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Article

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The impact of Sovereign Wealth Funds on their investees: Methodology limitations

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ABSTRACT

The purpose of this paper is to address inconsistencies identified in the literature published on the subject of the impact of sovereign wealth funds (SWFs) on the market value and performance of the companies in which they invest. We provide a systematic analysis of the methodologies used in the literature with a strong emphasis on the structure and compilation of the SWF dataset and the evaluation of the data. We compare the strengths and weaknesses of the methodologies used in the seminal works published on this topic between 2007 and 2020. The results of our analysis highlight the significant risks and limitations of applying the methodological approach used in studies of large institutional investors to analysis of the impact of SWF investment on their investees.

Introduction

Given the gradually increasing amount of AUM¹ held by SWFs and the persisting limited transparency of the majority of such funds² (Aggarwal and Goodell, 2018; Stone and Truman, 2016; WIR, 2014; UNCTAD, 2020), it is no surprise that SWFs keep attracting more attention. Limited access to verifiable data on performance, operations, governance, and investment transactions or SWFs challenges the limits of methodologies used by researchers and representatives of datasets that would allow objective measurement and the application of quantitative methods to analyse the data they develop.

Due to the common SWFs' restrictive internal transparency policies and the vagueness of legislative requirements for disclosure in different countries,³ some characteristics of SWFs are challenging to evaluate and compare with market benchmarks, similar institutional investments, or even the characteristics of other SWFs (Gelb et al., 2014). One option for circumventing the lack of direct data on SWFs is to take an indirect

approach to research by comparing the performance and market value of companies targeted for investment by SWFs with market averages. This research model is built upon methodological foundations established in the late 1970s and 1980s. It is linked to academic research on institutional investors, as discussed later in this article. In theory, this research approach should yield consistent results.⁴ However, the results of research by the independent authors presented in their seminal papers show significant inconsistencies, particularly when the target companies' performance is measured over the long run. These contradictory results were noted, for instance, by Cumming et al. (2017), Megginson and Fotak (2015), and Alhashel (2015); however, to our knowledge, no systematic, data-based analysis of the root causes of those inconsistencies has yet been presented in a respected academic journal.

SWFs are not a new phenomenon in the economic literature. We have identified numerous literature reviews and methodology surveys published in economic journals in the last decade. For a general review of the literature on SWFs, see for instance Alhashel (2015), Fotak et al.

Abbreviations: SWF, Sovereign Wealth Fund; AUM, Assets under Management.

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¹ SWFs that invest primarily in commodity producers have experienced various strains since the pronounced fall in commodity prices from 2014 to 2016 (Al-Hassan, 2018). In 2018, the AUM of non-commodity-based SWFs was almost half of the global AUM of all SWFs (Prequin, 2018).

² The Government Pension Fund of Norway and a handful of significantly smaller SWFs (in terms of AUM), for example, New Zealand's Superannuation Fund, Australia's Future Fund, and Ireland's Strategic Investment Fund, are well documented exceptions.

³ Some initiatives for legislation intended to counter protectionist measures taken by states against SWFs have been developed by the Organisation for Economic Cooperation and Development (OECD) and the International Monetary Fund (IMF) (Brown, 2011).

⁴ At least in terms the trend in research results for publicly traded investees over a similar investment period.

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(2017), or Bahoo et al. (2020). The closest work to our research focus that we have pinpointed is Megginson and Gao (2020). Their research is a sequel to Fotak et al. (2017). Among other interests, the authors discuss the literature on the impact of SWFs on targeted companies. Similarly to us, they conclude that the evidence derived from existing academic research on long-run market reactions to companies targeted by SWFs and their operating performance is “far from conclusive” or “mixed and inadequate.” However, they discuss the data supporting their statements only generally and conclude by attributing the inconsistencies they identify to a “failure to separate different types of SWFs.” We agree that the heterogeneity of SWFs is one possible cause of the mixed results of previous research, but we see this as a too-simple conclusion. To provide an evidence-based conclusion, we believe that a much deeper and more narrowly targeted review of the authors’ research methodologies and analysis of the resulting data is required.

The knowledge gap in the literature, in combination with the ongoing accumulation of immense financial resources in SWFs and their potential impact on global wealth and financial stability, is a major motivation for the effort we have devoted to this paper. Additionally, we strive to contribute a structured overview of the research methodologies and SWF investment transaction datasets used in the seminal papers to the research community, especially that part of it that is interested in the subject of SWFs. We highlight the major differences in data collection techniques and procedures for data evaluation used by different authors, and underline the risks and limitations of their interpretations of the results of their research.

This paper is structured as follows. First, we define SWFs and provide a brief introduction to their history. Then, we describe the classification procedure we used to narrow down the substantial amount of literature on SWFs and identify the seminal publications on their impact on their investees. Next, we discuss the methodologies the authors used for data collection and filtration, and separately present the findings about short-term and long-term impact analysis of the key authors. The important characteristics of the datasets used by selected authors are presented in Appendix I and Appendix II in the form of tables. The fifth chapter concludes the paper.

Brief history and definition

Sovereign Wealth Funds (SWFs) are a subset of the larger group of institutional investors. The fundamental difference between SWFs and other institutional investors, such as pension funds, endowments, and hedge funds, lies in the origin of their capital. If a fund’s capital is provided solely by a sovereign state, it is considered an SWF. Specific factors not common to other institutional investors may influence such a fund’s strategy, priorities, and investment decisions. Unfortunately, verifiable data on the financial performance of SWFs is often scarce or in some cases non-existent.

The total amount of assets under management (AUM) by SWFs has soared from \$2 trillion in 2005 to an estimated \$7 trillion in 2020,⁵ as illustrated in Fig. 1. In terms of assets, the assets managed by SWFs are twice as large as those held by the entire global hedge fund market, which was estimated to be \$3.55 trillion in 2017, and more than two and a half times those of the private equity market, which were estimated to be \$2.83 trillion in 2017 (Preqin, 2018).

The history of SWFs dates back to 1953 when the first SWF was established in Kuwait. To this date, it still exists as the Kuwait Investment Authority (Kotter and Lel, 2011). Some economists might consider

⁵ The estimates of SWFs’ AUM vary substantially, from USD 7 trillion to USD 15 trillion in 2020 (PWC Sovereign Investors, 2020). The data presented in Fig. 1 represents the author’s calculations based on the latest data available provided directly by major SWFs, in combination with an approximation of global trend presented by Preqin from 2017 to 2020, IMF and UNCTAD Investment Reports 2007–2020.

the Permanent School Fund established by the U.S. state of Texas in 1854 to be the ancestor of current SWFs (Dewenter, 2010). Still, by 1980, only nine SWFs were officially recognized. That number doubled by 1998, and more than quintupled by 2007. In March 2020, the total number of SWFs had reached 79 (Fig. 1).

The real “coming out” of SWFs happened after the financial crisis of 2007–2008, which provided a unique opportunity to fully utilize their accumulated liquidity, which was desperately needed by the global financial market. In only two years, SWFs became shareholders with a considerable amount of investment in companies as such as Merrill Lynch,⁶ Bear Stearns,⁷ Morgan Stanley,⁸ Citigroup,⁹ and even the Nasdaq Stock Market, a 19.99% ownership stake in which was purchased by Borse Dubai in September 2007 (Jory et al. 2010). Such intensive investment activity by SWFs could not be ignored by the financial markets, academia, regulatory bodies, or politicians. The financial security and transparency concerns linked to SWFs were major issues discussed by, for instance, Drezner (2008) in his work “SWFs and the (In) security of Global Finance.” The role of SWFs in the financial crisis was thoroughly studied by Butt et al. (2008), Monk (2009), Beck and Fidora (2008), Gilson and Milhaupt (2009), and Jen (2009). Jen’s publication is entitled “How Big Could Sovereign Wealth Funds Be by 2015?”

SWFs’ prime motivations, governance, transparency, performance, and accountability are major concerns for financial regulators, politicians, economists, and academia, especially when it concerns their foreign direct investment activities. The prominence of these concerns escalated in 2008, when the IMF’s International Working Group on Sovereign Wealth Funds (IWG-SWF) addressed the issues by organizing a summit attended by the representatives of the major SWFs. This conference resulted in a set of recommended principles of transparency and good governance for SWFs to follow (IMF, 2008). Nevertheless, the principles were never transformed into binding agreements. SWFs are, with a few exceptions, still a powerful but opaque group of institutional investors (Stone and Truman, 2016; Bassan, 2015). A detailed excursion into the origin of SWFs and their evolution is available in Kimmitt (2008) and Bassan (2015). The position of SWFs in the overall context of state-owned corporations, public–private partnerships, and even military-industrial projects is well described by Wood and Wright (2015).

Until 2005, state-owned investment funds were lumped in with the larger group of passive institutional investors (Kotter and Lel, 2011; Lins, 2003; Mikkelsen and Ruback, 1985; Johnson, 2007). The term “sovereign wealth fund” was used for the first time by Rozanov in his article “Who Holds the Wealth of Nations” (Rozanov, 2005). Rozanov defines SWFs¹⁰ as, “sovereign-owned asset pools, which are neither traditional pension funds nor reserve assets supporting national currencies.” This definition was updated by Rozanov (2008), who suggested liability-based classifications based on the source of the SWF’s capital and its intended use of its funds.

For purposes of this paper, we define SWFs as does the International

⁶ In 2007, a 9.4% ownership stake was acquired by Temasek Holdings, a Singapore based SWF; later in 2008, the Kuwait Investment Authority acquired an additional 6% stake in Merrill Lynch (Jen, 2009).

⁷ China’s CITIC Group bought a 9.9% ownership stake in Bear Stearns in 2008.

⁸ China’s CIC fund purchased a 9.9% share in Morgan Stanley in 2008.

⁹ Singapore’s GIC purchased a 3.6% ownership stake in the Kuwait Investment Authority, and a 1.6% ownership stake in Citigroup in 2008.

¹⁰ In another paper, “More Layers than an Onion,” Capapé and Guerrero (2013) provide an excellent analysis of how the definition of SWFs varies across economic research publications. Based on an SWF classification approach using eleven characteristics, Capapé found full consensus on only two defining characteristics of SWFs: (i) government ownership, and (ii) the purpose of an investment fund. They found a strong consensus that the definition includes three more characteristics. An SWF is (i) an international investor; (ii) has no explicit liability for funding public pensions, and (iii) receives public funding.

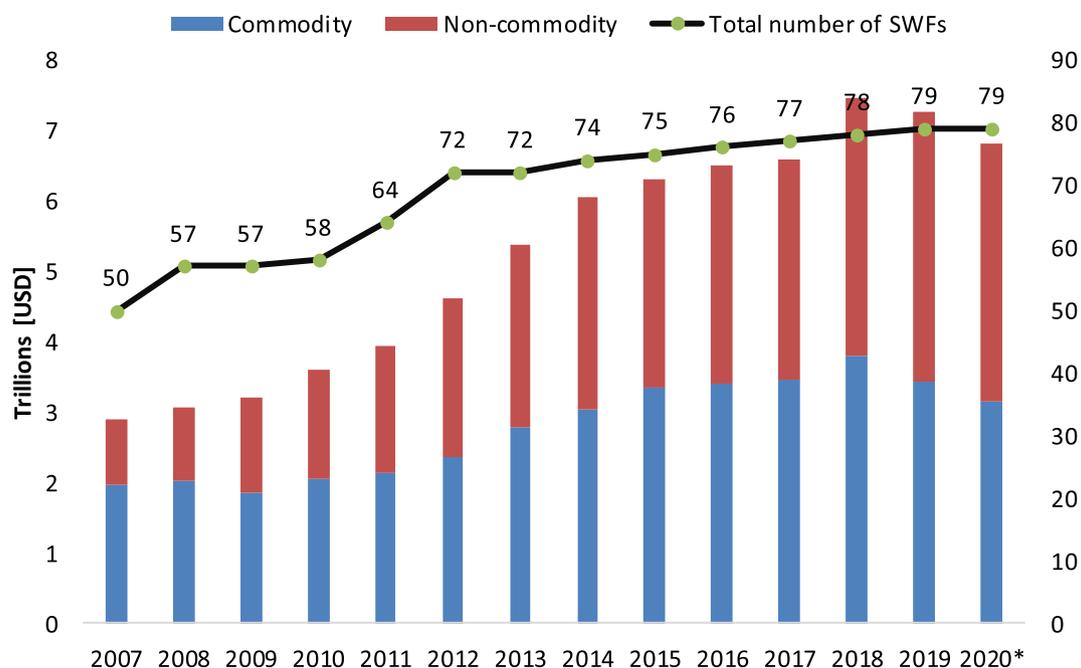


Fig. 1. Estimated Assets Under SWF Management and Number of Active Funds Worldwide (As of November 2020.) Source: Prequin, 2021, 2018 Sovereign Wealth Fund in Motion; IMF reports 2007–2019; Stone and Truman (2016); SWFs annual reports, authors calculations.

Monetary Fund: “special purpose investment funds or arrangements, owned by the general government. Created by the general government for macroeconomic purposes, SWFs hold, manage, or administer assets to achieve financial objectives, and employ a set of investment strategies which include investing in foreign financial assets” (SWF Generally Accepted Principles and Practices, IMF, 2008). This definition of an SWF was proposed by the IWG-SWF in 2008.¹¹

The literature

The general interest of academia and economists, illustrated in Fig. 2, shows the evolution of the number of publications released on the topic of SWFs from 2007 to 2018.¹² The initial interest of the general public, and the novelty and appeal of the topic is demonstrated by the steep growth in the number of publications on SWF-related subjects, represented by the number of results provided by the Google Scholar search engine. The number of such studies soared from five publications in 2006 to 146 publications in 2009.¹³

The trend of academic interest in SWFs, as illustrated by the continuous growth in the total number of publications on them, is reported in the Scopus and Web of Science databases. The number of publications reached a peak in 2011. Following a slowdown, the trend in the number of publications on SWFs turned positive again in 2017. Unlike the Scopus and Web of Science databases, World Wide Science and Science Direct include papers published in a broad spectrum of non-English language journals. The trend illustrated by World Wide Science

indicates that from 2007, the topic of SWFs has been addressed primarily by researchers and economists in the United States and the United Kingdom. Nevertheless, the subject of SWFs has become gradually more attractive to the global economic research community.

Literature classification

To better illustrate the various directions in which the academic research on SWFs has evolved, we use three categories:

- I. **Direct:** Literature on SWFs’ characteristics, such as their ownership (legal structure, governance, accountability), investment strategies, and investment portfolio risk-return ratios, the political, fiscal and monetary motivations behind SWFs, organizational theories, operational characteristics, and related strategic and political-economic issues.¹⁴
- II. **Indirect:** Literature on the short and long-term impacts of investment by SWFs on the companies that they target.
- III. **External:** Literature on SWFs’ impact on international investment law and international regulation, on regional and national regulations, their macroeconomic impact, their impact on global

¹¹ Given this definition, the IMF further provides a “purpose-based” classification of SWFs comprised of only three types: (i) stabilization funds, (ii) savings funds, and (iii) central bank reserve investment companies.

¹² The criteria for an article to be counted in this dataset were as follows: (i) It includes in its title, abstract, or keywords (if available), the words “sovereign wealth fund” or an abbreviated form or modification thereof, for instance, a plural form, or (ii) It is published in a journal or is a book.

¹³ We note that Google Scholar’s advanced search options are limited. Its search results include all publications, with no filters to allow one to assess the quality of those publications. Its results also include studies published by advisory and regulatory bodies.

¹⁴ The Direct category includes publications on the governance, transparency, motivations (economic, political, social), and investment strategies of SWFs, for instance, Truman (2007, 2009), Bagnall and Truman (2013), Gilson and Milhaupt (2009), Aizenman and Glick (2009), Aguilera et al. (2016), Aggarwal and Goodell (2018), Bykanova et al. (2017), and Megginson et al. (2013), or SWFs’ impact on the global financial markets, including Beck and Fidora (2008), Kimmitt (2008), Vasudeva (2013), Bertoni and Lugo (2014), Raymond (2008), Megginson and Fotak (2015), and Johan et al. (2013); their work was aimed at the determinants of SWF investment in Private Equity vs Public Equity.

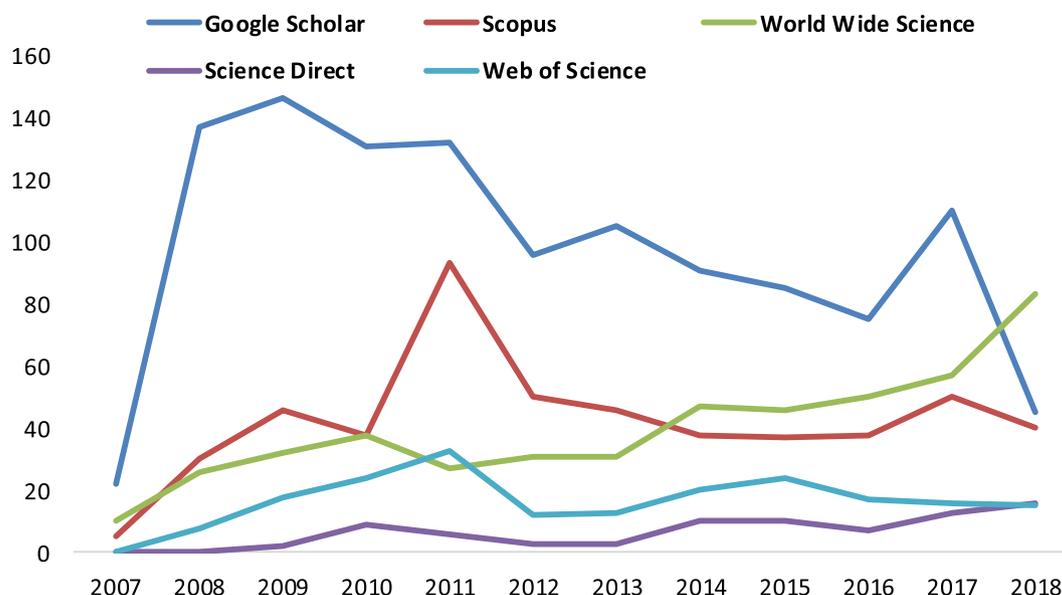


Fig. 2. SWFs in the academic literature—total number of published articles and books (The data for 2018 includes only publications for the first six months of the year.)

financial markets, and their contribution/risk to the home country's economy and its strategic export priorities.^{15, 16}

To develop a representative database of the literature on SWFs, we adopted a multi-step data-filtration procedure, detailed as follows.

First, our research is limited to the period 2007–18, because the vast majority of the SWF literature emerged only after the global financial crisis of 2007–08.¹⁷ An initial search utilizing various academic search engines and scholar databases (illustrated in Fig. 2) resulted in approximately 2500 publications, including unpublished papers, book reviews, and editorial material.

Next, we removed from the sample all publications other than research articles and books. All conference proceedings, book reviews, editorial material, book series and individual book chapters, patents, and trade publications were excluded from the clean sample.

Then, we checked for duplications. This is a procedure¹⁸ that identifies identical publications indexed by various search engines and publications, which were included in the dataset multiple times by one search engine (mostly by Google Scholar). We instantly removed all the duplications.

Next, we corrected glaring search errors. These errors include, for instance, a publication that uses the acronym SWF for in a different context than “Sovereign Wealth Fund,” e.g., “Social Welfare Function,” “Southwest Florida,” “Staff Working File,” “Shallow Water Flows,” and others that were included in the dataset provided by the initial search.

¹⁵ The External category includes, for example, Cohen's (2009) “Sovereign Wealth funds and National Security: The Great Tradeoff,” and Sornarajah's (2017) *The International Law on Foreign Investment*. Other examples are comparative studies such as Boubakri et al. (2016), who compare SWFs' investment strategies with Pension Funds or specific case studies as Martinek (2017) demonstrating the impact of SWFs on a selected industrial sector.

¹⁶ Similar to the analysis of SWFs' impact on targeted companies, most of the studies of SWFs' investment impact on legal protectionism is based on research of large institutional investors; for instance, La Porta (1999) showed that the legal protection environment for investors plays an important role in corporate governance at the national level.

¹⁷ Prior to 2005, state-owned funds were included in the larger category of institutional investors or state-owned enterprises. Between 2005 and 2006, the number of articles on SWFs was very limited.

¹⁸ This procedure was done manually by the authors of this study.

Other examples of obvious errors are studies by authors with the initials SWF, which were invariably included in the initial search results.

Finally, we organized the filtered results into three categories, as described at the beginning of this section. Since some of the publications included in the clean dataset can be included in two or even all three categories, it is not possible to classify them with absolute precision. However, classification was carried out as follows.

Initially, we separated publications aimed at the SWFs' impact on their investees' market value (category “Indirect”). We chose the indirect category to be the first selection, because the definition of this category is narrow. The publications in this category can easily be separated from the filtered dataset.

Then, we focused on publications in the “External” category. We selected publications that discussed SWFs' impact on international regulation, international investment law, etc. The remaining publications were included in the “Direct” category, which is the broadest and includes the majority of publications aimed at the phenomenon of SWFs. The results for the clean sample, categorized according to the proposed classification, are presented in Fig. 3.

Given the primary motivation of this research, which is to address an identified knowledge gap in the literature on SWFs' impact on their targeted companies' value and performance, the attention of this paper is limited to analysis of publications in the Indirect category.

Impact of SWFs on their investees

The methodology of the academic research on SWFs is strongly influenced by and closely follows that of the extensive body of research investigating large institutional investors. The major challenge for adopting this research methodology and applying it to SWFs, as discussed later in Chapter Four, is undoubtedly the quality and verifiability of the information that is publicly available on the transactions and performance of SWFs.

Despite the large number of publications and authors devoted to academic research about large shareholders, the literature does not display unanimous opinion about the effect of institutional ownership on a firm's value (Chhaochharia and Laeven, 2008; Karpoff, 2001; Ferreira and Matos, 2008). One of the most often-studied characteristics of large institutional shareholders is the extent to which they monitor the performance of their investees, and the impact of their monitoring on the value of those firms. Shleifer and Vishny (1986), McConnell and

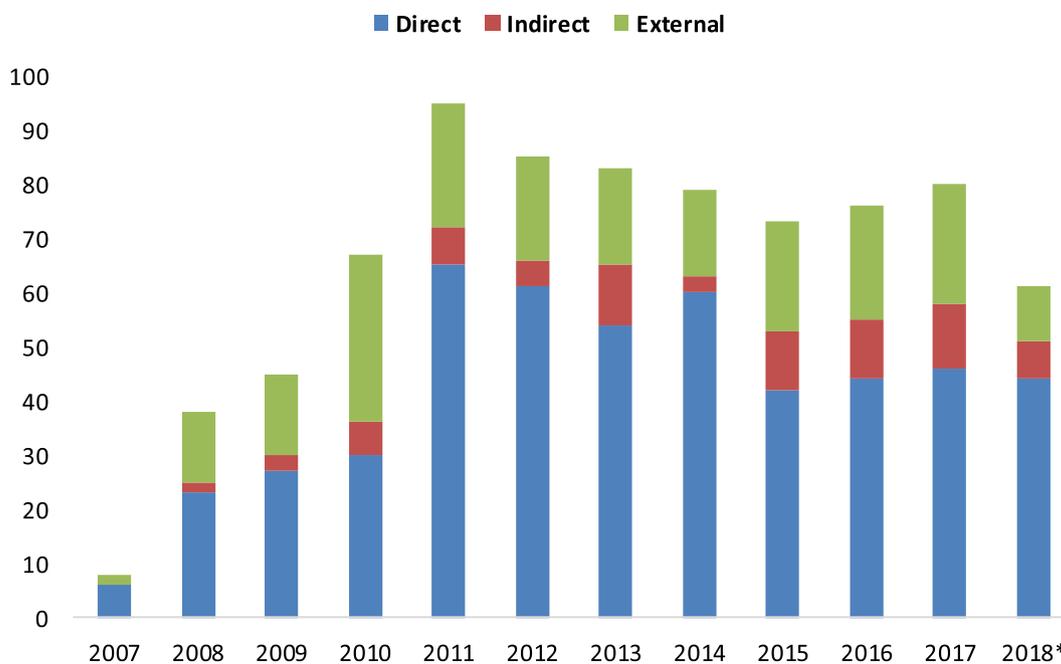


Fig. 3. Academic Literature on SWFs from 2007 to 2018, in terms of the total number of publications. Source: Google Scholar, Scopus, World Wide Science, Science Direct, Web of Science.

Servaes (1990), and Del Guercio and Hawkins (1999) confirm that institutional investors take an active role in monitoring a firm's performance, which leads to a positive impact on the target firm's value, compared to small shareholders who lack the means to monitor an investee's performance closely.¹⁹ This research was later followed by Chen et al. (2007), who conclude that monitoring activity is significantly greater among independent investors who focus on long-term investments. Hedge funds are the entities that are most like SWFs among the large, diverse group of institutional investors, especially in terms of their operations, degree of transparency, and investment practices. The positive impact of active monitoring of investees by hedge funds has been confirmed by Brav et al. (2008), among others.

At the same time, the "agency cost theory" developed by Jensen and Meckling (1976) predicts that a large shareholder will force a company in which it invests to act in the best interest of that shareholder and against the interests of other investors, employees, and managers. Barclay and Holderness (1992) and Zingales (1994) test this hypothesis empirically and confirm that large shareholders do impose agency costs on investees. Similarly, Carleton et al. (1998) and Gillan and Starks (2000) find that institutional shareholders hurt their investees' performance, either because they do not have adequate monitoring skills or because their objectives conflict with maximizing the value of the investee. In their later work, Shleifer and Vishny (1997) state that the activity of a dominant large shareholder is harmful to the investee because the large shareholder seeks to maximize its private benefit at the expense of minority shareholders. The negative impact of holders of a large block of shares ("blockholder") has been thoroughly studied, for instance, by Fama and Jensen (1983), Stulz (1988), and Clark and Ofek (1994) in their works on the potential costs associated with significant shareholdings by managers and other types of blockholders. This negative impact and the "tunneling" of investees was researched by Johnson et al. (2000) in a study of the behavior of large shareholders during the market crisis of 1997–1998. The overall impact of large institutional shareholders can be seen as a compromise between their positive impact (mainly due to improvement in the active monitoring of

performance) and their negative impact, as they try to maximize their own profit at the expense of the investee and others. Thus, the overall impact of institutional investors can be described as a nonlinear function of the size of the acquired ownership stake, where the benefits increase below a certain critical level of ownership, but decline after that as losses due to "tunneling" grow larger (Dewenter et al., 2010).

As shown by Truman (2007) and later by Stone and Truman (2016), ownership by SWFs with a close relationship to a government and in many cases a somewhat opaque governance structure raises several questions. What is the funds' prime motivation for investment? Does it interfere with the maximization of investee value? Is the impact of an SWF on the investee's performance significantly different from that of other institutional investors?

Publications that focus on the impact of SWFs on target companies' market value are only a minor portion of the SWF literature. Our search for relevant literature²⁰ found 78 articles where the SWF impact on investees is at least briefly discussed, usually in an introduction or the literature review section of the article, without original research or analysis (see Fig. 3, category "Indirect").

Even in this small group of articles, less than a third of the authors presented empirical research based on an original dataset. The rest of the publications either summarized previously published findings or expanded upon discussion in previously published articles (Megginson, 2016; Cumming et al., 2017). Some focus on the secondary effects on SWF investees' market performance, similar to Boubakri et al.'s (2017) work, evaluated the impacts on competitors to the SWFs' target firms. Only 22 publications presented the results of the authors' original research on the impact of SWFs on their investees' market value or operational performance.

If the authors used identical research methodologies for both short- and long-term time periods²¹ on larger (upgraded) data samples in later

¹⁹ The literature refers to this tendency by small-shareholders as a free-rider problem.

²⁰ We performed a full-text search based on a mix of keywords, abbreviations and exact phrases such as CAR, cumulative abnormal returns, Tobin's Q, credit default spread, market-adjusted return, short-term and long-term impact, and investee market value, on our clean sample of 790 publications.

²¹ This refers to an identical methodology for the short- and long-term impact analyses.

work, only their newest publication is included in the dataset we used for the final methodology review. This procedure excluded, for instance, Fernandes (2009)²² and Bortolotti et al. (2010). This final filter reduced the final sample by another six publications.²³ The final list of the publications used for the methodology review of studies reporting on the impact of SWFs on investees is provided in Appendix I and Appendix II.

The majority of the authors of the selected publications evaluated both immediate market reactions and long-term impact in their papers. However, because the authors of the papers in the dataset used different methodological approaches and data collection and verification procedures, this paper reviews the results they reported for long-term and short-term impacts separately.

Short-term impact

To assess the market reaction to SWF investments and the immediate effect of their announcement, the majority of authors employed an “event study” to different event windows. This methodological approach has been successfully tested in various fields of research in financial economics and has become a research standard, according to Bortolotti et al. (2017). Further detail on the event study methodology is provided by Karpoff and Malatesta (1989) and Lyon et al. (1999).

Market reaction can be measured by changes in stock values or credit default spreads (CDSs) (Bertoni and Lugo, 2014) around the time of an SWF’s announcement of investment. This procedure is often accompanied by a market comparison study.

The factors that differentiate the methodologies used in the studies are:

- (i) impact indicators (stock returns, credit default swaps)
- (ii) construction of the control group providing a proxy for benchmark market return
- (iii) the size of the event windows
- (iv) dataset size and transaction collection verification procedures

Research methodology

The vast majority of authors use investees’ stock values as the critical research indicator demonstrating the market reaction to the announcement of an investment by an SWF. Bertoni and Lugo (2014) took an innovative approach, working with the evolution of credit default spreads (CDS)²⁴ instead of changes in share values.

When the market value approach is applied, the most commonly used methodology is based on the concept of cumulative abnormal returns (CARs). Authors like Fotak et al. (2008), Dewenter et al. (2010), and Bortolotti et al. (2015), Bortolotti et al. (2017)²⁵ used CARs as indicators along with raw returns and market-model abnormal returns. The calculation of market-model abnormal returns uses the expected return to the shareholder obtained from a local equity index as a market

²² Fernandes, N., 2009. Sovereign wealth funds: Investment choices and implications around the world. International Institute for Management Development.

²³ This was mainly due to authors published work, utilizing very similar or only slightly updated datasets. There was no novelty presented in terms of the methodology with regard to the impact on the investee’s performance or market value.

²⁴ A credit default swap is a financial swap agreement whereby the seller of the credit default swap agrees to compensate the buyer in the event of a default on a debt or other credit event. The buyer of a credit default swap contract pays the seller a percentage of a notional principal amount (the “notional”)—the spread—since no principal actually changes hands in the transaction. The higher the credit risk associated with a firm’s liabilities, the higher the credit default swap spread (Bertoni and Lugo, 2014).

²⁵ The authors discuss raw returns for the purpose of testing the robustness of their research, but do not present their results.

proxy. The authors calculate the abnormal returns as the difference between actual returns and those predicted by the market model. The abnormal returns are then summed to calculate CARs. All the authors listed above use CARs in their event studies except Bertoni and Lugo (2014).

The primary variable in Bertoni and Lugo’s study was the adjusted increase or decrease in credit default spreads²⁶ observed at the time an SWF announced its investment in a target company. Bertoni and Lugo followed a methodology used by Hull et al. (2004), Norden and Weber (2004), and Jorion and Zhang (2007). The CDSs of target companies are adjusted by subtracting from them a weighted index of the CDSs of all firms in a particular Moody’s rating category.²⁷

CDSs provide certain advantages compared to stock returns and bond yields. As pointed out by Hull et al. (2004), they do not require additional adjustment for differences in the riskiness of the shares of a target company. Also, as suggested by Blanco et al. (2005), the market for credit default swaps has been found to lead the bond market and is more responsive to changes in credit conditions. Similar results are confirmed by Zhu (2006). However, employing CDSs as an indicator of the impact of an investment by an SWF requires some caution, because CDSs may reflect certain factors other than the risk of default. First, as suggested by Hull and White (2001), the relationship between a company’s CDS and credit risk can be affected by counterparty risk²⁸ (i.e., the risk that the seller of a credit default swap will not be able to meet its obligations). Second, the CDS for corporate bonds can also be influenced by issues of liquidity and taxes (Fabozzi et al., 2007).

The selection of a control group as a proxy for market returns

The primary sources for the control groups required for comparative CAR-based analysis that serve as a proxy for market returns are various commercial market indices. The one most commonly used is a market capitalization-weighted index provided by Thomson Reuters Datastream²⁹ (Kotter and LeI, 2008; Fotak et al., 2008; Dewenter et al., 2010; Bortolotti et al., 2010; Knill et al., 2012). From the information available in the data and methodology description sections provided by the authors, it is not always clear what criteria have been used to match the SWFs’ target investees with the companies included in the relevant market indices.

For instance, Knill et al. (2012) describe the selection of the benchmark index in detail. They use a three-criteria matching procedure based on the country, industry, and size of the target. However, Chhaochharia and Laeven (2008) only provide information that the U.S.-based SWF target companies they studied were matched with the Center for Research in Security Prices value-weighted return index, and the UK firms were matched with the FTSE 100 index, which would indicate that the national indices were used as market proxies in calculating expected returns. Other authors evaluate the target firms in comparison to sub-groups of similar companies, matched by fund type (pension funds, mutual funds). For instance, Bortolotti et al. (2015, Bortolotti et al., 2017) construct their control group³⁰ by selecting publicly traded companies having a Standard Industry Classification code between 6000 and 6999. They identified financial firms making investment announcements in an interval identical to the interval of the SWFs’ dataset of announcements of their investments in their target companies.

²⁶ In other words „spreads on Credit Default Spreads “

²⁷ As in Hull et al. (2004), the authors use Moody’s credit ratings and divide all firms into four credit categories: (i) AAA and AA, (ii) A, (iii) BAA, and (iv) BA and below.

²⁸ All else being equal (including the credit risk of the focal company), higher counterparty risk translates into a lower CDS.

²⁹ Recently renamed as Datastream – Refinitiv Financial Solutions.

³⁰ They based their control group on the publicly traded companies’ dataset from the Thomson Reuters SDC Platinum Mergers & Acquisitions Database (SDC).

Additionally, Bortolotti et al. only include transactions in which the acquirer originates from one of the countries where the SWFs included in the impact analysis are based. Similarly, they use only transactions for which the target firm is headquartered in one of the countries where the investees in the final benchmark dataset are headquartered. A different methodology is employed by Dewenter, Han and Malatesta (2010), who regress target firm stock returns based on the returns of two market indices: (i) returns in the domestic stock market of the country where the target firm is domiciled, and (ii) a market variable measuring returns in the global stock market.

Event window

An “event window” is the period around an SWF’s announcement of an investment during which the impact of the announcement on the investee’s market value is measured. Kotter and Lel (2008) present abnormal returns at the time of an announcement of SWF investment for day intervals of (0, +1), (-1, +1), and (-2, +2). However, they also discuss results for abnormal returns for a (-10, +20) window in their paper. Fotak et al. (2008) include results only for the announcement day. In later work (Bortolotti, Fotak and Megginson, 2015), the authors measure a three-day window (-1, +1) instead, an eleven-day window (-5; +5), and for good measure, the announcement day itself. Dewenter et al. (2010) and Bortolotti et al. (2017) provide results for an identical three-day window (-1, +1), as do Bertoni and Lugo (2014), who use other event windows as well, but only to test the robustness of their results. A different methodology is applied by Chhaochharia and Laeven (2008). They report CARs for an event window of (-20, +10). Based on positive results (i.e. an increase in share value) for a (-10, -5) event window, they conclude that the information about SWFs’ transactions is usually known to the market before their public announcements.

The pre-event periods in which the regressions are estimated begin variously from t-288 days (Chhaochharia and Laeven (2008)) to t-240 days (Fotak, 2009). In the majority of the research included in this methodology review, the pre-event window closes before the investment announcement, that is, (t-20, t-10) days before the SWF transaction announcement. In some cases, the measured window ends at (t, t + 1), and the period before the announcement is excluded. For instance, Dewenter et al. (2010) use daily returns over the period (-250, +1), but excluded the period immediately before the event (-6, -2).³¹

Data collection and verification procedures

As presented in Appendix I, the number of transactions upon which researchers’ calculations are based differs substantially in each study. A detailed analysis of the SWFs’ transaction datasets shows that regardless of the total number of transactions the authors have collected for research purposes, which they usually state in their papers’ abstract or introductory section, the real number of transactions they use for either their short-term or long-term impact analyses varies enormously. For instance, Chhaochharia and Laeven (2008) state that the dataset used for their research is built on 40,000 investment transactions, but the number of transactions they use for the evaluation of the impact of SWFs’ announcements is only 86 transactions. Similarly, Karolyi and Liao (2017) initially presents a dataset composed of 4759 transactions, while his clean sample for short-term analysis contains 436 transactions.

The average number of the transactions reported in the works covered by this methodology review is 368 transactions. Bortolotti et al. (2017) work with the most extensive clean dataset of 796 transactions. Sojli and Wah Tham (2011) use the smallest dataset, which has only 66 transactions.

The procedures for collecting transaction data and the databases the authors consulted to obtain information about SWF investment deals were similar across all of the seminal papers. The Securities Data

Corporation (SDC) database is the most popular database used to identify SWF investments (Fotak et al., 2008; Dewenter et al., 2010; Knill et al., 2012; Bortolotti et al., 2015; Bortolotti et al., 2017). The authors usually use it in combination with Zephyr from Bureau van Dijk (Fotak et al., 2008; Bernstein et al., 2013; Park et al., 2019) or Factiva (Chhaochharia and Laeven, 2008; Dewenter et al., 2010; Kotter and Lel, 2011). The Sovereign Wealth Fund Institute database was the source for an initial list of SWFs in all of the studies and its data was frequently combined with data collected from individual research. Datastream is the most favored source of market data. Bloomberg, in combination with WorldScope, is used by the majority of the authors for investee accounting data. Additionally, Thomson One Banker and Zawya Limited have been mentioned as a supporting source of financial data (Bortolotti et al., 2015; Bortolotti et al., 2017). In later studies, publicly available information sources were used for data mining, for example, the Lexis-Nexis database and the archives of the *Financial Times*, the *New York Times*, *GulfNews*, the Associated Press, Reuters, and others.

The criteria the authors use to filter and develop a clean dataset were:

- (i) Date (usually a time interval in years): Not surprisingly, more transactions result from a longer time frame. The dataset used by Bortolotti et al. (2015), Bortolotti et al. (2017), mentioned above as having the largest number of transactions (796), includes SWF investments from 1980 to 2012. Similarly, Kotter (2008) works with investments from 1982 to 2008. Some authors, such as Knill et al. (2012), provide only the information that the investments in their dataset were included up to a specific year. Other authors work with data from the mid-1990s to 2010, like Chhaochharia and Laeven (2008), whose dataset ranges from 1997 to 2007. Dewenter et al. (2010) use data from 1996 to 2007 and Karolyi and Liao (2017), from 1990 to 2008.
- (ii) SWF investment — direct or indirect: The majority of the authors include both direct and indirect investments (the latter being investments by subsidiaries of the SWF or special purpose vehicles that have a publicly verified connections to an SWF). The authors provide the results of short-run impact analyses for investments of both types.

(iii) The national origin of the SWFs and their investees (i.e., domestic versus cross-border investment): Authors such as Chhaochharia and Laeven (2008), and Karolyi and Liao (2017) work only with cross-border transactions. Other authors provide information about several domestic transactions and do not exclude them from their clean datasets.

(iii) Other criteria (e.g., exclusion from the dataset of initial public offerings, limitation to some particular geographical regions, and exclusion of selected industrial sectors).

Research results

The consistency of the empirical results of the research suggests that investment by SWFs causes positive short-term reactions (i.e. increases) in the value of the stock of their targets. The greatest average abnormal return in a three-day window around the announcement date was documented by Sojli and Wah Tham (2011). They also find that the abnormal returns for smaller event windows were significantly greater than zero but still less than those for larger windows. In their results, the average CAR is 3% for time period (-1, 1) and 8% for (-10, 10). Almost identically, Kotter and Lel (2011) find a positive risk-adjusted average cumulative abnormal return of 2.2% in the three-day window surrounding an announcement date. Fotak et al. (2008) confirms a positive 0.8% mean abnormal return around the announcement date, statistically significant at the 1% level. Chhaochharia and Laeven (2008) find positive CARs during the ten trading days before the announcement of the investment, with an average CAR of 1.15% over the period (-10, -5). Dewenter et al., (2010) find that the average CAR for a three-day window was 1.5% for their full sample and 1.7% for a clean (filtered)

³¹ This is in order to prevent possible pre-announcement news leakage from affecting the estimates.

subsample. The above results are supported by an analysis of the impact of *divestment* by SWFs, where the average abnormal return in a three-day window around the date of announcement was -1.4% presented by Dewenter et al., (2010). Similar results for SWFs investment and divestment transactions were obtained in later studies. For instance, Karolyi and Liao (2017) find a median CAR of 1.2% for a three-day window following the SWFs investment.

An important finding is that when the SWFs' investees are compared to a company targeted by private institutional investors, the results for the SWFs' targets show a significantly lower increase in share price. This finding is supported by Bortolotti et al. (2017), who observed a three-day average CAR of $+0.84\%$ for SWFs' investees and a three-day mean CAR of $+4.82\%$ for private investments. All CARs were significant at the 1% level.

Although Bertoni and Lugo (2014) employ a different research methodology using credit default spreads, they confirm the results of the other authors' analysis of stock market values. They find a non-negligible decrease in adjusted CDS around the time of an announcement. The mean five-year average credit default spread for the event window $(-1, +1)$ was 1.135 basis points (bps). The mean decrease in CDS, adjusted by an equally weighted index of all corporate CDS contracts, is significant at the 5% confidence level (or better) for each of the three maturities that Bertoni and Lugo consider. The magnitude of the average adjusted decrease in spread varies across different categories of the events they studied, ranging from 1.258 bps to 2.896 bps.

Long-term impact

SWFs are usually regarded as long-term, passive investors. They do have the capability and incentives to monitor the management of their investees and potentially to increase investee value by actively engaging in the governance of their target companies, as predicted by Shleifer and Vishny (1986). Enhanced access to markets and the availability of state or state-backed funding provides a significant advantage to SWFs' investees. However, investment by a government-owned entity can sometimes have a negative impact. In the case of SWFs, the wealth maximization typically pursued by private investors is replaced by politically motivated goals, including obtaining access to technology or natural resources and other national geopolitical objectives (Drezner, 2009; Cohen, 2009).

Unfortunately, empirical research into the impact of SWF investment over the long term³² does not show the same consistency of results as the studies of SWFs' short-term impact that are discussed in the previous section.

Research methodology

We divide the empirical studies of the long-term impact of SWF investments into two groups, based on the indicators selected by the authors:

- (i) market value
- (ii) firm performance indicators

In contrast to academic research on the short-term impact of SWFs, where the most common evaluation method is based on CARs, cumulative market-adjusted returns (CMARs) are more often used to evaluate long-term effects. Authors prefer comparing the change in SWFs' investees' market value with a market average instead of extrapolating the investees' absolute, historical market value or using performance indicators. CMARs are usually used in conjunction with buy-and-hold market-adjusted returns (BHARs), as described by Rosen (2006) and Bouwman et al. (2009).

³² "Long-term impact" refers to a one-year or longer time period from the effective date of the transaction.

The primary issue with using CMARs as an indicator is the need for a robust control sample. The quality, complexity, and robustness of the group of companies selected as proxies, or controls, have a significant impact on the reliability of the research results. We identify the authors' usual approach to the selection and verification of the control group as one of the weakest parts of the research in the literature and the primary source of inconsistencies in findings about SWFs' long-term impact on their investees.

Some authors, for instance Bernstein et al. (2013), openly admit that they faced a lack of reliable data on companies that realistically mirrored the market average. This difficulty led them to reduce the scope of their research and prevented them from publishing their research results in their entirety. The shortage of data is the main factor that limits academic research on SWFs' investments in state-owned companies.

Market value

In the 1980s, Brown and Warner (1980, 1985) and Dyckman et al. (1984) empirically documented the reliability and the power of test statistics designed to detect abnormal stock returns. These studies, however, documented abnormal returns in terms of months at the most. In contrast to previous work, Barber and Lyon (1997), and later, Barber and Tsai (1999) empirically documented the power and reliability of test statistics designed to detect long-run abnormal stock returns over one-year, three-year, and five-year periods, similar to the methodology later embraced by authors studying abnormal stock returns of SWFs investees.

Barber and Lyon (1997) advocated the use of the buy-and-hold abnormal return method (BHAR). This approach, however, was later questioned by Fama (1998) and Mitchell and Stafford (2000), who both suggest that this methodology does not sufficiently account for possible cross-sectional dependence in returns on investment.

Hertzel et al. (2002) mitigate the methodological weakness of BHAR by using "calendar-time abnormal returns," as do Mitchell and Stafford (2000). Kothari and Warner (2007) provided a comparative analysis of BHAR and the Jens-alpha approach. They discuss in detail the significance testing of the results and the primary issues with the methods described above, which they identify as the right skewness of BHAR and a bias arising due to cross-correlation in returns, as described by Brav et al. (2000).

In the research work on SWFs, BHAR is often used, but only for market proxies. Therefore, we focus on CMAR instead. We suggest reading Brav et al. (2000), Hertzel et al. (2002), and Kothari and Warner (2007) for discussions of BHAR's strengths and weaknesses as an analytical tool.

Comparative analysis based on CMARs is the tool most often used since the first studies aimed exclusively at the long-term impact of SWF investments. Examples are Fotak et al. (2008) and Dewenter et al. (2010). To this date, comparison of CMARs is the most popular method among researchers. The latest studies using this method include ones by Bortolotti et al. (2017) and Park et al. (2019).³³

Some authors, such as Fotak et al. (2008) and Bortolotti et al. (2015), simultaneously calculate the changes in investees' raw returns for various time windows, but those results are typically used only for testing the robustness of results. On the other hand, Knill et al. (2012) calculate differences in raw returns for both target companies and their benchmark or control groups. Dewenter et al. (2010) use both BHARs and CMARs. We do not find any dramatic differences between the BHARs and CMARs they present in terms of absolute values or significance. A combination of various performance indicators and Tobin's Q

³³ Park (2018) uses the abbreviation "CAR" for his measure of SWFs' impact. However, after reviewing his methodology and comparing it to Dewenter's (2010), we believe that the authors are using cumulated market-adjusted returns (CMARs) instead of CARs as their indicators.

was used by [Sojli and Wah Tham \(2011\)](#) and [Fotak et al. \(2008\)](#) — who simultaneously analyze buy-and-hold returns but only to measure investees' absolute performance.

Similarly, [Bortolotti et al. \(2017\)](#) conduct a buy-and-hold returns analysis to check the robustness of their results, but provide only the information that the results of their analysis were “similar with all samples displaying positive and statistically significant abnormal returns, smaller for the SWF sample than for the benchmark sample.” The literature that cites statistics linked to the testing of buy-and-hold returns, using market returns as the reference asset, is not very specific ([Barber and Lyon, 1997](#)). Therefore, in order to confirm the robustness of their data, some authors, such as [Knill et al. \(2012\)](#), take Barber's suggestion of using firm returns as the benchmark reference. In order to reduce “survivorship bias” in their dataset, Knill et al. assume that when a target firm is dropped from the sample, it has earned the benchmark return for the remainder of the sample period. [Kotter and Lel \(2011\)](#) examine only BHARs. They do not use CMARs or CARs at all, arguing that BHARs are preferable to CARs because CARs can suffer from a downward distortion, as found by [Kothari and Warner \(1997\)](#).

A frequently used metric for large-scale assessment of firm values is Tobin's Q, which is the book value of a firm's total assets plus the market value of its shareholder equity, minus the book value of its shareholder equity divided by its total assets. For details on the method of calculating Tobin's Q, see [Gompers et al. \(2003\)](#), [Gompers and Metrick \(2001\)](#), and [Ferreira and Matos \(2008\)](#). [Fernandes \(2014\)](#) and [Sojli and Wah Tham \(2011\)](#) use Tobin's Q in their studies.

The research results in general, however, provide contradictory results regardless of whether BHAR, CMAR, or Tobin Q were used. [Fotak et al. \(2008\)](#) find a consistent negative trend in mean abnormal buy-and-hold returns, which in their study can reach -18.3% at the end of the second year following an investment by an SWF. They find this to be true even though raw returns were positive and statistically significant at all intervals.³⁴ [Dewenter et al. \(2010\)](#) confirm the finding of negative mean and median market-adjusted returns and BHARs in the first and second years, but they also find that in the third and fifth years, mean CMARs were positive for all of their samples and in the fifth year, the estimates are significant. [Bortolotti et al. \(2010\)](#) find that that mean BHARs are negative, but not statistically significant; overall, they examined four holding periods, with BHARs ranging from -1.32% in one year to -4.61% at the end of three years. The median BHARs that [Bortolotti et al.](#) find are substantially more negative, ranging from -3.13% by six months to -12.75% by three years. The first BHAR returns for the earlier three holding periods were negative and statistically significant at the 1% level. [Kotter and Lel \(2011\)](#) show that on average, target firms do not earn any statistically significant excess returns in the first two years, but the average BHAR becomes both positive and statistically significant at the end of the third year. [Sojli and Wah Tham \(2011\)](#) show that average BHARs are positive, reaching a 16% premium in the first year. However, they argue that BHARs are sensitive to risk and may result in overstating abnormal performance, which was also pointed out by [Franks et al. \(1991\)](#) and [Lang and Stulz \(1994\)](#). Finally, [Park et al. \(2019\)](#) present the finding that based on the estimates of the median BHAR, SWFs' target firms underperform their benchmark local markets by -4.66% in the first year. This negative result magnifies in the second year, reaching -6.32% .

Firm performance indicators and return to risk approach

Analysis of the long-term performance indicators of firms targeted by

³⁴ [Fotak et al. \(2008\)](#) present results for six-month, one-year, two-year, and four-year post-investment windows. They found that the CMAR for the six-month interval was -1.46% and for the four-year interval, as high as -78% . This value indicates that when the SWF transaction dataset is significantly reduced, results can be significantly biased due to a few extreme values (the author does not provide information about data trimming or winsorizing).

SWFs is an alternative research approach to determining the impact of SWF investment. In one of the first long-term impact analyses of SWFs' investees' performance, [Kotter and Lel \(2008\)](#) use a methodology similar to that of [Karpoff \(1996\)](#). In Kotter and Lel's later work, they use both a market value approach and performance indicators. This approach was later repeated, by [Bortolotti et al. \(2015\)](#) and other authors. Still others, like [Fernandes \(2014\)](#), employ a combination of firm performance indicators and Tobin's Q. The selection of performance indicators varies. The most used performance indicators are (i) return on equity (ROE), (ii) return on assets (ROA) and (iii) EBITDA, which is the indicator favored by [Fernandes \(2014\)](#). [Bortolotti et al. \(2015\)](#) use total sales instead of EBITDA and book-to-market ratio. [Sojli and Wah Tham \(2011\)](#) use EBITDA/assets and EBITDA/sales as measures of efficiency and profitability.

The author's research procedures are identical for all of the above variables. The difference between the value of each variable at the time of the SWFs' investment and at select (one to five year) periods, are calculated. Then the authors apply the same procedure to the performance variables of the control group. Finally, difference-in-difference statistics are calculated by subtracting the change in each variable of interest for the control group from the corresponding change for the SWF sample.

[Fernandes \(2014\)](#) uses a propensity score-matched control group as a market proxy for his long-term impact analysis. A similar methodological approach was used by [Campello et al. \(2010\)](#), among others, to investigate the impact of financial constraints on companies. This technique matches events (transactions) from the research sample to the most similar events (transactions) from a control group, based on select parameters like size, ownership, ratings, and industrial sector. The analysis and the results are based on the absolute change in the selected operational indicators over the period between one year prior to the SWF's investment and one year following it. Finally, he tests the difference in the performance differences of the investee companies and the control group.

[Knill et al. \(2012\)](#) choose a different research approach. Similar to [Brown et al. \(2008\)](#), who evaluate hedge fund investments and stress the importance of considering both return and risk, Knill et al. are the first to evaluate SWF investments in this way. Knill follows [Bhagat et al. \(1987\)](#) in using a volatility event study. They compare total volatility, systematic risk, and idiosyncratic risk before and after SWF investment. They then compare both the Sharpe ratio,³⁵ and the appraisal ratio favored by [Brown \(2008\)](#). The Sharpe ratio measures total risk, while the appraisal ratio focuses on the investee firm's return per unit of idiosyncratic risk. Knill et al. compare the Sharpe and appraisal ratios before and after an SWF's investment, using a difference between means test. They conclude that the results show a statistically significant negative coefficient in the Sharpe and appraisal ratios, indicating that the decline in returns experienced by target firms is not compensated by a sufficient decline in risk in the one-, three-, and five-year windows.

The results based on the investee's performance indicators show inconsistencies similar to those of the studies based on the investee's market value. [Kotter and Lel \(2008\)](#) claim that there is an apparent deterioration in the investees' long-term performance. On the contrary, [Fernandes \(2014\)](#) finds statistically significant positive results for the group of SWF investees. He reports that in the first year following the SWF investment, they experienced an average 2.36% increase in their ROE, 1.18% in ROA, and 2.36% in their EBITDA/Assets ratio. The investees outperformed the control group performance indicators by 1.62% for ROE, 1.29% for ROA, and 2.81% for EBITDA/Assets. A

³⁵ As described in [Sharpe \(1966\)](#), and again in [Sharpe \(1994\)](#).

positive impact of SWF investment on its targets is observed by Soji (2011), who reports Tobin's Q difference-in-difference premium of 2% compared to a control group comprised of similar investments by hedge funds.³⁶ Contrasting results are presented by Bortolotti et al. (2015), and later, Bortolotti et al. (2017). In both papers, negative results are observed in all measured performance indicators, and a decline in profitability is reported for all three years after SWF investment. ROA declined by 2.31 % in the first year, by 1.13% over the second year, and by 1.76% in the third year. The market-to-book ratio showed a similar, statistically significant decline over all time horizons.

The majority of authors combine market value and firm performance approach. In all observed studies where the market value and firm performance approaches were utilized, research findings of one model were confirmed (it needs to be stressed that with different statistical significance) by the control calculations based on the second model.

Control group and benchmark procedure

We list the methodologies for developing a control group for long term impact analysis in Appendix II. The authors use either matched pair benchmarking procedure, for instance Knill et al. (2012), Kotter and Lel (2011), and Bernstein et al. (2013), or global and local market indices provided by professional market data providers. An example is Dewenter et al. (2010) or Bortolotti et al. (2015, Bortolotti et al., 2017).

We did not identify any study using both matched pair benchmark procedure and market indices benchmark approach. We believe it would be an interesting opportunity to verify the impact of the selection of the control group on the final results by applying both of the above-mentioned techniques for obtaining a clean SWFs transaction dataset. This might explain, for instance, Fernandes's (2014) positive results for SWF investment, which were based on the propensity score-matched control group methodology.

Data collection and verification procedures

The challenge presented by the limited number of transactions used for short-term impact analysis is even more evident in the long-term windows. Moreover, the size, structure, and verification procedures of the final transactions database differ significantly across the academic papers.

The early studies suffer because they use a limited number of transactions for long-term impact assessment. For instance, Fotak et al. (2008) worked with datasets of 620 transactions in their short-run analysis, but for their long-term impact analysis, they only used 162 transactions in the first (second) post-investment year, 114 in the second, and only 54 in the third year. Depending on the performance indicator, Kotter and Lel (2008) used datasets containing only 44 to 51 transactions in the one-year window and a meager 15 to 24 transactions in the third year.³⁷ Dewenter et al. (2010) used datasets containing 177, 127, and 74 transactions in years one, three, and five, respectively. Also, Knill et al. (2012) worked with only 157, 82, and 50 transactions for the same periods. Fernandes (2014) used the largest number of transactions. He compiled a dataset of 880 transactions, but only provides a result for the one-year window that is similar to Bernstein et al.'s (2013) dataset of 796 transactions (evaluated at six months). For impact analysis over a period longer than two years, the most extensive dataset was developed by Bortolotti et al. (2017), who (depending on the performance indicator) collected datasets with 284 to 517 transactions for one year, 380 to 445 for two years, and 189 to 266 for the three-year window.

³⁶ Sojli and Wah Tham's (2011) paper is an exception among the papers we selected for review because the authors cover only SWF investments in the United States. The reason for including this study in the clean sample is its interesting analysis of SWFs' investees performance compared to a group of similar companies targeted by hedge funds.

³⁷ The number of transactions varies depending on the the performance indicator.

Besides the size of the datasets, the authors' data collection procedures, and more importantly, the number of data filters they apply to the clean research sample, vary substantially.

Data collection procedures for the long-run studies were similar to short-term impact research. The primary sources for the identification of SWFs were the International Forum of Sovereign Wealth Funds (IFSWF) and the Sovereign Wealth Fund Institute, usually accompanied by the authors' independent online research. General information about the existence of various SWFs is widely available from public sources. For collecting SWFs' investment transactions, a majority of the authors relied on commercial transaction databases, the most popular of which are the Refinitiv Securities Data Corporation's (SDC) database, Zephyr (Bureau van Dijk), and Form 13F-HR for US-based SWFs' transactions. These resources were the ones used by Bortolotti et al. (2017). The source databases for the investees' financial data are most often WorldScope Banker and Zawya.

Some authors have developed original methods to deal with the lack of information on SWFs' transactions. Bortolotti et al. (2010), for instance, use the listings of all Norges Bank Investment Management (NBIM) equity holdings around the world, which NBIM publicly discloses quarterly. They use these reports to track the NBIM's transactions and enlarge the investment transactions dataset that they obtained from the commercial transaction databases. This approach led Bortolotti et al. to a final dataset of 688 transactions, which was the most extensive sample in the literature when their study was published.³⁸ However, it must be stressed that of those 688 transactions, 395 (57%) were carried out by NBIM.³⁹

This pattern, where a majority of the transactions in the final dataset originate from only three or four SWFs, is also seen in the other studies. For instance, Dewenter et al. (2010) state that Singaporean SWFs made 36% of all the transactions they studied, which is similar to the dataset used by Park et al. (2019), where 40% of the total sample originates from Singapore SWFs alone. This phenomenon is even more prominent in Kotter and Lel (2011), who used a dataset where 70% of the transactions are backed by Singaporean sovereign wealth funds.

The additional criteria and data filters that the authors apply to their final datasets for long-term analysis are similar to the short-term impact analyses. These are domestic versus cross-border investment, direct versus indirect investments (i.e., those carried out by SPVs), and the exclusion of selected geographical regions or industry sectors such as real estate.

SWF transactions dataset — average stake acquired

To our surprise, some authors paid limited or no attention to the size of the stake acquired by the SWFs. Despite the limited number of transactions in the dataset that Kotter and Lel (2008) used for their long-term impact analysis, they provided the following valuable information: "The median equity stake acquired by SWFs is 5 percent, with only about 5 percent of SWF investments exceeding the 50 percent threshold." Kotter and Lel also work with a "stake" variable⁴⁰ and find a positive but statistically insignificant coefficient for the stake acquired by an SWF, suggesting that their sample does not display a high degree of SWF activism if any. Similar results were confirmed by Fotak et al. (2008); they use a cross-sectional regression, where they set up a "percent acquired" variable and conclude that there is no evidence of a relationship between the share in the target acquired by an SWF and the target's long-term abnormal returns. The authors provide no information about

³⁸ This was for a time period exceeding 12 months following the SWF's investment.

³⁹ The authors are aware of the potential for distortion of the clean sample data and have used a dummy variable to verify the results for the transactions subgroup without NBIM investment deals.

⁴⁰ This refers to the percentage of the target firm's equity purchased by the SWF.

the median or average size of the share acquired. A similar research approach was used by [Bortolotti et al. \(2015, Bortolotti et al., 2017\)](#), who worked with a clean sample comprised of transactions where the mean SWF stake acquired was 8.45%, and the median was 1.23%. Unfortunately, they did not discuss the relationship between the long-term impact and the size of the ownership share in their work. [Dewenter et al. \(2010\)](#) used a clean sample with a significantly larger mean (28%) and median (20%) share acquired by SWFs than that observed by [Kotter and Lel \(2008\)](#).

[Knill et al. \(2012\)](#) control for the influence of the size of the investment and its impact on return-to-risk performance via including the total holdings of the target firm after the transaction, expressed as a percentage of the target firm's total assets.

A different approach was chosen by [Fernandes \(2014\)](#), who uses a dummy variable to separate the transactions where the SWF's ownership stake in a targeted company is greater than 1%. For this subsample, the average ownership stake equaled 6%. He concludes that for this "large position" subgroup of transactions, a higher long-term premium in value was recorded compared to the full sample.

The largest mean ownership share was recorded by [Bernstein et al. \(2013\)](#), where the mean percentage of the SWF stake in their database of transactions was 56.6%.⁴¹ The lowest value of mean ownership share was presented by [Fernandes \(2014\)](#) for his full sample, which was 0.54%.

The inconsistency of long-term impact results

Similar to [Aguilera et al. \(2016\)](#) and [Megginson and Gao \(2020\)](#), our research confirms inconsistencies in results on the SWFs long-term impact on investees. Nevertheless, after detailed analysis we found that the enhancement in the value of the target firm resulting from the positive influence on investees provided by their large shareholders, as envisioned by [Shleifer and Vishny \(1986\)](#), is supported only by two studies.

First, the work published by [Fernandes \(2014\)](#), who finds statistically significant positive results for the group of SWF investees in the first year following the SWF's investment. Second, [Dewenter et al. \(2010\)](#) observed a statistically significant premium in market value (based on cumulative market-adjusted returns) in the third and fifth year.

In [Fernandes's \(2014\)](#) work, we believe that his positive results might be connected to his use of a propensity score-matched control group methodology where the performance indicators of every SWF investee in his dataset are matched with a similar firm that did not receive SWF investment. We see that [Fotak et al. \(2008\)](#), similarly to [Fernandes \(2014\)](#), find positive raw returns in all measured windows up to four years, but when their results (using mean compounded abnormal returns) are adjusted for risk, the result turns to negative values. Furthermore, it needs to be stressed that [Fernandes \(2014\)](#) reports only the change in absolute operational parameters in the year before the SWFs investment and the year after. Moreover, the dataset used by [Fernandes](#) shows the lowest value of mean ownership share⁴² for his full sample, only 0.54%.

The second study confirming the positive long-term impact of SWF investment is [Dewenter et al. \(2010\)](#). The authors find that the mean CMARs are positive over 3- and 5-year periods and that in the 5-year time frame the results are statistically significant. All other authors who use the same methodology as [Dewenter et al. \(2010\)](#) confirm opposite results. We identified four factors with the potential to positively exaggerate the research results provided by [Dewenter et al. \(2010\)](#):

- (i). A limited number of transactions, especially in the fifth year following the SWFs investment (only 74 investees)
- (ii). 36% of all transactions in the clean dataset were generated by Singapore-based SWFs. Temasek and GIC are considered as a market benchmark in terms of SWFs performance
- (iii). BHAR and CMAR propensity to skewness in the longer horizon as discussed by [Kothari and Warner \(2007\)](#), and bias arising due to cross-correlation in returns described by [Brav et al. \(2000\)](#)
- (iv). The results are not adjusted for risk (volatility). We can see the strong impact of risk adjustments on the results of the SWF event study provided by [Knill et al. \(2012\)](#).⁴³

The positive results found by [Fernandes \(2014\)](#) and [Dewenter et al. \(2010\)](#) are contradicted by those of all the other authors who provided results for a greater than one-year post-investment window, no matter what methodological approach they employed. We see that the negative trend is even stronger when (i) risk adjustment methodology is applied, (ii) the clean dataset is comprised of a higher number of SWFs transactions, (iii) the stake acquired by an SWF is greater.

Conclusion

In preparing this paper, we reviewed an original dataset of approximately 2500 publications on the subject of SWFs, published between 2007 and 2018. After checking the publications for relevancy and redundancy, we separated a clean dataset into three categories. We narrowed our focus down to only those publications addressing the impact of SWFs on the companies in which they invest. The final list of publications we evaluated is available in [Appendix I](#), "Short-term Impact" and [Appendix II](#), "Long-term Impact."

We conclude that academic research on the short-term impact of investment by SWFs on their investees resulted in homogeneous outcomes, based predominately on the investee's market valuations. The most commonly used approach is based on the concept of cumulative abnormal returns (CARs). The results obtained by use of CARs were confirmed, even by authors experimenting with a different method, as shown by [Bertoni and Lugo \(2014\)](#). Bertoni and Lugo evaluated credit default spreads (CDS) instead of changes in share values. Their results were similar to findings presented in the literature on the influence of large shareholders on their investees, such as studies by [Holderness \(2003\)](#) and [Shleifer and Vishny \(1997\)](#) In those studies, investment by large shareholders is usually associated with an increase in the value of their target firms. The significant difference in those studies is how their control samples are constructed to provide a proxy for average market returns. Despite the diversity of the research methodologies used and the datasets of investment transactions that the studies compile, the consistency of the research results supports the conclusion that markets perceive investment by SWFs as value-enhancing. However, the observed premium in the market value of investees evoked by investment from an SWF, whether measured by the increase in the investee's market value or a decline in CDS, is substantially less than the premium observed in a comparable group of companies targeted by private investment funds.

Our findings about the methodological approaches used to determine the long-term impact of SWFs' investment on their investees are less conclusive. We find a consistent trend in the methodologies used by the majority of authors, who draw their inspiration from the extensive

⁴¹ [Bernstein's \(2013\)](#) dataset is comprised of both publicly and privately owned companies.

⁴² For comparison with other studies see section "SWF Transactions Dataset—Average Stake Acquired"

⁴³ [Knill et al. \(2012\)](#), who examined changes in both return and risk parameters, conclude that the decline the find in returns experienced by target firms is not compensated by a sufficient corresponding risk in the five-year window. A similar negative impact is confirmed by [Fotak et al. \(2008\)](#) based on mean compounded abnormal returns up to the four-year window, by [Bortolotti's \(2017\)](#) performance-based analysis for the three-year window, and by [Park et al.'s \(2018\)](#) market value-based research for the two-year window.

body of research investigating large institutional investors. The most preferred research methodology evaluates cumulative market-adjusted returns (CMARs), often in combination with analysis of investees' other performance indicators. CMARs are subsequently compared in conjunction with buy-and-hold market-adjusted returns (BHARs). The major concern arising from our analysis of the literature is the poor quality, verifiability, and overall representativeness of the SWF transaction datasets utilized by different authors. The overview provided in [Appendix II](#) clearly demonstrates how substantially the size and structure of the datasets of SWF transactions, and the verification procedures applied to them, vary across academic papers. The datasets, control groups, and benchmark procedures of the studies of the long-term impact of SWF investment are so heterogeneous that the comparability of their results is questionable.

Another serious concern arising from our analysis of the literature resonates with findings by [Megginson and Gao \(2020\)](#). We identified 78 SWFs operating in 2018. However, our analysis shows that over 90% of the SWF transactions in the literature we reviewed were generated by fewer than ten major SWFs. Moreover, the share of the transactions of the ten largest SWFs in the total was over 97%. Therefore, we conclude that the results of the studies we reviewed cannot be considered a representative picture of the entirety of the investments by SWFs, as can be the results of studies of the more homogenous group of institutional investors, such as pension funds and hedge funds.

To overcome the critical lack of verifiable information on SWFs' investment transactions and substantially improve the explanatory power of future research, to say nothing of its replicability, we suggest establishing an open-source platform for reporting on SWF investments similar that used for open-source software (OSS). The principle of open global collaboration has the potential to significantly improve the robustness and reliability of the SWF transaction dataset. We are truly happy to jumpstart this initiative by openly sharing our own original dataset of SWF transactions for the period 2007–17, comprising 400 + SWF transactions where the SWF ownership share in the investee is greater than 1%.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.resglo.2021.100072>.

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