



Active First Movers vs. Late Free-Riders? An Empirical Analysis of UN PRI Signatories' Commitment

Tobias Bauckloh¹ · Stefan Schaltegger² · Sebastian Utz³ · Sebastian Zeile⁴ · Bernhard Zwergel¹

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Abstract

Joining voluntary thematic initiatives can be a means for firms to legitimate their business activities. However, a lack of review mechanisms could create incentives for free-riding. This might lead to a lower commitment to the initiative's principles, and endanger its credibility and its members' legitimacy benefits. Whether members of voluntary initiatives take advantage of the opportunity to free-ride has not been analyzed empirically so far. To fill this research gap, we investigate from an institutional theory perspective the actual implementation behavior of publicly listed signatories of the United Nations Principles for Responsible Investment (UN PRI) in a difference-in-differences and an event study setting. Our empirical results show that, after signing, UN PRI signatories integrate environmental, social, and governance (ESG) criteria in their business activities significantly more than matched non-signatories from the financial sector, indicating the commitment of the signatories to the UN PRI in general. However, while the initial members show a high commitment to the initiative's principles by increasing their ESG integration performance substantially, new members signing at a later stage of the initiative perform considerably less, and thus undermine the UN PRI's credibility. We derive implications for voluntary thematic initiatives to avoid such a development.

Keywords Voluntary initiatives · Free-riding · Institutional theory · UN principles for responsible investment

Introduction

Participating in thematic initiatives is an approach for firms to communicate (a change in) their business conduct (Zerbini, 2017). One possible motivation of firms to do so is the desired effect of positively affecting their legitimacy (e.g., Berrone et al., 2017; Weaver et al., 1999; Zott & Huey, 2007). Business ethics literature has vividly discussed whether thematic initiatives, if they are voluntary and do not ensure that members implement the communicated principles, are effective self-regulatory programs, or if the members take advantage of the situation to gain and maintain legitimacy (e.g., Baeumlisberger, 2019; King & Lenox, 2000; Sethi & Schepers, 2014). If the initiative fails to monitor and ensure the commitment of its members, it offers the option of free-riding, i.e., enjoying the initiative's benefits without implementing its principles. Free-riders, if they are intensely scrutinized and detected by stakeholders such as non-governmental organizations or media can lose legitimacy (Berrone et al., 2017) and harm the credibility of the initiative. We refer to this as the *potential credibility problem of voluntary initiatives* with missing or weak review

✉ Sebastian Utz
sebastian.utz@unisg.ch

Tobias Bauckloh
t.bauckloh@uni-kassel.de

Stefan Schaltegger
stefan.schaltegger@leuphana.de

Sebastian Zeile
zeile@imug.de

Bernhard Zwergel
b.zwergel@uni-kassel.de

¹ Institute for Sustainable Finance, University of Kassel, Henschelstr 4, 34127 Kassel, Germany

² Centre for Sustainability Management, Leuphana University Lüneburg, Universitätsallee 1, 21335 Lüneburg, Germany

³ School of Finance, University of St. Gallen, Unterer Graben 21, 9000 St. Gallen, Switzerland

⁴ imug rating GmbH, Postkamp 14a, 30159 Hannover, Germany

and enforcement mechanisms. Whether a voluntary initiative does in fact lose credibility when members do not perform as promised depends on stakeholder reactions, such as whether somebody identifies the problem and whether media and NGOs do actually address the problem. The potential credibility problem, however, already exists whenever members do not perform as promised by the initiative. Our research therefore aims to understand (i) whether a voluntary initiative with missing or weak review mechanisms is able to ensure the implementation of its principles in general, (ii) whether the commitment to the initiative's principles is dependent on specific member characteristics, and (iii) whether late members perform similarly as early members of the initiative.

A widespread ethical concern is about possible motivations for signing a voluntary initiative. The initiative's members can either aim to legitimate the own business activities without contributing to the initiative's principles and performance (which might endanger the initiative's credibility) or show a real commitment and perform accordingly (Berrone et al., 2017; Huang & Chen, 2015; Laufer, 2003; Ramus & Montiel, 2005). We argue that signing an initiative documents to stakeholders the commitment of the firm to the initiative's principles. However, when review and enforcement mechanisms are absent in voluntary initiatives, members might not implement the principles while benefiting (or hoping to benefit) from the initiative's credibility. The rationale behind such a pattern is that once the membership in such an initiative is considered an effective tool to legitimate a firm's business conduct despite a low performance with regard to the initiative's principles, management has no incentive to improve performance (Qian & Schaltegger, 2017). Furthermore, over time, an increasing number of inactive members (i.e., free-riders) might undermine the initiative's credibility and endanger legitimacy benefits for active members. Consequently, active members might suffer under an increasing number of inactive (new) members.

Recent corporate scandals as well as economic and financial crises at the beginning of the twenty-first century have highlighted the need for monitoring business activities, particularly in the financial sector (Herzig & Moon, 2013). Financial institutions nowadays face societal expectations to legitimate their business activities. In this context, institutional theory suggests that firms respond to institutional pressures by communicating the integration of environmental, social, and governance (ESG) criteria in their business activities with non-financial disclosure or by participating in ESG (i.e., sustainability) initiatives (e.g., Beddewela & Fairbrass, 2016; Reid & Toffel, 2009; Reverte, 2009; Zerbini, 2017). Signing sustainability initiatives is one way for firms to communicate their adherence to the values of their environment and to secure their legitimacy (e.g., DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Robinson et al., 2011).

However, if the implementation of the initiative's principles is voluntary, it remains uncertain whether signing is done for free-riding purposes or whether it leads to a real change of a firm's business activities. The (possible) mismatch between the actual and the communicated business conduct has long been a debate in the business ethics literature (e.g., Chen & Chang, 2013; Laufer, 2003; Parguel et al., 2011). In particular, the participation in voluntary sustainability initiatives without review and enforcement mechanisms constitutes an opportunity for free-riding on the initiative's reputation and might lead to greenwashing (e.g., Baeumlisberger, 2019; Sethi & Schepers, 2014).¹ We contribute to this debate by empirically examining whether publicly listed members, i.e., signatories, of the United Nations Principles for Responsible Investment (UN PRI) seriously commit to the initiative's principles.

The UN PRI is a case in point to investigate the described potential credibility problem. Launched in 2006, the UN PRI is one of the most prominent global initiatives founded by institutional investors to support the development of a sustainable financial system by promoting the integration of ESG criteria in business activities of financial institutions (henceforth ESG integration). Similar to the high demand for financial products with sustainability labels (Ammann et al., 2019; Gutsche & Zwergel, 2020; Hartzmark & Sussman, 2019), UN PRI signatories can expect to benefit from positive investor reactions to a UN PRI membership. It is therefore not astonishing that by 2018, more than 2000 financial institutions with nearly 90 trillion USD in assets under management had signed the UN PRI (UN PRI, 2018). Since 2018, reporting on the implementation of the principles became mandatory.² However, before 2018, UN PRI signatories had the opportunity to exploit their membership for free-riding purposes without seriously implementing the principles. Whether such behavior has taken place or not, has not been investigated so far.

¹ More specifically and consistent with Baeumlisberger (2019), we define free-riding related to voluntary sustainability initiatives as the exploitation of members' sustainability efforts by inactive members for, among other things, greenwashing (in context of UN initiatives often called "bluewashing") purposes. Similar to Parguel et al. (2011), we interpret greenwashing as a misleading, i.e., a deception, of stakeholders regarding a firm's sustainability practices or its products' or services' sustainability benefits. While greenwashing implies a focus on environmental issues, we also cover social and governmental issues with this term.

² In 2018, the UN PRI implemented requirements for a UN PRI membership (UN PRI, 2019b). These requirements include a responsible investment policy, staff that is responsible for its implementation, and a management commitment as well as accountability procedures for its implementation. If a signatory fails to meet these requirements over a 2-year period, it will be delisted.

To fill this research gap, we first empirically analyze whether UN PRI signatories in general took advantage of this situation by assessing to what extent they implement ESG criteria in their business activities after signing. Our empirical design, i.e., the combination of genetic matching with a difference-in-differences setting, allows us to assess a differential effect in the ESG integration performance of UN PRI signatories after signing compared to matched non-signatories. We measure this differential effect using ESG ratings provided by Asset4 and Vigeo Eiris. Second, we evaluate whether the commitment to the initiative depends on the type of signatory, i.e., whether the signatory is an asset owner, investment manager, or service provider, or whether it signs directly or indirectly through a subsidiary. Third, we analyze whether late signatories show similar or less strong improvement in ESG integration than the early signatories and thus have taken advantage of the non-compulsory nature of the UN PRI. Such inactive late signatories could endanger the initiative's credibility over time. In this context, we also examine how the specific subgroup of late signatories that signed the UN PRI during the financial crisis have performed after entering the UN PRI. We test the difference of the seriousness in the implementation of the initiative's principles between early and late signatories by measuring the difference between the cumulative ESG integration performances that they achieve above the cumulative ESG integration performance of non-signatories for a certain period in an event study setting.

This study contributes to the existing literature by analyzing the potential credibility problem of voluntary initiatives and by empirically testing whether UN PRI signatories have adopted the initiative's principles in general and over time. Our study is the first that empirically assesses the behavior of UN PRI signatories on the basis of a broad multinational signatory panel data set for the period from 2002 to 2018. Therefore, we contribute to prior assessments on related questions that are mostly qualitative (e.g., Kell, 2013; Rasche, 2009; Thérien & Pouliot, 2006) or provide insights into drivers and motivations for signing the UN PRI (e.g., Cetindamar, 2007; Hoepner et al., 2021; Janney et al., 2009; Majoch et al., 2017; Perez-Batres et al., 2011).

The ethical implications of this analysis are relevant for political decision makers, customers³, and initiators of voluntary initiatives. The aim of the UN PRI is to increase its signatories' and other investors' awareness of the ESG standards of firms in which they invest, also known as responsible investing, to contribute to a sustainability transformation by

directing financial flows to sustainable firms. This goal, however, can only be achieved and the credibility of the UN PRI secured if free-riding does not happen. Whether ESG integration is achieved with this voluntary initiative has not been investigated so far. This study seeks to reduce the present uncertainty about the actual commitment of financial institutions participating in the UN PRI (e.g., Gutsche & Zwergel, 2020; Nilsson, 2008; Rhodes, 2010) by studying the seriousness in integrating ESG criteria into business activities. Since the UN PRI is one of the world's leading proponents of responsible investment, our findings may indicate whether publicly listed financial institutions have started integrating ESG criteria in their businesses.

The remainder of this paper is structured as follows. The next section provides an overview of the UN PRI and is followed by a discussion of the theoretical background and our hypotheses. After an explanation of the sample, the data, and the genetic matching, we present the methodological approaches, the results, and several tests to gauge the robustness of our findings. We continue with a discussion of the business ethics implications of our results, management implications to mitigate the potential credibility problem of voluntary initiatives, limitations of our study, and possible avenues of future research. Finally, we conclude the paper.

The UN PRI and its Signatories

The UN PRI network was launched in 2006 by a group of investors proposing that an economically efficient, sustainable global financial system is a necessity for long-term value creation. Initiated by the former UN Secretary-General Kofi Annan, the UN PRI is aligned with the UN Global Compact as one of the world's most considered standards supporting a sustainable business culture for human rights, employee safety, ecological improvements, and fighting corruption. The UN PRI states that responsible investments consider ESG factors in the investment decision-making process. The aim of the UN PRI is to increase investor awareness for responsible investments, i.e., to support a sustainable transformation of society by directing financial flows to sustainable firms (UN PRI, 2019a). As one of the world's leading proponents of responsible investments, the UN PRI attracts the attention of financial institutions as a way to communicate adherence to sustainability values, and thus, as a possibility to legitimate their business activities.

Members of this network are called "UN PRI signatories" since they signed a joint commitment to integrate the six principles for responsible investment in their asset management approach: (1) to incorporate ESG issues into investment analysis and decision-making processes, (2) to be active owners and incorporate ESG issues into ownership policies and practices, (3) to seek appropriate disclosure on

³ We refer to customers as all possible individuals and institutions that could collaborate with either UN PRI signatories or other financial institutions. Customers are, for instance, insured people, individual investors, or high-net-worth individuals.

ESG issues by the entities in which signatories invest, (4) to promote acceptance and implementation of the principles within the investment industry, (5) to work together to enhance the effectiveness in implementing the principles, and (6) to report on their activities and progress toward implementing the principles. By 2018, the number of UN PRI signatories exceeded 2000. Signatories include asset owners, investment managers, and service providers. Asset owners are pension funds, sovereign wealth funds, foundations, and (re)insurance firms. Entities categorized as investment managers (such as banks and investment firms) administer the wealth of third parties. Service providers are research firms and rating agencies that offer services to investment managers and asset owners. UN PRI signatories have to pay a membership fee based on the amount of assets under management. While at the beginning of the initiative, the implementation of the principles by its signatories was not compulsory, in 2018, the UN PRI implemented minimum requirements for membership.

Theoretical Background and Hypotheses Development

Previous business ethics literature analyzing why firms integrate ESG criteria predominantly adopts institutional, legitimacy, or stakeholder theory (e.g., Baldini et al., 2018; Reverte, 2009). While Suchman (1995) positions organizational legitimacy at the core of the intellectual transformation of institutional theory, Fernando and Lawrence (2014) argue that these theories are related to each other since they describe the relationship between a firm and the environment in which it operates. In line with that, Schaltegger and Hörisch (2017) consider firms' sustainability practices as an effort to create value for different stakeholder groups to ensure firms' legitimacy. Consequently, and consistent with studies on sustainability initiatives and signatories' ESG integration performance (e.g., Haque & Ntim, 2018), the following empirical study is informed by institutional theory. Joining voluntary sustainability initiatives such as the UN PRI can be a means for firms to show that they are acting responsibly. However, the initiative's credibility might suffer if it has weak review and enforcement mechanisms. Such a problem may occur when firms are not (or only slightly) punished for (partially) failing to implement the principles. Considering growth of the initiative over time, a credible initiative may furthermore attract new, less ambitious members. This raises the broader question of whether the legitimacy for active members involved in establishing the initiative is endangered by potentially less active members signing the initiative later, especially during crises periods with increasing institutional pressures (Kim, 1993). We link these considerations with existing studies on the possible

exploitation of voluntary sustainability initiatives by inactive members.

Signing the UN PRI—Symbolic or Followed by Substantive Actions?

The motivation among financial institutions to become a UN PRI signatory can be explained with an institutional theory framework. Institutional theory analyzes the influence of institutional pressures, for example a society's ethical expectations, on an organization's behavior (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Scott & Meyer, 1994).

Responses from a firm to institutional pressures are mainly driven by the motivation to ensure its legitimacy (Meyer & Rowan, 1977). A firm is considered legitimate if its activities do not violate the rules and values of its environment (Dowling & Pfeffer, 1975; Suchman, 1995). Deegan (2002) argues that legitimacy is critical to a firm's survival since it ensures access to important resources like a proper workforce and decreases the probability of being targeted with retributions like fines or loss of sales. Thus, legitimacy can be seen as a license to operate in a society (Newson & Deegan, 2002).

For the last decades, firms have increasingly been urged by various stakeholders (such as shareholders, NGOs, and consumers) to consider ESG criteria in their business activities (e.g., Reid & Toffel, 2009; Reverte, 2009). Recent economic and financial crises have stressed the need for monitoring the firms' businesses conduct, especially in the financial sector, and several discourses about corporate social (ir)responsibility of the financial sector have emerged (Herzig & Moon, 2013). Various studies point out that private and institutional investors are increasingly interested in investing their funds according to ESG criteria, i.e., investing in financial products with a sustainability label or at least underlying responsible investment strategies (e.g., Renneboog et al., 2008; Wen, 2009; Wins & Zwergel, 2015). This development is accompanied by political efforts to integrate sustainability in the financial system, such as the development of the EU's strategy on sustainable finance that started in 2016.

The consideration of ESG criteria in business, investment, and product development processes has therefore become critical for financial institutions. Consequently, financial institutions need ways to communicate that they are committed to sustainability expectations of the society to ensure their legitimacy. Possible approaches are, among others, the publication of sustainability reports (e.g., Deegan, 2002), the application of sustainability management tools (Windolph et al., 2014a, b) and the participation in voluntary sustainability initiatives (Zerbini, 2017). Therefore, we suggest that ensuring legitimacy is one possible motivation to participate in the UN PRI initiative. This is in line with the

findings of previous research on UN PRI signatories' signing motivations (Gray, 2009; Majoch et al., 2017).

However, according to Ashforth and Gibbs (1990), legitimacy-seeking responses must be distinguished between substantive or symbolic responses. A substantive response "involves real, material change in organizational goals, structures, and processes, or socially institutionalized practices" (Ashforth & Gibbs, 1990, p. 178), while a symbolic response implies that "rather than actually change its ways, the organization might simply portray—or symbolically manage—they so as to appear consistent with social values and expectations" (Ashforth & Gibbs, 1990, p. 180). In a similar vein, an ongoing debate in the business ethics literature circles around whether participating in sustainability initiatives is a substantive or symbolic (i.e., greenwashing) response to ensure legitimacy by free-riding on the initiative's reputation (e.g., Baeumlisberger, 2019; Sethi & Schepers, 2014). Rasche (2009) proposes that a lack of verification mechanisms leads to free-riding possibilities for UN Global Compact signatories. Similarly, Baeumlisberger (2019) argues that the implementation deficit of the UN Global Compact principles can be explained by an n-person prisoner's dilemma. UN Global Compact signatories would be motivated to save the cost of committing to the principles and gain a competitive advantage over committed competitors. Van Duuren et al. (2016) conduct an international survey of fund managers and conclude that managers who signed the UN PRI initiative implement ESG criteria in their investment process more often than non-signatories. However, Gibson et al. (2021) and Kim and Yoon (2020) who both analyze whether the aggregated sustainability performance of portfolio holdings managed by UN PRI signatories increases subsequent to signing the UN PRI come to divergent results. While Gibson et al. (2021) find sustainability performance improvements outside the United States of America, Kim and Yoon (2020) observe no changes in the sustainability performance of investment solutions. Focusing on a particular responsible investment strategy, Dimson et al. (2021) analyze 31 PRI coordinated engagement projects and conclude that collaborative engagement containing leading and supportive investors is especially successful. Moreover, the authors show that coordinating engagement activities through a third party can significantly reduce associated costs.⁴ In a similar vein, Majoch et al. (2012) argue that ESG-driven active ownership is the most effective channel to influence investees. This is particularly the case if the active owners enjoy societal legitimacy (Gifford, 2010).⁵

⁴ Further research on various aspects of collaborative engagement under the UN PRI is provided by Gond and Piani (2013a,b) and Piani and Gond (2014).

⁵ Mattison et al. (2011) presents a variety of effective ESG-related active ownership cases and recommendations.

Overall, while extant research has shown that non-compulsory communication on sustainability can be used by firms to ensure legitimacy (e.g., Archel et al., 2009; Deegan, 2002; O'Donovan, 2002), there is a vital discussion on whether it is predominantly connected to communicating an actual superior ESG integration performance or to greenwashing (e.g., Haque & Ntim, 2018; Kim & Lyon, 2015; Laufer, 2003; Lyon & Maxwell, 2011; Mahoney et al., 2013).

While institutional theory provides an explanation for the increasing number of UN PRI signatories, it is still unanswered whether firms act substantially by both signing and acting accordingly or whether firms sign symbolically without changing their business conduct, which could create a potential credibility problem for the UN PRI. To fill this research gap, we compare the extent of integration of ESG criteria in the investment process and product development of UN PRI signatories to matched non-signatories after signing based on the following hypothesis:

H1 After signing, UN PRI signatories in general do not integrate ESG criteria into their investment process and product development to a higher extent than matched non-signatories.

Further, Jansson and Biel (2011) discover different motivations for Swedish institutional investors (asset owners) and investment institutions (investment managers) to implement ESG criteria in their investment process. They argue that asset owners exhibit higher motivation stemming from moral values than investment managers, since they invest their own capital and are therefore not directly accountable to beneficiaries to the same extent as, for example, fund managers. Consistently, Majoch et al. (2017) provide evidence that the *signing motivation is dependent on the signatories' type, i.e., asset owner, investment manager, and service provider*. Additionally, Hoepner et al. (2021) analyze determinants of the probability for asset owners signing the UN PRI and identify normative and cultural-cognitive institutional aspects as well as a lack of compulsory regulation as main drivers of signing. We, therefore, formulate the following hypothesis:

H2a After signing, the type of UN PRI signatories does not influence the extent to which they integrate ESG criteria in their investment process and product development.

Another difference in the commitment to the UN PRI may prevail for *direct and indirect signatories*. Since indirect UN PRI signatories are parent institutions of UN PRI signatories that are not publicly listed, indirect UN PRI signatories may have a lower awareness of the UN PRI. We, consequently, argue that, due to different motivations inherent to different characteristics of UN PRI signatories, these characteristics

matter for ESG integration performance. We, therefore, formulate the following hypothesis:

H2b After signing, direct and indirect UN PRI signatories do not integrate ESG criteria to a different extent into their investment process and product development.

Signing the UN PRI Later—A Free-Riding Opportunity?

Various researchers discuss whether voluntary sustainability initiatives can be exploited for free-riding purposes. Sethi and Schepers (2014) argue that the number of inactive members in an initiative increases with the number of members, because of divergent interests among members and a lack of group cohesiveness. This observation is especially important in context of the development of the UN PRI since this initiative experienced an impressive growth since its inception.

Based on the UN PRI Report on Progress 2008, Gray (2009) differentiates between two types of signatories that differ in their signing motivation and proposes potential free-riding behavior. The core group would fully implement the initiative's principles due to ethical convictions, while a peripheral group of signatories would be mainly interested in benefiting from information access and gaining legitimacy. Similarly, Majoch et al. (2017) examine the motivation for signing the UN PRI by means of an international survey of UN PRI signatories and discover two different groups of signatories. Firms that signed the UN PRI at the beginning of the initiative in 2006 and 2007 (*first movers*), show a stronger identification with the values of the UN PRI than subsequent signatories. This difference is explained by an intrinsic ethical orientation of the first movers. While the first movers were involved in the launch of the UN PRI, the late signatories are mainly interested in profiting from the already existing credibility of the initiative and ensuring their own legitimacy. In line with institutional theory, firms that feel pressured to sign the UN PRI can misuse the initiative with the aim to enhance their legitimacy without implementing substantive ESG improvements.

For *late signatories* of a voluntary initiative with weak review and enforcement mechanisms, the incentive to free-ride may be particularly high in two cases: first, signatories may be motivated to join late when an initiative has already established a high credibility (*henceforth late movers*). Second, signatories who joined in a crisis in which the reputation of an industry has suffered may have tried to maintain or repair their reputation by temporarily implementing the initiative's principles (*henceforth crisis movers*). After the crisis, this group of signatories may perceive no reason to legitimate their business conduct anymore and lose the interest to comply with the initiative's principles.

Once a voluntary initiative has established credibility this might attract *late movers* to free-ride by signing without performing adequately. With an increasing number of inactive signatories, however, the potential credibility problem would develop for the UN PRI as a whole and for all members in spite of a higher performance of active early UN PRI signatories.

Financial institutions lost a lot of trust during the financial crisis (Kottasz & Bennett, 2016), e.g., through the Lehman Brothers bankruptcy in 2008. As an economic consequence, shareholder compensation was very weak accompanied by negative stock returns. According to the managerial opportunism hypothesis, managers tend to placate stakeholders in a crisis by increasing social welfare to generate moral capital and goodwill (Posner & Schmidt, 1992). In so doing, managers may try to avoid scrutiny by watchdog groups to improve their reputation as good global citizens and to initiate a “warm-glow” effect (Barnea & Rubin, 2010). In particular, better corporate reputation and customer loyalty are well-known results of improving with regard to ESG criteria. Such positive effects result in lower risk through insurance-like protection in general (Utz, 2018) and better financial performance during the financial crisis (Lins et al., 2017). Thus, signatories during the financial crisis (*crisis movers*) might have utilized an improvement in the ESG integration performance to generate insurance-like protection during and directly after the crisis. However, once the crisis is over and institutional pressures to legitimate business conduct are weaker, such crisis movers may have lost interest in serious ESG integration. We therefore expect crisis movers to improve their ESG integration in the crisis but to show a lower commitment to the UN PRI criteria over time than first movers. Crisis movers are expected to exhibit the same behavior after the financial crisis as late movers, and thus are likely to be rather inactive in complying with the non-compulsory principles of the initiative.

While earlier studies have identified differences between early and late signatories, a research gap exists whether these differences are reflected in different levels of ESG integration, leading to decreasing ESG integration performance on average. With the third hypothesis we, therefore, test whether first, crisis, and late movers show different ESG integration performances, i.e., different levels of commitment to the initiative's principles after their signature:

H3 After signing the UN PRI, first movers do not integrate ESG criteria to a higher extent into their investment process and product development than crisis and late movers.

Table 1 Sample selection process and UN PRI signatories distribution

<i>Panel A: sample selection</i>						
UN PRI signatories						2698
– Non-listed signatories						2240
Identified publicly listed UN PRI signatories						458
– ISIN duplicates						137
Unique publicly listed UN PRI signatories						321
– Missing ESG or financial data						180
The final sample of publicly listed UN PRI signatories						141
<i>Panel B: number of UN PRI signatories per year, group, and type</i>						
	New	Group		Type		
		Direct	Indirect	Asset owner	Invest. manager	Service provider
2006	19	4	15	3	13	3
2007	12	4	8	2	10	0
2008	10	4	6	2	8	0
2009	10	3	7	0	9	1
2010	13	6	7	0	11	2
2011	10	4	6	3	6	1
2012	9	4	5	3	4	2
2013	8	4	4	1	7	0
2014	12	5	7	1	10	1
2015	9	2	7	2	7	0
2016	7	2	5	0	4	3
2017	10	3	7	3	7	0
2018	12	6	6	1	10	1
Total	141	51	90	21	106	14

Panel A illustrates how the sample size was reduced to 141 listed UN PRI signatories. The majority of signatories (2240) are not listed, have no listed parent institution, and are therefore not in the scope of this analysis. In addition to signatories that are listed (direct signatories), we verified whether non-listed signatories have a parent institution that is listed (indirect signatory). The security identifier (ISIN) can emerge more than once in the list of signatories, as one parent institution can be an indirect signatory and at the same time a direct signatory. To avoid double-counting of a parent institution, we checked all ISINs and deleted 137 ISIN duplicates from our sample. Finally, all identified unique publicly listed UN PRI signatories for which no sufficient ESG and financial data exist for the observation period had to be excluded (180)

Panel B of this table contains the number of new UN PRI signatories per signature year. The distribution of these new UN PRI signatories is shown with respect to group (direct and indirect) and type (asset owner, investment manager, and service provider)

Data and Matching Approach

Sample Description

Our signatory sample comprises all publicly listed direct and indirect UN PRI signatories from the financial sector with available ESG ratings from the Asset4 database and accounting data from Worldscope and Refinitiv Datastream at least one year before the signature year. A firm that is categorized as a direct UN PRI signatory signed itself, while indirect UN PRI signatories are members of this network because one of their subsidiaries signed the UN PRI. A UN PRI signatory was kept in the sample in the following years for the period after its signature year until its delisting from

the UN PRI.⁶ We analyzed UN PRI signatories that signed between 2006 and 2018. Most of the UN PRI signatories had to be excluded from the analysis as they are not publicly listed or do not have a publicly listed parent institution (see Table 1, Panel A). As of December 2019, we identified 321 publicly listed direct and indirect UN PRI signatories. However, another 180 unique publicly listed UN PRI signatories had to be dropped as no sufficient Asset4 ESG data or

⁶ A UN PRI signatory could be delisted due to failing to pay the membership fee or due to a missing annual publication on its responsible investment activity based on the UN PRI framework. Starting in 2018, the UN PRI designed a scoring system with minimum criteria standards. UN PRI signatories that fail to meet these minimum standards in a two-year period will be delisted.

financial data were available for these firms. This resulted in a final data sample of 141 publicly listed direct and indirect UN PRI signatories with sufficient Asset4 ESG and financial data (see Tables 8 and 9 in Appendix C). Panel B of Table 1 contains summary statistics of the UN PRI signatory sample. The entire observation period ranges from 2002 to 2018. Our sample contains 51 direct and 90 indirect UN PRI signatories. The majority of the UN PRI signatories in our sample are investment managers (106).

ESG Integration Performance

To measure the ESG integration performance, we use Asset4 ESG ratings. Asset4 uses publicly available and traceable sources such as websites, SEC filings, sustainability reports, media sources, and NGO reports to derive more than 700 non-financial firm-level data points. Every data point is the firm-specific expression of a single ESG-related or sustainable characteristic. These data points are aggregated in several stages into 18 categories that cover general ESG themes within the environmental, social, and corporate governance pillars. Asset4 generates a rating for each category. A rating ranges from 0 to 100 points, with 100 indicating a very strong ESG integration performance relative to other firms. Our study focuses on the ESG integration of the UN PRI signatories in their investment and product development processes since the UN PRI explicitly addresses these business activities. Therefore, our major rating is the product innovation rating (ENPI). The ENPI rating reflects a firm's efforts toward the research and development of environmentally friendly products or services and it considers the reporting on the implementation of screening criteria in the investment selection process. Moreover, we examine whether UN PRI signatories increase their ESG integration in general, i.e., in all their business activities, by including a more general rating, which is an equally weighted aggregation of the ratings of the three pillars environment, social, and corporate governance (henceforth EWR rating).⁷ We argue that an increase in the more general EWR rating subsequent to signing the UN PRI is a further indication for a serious commitment to the initiative since it suggests a general commitment to sustainability issues.⁸ In the following, we use ESG as the general term to indicate specific or aggregated ESG

⁷ A detailed description of the employed ESG integration performance variables is provided by Table 7 in Appendix B of this paper.

⁸ It is essential to note that the ENPI and EWR ratings are not influenced by whether a firm signed the UN PRI or not. The signing of the UN PRI is not explicitly mentioned as an influencing factor for the Asset4 rating process. Furthermore, if Asset4 considers the signature of a financial institution in one key performance indicator, it would be one among 250 and for each category rating one among 40–50 data points. Thus, the influence would be marginal in our analysis.

Table 2 Descriptive statistics for UN PRI signatories in the matching year

Variable	Mean	Median	SD
<i>Panel A: ENPI and EWR ratings</i>			
ENPI	53.16	55.26	30.76
EWR	59.92	63.39	24.58
<i>Panel B: accounting matching variables</i>			
Sales	23.05	23.13	1.54
Total assets	24.91	25.54	2.43
EBIT	23.40	23.31	0.96
ROA	4.11	1.37	7.67
Asset turnover	0.23	0.10	0.29

This table presents the mean, median, and standard deviation (sd) of the matching variables for the UN PRI signatories at the end of the matching year t_{-1} . Sales, total assets, and EBIT are presented using their natural logarithm

integration activities, and refer to the ENPI and EWR ratings as our specific measures for ESG integration performance.

We chose Asset4 as our main ESG rating provider because it best fits our study in terms of coverage, scope, methodology, and output, and thus overcomes limitations of other ESG rating databases. Firstly, and in contrast to other ESG rating providers like MSCI-KLD, Asset4 covers a global sample of firms for a time series starting in 2002. Thus, Asset4 ESG ratings are available for the whole duration of the UN PRI initiative since its launch in 2006. Moreover, ratings prior to the signature year are important for our methodological setting. Thus, the access to ESG ratings from 2002 to 2005 are critical for our study. Secondly, in contrast to the MSCI-KLD, FTSE4Good, and Dow Jones rating approaches, the scope of Asset4 ESG ratings is comparatively granular. This granularity in the ratings ensures a high level of transparency by providing both the characteristics and the expressions of these data points for every firm in the Asset4 universe (Chatterji & Levine, 2006). Finally, the Asset4 methodology guarantees a high level of integrity and comparability of the ratings since every data point is cross-checked by at least one additional analyst and by means of statistical analysis tools. Moreover, there was no critical change in the methodology of the Asset4 ESG ratings for the entire observation period, which makes the output of Asset4 ESG ratings comparable in our long time series of Asset4 ESG ratings.⁹

Panel A of Table 2 contains descriptive statistics on the ESG ratings for the UN PRI signatories at the end of the matching year (t_{-1}), i.e., the year before the signature year.

⁹ Ioannou and Serafeim (2012), Dorfleitner et al. (2015), and Chatterji et al. (2016) include a detailed description and statistics on Asset4 ESG ratings.

It becomes apparent that UN PRI signatories have the possibility to improve their ESG integration performance after signing, since the ENPI and the EWR ratings are well below the maximum rating of 100.

Matching UN PRI Signatories to the Non-signatory Sample

We apply genetic matching (GM) to control for possible biases in our sample of UN PRI signatories because these firms may be exposed to the self-selection bias. The UN PRI signatory sample may not be representative of the population, since it could differ systematically in main characteristics compared to possible control firms (Weisberg, 2010). A simple comparison of UN PRI signatories and non-signatories is therefore not feasible. Since the same firm cannot be observed in two different conditions (UN PRI signatory and non-signatory) at the same time, a non-signatory with similar characteristics needs to be identified for every UN PRI signatory to approximate its development of a signatory in a non-signing status. This approach allows to make judgements on a signatory's commitment to the principles of the initiative.

GM is a sophisticated version of Propensity Score Matching (PSM) that is combined with Mahalanobis Metric Matching. We apply GM since standard PSM balances the observed variables asymptotically. However, some variables may not be balanced due to limited data (Sekhon & Grieve, 2012) and potential bias in matching approaches could occur if variables do not have an elliptical distribution (Rubin, 1976). GM is valid independent of the availability of a true propensity score (Sekhon, 2011; Sekhon & Grieve, 2012). For each UN PRI signatory, we apply GM in the year before the respective signature year, i.e., we use the end-of-the-year firm characteristics from the previous year. According to Diamond and Sekhon (2013), the algorithm identifies a measurement parameter under a number of distance measures, which maximizes the balance after matching. For potential counterparts to UN PRI signatories (i.e., non-signatories with similar characteristics to the respective signatory), we select all publicly listed firms from the financial sector following the Industry Classification Benchmark (ICB).¹⁰ After applying this matching process, we can attribute differences in the ESG integration performance between UN PRI signatories and non-signatories to the treatment effect (i.e., being a UN PRI signatory).

We select matching variables based on their influence on the treatment as well as the dependent variable (Ho et al.,

2007). We follow the model of Shen and Chang (2009) and use matching variables from the following three categories: scale, income, and management. The scale of a firm has been shown to have a positive effect on its ESG integration performance, e.g., bigger firms are faced with increased attention and expectation of stakeholders and small firms lack resources to implement ESG criteria in their business activities (Gallo & Christensen, 2011; Hoepner et al., 2021; Moore, 2001; Tagesson et al., 2009). Moreover, Drempetic et al. (2020) find a firm size bias in the measurement of a firm's ESG integration performance in the Asset4 database that needs to be controlled for. We measure the scale of a firm using the natural logarithm of total sales and total assets. Furthermore, income is included since the available fund theory (Hong et al., 2012; McGuire et al., 1988; Moore, 2001) supports the view that firms with abundant resources have a higher ESG integration performance, because the surplus can be used for ESG activities (Galbreath, 2013). Income is measured with return on assets (ROA) and the natural logarithm of earnings before interest and taxes (EBIT). Our measure for the management factor is asset turnover. Firms with well-functioning administration systems and management ability are more likely to maximize stakeholder benefits to maintain their competitive advantage (Shen & Chang, 2009). Therefore, management ability is also a decisive factor in becoming a UN PRI signatory. The sources for accounting matching data are Refinitiv Datastream and Worldscope. Panel B of Table 2 reports descriptive statistics for the accounting matching variables for the UN PRI signatories in the matching year (t_{-1}).

We include two further categories: region and the firm's ESG integration performance. First, it is well documented that national and international institutional factors such as culture and legislation influence the adoption of ESG practices by firms (e.g., Campbell, 2007; Doh & Guay, 2006; Husted & Allen, 2006). We therefore control for this bias by matching firms on the level of regions,¹¹ based on Refinitiv's region classification (*TR.HeadquartersRegion*), i.e., Africa, Americas, Asia, Europe, and Oceania. Subsequently, we follow the developed market approach by Fama and French (2017) and treat Japan individually and consider

¹⁰ Since this analysis is based on firms from the financial sector, a sector specific matching as proposed by Banerjee et al. (2003) and Melo and Garrido-Morgado (2012) is necessary in our application.

¹¹ A matching based on country-level would be the ideal setting to capture differences in national institutional factors such as culture and legislation. However, due to the limited amount of similar UN PRI signatories and non-signatories in some countries, a country-level matching deteriorates the matching considerably, so that matched firms show significant differences in matching variables such as size or ESG integration performance at the time of matching. Matching on regions solves this problem and inevitably also results in partial matching on countries. Thus, 44% of the UN PRI signatories in the ENPI dataset and 42% in the EWR dataset turn out to be matched to non-signatories from the same country. A detailed overview on the matching-pairs is presented in Appendix C (Tables 8 and 9).

Table 3 Region and country classification

Region	Country
Africa	South Africa
Asia	Bahrain
	China
	Hong Kong
	India
	Indonesia
	Malaysia
	Singapore
	Taiwan
	Turkey
	Europe
	Belgium
	Czech Republic
	Denmark
	Finland
	France
	Germany
	Greece
	Ireland
	Italy
	Netherlands
	Norway
	Poland
	Portugal
	Russia
	Spain
	Sweden
	Switzerland
	United Kingdom
Japan	Japan
North America	Canada
	United States of America
Oceania	Australia
South America	Brazil
	Colombia
	Mexico
	Peru

This table shows the region and country classification used for genetic matching. Basis is Refinitiv's country and region classification (*TR.HeadquartersCountry*; *TR.HeadquartersRegion*), which is partly adjusted according to the Fama and French (2017) developed market approach

North America (Canada and United States of America) separately. The remaining countries from the Americas region are assigned to South America. Table 3 gives an overview on the countries' region classification.

Second, since we analyze the change in ESG integration performance after signing the UN PRI, we also include the respective ESG rating of each firm in the year before

Table 4 Matching statistics

	Matching with	
	ENPI	EWI
ENPI	3.76 (0.31)	
EWI		3.22 (0.29)
Sales	0.18 (0.31)	0.19 (0.29)
Total assets	0.23 (0.42)	0.14 (0.63)
EBIT	0.06 (0.64)	0.05 (0.68)
ROA	0.67 (0.39)	0.57 (0.48)
Asset turnover	-0.01 (0.88)	0.01 (0.86)

This table presents the mean differences between UN PRI signatories and respective matching samples in matching variables for the matching year (t_{-1})

t tests and Wilcoxon-Rank-Sum tests are conducted to identify statistically significant differences. Both tests find similar results

p values of the t tests are presented in parentheses

signing in the matching process. The rationale behind this inclusion is the fact that it is less likely to achieve further improvements in already high ESG ratings. Furthermore, the self-selection of the signing firms can cause a bias toward high-performing firms since they want to communicate their sustainability profile. Therefore, we repeat the matching approach for each ESG rating under consideration, and use the respective ESG rating in the GM.

The matching process is based on the observations of the described variables in the year prior to the signature year. We apply a 1:1 matching which means that we include the non-signatory which is closest to the UN PRI signatory in the matching-pair. The matching procedure is a sampling without replacement in each signature year, i.e., a matching firm can be included in only one matching-pair in each year. While we use an exact match between UN PRI signatories and non-signatories for the variable region, the matching of the remaining variables is evaluated by the nearest neighbor method.

Table 4 contains the differences in the matching variables between UN PRI signatories and non-signatories. All differences are statistically insignificant, both for the t

tests and the Wilcoxon-Rank-Sum tests. This supports the fact that the matching is successful.

Empirical Designs and Results

Estimating UN PRI Signatories' Commitment in General

To analyze the seriousness of the commitment of UN PRI signatories to the initiative's principles, we apply a difference-in-differences setting to mimic a natural experiment. In this difference-in-differences model, we estimate the differential effect of the treatment (being a UN PRI signatory) on the ESG integration performance measured by Asset4 ESG ratings during the treatment period (the period after signing). We estimate the treatment effect by comparing the average change over time in the ESG ratings for the treatment group (UN PRI signatories) with the average change over time for the control group (matched non-signatories). Applying the difference-in-differences model on our panel of UN PRI signatories and non-signatories evaluates the between group differences of the changes in the ESG integration performance that occur over time.

We create two dummy variables, *TIME* and *TREAT*. *TIME* takes the value of 0 for years before the respective UN PRI signing and the value of 1 afterward. *TREAT* takes the value of 0 for matched non-signatories and 1 for UN PRI signatories. We refer to the interaction of *TIME* and *TREAT* as the DiD variable. The DiD variable coefficient represents the differential effect in ESG integration performance of the treatment. To determine the differential effect of the treatment, we estimate specifications of the following difference-in-differences model in panel structure:

$$ESG_{i,t} = \beta \cdot DiD_{i,t} + \gamma \cdot TIME_{i,t} + u_i + E_{i,t}, \quad (1)$$

where $ESG_{i,t}$ is the measure for the ESG integration performance of firm i in time t , $DiD_{i,t}$ is the interaction term as defined above, $TIME_{i,t}$ is the time dummy as defined above, u_i is the firm fixed-effect of firm i , and $E_{i,t}$ is the error term of firm i at time t . Since the *TREAT* dummy is time-invariant, and thus is included in the firm fixed-effect u_i , we drop it from the list of independent variables.

A positive coefficient β in Model (1), i.e., a positive differential effect of the treatment, indicates that, on average, the difference between the ESG integration performance of UN PRI signatories and non-signatories has increased after the matching year. Thus, in line with our theoretical framework, a positive β alludes to more ESG integration in UN PRI signatories' business activities than in the one of non-signatories, i.e., a serious commitment of the signatories to implement the UN PRI. The higher the β , the more distinct

the commitment of UN PRI signatories and non-signatories is toward ESG integration. Moreover, a positive β mitigates the concern of a potential credibility problem in general. On the contrary, a zero or negative β would imply a tendency to inactive behavior toward an improvement in ESG integration of UN PRI signatories.

Substantive Commitment of UN PRI Signatories in General

The empirical findings provide clear evidence that UN PRI signatories seriously comply with the principles of the initiative. Thus, we find no evidence for free-riding behavior of UN PRI signatories in general and can reject Hypothesis 1. The columns in Table 5 contain the estimates of panel regressions with firm fixed-effects of the specifications of Model (1) for the ENPI and EWR ratings as measures of the ESG integration performance. UN PRI signatories show an average differential increase in ESG integration performance by 11.449 (ENPI) and 6.876 (EWR) compared to non-signatories after signing [see model specifications (1) and (5) in Table 5]. I.e., UN PRI signatories improve their ESG integration performance to a significantly higher extent after signing the UN PRI than non-signatories. The signature does therefore not act solely as lip service but is followed by a serious commitment to the UN PRI. The positive *TIME* variable coefficient indicates a general increase in the ESG integration performance for all firms over time.

Additionally, and as a first robustness test, we add the variables employed in the genetic matching (sales, total asset, EBIT, ROA, and asset turnover) as control variables to the estimation of Model (1) to control for the effect of other firm characteristics that may influence the ESG integration performance [see model specifications (2) and (6) in Table 5]. The DiD variable coefficients stay significantly positive and different from zero at a 1% level. Thus, the differential shift in the ESG integration performance of UN PRI signatories is not due to firm fundamentals but could be attributed to the integration of ESG criteria in the products and business activities. With the conservative matching approach, the control variables, and the firm fixed-effects in this difference-in-differences model specification, we can attribute the differential shift in the ESG integration performance to the characteristic of being a UN PRI signatory and the serious implementation of the principles. Thus, the UN PRI initiative does not suffer under a potential credibility problem in general.

Commitment Level of Different Signatory Types and Direct and Indirect Signatories in General

To test whether the type of a UN PRI signatory matters for ESG integration performance, we interact the DiD variable

Table 5 Difference-in-differences analysis of the ESG integration performance of UN PRI signatories

	Dependent variable							
	ENPI				EWR			
	H1		H2a	H2b	H1		H2a	H2b
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DiD	11.449*** (2.517)	10.289*** (2.522)	15.795*** (4.178)	9.436*** (2.841)	6.876*** (1.813)	5.625*** (1.831)	5.383* (2.929)	4.674** (2.115)
DiD * inv.man			- 5.320 (4.218)				0.844 (2.922)	
DiD * ser.pro			- 16.861** (8.097)				- 4.352 (5.283)	
DiD * direct				2.368 (3.536)				2.637 (2.225)
TIME	9.475*** (1.916)	6.573*** (1.975)	6.465*** (1.953)	6.561*** (1.974)	8.835*** (1.434)	6.077*** (1.421)	6.038*** (1.410)	6.064*** (1.420)
Sales		- 0.678 (0.614)	- 0.736 (0.584)	- 0.695 (0.606)		0.532 (0.423)	0.505 (0.410)	0.513 (0.418)
Total assets		10.816*** (2.243)	11.049*** (2.081)	10.876*** (2.225)		8.594*** (1.573)	8.690*** (1.487)	8.662*** (1.556)
EBIT		- 0.216 (0.249)	- 0.226 (0.249)	- 0.211 (0.249)		- 0.434*** (0.167)	- 0.438*** (0.166)	- 0.431*** (0.167)
ROA		0.109 (0.115)	0.114 (0.114)	0.109 (0.113)		-0.061 (0.100)	-0.060 (0.100)	-0.061 (0.098)
Asset turnover		25.942*** (7.209)	24.598*** (7.228)	26.032*** (7.096)		22.003*** (6.089)	21.648*** (6.170)	22.107*** (5.995)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	3944	3819	3819	3819	3955	3814	3814	3814
R ²	0.135	0.176	0.181	0.177	0.177	0.240	0.241	0.240
F-stat	286.76***	107.94***	86.36***	94.63***	394.08***	158.52***	124.05***	139.35***

This table presents the estimates of the regression models for Hypotheses 1, 2a and 2b. We measure ESG integration performance by the ENPI and EWR ratings. Sales, total assets, and EBIT are used on the basis of their natural logarithm. Robust standard errors, clustered at firm level, are in parentheses

*, **, ***Indicate statistical significance at the 0.1, 0.05, and 0.01 level, respectively

with the UN PRI signatories' type variable [model specifications (3) and (7) in Table 5]. Our results show that the type is crucial in the sense that UN PRI *asset owners* (reference category) and UN PRI *investment managers* improve their ESG integration performance by an amount that is significantly different from the ESG integration performance of non-signatories. Thus, UN PRI asset owners and investment managers are seriously committed to their signature. UN PRI *service providers*, in contrast, exhibit a significantly lower differential shift than asset owners for the ENPI rating. As an additional test, we changed the reference category to UN PRI service providers (unreported results) and find indeed that this group of UN PRI signatories exhibits differential shifts in ESG integration performance insignificantly different from those of non-signatories, indicating their

low commitment to ESG integration. We, therefore, reject Hypothesis 2a.

Since *indirect UN PRI signatories* are parent institutions of UN PRI signatories that are not publicly listed, indirect UN PRI signatories may have a lower awareness of the UN PRI. We therefore conduct a difference-in-differences model specification that distinguishes between the differential effects in the ESG integration performance of direct and indirect UN PRI signatories separately. The empirical results show that Hypothesis 2b could not be rejected. The statistically insignificant coefficients for the "DiD * direct" variable in columns (4) and (8) in Table 5 indicate that the differential effect for ESG integration performance is similar for both groups of UN PRI signatories. This provides strong support that direct and indirect signatories perform similarly well with regard to the seriousness

of the ESG integration. This is in line with observations by Ortiz-de Mandojana and Aragon-Correa (2015), who argue that environmental performance of parent institutions and subsidiaries converge due to board interlocks.

In summary, direct and indirect UN PRI signatories, and particularly the subsamples of asset owners and investment managers, consider signing the UN PRI as a serious commitment, and thus apply a business conduct in the spirit of the initiative. This serious commitment could not solely be observed for the integration of ESG criteria in their investment process and products (ENPI rating), but also for efforts been undertaken by signatories to improve their ESG integration performance in all business activities (EWR rating) subsequent to signing the UN PRI.

Estimating UN PRI Signatories' Commitment with Respect to the Signature Year

In the following, we study the ESG integration performance of the UN PRI signatories and non-signatories with respect to the signature year, which we refer to as t_0 . To do so, we continue with an event study to enrich our findings in this area for which the difference-in-differences model is inappropriate. While the difference-in-differences model provides us with an average improvement of treated firms (UN PRI signatories) compared to non-treated firms (non-signatories) during the treatment period, the event study approach allows us to analyze the impact of the signature year on the ESG integration performance.

In this event study setting, we analyze the seriousness in the implementation of the initiative's principles by considering the abnormal shifts in ESG ratings of the signatories after signing the UN PRI. We define the signing of the UN PRI by a firm as a firm-specific event and organize our data in event time. The estimation period ends in the year before the signature year of the respective firm. The event window for a certain firm represents the period of being a signatory, i.e., we keep a UN PRI signatory in the treatment group until the year of its delisting or the last year in our analysis. For each UN PRI signatory, the control firm is the matched non-signatory based on the GM applied in the year before the date of signing.

We measure the improvement in the ESG integration performance after signing the UN PRI by the short-term shift in ESG integration performance from the end of the matching year t_{-1} to the end of the signature year t_0 . This period includes the signature date. The short-term (one year) shift of firm i ($\Delta_1 ESG_i$) is calculated following Utz (2019) as the difference between the current ESG rating net the ESG rating of the previous period.

$$\Delta_1 ESG_i = ESG_{i,t_0} - ESG_{i,t_{-1}} \quad (2)$$

Further, we define the abnormal short-term (one year) shift in ESG integration performance ($ab\Delta_1 ESG_i$) of the signatory i from the end of the matching year t_{-1} to the end of the signature year t_0 as the difference between the shift of the UN PRI signatory $\Delta_1 ESG_i$ net the shift of the matched non-signatory $\Delta_1 ESG_m$.

$$ab\Delta_1 ESG_i = \Delta_1 ESG_i - \Delta_1 ESG_m \quad (3)$$

Accordingly, we generalize Eqs. (2) and (3) for k -year shifts to capture the medium- and long-term influence of the signature on the ESG integration performance. Therefore, we calculate the cumulative abnormal shift in ESG integration performance $ab\Delta_k ESG_i$ for the period of k years after the end of the matching year:

$$ab\Delta_k ESG_i = \Delta_k ESG_i - \Delta_k ESG_m \quad (4)$$

with $\Delta_k ESG_* = ESG_{*,t_{-1+k}} - ESG_{*,t_{-1}}$ and $* \in \{i, m\}$. The cumulative abnormal shift $ab\Delta_k ESG_i$ represents the change in the ESG ratings of the UN PRI signatories i net the change in the ESG ratings of the matched non-signatories.

Since changes in the ESG ratings are considered until the year 2018, the maximum number of k depends on the signature year of each UN PRI signatories. While UN PRI signatories from 2006 have a treatment period of 13 years, UN PRI signatories from 2014, for example, have a treatment period of five years. Therefore, the amount of data analyzed decreases for long-term shifts. To avoid an overrepresentation of early signatories in the long-term analysis, we therefore consider a treatment period of seven years, i.e., t_0 to t_6 .

Late Signatories do Free-Ride

To study whether late signatories use the UN PRI as a free-riding opportunity, which could create a potential credibility problem for the UN PRI, we analyze the cumulative abnormal shifts in ESG integration performance separated by the signature years. We begin with the presentation of the event study results for the whole sample and continue with the findings for different signature year groups (i.e., first, crisis, and late movers).

The results for the whole sample provide clear evidence that UN PRI signatories show significantly higher increases in ESG ratings than their matched non-signatories after the signature year (see Table 6). These findings confirm the results of the difference-in-differences model that, on average, UN PRI signatories seriously comply with the initiative's principles. UN PRI signatories are, therefore, not free-riding on the initiative's credibility since they are seriously committed to the UN PRI. Moreover, the results provide additional insights on the pattern of the changes of the ESG integration performance, i.e., the changes occur steadily over

Table 6 Short, medium, and long-term cumulative abnormal shifts in the ESG integration performance of UN PRI signatories

Panel A: ENPI rating					
	k	Mean $ab\Delta_k$ ENPI			
		Full	FM	CM	LM
t_0	1	1.82	4.71	4.61	-0.64
t_1	2	7.75***	13.91**	8.22**	4.48
t_2	3	8.97***	10.55*	8.66	8.27**
t_3	4	5.87**	9.90	5.67	3.36
t_4	5	7.35***	14.17**	6.91	1.73
t_5	6	10.44***	17.50***	7.58	5.02
t_6	7	12.57***	19.84***	9.23*	4.90
FM vs				10.61	14.94**
Panel B: EWR rating					
	k	Mean $ab\Delta_k$ EWR			
		Full	FM	CM	LM
t_0	1	2.81***	5.60**	6.13***	0.20
t_1	2	5.02***	7.75**	8.71***	1.80
t_2	3	7.87***	11.62***	10.07***	4.43***
t_3	4	7.96***	10.84***	9.42***	5.11***
t_4	5	9.70***	12.90***	9.24***	7.31***
t_5	6	10.23***	15.55***	8.86***	5.22*
t_6	7	10.15***	16.62***	9.92***	-1.93
FM vs				6.70	18.55***

This table presents the mean cumulative abnormal shifts in the ENPI and EWR ratings of UN PRI signatories over time. The first column contains the year until when we calculated the cumulative abnormal shifts. t_0 indicates the signature year, t_1 the following year, etc. The second column indicates the number of years that are included in the cumulative abnormal shift

Full: Full sample of signatories; *FM*: subsample of first movers; *CM*: subsample of crisis movers; *LM*: subsample of late movers

*, **, ***Indicate statistical significance at the 0.1, 0.05, and 0.01 level, respectively. Bootstrapping is used to determine the p value

the six years after the signature year (see the columns named “Full” of Panels A and B in Table 6). This table contains the short-, medium-, and long-term cumulative abnormal shifts in ESG integration performance ($ab\Delta_k ESG_i$) for different time lags $k=1, \dots, 7$. For instance, UN PRI signatories exhibit a statistically significant¹² cumulative abnormal shift in the ENPI rating of 12.57 six years after the signature year. This indicates that an average UN PRI signatory increased its ENPI rating by 12.57 points more than its matched non-signatory did in the period from the end of the matching year to six years after the signature year. With respect to the mean ENPI rating (53.16) of the UN PRI signatories, this

cumulative abnormal shift represents a percentage change of 23.65%. We find similar results for the EWR rating.

Moreover, we wish to highlight that the steady increase in the cumulative abnormal shift of the ESG integration performance indicates that our results are not a methodological artifact of the Asset4 evaluation process with respect to direct influence of the signature on the ESG ratings. If this were the case, it would only explain the abnormal shift in t_0 , but not the abnormal shifts in the years t_1, \dots, t_6 . Therefore, the findings are attributable to the increased ESG integration in business activities that UN PRI signatories implement in the long run. This observation is supported by Fig. 1, which shows the ESG integration performance of signatories and matched non-signatories for the time period t_{-3} to t_6 . It demonstrates that the observed differential shifts between the ESG integration performance of UN PRI signatories and non-signatories are mainly based on an increase in the UN PRI signatories’ ESG ratings while the ESG ratings of the non-signatories remain close to their previous level. As can also be

¹² We measure statistical significance by applying a non-parametric test to capture the fact that the data are not normally distributed. To additionally overcome the problem of small sample sizes, we generate bootstrapped p values. Therefore, 10,000 bootstrap samples $x_{1,b}, x_{2,b}, \dots, x_{n,b}$ are generated by a random sampling with replacement. We calculate the mean for each bootstrap sample and an empirical distribution of x .

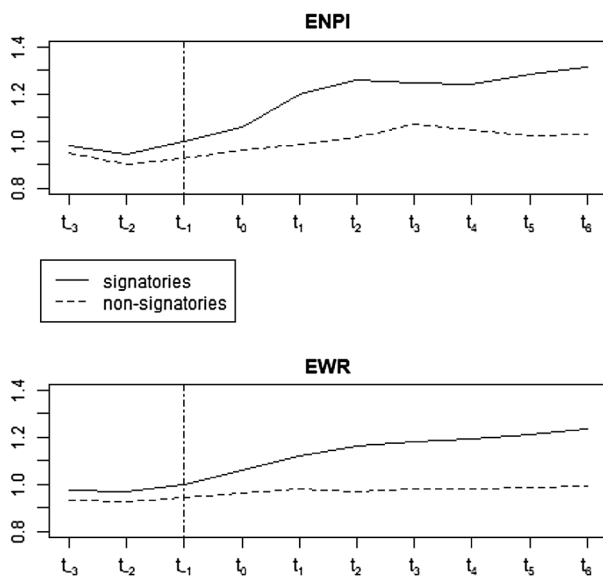


Fig. 1 Mean ESG integration performance of UN PRI signatories and non-signatories. This figure shows the development of the mean ENPI and EWR ratings of UN PRI signatories and non-signatories over time. The respective mean value of the signatories in the matching year t_{-1} is defined as 1.0 (=100%) for every ESG integration performance measure

observed, the UN PRI signatories do not show a continuously different ESG integration performance development compared to the matched non-signatories prior to their actual signature for every ESG rating (which is in line with the parallel trend assumption of the DiD approach). These findings indicate that the difference in the development of the ESG integration performance of UN PRI signatories and non-signatories can be attributed to signing the UN PRI.

We continue with the presentation of the results on the question of whether crisis and late movers use the UN PRI as a free-riding opportunity. Therefore, we analyze the cumulative abnormal shifts in ESG integration performance separated by the signature years. We assign UN PRI signatories to one of the following three groups with respect to their signature year. *First movers (FM)* are all the signatories that signed the UN PRI in 2006 and 2007. *Crisis movers (CM)* are those signatories that joined the UN PRI during and after the financial crisis from 2008 until 2010. We consider the group of crisis movers due to its potential different signing motivation during the financial crisis. All the firms that signed between 2011 and 2018 are referred to as *late movers (LM)*. The columns FM, CM, and LM in Table 6 show the signatory groups separated according to the respective ESG integration performance measure. The overall results for the different signature years provide evidence to reject Hypothesis 3, i.e., first movers show more commitment than crisis and

late movers. This pattern indicates that *first movers implement serious sustainability efforts* (and bear the costs for this implementation and of building up the credibility of the initiative), while *free-riding on the initiative's reputation seems to be (part of) the motivation of crisis and late movers*. This results in a potential credibility problem of the UN PRI.

More specifically, the results for the ENPI rating (Panel A, Table 6) show the following pattern: first movers show highly significant, positive cumulative abnormal shifts in ESG integration performance throughout the entire event window. Panel B of Table 6 contains the results for the EWR rating which are similar to the ENPI rating results. We compare the cumulative abnormal shift in ESG integration performance in t_6 of first movers to the similar quantities of crisis movers and late movers in a bootstrap test. The last row of each panel of Table 6 contains the differences in the cumulative abnormal shifts. These cumulative abnormal shifts are significantly higher for first movers than those for late movers at a 5% and 1% level. Also, crisis movers show lower cumulative abnormal shifts than first movers, however, they are not significantly different from the shifts of the first movers for the entire period t_0 to t_6 . The increasing *positive significant cumulative abnormal shifts in the EWR rating after the signature year of crisis movers* may be linked to the intention to improve reputation and customer loyalty during the financial crisis. In an additional analysis to test whether crisis movers are less active than first movers after the reason for their signature disappeared (i.e., the crisis was over), we compare the average difference of cumulative abnormal shifts in ESG integration performance for the time period t_2 to t_6 . The first movers have cumulative abnormal shifts of 9.29 (ENPI rating) and 5.00 (EWR rating), which are significantly higher (at the 10% level) than cumulative abnormal shifts of the crisis movers, which are 0.57 for the ENPI rating and -0.15 for the EWR rating. This pattern provides some evidence for the decreasing interest of crisis movers to engage in the initiative's principles actively after the crisis. Our finding for the first movers complements the qualitative observation made by Majoch et al. (2017). The first movers appear to commit more seriously to the UN PRI. The results for both, the ENPI and EWR ratings support the finding that first movers show the highest cumulative abnormal shifts in ESG integration performance.

The empirical results therefore indicate that *crisis movers utilized an improvement in the ESG integration performance to generate insurance-like protection during and directly after the financial crisis but lost commitment for serious ESG integration after the financial crisis*. We base this statement on the fact that crisis movers significantly increased the abnormal cumulative shifts in the ESG integration performance in the first two to three years after the signature year (e.g., the ENPI rating shift after two years is 8.22, see

Panel B in Table 6). Subsequently, the yearly abnormal shifts were, however, almost zero or slightly negative. Late movers show no clear pattern in the ESG integration performance of their ENPI and EWR ratings and they did not show as much improvement as first movers.

Robustness Tests and Empirical Challenges

We gauge the robustness of our empirical results in several robustness checks. First, we conducted our analyses with different ESG ratings of Asset4. Second, we tested whether our results are exposed to the point in time in which we received the ESG ratings from Asset4. This is a crucial aspect since historical time series of Asset4 ESG ratings have been documented to be changed with the increase of the rating universe, for instance. Third, we ran our tests with the ESG ratings of Vigeo Eiris as a second basis for the ESG data. The additional tests show that our results are robust to all variation in the ESG data. Appendix A of this paper contains a detailed description of the indicated robustness tests.

Moreover, our empirical study may be exposed to biases such as the *survivorship bias*. To prevent our study from being exposed to a survivorship bias, we compared signatory lists of different dates to identify firms that left the UN PRI during our investigation period and incorporated these firms into our analysis until their delisting date. We did this by consolidating two lists of all active UN PRI signatories as of December 2019 and December 2013 from the UN PRI office. Based on these lists, we created our final sample and the list of leavers during the observation period. In this approach, the 2019 list acted as the reference list. We compared all publicly listed UN PRI signatories with available ESG data of this list with those included in the 2013 list. In detail, we identified from the 2013 list which publicly listed UN PRI signatories with available ESG data were active in 2013, but not in 2019. Those firms are classified as leavers. Further, for all identified leavers, we manually checked the UN PRI annual reports to verify in which year the respective firm resigned from the initiative in the period from 2013 to 2019. This approach and the available data do not allow to identify earlier leavers. In the period from 2013 to 2018 (end of our observation period), only one publicly listed UN PRI signatory left the UN PRI. The number of leavers in our sample is so small since we restrict our sample to publicly listed UN PRI signatories for whom ESG ratings are available. These two restrictions reduce the sample size substantially compared to the list of all signatories. As a consequence, the number of leavers, i.e., signatories that left the UN PRI, is also smaller in our sample than the total number of all leavers. As (i) only one leaver could be identified for the time period from 2013 to 2019, and as (ii) the requirements for being a signatory in the period 2007 to 2013 were remarkably modest and thus provided no considerable motivation

to leave the initiative, the number of leavers relevant for our analysis, i.e., publicly listed signatories with available ESG data, in the period 2007 to 2013 is likely to be too small to influence the robust results.

Additionally, our sample is unlikely to be biased by *delistings caused by acquisitions and mergers* as for the investigation period, we only identified one relevant merger, which is between Aberdeen Asset Management and Standard Life to Standard Life Aberdeen. Since Standard Life Aberdeen is a UN PRI signatory, we continued the ESG integration performance of Aberdeen Asset Management with the performance of the former. In more detail, mergers and acquisitions do not play a crucial role in our sampling process due to the following four scenarios:

- (I) If a UN PRI signatory from our final sample is acquired by another firm (bidder) but keeps its legal entity (i.e., stays “independent”) and remains a UN PRI signatory, it remains in our sample as a direct signatory and the status of the bidder will be unchanged (either signatory or non-signatory). A non-signatory bidder does not automatically become an indirect signatory after the acquisition, because we can still analyze the acquired firm as a direct signatory.
- (II) If a UN PRI signatory from our final sample is acquired by another firm (bidder) and is fully incorporated in the bidder’s structure (i.e., the acquired firm has no own legal entity anymore), it is delisted from the UN PRI. The acquired firm is removed from our final sample. The status of the bidder does not change (either signatory or non-signatory). A non-signatory bidder does not automatically become an indirect UN PRI signatory after the acquisition, because the acquired firm is delisted from the UN PRI.
- (III) If a UN PRI signatory from our final sample merges with another firm to a new firm (merger) and the UN PRI signatory is delisted from the initiative and the merger does not sign the UN PRI, then the UN PRI signatory is removed from our sample.
- (IV) If a UN PRI signatory from our final sample merges with another firm to a new firm (merger) and the UN PRI signatory is delisted from the initiative but the merger does sign the UN PRI immediately after the merger or continues signing the UN PRI initiative, the merger replaces the former UN PRI signatory from the moment of the merger onward.

The merger case in our sample (Standard Life Aberdeen) is a scenario (IV) case, while the other scenarios are not observed in our sample.

To identify the “real” effect and rule out *spurious correlation* we control for the three endogeneity challenges (omitted variable bias, reverse causality, and measurement error) as follows. We address omitted variables in three ways: first, by applying a genetic matching in which we identified the most-similar available non-signatory firm from the financial sector to obtain a non-treated counterfactual to the treated signatory firm. This matching is applied to data of the year before the signature year and is based on covariates derived from related literature. Second, we include firm fixed-effects to capture unobserved time-invariant firm characteristics. Third, we include well-documented control variables (i.e., the matching variables) to explain the variation in the outcome variables in our regression analyses.

To capture *reverse causality*, we use an event study setting and estimate the differential effect in the ESG integration development of signatories compared to matched non-signatories in a difference-in-differences setting. To evaluate the appropriateness of this approach, we tested the parallel trends assumption before the signature year (i.e., the event date). Moreover, since we consider abnormal changes in the ESG ratings, our results are not biased to the signature’s calendar year. I.e., even if the general ESG rating level varies across years, both the signatories and the matched non-signatories are affected, while the difference between the ESG ratings of the signatory and the matched non-signatory is not exposed to this time effect.

Finally, we mitigate issues of the measurement error in our robustness test, which shows that our results are not specific for one particular data provider but robust with different approaches to measure ESG data.

Discussion

Differentiating Member Groups of Voluntary Initiatives

By analyzing the UN PRI as the most prominent current voluntary initiative for responsible investing, this study adds to the debate of whether signing a voluntary initiative can ensure compliance with communicated principles and whether it might suffer under a potential credibility problem. Key for the initiative’s credibility is whether signing the UN PRI is accompanied by substantive action to integrate ESG criteria. Critiques of voluntary initiatives like the UN PRI, however, emphasize existing greenwashing possibilities for non-committed signatories to free-ride on the initiative’s reputation (e.g., Baeumlisberger, 2019; Gray, 2009; Sethi & Schepers, 2014).

Since the implementation of the UN PRI is voluntary and was weakly enforced until 2018, the UN PRI context provides an excellent case in point to empirically study if

signing the UN PRI is a substantive or symbolic response to institutional pressures. The presented empirical analysis offers further nuance to the existing research knowledge as it indicates a serious commitment of early signatories signing the UN PRI but free-riding of late signatories. Hypothesis 1 that signatories of voluntary initiatives would in general consider missing review and enforcement mechanisms as an opportunity for greenwashing and not act substantively, had to be rejected. For the sample of publicly listed UN PRI signatories, the UN PRI achieves its normative goal of increasing ESG integration in financial institutions. This extends the findings of Ortas et al. (2015) who show that the ESG integration performance of UN Global Compact signatories from Spain, France, and Japan improves after signing. The authors attribute these findings to institutional pressures. For firms listed on the Australian Stock Exchange, Galbreath (2013) also finds improvement of ESG integration from 2002 to 2009, particularly for the corporate governance dimension. He attributes this result mainly to the presence of regulative, normative, and cognitive institutional influences related to ESG issues including the UN Global Compact. Li and Wu (2017) furthermore reveal that UN Global Compact participation leads to a significant reduction in business ethics controversies, measured by RepRisk data.

Our study extends previous research by distinguishing different groups of signatories and an analysis over time. With regard to signatory types, clear differences could be identified (strong evidence to reject H2a). This means that UN PRI *asset owners* and *investment managers* improved their ESG integration performance significantly more than *non-signatories*, UN PRI *service providers* did not. Moreover, no significant difference could be found for *direct and indirect signatories* (no evidence to reject H2b). Overall, the empirical results therefore show that the type of members should be considered in managing a voluntary initiative as different motivations may exist with the effect of different levels of commitment.

With regard to time effects we investigated whether late signatories (including late movers and crisis movers) would perform differently than early signatories. Hypothesis 3 could be rejected. *Late and crisis movers are less committed* to integrate ESG criteria than early signatories. While early signatories show serious commitment and establish the UN PRI’s credibility (thus acting substantively) in spite of missing review mechanisms, late signatories seem to act opportunistically and free-ride (thus acting symbolically). Late movers seem to consider signing the UN PRI as a channel to benefit from its credibility without realizing serious efforts. The initiative’s growth has attracted signatories who aim to profit from the UN PRI’s credibility that was built up by early signatories. Late movers, however, are far less committed and seem to hope to gain legitimacy at low cost, i.e., without comparable strong commitment to ESG integration.

These findings add to Delmas and Montes-Sancho (2010), who show that late joiners of environmental voluntary agreements cooperate symbolically while early joiners cooperate substantively. Our study furthermore shows that crisis movers did improve their ESG integration during the crisis and shortly afterwards but showed no further performance improvement at a later stage when the crisis was over. These results reveal the necessity to actively combat free-riding by both crisis and late movers to mitigate the potential credibility problem.

Potential Benefits of the UN PRI and Implications

Although voluntary cross-country initiatives might not be capable of monitoring free-riding activities thoroughly, such initiatives can guide firms to behave responsibly through moral obligation (Perez-Batres et al., 2012). In contrast to public regulation, such supranational entities as the UN PRI are not limited by the borders of nation states. Thus, benefits of such voluntary initiatives comprise the mitigation of negative effects of information asymmetries (Darnall & Carmin, 2005; King et al., 2002), self-regulation through peers, auditing, and creating a community that fosters knowledge transfer through workshops, best-practice examples, and awareness (Qian & Schaltegger, 2017).

Although our results show a decreasing effectiveness with regard to late signatories, initiatives such as the UN PRI might still be effective in self-regulation if managed accordingly. In principle, voluntary initiatives can act as catalyst to drive changes in organizations to improve ESG integration performance. However, to establish the awareness of these positive ESG integration effects, the knowledge transfer among UN PRI signatories is essential. Workshops, publications, and the discourse with academics at annual conferences are effective tools of the UN PRI to get many investors on board, improve their understanding of ESG integration, and develop their passion for the topic.

Based on these positive effects among UN PRI signatories, management pursues an approach to incorporate ESG aspects in risk and asset management profitably (financialized ESG approach). A growing stream of literature (e.g., Fauser & Utz, 2021; Khan et al., 2016) documents clear indications that the integration of ESG criteria is financially important since it allows better-informed risk management and trading on otherwise unobserved underpriced assets. This financialized ESG approach-perspective argues that firms can act proactively to possible regulatory changes to ESG (strategies). This view acknowledges that in the case of management is aware of ESG integration benefits, management can aim to implement the UN PRI without necessarily signing the initiative. Thus, the pure existence of the UN PRI might have had positive education effects for the entire financial sector, not only for its signatories. Several

examples such as the coal-divestments of major (re-)insurance firms, the emergence of numerous actively and passively managed ESG funds, and the ESG-alignment of assets managed by large pension funds throughout the last decade show the (in)direct success of initiatives such as the UN PRI for increasing the societal awareness of the importance for ESG consideration, particularly in the investment industry.

The UN PRI has also had a positive societal impact by being the role model for other initiatives such as the Principles for Responsible Banking, the Principles for Responsible Insurance, and the Principles for Responsible Investment in Agriculture and Food Systems. Although the UN PRI may not be entirely effective in avoiding inactive members, it has stimulated reflection on proper business conduct of different actors in the financial sector. The intermediary nature of the financial industry puts financial institutions at the center of the economy's sustainability transformation (Scholtens & Sievänen, 2013). If finance changes appropriately, it has the power to finance change. As investments can have a considerable external influence on organizations in terms of changing business conduct (Michelson et al., 2004; Solomon et al., 2002), the importance of the UN PRI goes beyond purely measurable aspects.

We conclude with the recommendation that to mitigate the potential credibility problem and to reduce the number of inactive members, an initiative's management should review whether members of a voluntary initiative actually do implement the stated goals. Reviewing and ensuring commitment of an initiative's members to its goals may help securing the credibility of a voluntary initiative over time by benchmarking the ESG integration performance of the initiative's members with the performance goals of the initiative. Similar to the suggestions of Qian and Schaltegger (2017) for disclosure on carbon emissions, standardized disclosure of actual ESG integration performance would make rankings easier and more reliable, and could therefore help detecting free-riding and ensuring the credibility of the UN PRI. Awards could honor "best ESG integration approaches" and increase the visibility of active signatories and their business conduct with regard to the initiative's principles.

Limitations and Avenues for Future Research

Our research goes along with limitations as it focuses on the *subset of publicly listed* UN PRI signatories with available ESG and financial data, and thus, a sample of 141 firms. This number of firms appears small compared to all UN PRI signatories. Nevertheless, the publicly listed UN PRI signatories are certainly the subset with the highest public recognition and thus a relevant subsample.

While our research has controlled for various variables such as industry (only firms from the financial sector) and further fundamental firm characteristics (e.g., scale, income,

and region), other potentially influential factors could not be considered. Future research may want to investigate the impact of *further organizational differences* such as organizational orientation and identity, identification, or knowledge management on inactive behavior of signatories in voluntary thematic initiatives. Moreover, while the empirical findings of this study may be relevant for voluntary initiatives in general, the focus of this analysis on the UN PRI does not allow to generalize the results for all types of voluntary initiatives but opens avenues for future research.

Future research could analyze whether the potential credibility problem of voluntary initiatives with weak review and enforcement mechanisms materializes into a substantial problem in practice. This requires investigating whether stakeholders do actually identify inactive late signatories and whether they act accordingly to scrutinize free-riding. While we analyzed the implementation of the UN PRI on the firm level with third-party ESG data, survey-based research projects may improve the understanding for the perceived credibility of the initiative by various stakeholders. Such analyses can be closely linked to our research by asking different stakeholders to assess the perceived credibility of initiators of the UN PRI as well as of late signatories. Future research could also analyze whether the stricter requirements of the UN PRI after 2018 have helped to avoid free-riding by new signatories as documented in our study.

Other venues of research on the UN PRI could investigate the commitment of non-listed signatories. Moreover, it could be interesting to see whether the acquisition of or the merger with a UN PRI signatory improves the ESG awareness of the bidder. It would be interesting to examine whether and how the initiative has supported knowledge transfer among the UN PRI signatories to internalize the principles in the bidder's firm. In the new environment (as the acquired firm or in a merger), can the early signatory pass on the knowledge and improves the entire firm's awareness for ESG aspects in investment decisions?

Conclusion

The results of this study have relevant ethical implications for political decision makers, customers, and initiators of voluntary initiatives. In light of the importance of private and institutional funds for the development of a more sustainable economy (EU Commission, 2019), this study reduces uncertainty about the nature of the signatories' commitment to the UN PRI (e.g., Gutsche & Zwergel, 2020; Nilsson, 2008; Rhodes, 2010) and the initiative's potential credibility problem. The primary aim of the UN PRI is to increase its members' and other investors' awareness for responsible investments, i.e., to contribute to a sustainable change in society by directing financial flows to sustainable

firms. Consequently, UN PRI signatories can be seen as role models in the financial sector. The voluntary nature of the UN PRI with a low level of barriers for signatories may have been one part of the growth success of the initiative. The achievements of the UN PRI, particularly the performance improvement of early signatories over time, have to be acknowledged. The UN PRI has contributed to the dissemination of principles of responsible investments and helped establishing a vital dialogue about how money can support sustainable development. Early signatories may also have benefited from the coordination of joint activities such as structured active ownership policies and engagement by the UN PRI. Our discovery of free-riding by a subset of late UN PRI signatories should, however, be an alarming finding for the initiators and managers of the UN PRI as well as for other voluntary initiatives. Little or no commitment of late signatories can heavily impact the credibility of this prominent initiative over time. This is especially unfortunate for serious early signatories who put a lot of effort into implementing the principles and contribute to developing a more sustainable financial system. The exploitation of voluntary initiatives like the UN PRI by inactive late signatories questions the ability of the financial sector to self-regulate with regard to sustainability issues. Customers who entrust their money to (active or inactive) UN PRI signatories might feel deceived by the development and quality diluting of the initiative by late signatories and withdraw their funds. To safeguard and further develop the credibility of the initiative, the UN PRI is now challenged to implement a well-functioning, binding review and performance assurance framework for all members, particularly new signatories.

Appendix A

Robustness Tests

The results show clear evidence that UN PRI signatories improve their ESG integration performance significantly stronger after signing than matched non-signatories. The difference-in-differences setting provides us an up-to-date methodological framework to identify a causal relationship of an average improvement in the ESG integration performance using the Asset4 dataset. We also conduct the event study as a test to gauge the robustness of our results according to a change in the methodological approach and to detail the time pattern of the ESG integration performance. In the following, we therefore test whether the dataset is exposed to biases that impact our results. For the sake of brevity, we

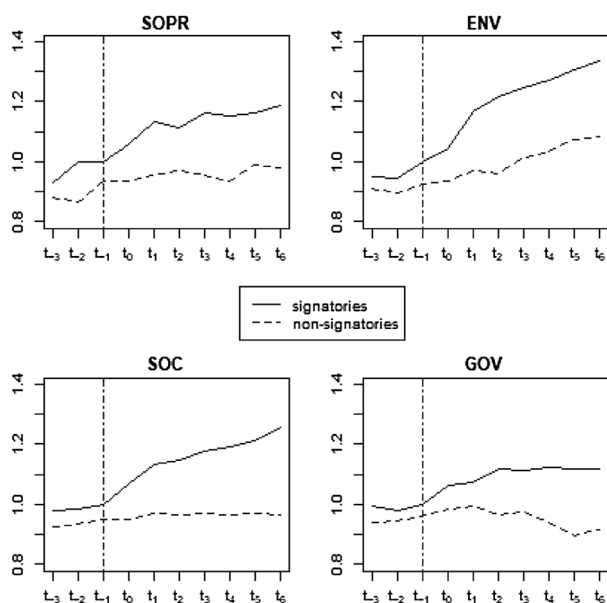


Fig. 2 Additional ratings for ESG integration performance of UN PRI signatories and non-signatories over time. This figure shows the development of the mean product responsibility (SOPR) rating and the ratings of the environmental (ENV), social (SOC), and corporate governance (GOV) pillars of UN PRI signatories and non-signatories over time. The respective mean value of the signatories in the matching year t_{-1} is set to 1.0 (=100%) for every ESG integration performance measure

present graphs to illustrate that the pattern of the ESG integration performance in the robustness tests is similar to the pattern in the main analysis. Tables are available on request.

Additional Measures for ESG Integration Performance

The first robustness test shows that our results are not due to the specific selection of the ENPI and EWR ratings of the Asset4 database. We rerun our tests for four other measures, i.e., the product responsibility (SOPR) rating and the ratings of the environmental (ENV), social (SOC), and corporate governance (GOV) pillars. The SOPR rating measures a firm's efforts toward providing value-added products and services, e.g., through evaluating whether a firm monitors the impact of its product and services. The pillar ratings capture the overall performance of integrating ESG criteria of the respective pillar in business activities.

Figure 2 shows the development of the four additional different measures for the ESG integration performance. The patterns of the graphs are similar to those of the ENPI and EWR ratings and so are the results in the regression analyses (unreported results).

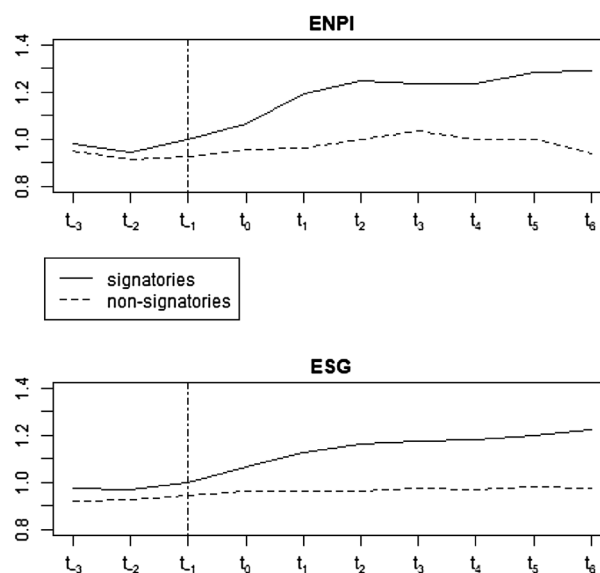


Fig. 3 Rewriting history bias: mean ESG integration performance of UN PRI signatories and non-signatories over time. This figure shows the development of the mean ENPI and EWR ratings of UN PRI signatories and non-signatories over time. The respective mean value of the signatories in the matching year t_{-1} is set to 1.0 (=100%) for every ESG integration performance measure. The data file for this graph was retrieved from Asset4 5 months before the data file of the main results

Rewriting History Bias in the Asset4 ESG Ratings

Although the Asset4 ESG ratings provide the best fit of ESG ratings in our study, our results may be exposed to a limitation, the rewriting history bias. As is the case with all ESG rating providers, Asset4 steadily increased its rating universe throughout the last years. This retrospective extension of the rating universe caused updates in the historical ESG ratings of firms that have already been included in the rating universe in previous years. The change in the ESG ratings occurs due to the applied rating methodology to calculate ratings that indicate the percentile of a firm in the cross-section of firms.

In this test, we show that the rewriting history bias has no influence on our results. We rerun our analyses based on two additional ESG rating files which we retrieved from the Asset4 database five months and two weeks earlier than the data file employed in the main analysis. The rating universes of these files contained about 500, respectively 200, fewer firms than our data file employed in the main analysis. The coefficients and the significance levels in the estimations with the older data files are similar to the ones in the main analysis (unreported results). Thus, our results are not due to a luckily selected data file but robust to the so-called rewriting history bias of the Asset4 data set. Moreover, the results for the event study based on the older ESG data files

are also similar to our main results. Figure 3 present the development of the ESG integration performance for the five months older data file. Note that, although the rewriting history bias in the Asset4 ESG ratings has no effect on our results, it is certainly an important topic to be discussed in future research. We expect it to be particularly crucial for research that could not present such clearly significant results as we were able to do.

Robustness Check with Vigeo Eiris ESG Ratings

Although the tests on the variable selection and the rewriting history bias suggest that our results based on the Asset4 ESG ratings are robust, we conducted our analyses using ESG ratings from another ESG rating agency, Vigeo Eiris. Vigeo Eiris ESG ratings measure the degree to which firms take into account and manage material ESG factors. Firms with higher ESG ratings are better at managing relationships with their stakeholders on a scale from 0 to 100. To generate ratings, Vigeo Eiris analyzes and scores up to 38 distinct ESG criteria that are framed within 40 industry specific models. In each industry framework, the 38 generic ESG criteria are assigned a weight that reflects the sector specific materiality of the analyzed criterion. Each criterion has a defined set of so-called "Principles of Action". These determine the active content of the analysis and articulate the actions that Vigeo Eiris would expect a high-performing firm to undertake in this dimension. These principles are derived from universally recognized norms and standards emanating from organizations such as the United Nations, the International Labour Organization, and the Organisation for Economic Cooperation and Development. Within the rating process, qualitative and quantitative data, management and performance data as well as self-reported and third-party data are used.

Vigeo Eiris offers ESG ratings for an international sample of firms for a time series starting in 2003. Furthermore, Vigeo Eiris provides high-quality ESG ratings on a granular level, while the ESG methodology is reviewed by a scientific committee. Nevertheless, the coverage of the Vigeo Eiris ESG ratings is significantly lower for our signatory sample resulting in a reduction of the sample size to 90 signatories. We replace the ENPI Asset4 rating by the green products and services (ENGPS) rating of Vigeo Eiris and the EWR Asset4 rating by the ESG rating of Vigeo Eiris. The summary statistics of the dependent and independent variables in the Vigeo Eiris sample are similar to ones in our main sample, and the GM matching approach generated results that are comparable with the results of the main sample matching (unreported results).

However, the lower number of UN PRI signatories with available Vigeo Eiris ESG ratings compared to the Asset4

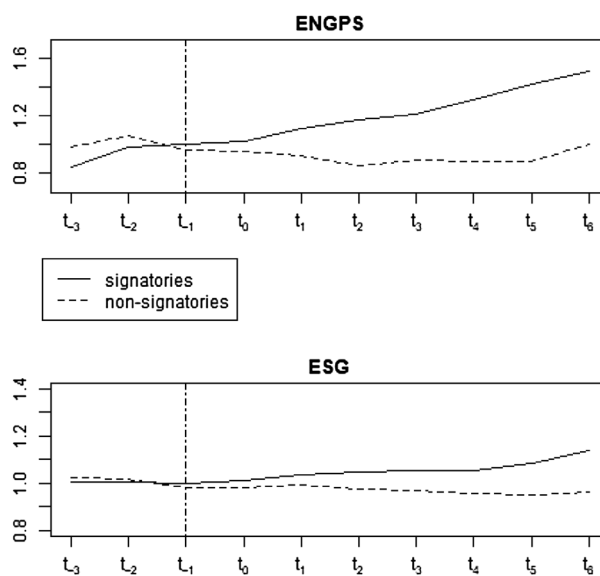


Fig. 4 Vigeo Eiris: mean ESG integration performances of UN PRI signatories and non-signatories over time. This figure shows the development of the mean green products and services (ENGPS) and ESG ratings of UN PRI signatories and non-signatories over time. The respective mean value of the UN PRI signatories in the matching year t_{-1} is set to 1.0 (= 100%) for every ESG integration performance measure

sample results in a reduction in firm-year observations in the difference-in-differences model from 3,900 with the Asset4 data to approximately 1,900 with the Vigeo Eiris data set. Nevertheless, the general effect illustrated by Fig. 4 suggests the same pattern as we observed with the Asset4 ESG ratings.

We also conduct the difference-in-differences model for the Vigeo Eiris ratings. Although the number of observations is lower than in the Asset4 sample, and thus the robust standard errors (clustered on firm level) are comparably high, unreported results of this analysis support our main findings. In detail, we obtain positive and significant coefficients of the DiD variable for the ENGPS rating, which is the respective rating for the ENPI rating in the Asset4 dataset. Thus, in summary, the robustness test with Vigeo Eiris ESG ratings provides further evidence on a serious commitment of UN PRI signatories to the initiative's principles.

Appendix B

List of variables

See Table 7.

Table 7 List of variables

Variable	Description	Source
ENPI	The product innovation category measures a firm's management commitment and effectiveness in supporting the research and development of eco-efficient products or services. It reflects a firm's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed, dematerialized products with extended durability	Asset4
EWB	The Equal Weighted Rating reflects a balanced view of a firm's performance in all three areas, environmental, social, and corporate governance	Asset4
SOPR	The customer/product responsibility category measures a firm's management commitment and effectiveness toward creating value-added products and services upholding the customer's security. It reflects a firm's capacity to maintain its license 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 labeling	Asset4
ENV	The environmental pillar measures a firm's impact on living and non-living natural systems, including the air, land and water, and complete ecosystems. It reflects how well a firm uses best management practices to avoid environmental risks and capitalize on environmental opportunities to generate long-term shareholder value	Asset4
SOC	The social pillar measures a firm's capacity to generate trust and loyalty with its workforce, customers, and society, through its use of best management practices. It reflects the firm's reputation and the health of its license to operate, which are key factors in determining its ability to generate long-term shareholder value	Asset4
GOV	The corporate governance pillar measures a firm's systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders. It reflects a firm's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances to generate long-term shareholder value	Asset4
ENGPS	The development of green products and services category measures the depth of the commitments made on developing green products and services. Furthermore, it assesses the measures and processes to support the firm's policy commitments on green products and services	Vigeo Eiris
ESG	The ESG rating measures the degree to which firms consider and manage material environmental, social, and governance factors	Vigeo Eiris

Appendix C

Lists of signatories and matched non-signatories

See Tables 8 and 9.

Table 8 List of signatories and matched non-signatories for ENPI variable

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
1	3I GROUP	GB00B1YW4409	United Kingdom	BANK MILLENNIUM	PLBIG0000016	Poland
2	ABSA GROUP	ZAE000255915	South Africa	FIRSTRAND	ZAE000066304	South Africa
3	ACKERMANS & VAN HAAREN	BE0003764785	Belgium	GJENSIDIGE FORSIKRING	NO0010582521	Norway
4	AEGON	NL0000303709	Netherlands	STANDARD CHARTERED	GB0004082847	United Kingdom
5	AGF MANAGEMENT	CA0010921058	Canada	GREEN DOT CLASS	US39304D1028	United States of America
6	AKBANK	TRAAKBNK91N6	Turkey	ICICI BANK	INE090A01021	India
7	ALLIANCE TRUST	GB00B11V7W98	United Kingdom	CORPORACION FINCA.ALBA	ES0117160111	Spain
8	ALLIANZ	DE0008404005	Germany	AGEAS	BE0974264930	Belgium
9	AMERIPRISE FINL	US03076C1062	United States of America	LINCOLN NATIONAL	US5341871094	United States of America
10	AMP	AU000000AMP6	Australia	SUNCORP GROUP	AU000000SUN6	Australia
11	ARTISAN PTNS. ASTMGMT	US04316A1088	United States of America	LADENBURG THALMAN FNSR	US05075Q1022	United States of America
12	ASHMORE GROUP	GB00B132NW22	United Kingdom	IG GROUP HOLDINGS	GB00B06QFB75	United Kingdom
13	ASSICURAZIONI GENERALI	IT0000062072	Italy	UNICREDIT	IT0005239360	Italy
14	AVIVA	GB0002162385	United Kingdom	BANCA MONTE DEI PASCHI	IT0005218752	Italy
15	AXA	FR0000120628	France	DEXIA	BE0974290224	Belgium
16	B3 BRASIL BOLSA BALCAO	BRB3SAACNOR6	Brazil	GRUPO FINANCIERO INBURSA	MXP370641013	Mexico
17	BALOISE HOLDING	CH0012410517	Switzerland	BANK OF IRELAND GROUP	IE00BD1RP616	Ireland
18	BANCO BRADESCO	BRBBDCACNPR8	Brazil	ITAUSA INVESTIMENTOS ITAU PN	BRITSAACNPR7	Brazil
19	BANCO DE SABADELL	ES0113860A34	Spain	BANCO ESPR. SANTO	PTBES0AM0007	Portugal
20	BANCO SANTANDER	ES0113900J37	Spain	DEXIA	BE0974290224	Belgium
21	BANCOLOMBIA	COB07PA00078	Colombia	BANCO SANTANDER	MX41BS060005	Mexico
22	BANK OF AMERICA	US0605051046	United States of America	ROYAL BANK OF CANADA	CA7800871021	Canada
23	BANK OF MONTREAL	CA0636711016	Canada	ROYAL BANK OF CANADA	CA7800871021	Canada
24	BANK OF NEW YORK MELLON	US0640581007	United States of America	PNC FINL.SVS.GP	US6934751057	United States of America
25	BARCLAYS	GB0031348658	United Kingdom	STANDARD CHARTERED	GB0004082847	United Kingdom
26	BBV.ARGENTARIA	ES0113211835	Spain	UNICREDIT	IT0005239360	Italy
27	BK.OF NOVA SCOTIA	CA0641491075	Canada	ROYAL BANK OF CANADA	CA7800871021	Canada
28	BNP PARIBAS	FR0000131104	France	AGEAS	BE0974264930	Belgium
29	BRIGHTSPHERE INVESTMENT GROUP	US10948W1036	United States of America	EVERCORE	US29977A1051	United States of America
30	CANADIAN IMP. BK.COM	CA1360691010	Canada	PNC FINL.SVS.GP	US6934751057	United States of America

Table 8 (continued)

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
31	CATHAY FINL.HLDG	TW0002882008	Taiwan	DBS GROUP HOLDINGS	SG1L01001701	Singapore
32	CHALLENGER	AU000000CGF5	Australia	ASX	AU000000ASX7	Australia
33	CI FINANCIAL	CA1254911003	Canada	FIRSTCASH	US33767D1054	United States of America
34	CITIC SECURITIES	CNE000001DB6	China	BANK MANDIRI	ID1000095003	Indonesia
35	CNP ASSURANCES	FR0000120222	France	DEXIA	BE0974290224	Belgium
36	COMMONWEALTH BK.OF AUS	AU000000CBA7	Australia	BENDIGO & ADELAIDE BANK	AU000000BEN6	Australia
37	CREDIT AGRICOLE	FR0000045072	France	UNICREDIT	IT0005239360	Italy
38	CREDIT SUISSE GROUP	CH0012138530	Switzerland	STANDARD CHARTERED	GB0004082847	United Kingdom
39	DAIWA SECURITIES GROUP	JP3502200003	Japan	SHINSEI BANK	JP3729000004	Japan
40	DANSKE BANK	DK0010274414	Denmark	STANDARD CHARTERED	GB0004082847	United Kingdom
41	DEUTSCHE BANK	DE0005140008	Germany	UNICREDIT	IT0005239360	Italy
42	DEUTSCHE BOERSE	DE0005810055	Germany	BPER BANCA	IT0000066123	Italy
43	DNB	NO0010031479	Norway	STANDARD CHARTERED	GB0004082847	United Kingdom
44	EATON VANCE	US2782651036	United States of America	WADDELL & REED FINL	US9300591008	United States of America
45	ERSTE GROUP BANK	AT0000652011	Austria	DEXIA	BE0974290224	Belgium
46	EURAZEO	FR0000121121	France	VIENNA INSURANCE GROUP	AT0000908504	Austria
47	EUROBANK ERGASIAS	GRS323003012	Greece	BANCO COMR.PORTUGUES	PTBCP0AM0015	Portugal
48	FEDERATED INVRS	US3142111034	United States of America	FIDELITY NAT. FINANCIAL	US31620R3030	United States of America
49	FRANKLIN RESOURCES	US3546131018	United States of America	FIDELITY NAT. FINANCIAL	US31620R3030	United States of America
50	GAM HOLDING	CH0102659627	Switzerland	INTRUM	SE0000936478	Sweden
51	GBL NEW	BE0003797140	Belgium	PARGESA	CH0021783391	Switzerland
52	GOLDMAN SACHS GP	US38141G1040	United States of America	ROYAL BANK OF CANADA	CA7800871021	Canada
53	GREAT WEST LIFE CO	CA39138C1068	Canada	POWER CORP. CANADA	CA7392391016	Canada
54	HARTFORD FINL. SVS.GP	US4165151048	United States of America	US BANCORP	US9029733048	United States of America
55	HSBC HOLDINGS	GB0005405286	United Kingdom	UNICREDIT	IT0005239360	Italy
56	IGM FINL	CA4495861060	Canada	NASDAQ	US6311031081	United States of America
57	ING GROEP	NL0011821202	Netherlands	SBERBANK OF RUSSIA	RU0009029540	Russia
58	INSURANCE AUS. GROUP	AU000000IAG3	Australia	SUNCORP GROUP	AU000000SUN6	Australia
59	INTERMEDIATE CAPITAL GP	GB00BYT1DJ19	United Kingdom	AZIMUT HOLDING	IT0003261697	Italy
60	INTESA SANPAOLO	IT0000072618	Italy	COMMERZBANK	DE000CBK1001	Germany
61	INVESCO	BMG491BT1088	United States of America	EVEREST RE GP	BMG3223R1088	United States of America

Table 8 (continued)

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
62	JANUS HENDERSON GROUP	JE00BYPZJM29	United Kingdom	BEAZLEY	GB00BYQ0JC66	United Kingdom
63	JP MORGAN CHASE & CO	US46625H1005	United States of America	AMERICAN INTL.GP	US0268747849	United States of America
64	JULIUS BAER GRUPPE	CH0102484968	Switzerland	MBANK	PLBRE0000012	Poland
65	JUST GROUP	GB00BCRX1J15	United Kingdom	TOPDANMARK	DK0060477503	Denmark
66	JYSKE BANK	DK0010307958	Denmark	BCA.PICCOLO CDT. VALTELL	IT0005319444	ITALY
67	KBC GROUP	BE0003565737	Belgium	DEXIA	BE0974290224	Belgium
68	KOTAK MAHINDRA BANK	INE237A01028	India	HUATAI SECURITIES	CNE100000LQ8	China
69	LAZARD	BMG540501027	United States of America	MERCURY GEN-ERAL	US5894001008	United States of America
70	LEGAL & GENERAL	GB0005603997	United Kingdom	AGEAS	BE0974264930	Belgium
71	LEGG MASON	US5249011058	United States of America	W R BERKLEY	US0844231029	United States of America
72	LLOYDS BANKING GROUP	GB0008706128	United Kingdom	SBERBANK OF RUS-SIA	RU0009029540	Russia
73	LONDON STOCK EX.GROUP	GB00B0SWJX34	United Kingdom	ADMIRAL GROUP	GB00B02J6398	United Kingdom
74	M&T BANK	US55261F1049	United States of America	CITIZENS FINAN-CIAL GROUP	US1746101054	United States of America
75	MACQUARIE GROUP	AU000000MQG1	Australia	BENDIGO & ADE-LAIDE BANK	AU000000BEN6	Australia
76	MAN GROUP	JE00BJIDLW90	United Kingdom	MARFIN INV. GP.HDG	GRS314003005	Greece
77	MANULIFE FINAN-CIAL	CA56501R1064	Canada	US BANCORP	US9029733048	United States of America
78	MAPFRE	ES0124244E34	Spain	HANNOVER RUECK	DE0008402215	Germany
79	MARSH & MCLEN-NAN	US5717481023	United States of America	PROGRESSIVE OHIO	US7433151039	United States of America
80	METLIFE	US59156R1086	United States of America	US BANCORP	US9029733048	United States of America
81	MITSUBISHI UFJ FINL.GP	JP3902900004	Japan	MITSUB.UFJ LSE.& FINANCE	JP3499800005	Japan
82	MIZUHO FINL.GP	JP3885780001	Japan	ACOM	JP3108600002	Japan
83	MLP	DE0006569908	Germany	BEAZLEY	GB00BYQ0JC66	United Kingdom
84	MOODY'S	US6153691059	United States of America	ONEX	CA68272K1030	Canada
85	MORGAN STANLEY	US6174464486	United States of America	ROYAL BANK OF CANADA	CA7800871021	Canada
86	MORNINGSTAR	US6177001095	United States of America	FIRSTCASH	US33767D1054	United States of America
87	MS&AD INSURANCE GP.HDG	JP3890310000	Japan	MITSUB.UFJ LSE.& FINANCE	JP3499800005	Japan
88	MSCI	US55354G1004	United States of America	GMP CAPITAL	CA3801341064	Canada
89	MUENCHENER RUCK	DE0008430026	Germany	DEXIA	BE0974290224	Belgium
90	NATIONAL AUS. BANK	AU000000NAB4	Australia	SUNCORP GROUP	AU000000SUN6	Australia

Table 8 (continued)

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
91	NATIXIS	FR0000120685	France	BANK OF IRELAND GROUP	IE00BD1RP616	Ireland
92	NOMURA HDG	JP3762600009	Japan	HOKUHOKU FINL. GP	JP3842400008	Japan
93	NORDEA BANK	FI4000297767	Finland	STANDARD CHARTERED	GB0004082847	United Kingdom
94	NORTHERN TRUST	US6658591044	United States of America	KEYCORP	US4932671088	United States of America
95	OLD MUTUAL LIMITED	ZAE000255360	South Africa	STANDARD BANK GROUP	ZAE000109815	South Africa
96	ORIX	JP3200450009	Japan	AIFUL	JP3105040004	Japan
97	PARTNERS GROUP HOLDING	CH0024608827	Switzerland	HELLENIC EXCHANGES HDG	GRS395363005	Greece
98	PENDAL GROUP	AU0000009789	Australia	MCMILLAN SHAKE-SPEARE	AU000000MMS5	Australia
99	PERPETUAL	AU000000PPT9	Australia	ASX	AU000000ASX7	Australia
100	PRINCIPAL FINL.GP	US74251V1026	United States of America	GENWORTH FINANCIAL	US37247D1063	United States of America
101	PRUDENTIAL	GB0007099541	United Kingdom	CHUBB	CH0044328745	Switzerland
102	PRUDENTIAL FINL	US7443201022	United States of America	ROYAL BANK OF CANADA	CA7800871021	Canada
103	PZENA INV.MAN	US74731Q1031	United States of America	ELEVATE CREDIT	US28621V1017	United States of America
104	QBE INSURANCE GROUP	AU000000QBE9	Australia	SUNCORP GROUP	AU000000SUN6	Australia
105	RAIFFEISEN BANK INTL	AT0000606306	Austria	BANCA MONTE DEI PASCHI	IT0005218752	Italy
106	RATHBONE BROTHERS	GB0002148343	United Kingdom	CALEDONIA INVESTMENTS	GB0001639920	United Kingdom
107	RATOS	SE0000111940	Sweden	WENDEL	FR0000121204	France
108	RAYMOND JAMES FINL	US7547301090	United States of America	ALLEGHANY	US0171751003	United States of America
109	RESONA HOLDINGS	JP3500610005	Japan	SHINSEI BANK	JP3729000004	Japan
110	S&P GLOBAL	US78409V1044	United States of America	LPL FINANCIAL HOLDINGS	US50212V1008	United States of America
111	SAMPO	FI0009003305	Finland	UNIPOL GRUPPO FINANZIARI	IT0004810054	Italy
112	SCHRODERS	GB0002405495	United Kingdom	TOPDANMARK	DK0060477503	Denmark
113	SCOR SE	FR0010411983	France	VIENNA INSURANCE GROUP	AT0000908504	Austria
114	SDIC CAPITAL	CNE000000Q11	China	INDUSTRIAL SECS	CNE100000V95	China
115	SEI INVESTMENTS	US7841171033	United States of America	WADDELL & REED FINL	US9300591008	United States of America
116	SINGAPORE EXCHANGE	SG1J26887955	Singapore	BAHRAIN COMMERCIAL FACS	BH0004652895	Bahrain
117	SKANDINAVISKA ENSKILDA BANKEN	SE0000148884	Sweden	AIB GROUP	IE00BF0L3536	Ireland
118	STANDARD LIFE ABERDEEN	GB00BF8Q6K64	United Kingdom	BANK OF IRELAND GROUP	IE00BD1RP616	Ireland
119	STATE STREET	US8574771031	United States of America	GENWORTH FINANCIAL	US37247D1063	United States of America

Table 8 (continued)

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
120	STOREBRAND	NO0003053605	Norway	BANCA MEDIOLA- NUM	IT0004776628	Italy
121	SUMITOMO MITSUI FINL.GP	JP3890350006	Japan	MITSUB.UFJ LSE.& FINANCE	JP3499800005	Japan
122	SUMITOMO MITSUI TST.HDG	JP3892100003	Japan	CHIBA BANK	JP3511800009	Japan
123	SUN LIFE FINL	CA8667961053	Canada	POWER FINL	CA73927C1005	Canada
124	SVENSKA HAN- DELSBANKEN	SE0007100599	Sweden	UNIONE DI BANCHE ITALIAN	IT0003487029	Italy
125	SWEDBANK	SE0000242455	Sweden	AIB GROUP	IE00BF0L3536	Ireland
126	SWISS LIFE HOLD- ING	CH0014852781	Switzerland	BANCO BPM	IT0005218380	Italy
127	SWISS RE	CH0126881561	Switzerland	COMMERZBANK	DE000CBK1001	Germany
128	SYDBANK	DK0010311471	Denmark	BANCA PPO.DI SON- DRIO	IT0000784196	Italy
129	T & D HOLDINGS	JP3539220008	Japan	AIFUL	JP3105040004	Japan
130	T ROWE PRICE GROUP	US74144T1088	United States of America	ARTHUR J GAL- LAGHER	US3635761097	United States of America
131	TOKIO MARINE HOLDINGS	JP3910660004	Japan	MITSUB.UFJ LSE.& FINANCE	JP3499800005	Japan
132	TORONTO-DOMIN- ION BANK	CA8911605092	Canada	ROYAL BANK OF CANADA	CA7800871021	Canada
133	UBS GROUP	CH0244767585	Switzerland	COMMERZBANK	DE000CBK1001	Germany
134	UNIPOLSAI	IT0004827447	Italy	VIENNA INSUR- ANCE GROUP	AT0000908504	Austria
135	VIRTUS INVEST- MENT PTNS	US92828Q1094	United States of America	CANACCORD GENU- ITY GROUP	CA1348011091	Canada
136	VOYA FINANCIAL	US9290891004	United States of America	LINCOLN NATIONAL	US5341871094	United States of America
137	WELLS FARGO & CO	US9497461015	United States of America	CITIGROUP	US1729674242	United States of America
138	WESTPAC BANKING	AU000000WBC1	Australia	COMPUTERSHARE	AU000000CPU5	Australia
139	WESTWOOD HDG. GP	US9617651040	United States of America	WORLD ACCEPT- ANCE	US9814191048	United States of America
140	WILLIS TOWERS WATSON	IE00BDB6Q211	United Kingdom	PARGESA	CH0021783391	Switzerland
141	ZURICH INSUR- ANCE GROUP	CH0011075394	Switzerland	COMMERZBANK	DE000CBK1001	Germany

Table 9 List of signatories and matched non-signatories for EWR variable

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
1	3I GROUP	GB00B1YW4409	United Kingdom	EDENRED	FR0010908533	France
2	ABSA GROUP	ZAE000255915	South Africa	FIRSTRAND	ZAE000066304	South Africa
3	ACKERMANS & VAN HAAREN	BE0003764785	Belgium	TOPDANMARK	DK0060477503	Denmark
4	AEGON	NL0000303709	Netherlands	DEXIA	BE0974290224	Belgium
5	AGF MANAGEMENT	CA0010921058	Canada	GREEN DOT CLASS	US39304D1028	United States of America
6	AKBANK	TRAAKBNK91N6	Turkey	HANG SENG BANK	HK0011000095	Hong Kong
7	ALLIANCE TRUST	GB00B11V7W98	United Kingdom	KINNEVIK	SE0013256682	Sweden
8	ALLIANZ	DE0008404005	Germany	AGEAS	BE0974264930	Belgium
9	AMERIPRISE FINL	US03076C1062	United States of America	KEYCORP	US4932671088	United States of America
10	AMP	AU000000AMP6	Australia	SUNCORP GROUP	AU000000SUN6	Australia
11	ARTISAN PTNS. ASTMGMT	US04316A1088	United States of America	LADENBURG THALMAN FNSR	US05575Q1022	United States of America
12	ASHMORE GROUP	GB00B132NW22	United Kingdom	IG GROUP HOLDINGS	GB00B06QFB75	United Kingdom
13	ASSICURAZIONI GENERALI	IT0000062072	Italy	UNICREDIT	IT0005239360	Italy
14	AVIVA	GB0002162385	United Kingdom	COMMERZBANK	DE000CBK1001	Germany
15	AXA	FR0000120628	France	DEXIA	BE0974290224	Belgium
16	B3 BRASIL BOLSA BALCAO	BRB3SAACNOR6	Brazil	CREDICORP	BMG2519Y1084	Peru
17	BALOISE HOLDING	CH0012410517	Switzerland	PZU GROUP	PLPZU0000011	Poland
18	BANCO BRADESCO	BRBBDACNPR8	Brazil	ITAUSA	BRITSAACNPR7	Brazil
19	BANCO DE SABADELL	ES0113860A34	Spain	BANCO COMR.POR-TUGUES	PTBCP0AM0015	Portugal
20	BANCO SAN-TANDER	ES0113900J37	Spain	AGEAS	BE0974264930	Belgium
21	BANCOLOMBIA	COB07PA00078	Colombia	CREDICORP	BMG2519Y1084	Peru
22	BANK OF AMERICA	US0605051046	United States of America	ROYAL BANK OF CANADA	CA7800871021	Canada
23	BANK OF MONTREAL	CA0636711016	Canada	ROYAL BANK OF CANADA	CA7800871021	Canada
24	BANK OF NEW YORK MELLON	US0640581007	United States of America	GENWORTH FINANCIAL	US37247D1063	United States of America
25	BARCLAYS	GB0031348658	United Kingdom	UNICREDIT	IT0005239360	Italy
26	BBV.ARGENTARIA	ES0113211835	Spain	UNICREDIT	IT0005239360	Italy
27	BK.OF NOVA SCOTIA	CA0641491075	Canada	ROYAL BANK OF CANADA	CA7800871021	Canada
28	BNP PARIBAS	FR0000131104	France	AGEAS	BE0974264930	Belgium
29	BRIGHTSPHERE INVESTMENT GROUP	US10948W1036	United States of America	EVERCORE	US29977A1051	United States of America
30	CANADIAN IMP. BK.COM	CA1360691010	Canada	PNC FINL.SVS.GP	US6934751057	United States of America
31	CATHAY FINL.HLDG	TW0002882008	Taiwan	AIA GROUP	HK0000069689	Hong Kong
32	CHALLENGER	AU000000CGF5	Australia	ASX	AU000000ASX7	Australia
33	CI FINANCIAL	CA1254911003	Canada	FIRSTCASH	US33767D1054	United States of America
34	CITIC SECURITIES	CNE000001DB6	China	HAITONG SECURITIES	CNE000000CK1	China

Table 9 (continued)

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
35	CNP ASSURANCES	FR0000120222	France	DEXIA	BE0974290224	Belgium
36	COMMONWEALTH BK.OF AUS	AU000000CBA7	Australia	BENDIGO & ADELAIDE BANK	AU000000BEN6	Australia
37	CREDIT AGRICOLE	FR0000045072	France	COMMERZBANK	DE000CBK1001	Germany
38	CREDIT SUISSE GROUP	CH0012138530	Switzerland	STANDARD CHARTERED	GB0004082847	United Kingdom
39	DAIWA SECURITIES GROUP	JP3502200003	Japan	SHINSEI BANK	JP3729000004	Japan
40	DANSKE BANK	DK0010274414	Denmark	STANDARD CHARTERED	GB0004082847	United Kingdom
41	DEUTSCHE BANK	DE0005140008	Germany	UNICREDIT	IT0005239360	Italy
42	DEUTSCHE BOERSE	DE0005810055	Germany	AIB GROUP	IE00BF0L3536	Ireland
43	DNB	NO0010031479	Norway	STANDARD CHARTERED	GB0004082847	United Kingdom
44	EATON VANCE	US2782651036	United States of America	WADDELL & REED FINL	US9300591008	United States of America
45	ERSTE GROUP BANK	AT0000652011	Austria	BANK OF IRELAND GROUP	IE00BD1RP616	Ireland
46	EURAZEO	FR0000121121	France	HELVETIA HOLDING	CH0466642201	Switzerland
47	EUROBANK ERGASIAS	GRS323003012	Greece	BANCO COMR.POR-TUGUES	PTBCP0AM0015	Portugal
48	FEDERATED INVRS	US3142111034	United States of America	FIDELITY NAT. FINANCIAL	US31620R3030	United States of America
49	FRANKLIN RESOURCES	US3546131018	United States of America	THOMSON REUTERS	CA8849037095	Canada
50	GAM HOLDING	CH0102659627	Switzerland	INTRUM	SE0000936478	Sweden
51	GBL NEW	BE0003797140	Belgium	PARGESA	CH0021783391	Switzerland
52	GOLDMAN SACHS GP	US38141G1040	United States of America	ROYAL BANK OF CANADA	CA7800871021	Canada
53	GREAT WEST LIFE CO	CA39138C1068	Canada	POWER CORP. CANADA	CA7392391016	Canada
54	HARTFORD FINL. SVS.GP	US4165151048	United States of America	PNC FINL.SVS.GP	US6934751057	United States of America
55	HSBC HOLDINGS	GB0005405286	United Kingdom	UNICREDIT	IT0005239360	Italy
56	IGM FINL	CA4495861060	Canada	OCWEN FINANCIAL	US6757463095	United States of America
57	ING GROEP	NL0011821202	Netherlands	UNICREDIT	IT0005239360	Italy
58	INSURANCE AUS. GROUP	AU000000IAG3	Australia	SUNCORP GROUP	AU000000SUN6	Australia
59	INTERMEDIATE CAPITAL GP	GB00BYT1DJ19	United Kingdom	BANK VOZROZH-DENIE	RU0009084214	Russia
60	INTESA SANPAOLO	IT0000072618	Italy	STANDARD CHARTERED	GB0004082847	United Kingdom
61	INVESCO	BMG491BT1088	United States of America	CINCINNATI FINL	US1720621010	United States of America
62	JANUS HENDERSON GROUP	JE00BYPZJM29	United Kingdom	AZIMUT HOLDING	IT0003261697	Italy
63	JP MORGAN CHASE & CO	US46625H1005	United States of America	AMERICAN INTL.GP	US0268747849	United States of America
64	JULIUS BAER GRUPPE	CH0102484968	Switzerland	KOMERCNI BANKA	CZ0008019106	Czech Republic

Table 9 (continued)

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
65	JUST GROUP	GB00BCRX1J15	United Kingdom	CATTOLICA ASSI- CURAZIONI	IT0000784154	Italy
66	JYSKE BANK	DK0010307958	Denmark	BANCA PPO.DI SONDRIO	IT0000784196	Italy
67	KBC GROUP	BE0003565737	Belgium	COMMERZBANK	DE000CBK1001	Germany
68	KOTAK MAHINDRA BANK	INE237A01028	India	BANK CENTRAL ASIA	ID1000109507	Indonesia
69	LAZARD	BMG540501027	United States of America	MERCURY GEN- ERAL	US5894001008	United States of America
70	LEGAL & GENERAL	GB0005603997	United Kingdom	BANCA MONTE DEI PASCHI	IT0005218752	Italy
71	LEGG MASON	US5249011058	United States of America	INTACT FINANCIAL	CA45823T1066	Canada
72	LLOYDS BANKING GROUP	GB0008706128	United Kingdom	STANDARD CHAR- TERED	GB0004082847	United Kingdom
73	LONDON STOCK EX.GROUP	GB00B0SWJX34	United Kingdom	ADMIRAL GROUP	GB00B02J6398	United Kingdom
74	M&T BANK	US55261F1049	United States of America	HUNTINGTON BCSH	US4461501045	United States of America
75	MACQUARIE GROUP	AU000000MQG1	Australia	SUNCORP GROUP	AU000000SUN6	Australia
76	MAN GROUP	JE00BJ1DLW90	United Kingdom	EDENRED	FR0010908533	France
77	MANULIFE FINAN- CIAL	CA56501R1064	Canada	ROYAL BANK OF CANADA	CA7800871021	Canada
78	MAPFRE	ES0124244E34	Spain	HANNOVER RUECK	DE0008402215	Germany
79	MARSH & MCLEN- NAN	US5717481023	United States of America	PROGRESSIVE OHIO	US7433151039	United States of America
80	METLIFE	US59156R1086	United States of America	AMERICAN INTL.GP	US0268747849	United States of America
81	MITSUBISHI UFJ FINL.GP	JP3902900004	Japan	SHIZUOKA BANK	JP3351200005	Japan
82	MIZUHO FINL.GP	JP3885780001	Japan	HOKUHOKU FINL. GP	JP3842400008	Japan
83	MLP	DE0006569908	Germany	BEAZLEY	GB00BYQ0JC66	United Kingdom
84	MOODY'S	US6153691059	United States of America	ONEX	CA68272K1030	Canada
85	MORGAN STANLEY	US6174464486	United States of America	US BANCORP	US9029733048	United States of America
86	MORNINGSTAR	US6177001095	United States of America	FIRSTCASH	US33767D1054	United States of America
87	MS&AD INSURANCE GP.HDG	JP3890310000	Japan	MITSUB.UFJ LSE.& FINANCE	JP3499800005	Japan
88	MSCI	US55354G1004	United States of America	GMP CAPITAL	CA3801341064	Canada
89	MUENCHENER RUCK	DE0008430026	Germany	DEXIA	BE0974290224	Belgium
90	NATIONAL AUS. BANK	AU000000NAB4	Australia	SUNCORP GROUP	AU000000SUN6	Australia
91	NATIXIS	FR0000120685	France	STANDARD CHAR- TERED	GB0004082847	United Kingdom
92	NOMURA HDG	JP3762600009	Japan	SHINSEI BANK	JP3729000004	Japan
93	NORDEA BANK	FI4000297767	Finland	COMMERZBANK	DE000CBK1001	Germany
94	NORTHERN TRUST	US6658591044	United States of America	KEYCORP	US4932671088	United States of America

Table 9 (continued)

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
95	OLD MUTUAL LIMITED	ZAE000255360	South Africa	STANDARD BANK GROUP	ZAE000109815	South Africa
96	ORIX	JP3200450009	Japan	AIFUL	JP3105040004	Japan
97	PARTNERS GROUP HOLDING	CH0024608827	Switzerland	HELLENIC EXCHANGES HDG	GRS395363005	Greece
98	PENDAL GROUP	AU0000009789	Australia	MCMILLAN SHAKE-SPEARE	AU000000MMS5	Australia
99	PERPETUAL	AU000000PPT9	Australia	ASX	AU000000ASX7	Australia
100	PRINCIPAL FINL.GP	US74251V1026	United States of America	GENWORTH FINANCIAL	US37247D1063	United States of America
101	PRUDENTIAL	GB0007099541	United Kingdom	SBERBANK OF RUSSIA	RU0009029540	Russia
102	PRUDENTIAL FINL	US7443201022	United States of America	ROYAL BANK OF CANADA	CA7800871021	Canada
103	PZENA INV.MAN	US74731Q1031	United States of America	WISDOMTREE INVS	US97717P1049	United States of America
104	QBE INSURANCE GROUP	AU000000QBE9	Australia	BENDIGO & ADELAIDE BANK	AU000000BEN6	Australia
105	RAIFFEISEN BANK INTL	AT0000606306	Austria	BANCA MONTE DEI PASCHI	IT0005218752	Italy
106	RATHBONE BROTHERS	GB0002148343	United Kingdom	BOLSAS Y MERCADOS ESPANOLES	ES0115056139	Spain
107	RATOS	SE0000111940	Sweden	PROVIDENT FINANCIAL	GB00B1Z4ST84	United Kingdom
108	RAYMOND JAMES FINL	US7547301090	United States of America	MARKEL	US5705351048	United States of America
109	RESONA HOLDINGS	JP3500610005	Japan	SHINSEI BANK	JP3729000004	Japan
110	S&P GLOBAL	US78409V1044	United States of America	LPL FINANCIAL HOLDINGS	US50212V1008	United States of America
111	SAMPO	FI0009003305	Finland	VIENNA INSURANCE GROUP	AT0000908504	Austria
112	SCHRODERS	GB0002405495	United Kingdom	BCA.PICCOLO CDT. VALTELL	IT0005319444	Italy
113	SCOR SE	FR0010411983	France	HANNOVER RUECK	DE0008402215	Germany
114	SDIC CAPITAL	CNE000000Q11	China	INDUSTRIAL SECS	CNE100000V95	China
115	SEI INVESTMENTS	US7841171033	United States of America	WADDELL & REED FINL	US9300591008	United States of America
116	SINGAPORE EXCHANGE	SG1J26887955	Singapore	BURSA MALAYSIA	MYL181800003	Malaysia
117	SKANDINAVISKA ENSKILDA BANKEN	SE0000148884	Sweden	AIB GROUP	IE00BF0L3536	Ireland
118	STANDARD LIFE ABERDEEN	GB00BF8Q6K64	United Kingdom	BANK OF IRELAND GROUP	IE00BD1RP616	Ireland
119	STATE STREET	US8574771031	United States of America	NATIONAL BANK OF CANADA	CA6330671034	Canada
120	STOREBRAND	NO0003053605	Norway	INVESTEC	GB00B17BBQ50	United Kingdom
121	SUMITOMO MITSUI FINL.GP	JP3890350006	Japan	SHINSEI BANK	JP3729000004	Japan
122	SUMITOMO MITSUI TST.HDG	JP3892100003	Japan	CHIBA BANK	JP3511800009	Japan
123	SUN LIFE FINL	CA8667961053	Canada	US BANCORP	US9029733048	United States of America

Table 9 (continued)

No.	Signatories			Non-signatories		
	Name	ISIN	Country	Name	ISIN	Country
124	SVENSKA HANDELSBANKEN	SE0007100599	Sweden	BANCA MONTE DEI PASCHI	IT0005218752	Italy
125	SWEDBANK	SE0000242455	Sweden	BANK OF IRELAND GROUP	IE00BD1RP616	Ireland
126	SWISS LIFE HOLDING	CH0014852781	Switzerland	ALPHA BANK	GRS015003007	Greece
127	SWISS RE	CH0126881561	Switzerland	STANDARD CHARTERED	GB0004082847	United Kingdom
128	SYDBANK	DK0010311471	Denmark	BCA.PICCOLO CDT. VALTELL	IT0005319444	Italy
129	T & D HOLDINGS	JP3539220008	Japan	SHINSEI BANK	JP3729000004	Japan
130	T ROWE PRICE GROUP	US74144T1088	United States of America	ARTHUR J GALLAGHER	US3635761097	United States of America
131	TOKIO MARINE HOLDINGS	JP3910660004	Japan	SONY FINANCIAL HOLDINGS	JP3435350008	Japan
132	TORONTO-DOMINION BANK	CA8911605092	Canada	ROYAL BANK OF CANADA	CA7800871021	Canada
133	UBS GROUP	CH0244767585	Switzerland	UNICREDIT	IT0005239360	Italy
134	UNIPOLSAI	IT0004827447	Italy	VIENNA INSURANCE GROUP	AT0000908504	Austria
135	VIRTUS INVESTMENT PTNS	US92828Q1094	United States of America	CANACCORD GENUITY GROUP	CA1348011091	Canada
136	VOYA FINANCIAL	US9290891004	United States of America	TRUIST FINANCIAL	US89832Q1094	United States of America
137	WELLS FARGO & CO	US9497461015	United States of America	CITIGROUP	US1729674242	United States of America
138	WESTPAC BANKING	AU000000WBC1	Australia	COMPUTERSHARE	AU000000CPU5	Australia
139	WESTWOOD HDG. GP	US9617651040	United States of America	WORLD ACCEPTANCE	US9814191048	United States of America
140	WILLIS TOWERS WATSON	IE00BDB6Q211	United Kingdom	GJENSIDIGE FORSIKRING	NO0010582521	Norway
141	ZURICH INSURANCE GROUP	CH0011075394	Switzerland	COMMERZBANK	DE000CBK1001	Germany

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Declarations

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Informed consent was obtained from all individual participants included in the study.

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