.5%, and different samples, including all SWF ownership data and only including the NGPF-G and NZSF ownership data. The t-statistics are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

| Panel A: For all firms with ownership stakes held by SWFS | | | | | | | | | | | | | | | |
|---|---|--------------------|-------------------|-------------------|-------------------|----------------------|--------------------|-------------------|--------------------|--------------------|---------------------|---------------------|---------------------|------------------|-------------------|
| Sample | Firms: Publicly listed—Motor Vehicles and Passenger Car Bodies Industry—Mcap min. 500M US\$ | | | | | | | | | | | | | | |
| | CGSR | CGVS | CGCP | CGBS | CGBF | SOPR | SOCO | SOHR | SODO | SOEQ | SOHS | SOTD | ENER | ENPI | ENRR |
| Dependent variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| Dum SWF Ownership | 27.250*** (5.56) | 6.444 (0.95) | 13.540 (1.60) | -1.936 (-0.55) | 10.900* (1.80) | -14.35*** (-5.13) | 11.450* (1.87) | -3.679 (-1.15) | 2.767 (1.04) | 16.450 (1.58) | 23.050* (1.70) | 10.360 (1.00) | 0.588 (0.13) | 3.400 (0.62) | -2.370 (-0.46) |
| Event (Post-2015) | 15.650 (1.67) | 16.75*** (2.94) | 4.272 (1.29) | 4.025 (0.84) | -2.792 (-0.56) | 12.440*** (3.00) | 17.400** (2.67) | 6.079 (0.82) | 11.230** (2.08) | 14.980** (2.64) | 14.580*** (4.82) | 16.510*** (5.54) | 17.090*** (3.56) | 7.822* (1.95) | 11.970* (1.93) |
| Dum SWF x Post-2015 | -4.752 (-0.48) | -5.720 (-0.87) | -5.826 (-1.48) | -2.177 (-0.40) | 5.824 (1.06) | -4.406 (-0.90) | -6.954 (-0.96) | 8.285 (0.96) | 1.373 (0.23) | -6.610 (-1.03) | -3.306 (-0.78) | -5.978 (-1.26) | -6.653 (-1.14) | 2.173 (0.43) | -0.535 (-0.07) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 |
| Number of firms | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| Adj. R-squared | 0.084 | 0.141 | 0.030 | -0.003 | 0.016 | 0.050 | 0.077 | 0.078 | 0.170 | 0.056 | 0.100 | 0.137 | 0.168 | 0.100 | 0.091 |

Table 8: Continued

| Sample | Firms: Publicly listed—Motor Vehicles and Passenger Car Bodies Industry—Mcap min. 500M US\$ | | | | | | | | | | | | | | |
|---------------------|---|---------------------|-------------------|-------------------|-------------------|----------------------|--------------------|-------------------|--------------------|--------------------|---------------------|---------------------|---------------------|------------------|-------------------|
| | CGSR | CGVS | CGCP | CGBS | CGBF | SOPR | SOCO | SOHR | SODO | SOEQ | SOHS | SOTD | ENER | ENPI | ENRR |
| Dependent variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| Dum SWF Ownership | 27.250*** (5.56) | 6.444 (0.95) | 13.54 (1.60) | -1.936 (-0.55) | 10.90* (1.80) | -14.35*** (-5.13) | 11.45* (1.87) | -3.679 (-1.15) | 2.767 (1.04) | 16.450 (1.58) | 23.050* (1.70) | 10.360 (1.00) | 0.588 (0.13) | 3.400 (0.62) | -2.370 (-0.46) |
| Event (Post-2015) | 15.650 (1.67) | 16.750*** (2.94) | 4.272 (1.29) | 4.025 (0.84) | -2.792 (-0.56) | 12.440*** (3.00) | 17.400** (2.67) | 6.079 (0.82) | 11.230** (2.08) | 14.980** (2.64) | 14.580*** (4.82) | 16.510*** (5.54) | 17.090*** (3.56) | 7.822* (1.95) | 11.970* (1.93) |
| Dum SWF × Post-2015 | -4.752 (-0.48) | -5.720 (-0.87) | -5.826 (-1.48) | -2.177 (-0.40) | 5.824 (1.06) | -4.406 (-0.90) | -6.954 (-0.96) | 8.285 (0.96) | 1.373 (0.23) | -6.610 (-1.03) | -3.306 (-0.78) | -5.978 (-1.26) | -6.653 (-1.14) | 2.173 (0.43) | -0.535 (-0.07) |
| Control var. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 |
| Number of ID | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| Adj. R-squared | 0.084 | 0.141 | 0.030 | -0.003 | 0.016 | 0.050 | 0.077 | 0.078 | 0.170 | 0.056 | 0.100 | 0.137 | 0.168 | 0.100 | 0.091 |

is significant, which shows that the shock has a significant impact on the industry but the SWF ownership does not lead firms to change their ESG policy more. Various tests on the impact period, the SWF sample, and the size of the SWF ownership do not yield different results.

Overall, results from these tests suggest that there is no strong evidence that SWF engagement affects the ESG policy of target firms. In other words, the positive correlation between a firm's ESG rating and its ownership held by an SWF is more likely to be driven by the preference of SWFs in selecting high ESG companies to invest, rather than actively improving the company's ESG performance.

V. Conclusions

This study investigates the relationship between SWFs and their portfolio companies' ESG scores. One striking initial observation is that SWFs are quite heterogeneous with regard to their size, organizational structure, funding sources, legal status, investment policies, number of equity investments, and size of average equity investment. Also, the vast majority of the SWFs lack transparency and hardly disclose any information with regard to their operations and ESG policies.

In order to gain some insight into how SWFs leave sustainability footprints across the world, partially through their investment in public equity, we collect statements concerning SWFs' ESG policy from their websites and reports. About half of the SWFs with a high level of transparency disclose statements on their ESG policies. The Norwegian SWF (NGPF-G) and the Public Investment Corporation (PIC) of South Africa state that they not only include ESG as a determinant to select target firms but also actively engage with firms within their investment portfolio to improve their ESG policies. These funds do, indeed, have a higher value-weighted ESG score than the SWFs without an explicit ESG policy.

The results from the Heckman selection models (as well as probit panel regressions) provide further evidence that SWFs take the ESG performance of target firms into account in their investment decision process. The positive relationship between SWF ownership and ESG scores of target firms is in line with the existing literature, suggesting that the objective of SWFs is to maximize financial returns and minimize risk and losses while taking into account long-term development and stability (Mohseni-Cheraghloo, 2017). Friede *et al.* (2015), Clark *et al.* (2015), Ferrell *et al.* (2016), and Gerard (2018) support that taking ESG scores into account as an investment determinant is positively related to corporate financial performance.

Delving one level deeper into the E, S, and G subscores, we find that SWFs do not focus on one particular subfield of corporate responsibility and sustainability, but each of the three ESG pillars is an important investment determinant of SWFs. The ESG relation to SWF ownership is driven by SWFs originating from developed countries and civil law countries and by SWFs that explicitly adopt an ESG policy. This is consistent with studies as Aggarwal and Goodell (2018) and Aizenman and Glick (2009), finding that national culture, norms, and governance have a significant impact on SWF governance. Additionally, Liang and Renneboog (2017) show that a firm's CSR rating and its country's legal origin are strongly correlated.

While we have found that ESG is a selection criterion in SWFs' investment decisions, we also study whether SWF engagement leads to changes in the ESG performance of target firms. For this reason, we exploit the occurrence of some exogenous shocks in difference-in-differences regressions. We do not find evidence that SWF ownership increases the ESG performance of the firms belonging to the industries concerned, even when we focus on the constituents of the E, S, and G subscores. So, our results show no evidence of engagement of SWFs towards improving the ESG performance of target firms. This is in line with the findings of [Alhashel \(2015\)](#) and [Rose \(2014\)](#), stating that SWFs primarily behave passively and monitor target firms, not to seek ways to force value-creating changes, but to prevent losses from mismanagement. Also, the survey by [Mullen and Rose \(2018\)](#) indicates that SWFs use ESG scores as a selection criterion to include or exclude target firms in their portfolio, but do not actively engage in target firms in order to improve their ESG policy.

With regard to the generalizability of our results, we would like to point out a few caveats. Due to a lack of transparency by the bulk of SWFs, the analysis is limited to only 24 funds (although these funds stand for more than 80 per cent of the total AUM of SWFs). In addition, even for the most transparent SWFs, we can only study SWFs' equity investments and not the investments in other asset classes (such as private equity, bond investments, real estate, etc.) which are not disclosed and most of which do not have an ESG rating. It should also be noted that the results are driven by some dominant funds. For example, the NGPF-G accounts for 62.40 per cent of the AUM of our sample. Another limitation in this research is that the execution of an event study to test for engagement of SWFs is not possible as the exact dates of the SWF investment and ESG rating are not available in the databases employed. Nevertheless, our findings highlight how SWFs, being among the most important global institutional investors, leave their ESG footprints across the world.

Appendix I: Variable definitions

This table presents the definitions of main and control variables.

Main variables

| | |
|----------------------|---|
| <i>SWF ownership</i> | % ownership stake SWFs have of a target firm |
| <i>ESG</i> | ESG score of target firm |
| <i>Delta ESG</i> | Difference in ESG score compared to ESG score of the previous year. |

Control variables

| | |
|--------------------------|--|
| <i>Annual return</i> | Return calculated using the current adjusted price and the adjusted price 1 year ago. Displayed as a percentage. |
| <i>Log(market value)</i> | Logarithm of market value in millions. |
| <i>Dividend yield</i> | The ratio of a company's annual dividend divided by its share price. Displayed as a percentage. |
| <i>Leverage</i> | Leverage ratio, calculated by dividing a firm's debt by the firm's equity. Displayed as a percentage. |
| <i>Sales growth</i> | Annual growth in sales. Displayed as a percentage. |
| <i>Cash assets ratio</i> | Cash and cash equivalents divided by total assets. Displayed as a percentage. |
| <i>ROA</i> | Calculated by dividing a company's annual earnings by its total assets. Displayed as a percentage. |
| <i>Operating income</i> | Annual sales minus total operating expenses. |
| <i>Intangible assets</i> | Intangible assets on the balance sheet of a company. |

Appendix I: Continued

| | |
|-----------------------------|---|
| <i>CAPEX</i> | Capital expenditures on the balance sheet of a company |
| <i>Total assets</i> | Total assets represent the sum of total current assets, long-term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets. |
| <i>Market to book ratio</i> | Market to book ratio of firm, calculated as market value of equity divided by book value of equity. Displayed as a percentage. |
| <i>ROE</i> | Net income divided by book value of equity. Displayed as a percentage. |
| <i>Sales</i> | The annual revenue a firm generates from the sale of its products. |
| <i>E-index</i> | Proxy of corporate governance from Bebchuck <i>et al.</i> (2008). This form of the E-index is constructed using a point system based on whether firms have a staggered board, supermajority, poison pill, and/or golden parachute in place. |

Appendix II: Acronyms

| | |
|--------|---|
| CSR | Corporate social responsibility |
| CIC | China Investment Corporation |
| ESG | Environmental, social, and governance |
| GAPP | Generally accepted principles and practices |
| GIC | Government of Singapore Investment Corporation |
| AUM | Assets under management |
| IWG | The International Working Group |
| NGPF-G | Norway Government Pension Fund-Global |
| NZSF | New Zealand Superannuation Fund |
| APF | Alaska Permanent Fund |
| AFF | Australian Future Fund |
| KIC | Korea Investment Corporation |
| TH | Temasek Holdings |
| KIA | Kuwait Investment Authority |
| HKMA | Hong Kong Monetary Authority |
| SRI | Socially responsible investing (or sustainable, responsible and impact investing) |
| PSF | (Texas) Permanent School Fund |
| PIC | Public investment corporation |
| SWF | Sovereign wealth fund |

Appendix III: Asset4 subcomponent score definitions

| Asset4 (Datastream code) | ESG pillar | Name | Description |
|---|----------------------|----------------------------------|--|
| CGSR | Corporate governance | Shareholders /shareholder rights | The shareholders/shareholder rights category measures a company's management commitment and effectiveness towards following best practice corporate governance principles related to a shareholder policy and equal treatment of shareholders. It reflects a company's capacity to be attractive to minority shareholders by ensuring them equal rights and privileges and by limiting the use of anti-takeover devices. |

Appendix III: Continued

| Asset4 (Datastream code) | ESG pillar | Name | Description |
|---|----------------------|---|--|
| CGVS | Corporate governance | Integration/ vision and strategy | The integration/vision and strategy category measures a company's management commitment and effectiveness towards the creation of an overarching vision and strategy integrating financial and extra-financial aspects. It reflects a company's capacity to convincingly show and communicate that it integrates the economic (financial), social, and environmental dimensions into its day-to-day decision-making processes. |
| CGCP | Corporate governance | Board of directors/ compensation policy | The board of directors/compensation policy category measures a company's management commitment and effectiveness towards following best-practice corporate governance principles related to competitive and proportionate management compensation. It reflects a company's capacity to attract and retain executives and board members with the necessary skills by linking their compensation to individual or company-wide financial or extra-financial targets. |
| CGBS | Corporate governance | Board of directors/board structure | The board of directors/board structure category measures a company's management commitment and effectiveness towards following best-practice corporate governance principles related to a well balanced membership of the board. It reflects a company's capacity to ensure a critical exchange of ideas and an independent decision-making process through an experienced, diverse, and independent board. |
| CGBF | Corporate governance | Board of directors/board functions | The board of directors/board functions category measures a company's management commitment and effectiveness towards following best-practice corporate governance principles related to board activities and functions. It reflects a company's capacity to have an effective board by setting up the essential board committees with allocated tasks and responsibilities. |
| SOPR | Social | Customer / product responsibility | The customer/product responsibility category measures a company's management commitment and effectiveness towards creating value-added products and services upholding the customer's security. It reflects a company's capacity to maintain its licence to operate by producing quality goods and services integrating the customer's health and safety, and preserving its integrity and privacy also through accurate product information and labelling. |
| SOCO | Social | Society / community | The society/community category measures a company's management commitment and effectiveness towards maintaining the company's reputation within the general community (local, national, and global). It reflects a company's capacity to maintain its licence to operate by being a good citizen (donations of cash, goods, or staff time, etc.), protecting public health (avoidance of industrial accidents, etc.) and respecting business ethics (avoiding bribery and corruption, etc.). |

Appendix III: Continued

| Asset4 | | | |
|--------------------------|-------------------|---------------------------------------|---|
| (Datastream code) | ESG pillar | Name | Description |
| SOHR | Social | Society / human rights | The society/human rights category measures a company's management commitment and effectiveness towards respecting the fundamental human rights conventions. It reflects a company's capacity to maintain its licence to operate by guaranteeing the freedom of association and excluding child, forced, or compulsory labour. |
| SODO | Social | Workforce / diversity and opportunity | The workforce/diversity and opportunity category measures a company's management commitment and effectiveness towards maintaining diversity and equal opportunities in its workforce. It reflects a company's capacity to increase its workforce loyalty and productivity by promoting an effective life–work balance, a family friendly environment, and equal opportunities regardless of gender, age, ethnicity, religion, or sexual orientation. |
| SOEQ | Social | Workforce / employment quality | The workforce/employment quality category measures a company's management commitment and effectiveness towards providing high-quality employment benefits and job conditions. It reflects a company's capacity to increase its workforce loyalty and productivity by distributing rewarding and fair employment benefits, and by focusing on long-term employment growth and stability by promoting from within, avoiding lay-offs, and maintaining relations with trade unions. |
| SOTD | Social | Workforce / training and development | The workforce/training and development category measures a company's management commitment and effectiveness towards providing training and development (education) for its workforce. It reflects a company's capacity to increase its intellectual capital, workforce loyalty, and productivity by developing the workforce's skills, competences, employability, and careers in an entrepreneurial environment. |
| SOHS | Social | Workforce / health and safety | The workforce/health and safety category measures a company's management commitment and effectiveness towards providing a healthy and safe workplace. It reflects a company's capacity to increase its workforce loyalty and productivity by integrating into its day-to-day operations a concern for the physical and mental health, well-being, and stress level of all employees. |
| ENER | Environmental | Emission reduction | The emission reduction category measures a company's management commitment and effectiveness towards reducing environmental emission in the production and operational processes. It reflects a company's capacity to reduce air emissions (greenhouse gases, F-gases, ozone-depleting substances, NOx and SOx, etc.), waste, hazardous waste, water discharges, spills, or its impacts on biodiversity, and to partner with environmental organizations to reduce the environmental impact of the company in the local or broader community. |

Appendix III: Continued

| Asset4 (Datastream code) | ESG pillar | Name | Description |
|--------------------------------|---------------|--------------------|---|
| ENPI | Environmental | Product innovation | The product innovation category measures a company's management commitment and effectiveness towards supporting the research and development of eco-efficient products or services. It reflects a company's capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies and processes or eco-designed, dematerialized products with extended durability. |
| ENRR | Environmental | Resource reduction | The resource reduction category measures a company's management commitment and effectiveness towards achieving an efficient use of natural resources in the production process. It reflects a company's capacity to reduce the use of materials, energy, or water, and to find more eco-efficient solutions by improving supply chain management. |

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