Who can better push firms to go green? A look at ESG effects on stock returns

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Abstract

We examine how the information contained in corporate social performance is incorporated into stock prices. Pastor et al. (2021) propose an equilibrium model focusing exclusively on the demand part coming from investors (discount rate story). They show that brown assets should have higher expected returns than green assets because investors have green tastes. In line with theoretical model of Pedersen et al. (2021), Derrien et al. (2022) analyze how the impact of negative ESG news on firms' future value, focusing exclusively on the expectations of futures sales (cash flows story). To understand the net effect of ESG on stocks returns, we must reconcile the two stories and analyze the perception of customers and investors' green real investment of firms and the effects of their actions and interactions. Neither theory, nor empirical studies give a clear conclusion on the sign of the effect because they only look at one channel at a time. We decompose here the effect of "S" scores on expected returns via changes in institutional ownership, and show that the negative effect can disappear when allowing for both the cash flows and the discount rate parts in the empirical model. Finally, we show that "E", "S", and "G" qualities are not perceived the same by customers and investors changing the overall effect on stocks returns.

1 Introduction

The term ESG (Environment, Social, and Governance) made its first appearance in the landmark "Who Cares Wins" conference report published in 2005. Yet practices of considering social concerns in investment decisions can be traced back to the last century in the United States, with Electrical and Mine Workers Unions investing in affordable housing projects and health facilities in the 1950s and 1960s. The development of ESG has come through a "thorny path" in the first two decades of the 21st century. On the one hand, greenwashing scandals and the lack of universal standards have cast doubt on the reliability of ESG measurement. On the other hand, looming environmental issues and growing social inequalities have contributed to a greater focus on corporate social responsibility, thus urging companies to incorporate ESG attributes into their operations. While more and more people are aware of ESG and do care about it, the efforts of companies on that matter are not perceived in the same way by consumers and investors. These differences in population and perception can have potentially different effects on stock returns. They can also be the source of some heterogeneity between sectors and geographical areas.

In this paper, we focus on the "S" dimension and the perception of corporate actions to developp a good social environment in conducting their business by customers as well as investors. We examine how the information contained in corporate social performance is incorporated into stock prices. Theories suggest that ESG exerts an impact on stock returns and that institutional ownership may be a transmission channel. Using an equilibrium model, Baker et al. (2022) analyze the one-period portfolio choice problem of two types of investors: standard mean-variance maximisers and investors deriving utility from holding shares of ESG outperformers. Baker et al. (2022)'s model predicts that a firm's ESG rating is negatively correlated with stock returns while positively correlated with in-

stitutional ownership. Oehmke and Opp (2022) and Pástor et al. (2021) also draw the distinction between investors caring only about their financial wealth and investors having concerns about ESG. Compared with Baker et al. (2022), Oehmke and Opp (2022) include the optimization problem of firms in the model. Moreover, they suppose that investors demonstrate ESG preferences by the additional utility derived from the social impact of firm investment. Pástor et al. (2021)'s model considers that investors with ESG preferences derive non-pecuniary utility simultaneously from direct investment in companies with better ESG ratings and from the social impact of firm investment. Despite differences in model complexity and investor utility functions, Oehmke and Opp (2022) and Pástor et al. (2021) agree with Baker et al. (2022) on the negative impact of ESG on stock returns. Baker et al. (2022)'s prediction on the increase in institutional ownership of firms with better ESG ratings provides an explanation for the negative correlation between ESG and stock returns. The increase in demand from institutional investors will naturally bid up the stock price of firms with better ESG ratings, lowering the expected returns of these firms.

Institutional investors have long been essential in the financial markets with their large investment volumes and relatively long investment horizons. Under economic recovery after the global Pandemic, institutional investments reached $61 trillion by 2020, representing 59% of the worldwide market (*Global Asset Management 2021*[1]*: The $100 Trillion Machine*, 2021). Like all investors, institutional investors used to set revenue maximization as their primary goal and judge the quality of a firm based primarily on its financial performance. Nevertheless, the tide seems to be shifting with the increasing importance of ESG considerations. MSCI, a global provider of financial analysis tools, ESG, and climate products, surveyed 200 executives at 200 separate asset owners in September 2020. In the report released after the survey, MSCI notes that ESG considerations are "transitioning

[1]Global Asset Management 2021: The $100 Trillion Machine. (2021). `https://www.bcg.com/publications/2021/global-asset-management-industry-report`

from a side-fund to a main-fund issue," with 73% of surveyed funds planning to increase ESG investments and 36% of solicited funds allocating more attention to the "social" aspect by the end of 2021 (*MSCI Investment Insights 2021*, 2021). Accordingly, assets under the management of ESG funds amounted to $2.74 trillion at the end of December 2021 (*Global Sustainable Fund Flows Report*, 2022[2]). Institutional investors' ESG preferences are also empirically verified from their trading behavior. For instance, Lopez de Silanes et al. (2022) evaluate SEC 13F filings of institutional investors of U.S. equities between 2016 and 2018 and note a positive correlation between a firm's ESG rankings and institutional investors' interest in the firm.

Even if these first results are convincing, the extent to which ESG information matter for firm value is still debated in the literature and the channel through which ESG information affect the value of the firms are not totally understood. Derrien et al. (2022) for example investigate another channel directly related to firm's cash flows. They consider earnings forecasts made by security analysts and study how any change of these forecasts following ESG news may have an impact on firm values. Indeed, ESG could potentially affect firm values if ESG metrics predict the future earnings of the firm. A firm subject to negative ESG news for example, could experience a decrease of future earnings because of negative reactions from customers and shareholders could also downgrade the earnings forecasts of the firm for the same reason. Such real implications of ESG information for firm earnings might be either short-term or potentially long term. Customers or employees may indeed turn their back on firms with poor ESG profiles. This cash flow channel is embedded in the model developed by Pedersen et al. (2021) and predicts a positive impact of ESG information on stock returns. Derrien et al. (2022) empirically test this channel and provide some evidence that negative ESG news shifts earnings forecasts over both long and short

[2]Global Sustainable Fund Flows Report. (2022). `https://www.morningstar.com/lp/global-esg-flows`

horizon. Moreover, the reaction is stronger in the case of multiple negative ESG news and when news are related to "S". Finally, Derrien et al. (2022) show that earning at longer horizon are affected by ESG news more strongly that other negative corporate news, suggesting that negative reactions from customers are the channel in action.

these empirical finding are supported by Pedersen et al. (2021). They propose a theoretical model of the investment decision of three types of investors: "ESG-unaware investors" who seek to achieve the highest return for a given level of risk; "ESG-aware investors" who have mean-variance utility but also consider ESG ratings in the valuation of securities; and "ESG-motivated investors" who not only use ESG ratings to make investment decisions but also derive utility from holding securities with high ESG ratings. In addition to the negative indirect impact of ESG on stock returns identified in other work (Baker et al., 2022; Oehmke and Opp, 2022; Pástor et al., 2021), Pedersen et al. (2021) note a positive direct impact of ESG: better ESG ratings signal improved firm fundamentals and stock returns are expected to rise following increased profitability. They claim that the overall impact of ESG on stock returns depends on the relative proportions of each type of investors, or in other terms, the extent to which ESG is valued by market participants. The more "ESG-motivated investors" in the market, the more likely the negative indirect impact of ESG will dominate the positive direct impact, as "ESG-motivated investors" are willing to forgo high returns to hold securities with better ESG ratings (Pedersen et al., 2021).

Although a large body of empirical literature has assessed the link between ESG and corporate financial performance, there is a dearth of literature focusing on the social ("S") dimension of ESG. Recent contributions mainly concentrate on one aspect of the "S" dimension—employee satisfaction (Becker et al., 2022; Edmans, 2011; Green et al., 2019). Existing studies on the intermediary role of institutional ownership between ESG and corporate financial performance also overlook the "S" dimension of ESG. Indeed, they focus

on corporate environmental performance (Fernando et al., 2017) or overall ESG performance (Cao et al., 2022). Therefore, we narrow down the scope of research to corporate performance in the "S" dimension to complement the related literature.

We first provide empirical evidence of institutional investors' sensitivity to social matters, using data on a sample of 2019 U.S.-listed firms over the period from 2003 to 2021. We start the analysis by following the literature (Fernando et al., 2017; Gantchev et al., 2021; Lopez de Silanes et al., 2022; Nofsinger et al., 2019) and running a panel regression of a firm's institutional ownership on its lagged social score. The results show a positive correlation between institutional ownership and social scores, which is consistent with the upward trend observed in financial markets for institutional investors to allocate capital based on ESG criteria. A possible explanation for institutional investors' preference for social performance leaders is that ESG performance has a positive impact on firms' operating conditions and ability to stand out in the face of fierce competition (Bardos et al., 2020; Becker et al., 2022; Berg et al., 2021; Derrien et al., 2021; Edmans, 2011; Krueger et al., 2021; Lins et al., 2017; Pedersen et al., 2021; Servaes and Tamayo, 2013). Institutional investors may also want to invest in firms with high ESG profiles for hedging purposes (Pástor et al., 2022).

We then distinguish and measure the two effects discussed above (cash flows and discount rate) of social performance on stock returns through changes in institutional ownership. To achieve this end, we implement a stock-level approach inspired by the mediation analysis and follow the procedure described by Baron and Kenny (1986) and Preacher and Hayes (2004). The results show that social performance positively affects stock returns in what we call a direct manner (cash flow) while negatively affecting stock returns in an indirect manner (dicount rate) through its effect on institutional ownership. In conjunction with the previous analysis of institutional investors' sensitivity to corporate social performance, we can derive that a firm with outstanding social performance will attract institutional investors to invest

more capital. The massive buying behavior of institutional investors will inevitably push up the stock price and cause a decrease in the firm's stock return. Comparing the magnitude of direct and indirect effects of social performance, we note that the negative indirect effect outweighs the positive direct effect, so the overall effect is negative. This situation may lead to the erroneous conclusion that social performance is improved at the expense of stock returns.

Our paper is related to the literature on the relation between investors' ESG preferences and the predictability of ESG ratings on stock returns. Pedersen et al. (2021) demonstrate both theoretically and empirically that the overall impact of ESG on stock returns depends on the distribution of investors with different levels of ESG preferences. According to their model, the signal of higher profitability carried by a higher ESG rating is not priced into the market when there are many "ESG-unaware investors" who are not sensitive to ESG ratings, so stocks with higher ESG ratings have higher expected returns in this scenario. The arrival of "ESG-aware investors" who use ESG information to update their views on adequate asset prices introduces a negative indirect impact of ESG on stock returns through the bidding process (Pedersen et al., 2021). The negative indirect impact of ESG on stock returns offsets the positive direct impact when there are many "ESG-aware investors" and even outweighs positive direct impact when there are many "ESG-motivated investors" who derive direct utility from holding stocks with higher ESG ratings (Pedersen et al., 2021). Pedersen et al. (2021) test these model predictions using investor demand as a proxy for investors' ESG preferences. For stocks with better environmental (E), social (S), or overall ESG performance, they find the dominance of the negative indirect impact over the positive direct impact of ESG on stock returns. Indeed, empirical evidence show that higher E, S, and overall ESG metrics reveal weakly positive or insignificant signals about firm fundamentals but promote demand from institutional investors (Pedersen et al., 2021). In contrast, the

positive direct impact of a firm's governance (G) performance on stock returns dominates, with higher G metrics forecasting better profitability and attracting modest institutional investment (Pedersen et al., 2021).

Starks et al. (2017) assess investors' ESG preferences through their investment horizons. The reasoning behind their hypothesis on the relationship between investors' investment horizons and ESG preferences is that ESG-enhancing projects incur costs in the short-term but create value in the long-term. As a result, long-term investors who adjust their holdings less frequently are expected to be more patient and invest more in firms with higher ESG ratings (Starks et al., 2017). Working on a sample of mutual funds and 13f institutions, Starks et al. (2017) find both fund-level and firm-level evidence on the positive correlation between investors' investment horizons and ESG preferences.

Starks et al. (2017) and Pedersen et al. (2021) both acknowledge the existence of two competing impacts of ESG on stock returns. One is a positive direct impact, where better ESG metrics send promising signals about a firms's prospects and increase expected returns. Another is a negative indirect impact, where better ESG metrics attract more institutional investment and subsequently drive stock prices higher. The overall impact of ESG on stocks returns, the one we actually observe in the financial markets, is determined by the relative weights of investors having different sensitivities to corporate ESG performance (Pedersen et al., 2021; Starks et al., 2017). In Pedersen et al. (2021)'s model, ESG has an overall negative impact on stock returns if there are many "ESG-motivated investors" who prefer and actively invest in firms with better ESG performance. Starks et al. (2017) associate investors' sensitivities to ESG with their investment horizons and empirically notice the preference of long-term investors for firms with better ESG performance. Naturally, when there are many long-term investors in the economy, the overall impact of ESG on stock returns is negative (Starks et al., 2017). The shared reasoning of Starks et al. (2017) and

Pedersen et al. (2021) is that the more ESG-sensitive investors there are, the higher the demand for firms with better ESG performance. Higher investor demand will translate into higher stock prices and subsequently lower stock returns. Thus, when the proportion of ESG-sensitive investors in the economy increases, the negative indirect impact of ESG on stock returns is more likely to prevail and lower returns for high-ESG stocks are more likely to be observed in the financial markets.

The present work seeks to complement the literature on the relationship between firms' performance in the "S" dimension of ESG and firms' stock returns while focusing on one particular transmission channel—institutional ownership. In line with Starks et al. (2017) and Pedersen et al. (2021), we use 13 filings to compute institutional ownership of firms and then regress institutional ownership on ESG metrics to capture institutional investors' sensitivity to ESG performance. Levels of institutional ownership demonstrate the degree of institutional investors' ESG preferences and changes in institutional ownership are deemed the mechanism through which the indirect impact of ESG on stock returns is exercised. Although Starks et al. (2017) and Pedersen et al. (2021) both provide empirical evidence on the existence of two competing forces behind the overall impact of ESG on stock returns, they ignore the comparison of the relative importance of the two competing forces in the overall impact. Our main contribution to the literature on the impact of ESG on stock returns is thus that we isolate respective contributions of the direct impact and the indirect impact to the overall impact of ESG on stock returns. To achieve this end, we observe how the relation between ESG and stock returns changes after explicitly considering differences in institutional investors' ESG preferences in our analysis.

Our regression results of stock returns on S ratings indicate a negative overall impact of S metric on stock returns. Then, by regressing stock returns on S ratings and institutional ownership, we notice that the negative overall impact of S metric on stock returns

is constituted of two parts: a positive direct impact of S metric on stock returns, and a negative indirect impact exercised through variations in institutional ownership. Thus, the lower returns observed for stocks with higher S ratings are due to the predominance of the negative indirect impact over the positive direct impact. This finding is consistent with the Pedersen et al. (2021)'s prediction on the decomposition of the overall impact of ESG on stock returns into a positive direct impact through forecasted profitability and a negative indirect impact through an increase in investor demand. Using a different proxy for firms' S performance, Pedersen et al. (2021) also find in data that the overall impact of S metric on stock returns is negative.

In increasingly complex financial markets, information is critical for investors to promptly identify appropriate investment objectives and accurately estimate expected investment profits. Investors used to judge the quality of a firm and make investment decisions based only on the financial information in the firm's financial statements. However, non-financial information can also play a role in financial issues and provide supplementary data on a firm. By showing how non-financial information contained in corporate social performance is incorporated into stock prices and subsequently affects stock returns, we expect this study to demonstrate the financial implications of non-financial information. Investors can then base their investment decisions on both financial and non-financial information and generate better profitability. This research also complements the literature on institutional investors' trading behavior. More specifically, by analyzing variations in institutional ownership in response to variations in firms' social performance, the present work sheds light on the influence of ESG on institutional investors' trading behavior. Moreover, examining the intermediary role that institutional ownership plays between corporate social performance and corporate financial performance provides evidence of the impact of institutional investment on stock returns of investee firms.

The remainder of this paper is divided into five distinct sections. Section 2 presents the current state of research on institutional investors' behavior and ESG preferences. Section 3 describes ESG and institutional ownership measures and provides an overview of data. Section 4 presents the findings on the intermediary role that institutional ownership plays in the relation between corporate social ("S") and financial performance. Section 5 explore and compare the findings on the intermediary role that institutional ownership plays in the relation between corporate governance/Environmental and financial performance. Section 6 explores the existence of sectorial specificities, and Section 7 discusses the robustness tests. Finally, Section 7 concludes the article, presents the possible applications of the findings, and suggests directions for future research.

2 Institutional Investors' Behavior and ESG Preferences

Extant literature provides abundant empirical evidence to explain why institutional investors are sensitive to ESG and to demonstrate how institutional investors' ESG-induced trading behavior is affecting the market.

2.1 Institutional ownership sensitivy to ESG

Institutional investors play a crucial role in firms' ownership structures because of their significant investment volumes and long investment horizons. Although institutional investors still consider traditional financial risks the most critical risks they face in investment decisions, they recognize the financial and non-financial implications that climate risks have on their portfolio firms (Krueger et al., 2020).

Empirically, institutional investors' sensitivity to firms' ESG profiles can be observed in

two main ways: engagements on ESG issues and adjustment of capital allocation to firms (Krueger et al., 2020; McCahery et al., 2016). While the former is often private and hard to observe (McCahery et al., 2016), the latter can be easily captured from publicly disclosed institutional holdings. Observing how institutional investors allocate capital to firms with different ESG profiles, researchers detect either monotonicity (Gantchev et al., 2021; Lopez de Silanes et al., 2022; Pedersen et al., 2021; Starks et al., 2017) or asymmetric patterns (Fernando et al., 2017; Nofsinger et al., 2019) in the relationship between corporate ESG performance and institutional holdings.

Some researchers assess institutional investors' sensitivity to ESG from a dynamic perspective. For instance, Berg et al. (2022) observe how mutual fund holdings adjust when a firm's ESG rating changes. Their results show that mutual funds decrease their holdings in firms undergoing rating downgrades and increase their holdings in firms undergoing rating upgrades.

2.2 Institutional ownership's role - between ESG and financial performance

Some studies have endeavored to provide deeper insights into how institutional investors intervene in the relationship between ESG and corporate financial performance.

By focusing on the environmental ("E") dimension of ESG, Fernando et al. (2017) note a negative correlation between institutional ownership of a stock and the stock's environmental risk exposure. Moreover, institutional preferences for a stock coincide with the stock valuation in the market—stocks with high environmental risk are less held by institutional investors and have lower valuations (Fernando et al., 2017). Later work of Pástor et al. (2022) confirms the results of Fernando et al. (2017) from another angle. Pástor et al.

(2022) remark that institutional investors deem green assets as hedging tools against climate risks. Institutional investors growing environmental concerns lead them to include more green assets in their portfolios, driving up the stock prices and decreasing the stock returns of green assets (Pástor et al., 2022). Gantchev et al. (2021) also interpret the negative indirect impact of ESG on stock returns with the upward pressure that institutional investors' trading behavior exerts on the stock prices of ESG leaders.

Cao et al. (2022) adopt a more direct approach to measuring institutional investors' ESG preferences and focus on the overall ESG performance. Through investigating the impact of socially responsible ownership on stock return patterns, they find that stocks that are less held by socially responsible institutional investors[3] generate higher abnormal returns.

2.3 ESG, institutional trading, and financial performance

Methodologically, the extant literature mainly analyses institutional investors' sensitivity to firms' ESG performance with panel regressions. Fernando et al. (2017) and Nofsinger et al. (2019) capture institutional investors' responses to changes in ESG performance from the perspective of firms, thus using institutional ownership as the dependent variable. Institutional investors' reactions to changes in ESG performance can also be captured from the perspective of institutional investors. For instance, the dependent variable in Gantchev et al. (2021)'s regression model is variations in the proportion of a fund's total assets allocated to a firm.

One regrettable feature of the literature on the transmission channels linking ESG performance and corporate financial performance is that few studies attempt to distinguish between the direct impact of ESG performance on corporate financial performance and the indirect impact through the transmission channels. The studies that draw the distinction

[3]Socially responsible institutional investors are those who favor ESG outperformers in the construction of portfolios.

between the two impacts share the following hypotheses: if firms' ESG performance indirectly affects financial performance, we would expect the impact of ESG performance to vanish once we control for the transmission channel (Bardos et al., 2020; Cao et al., 2022; Servaes and Tamayo, 2013). Furthermore, if firms' ESG performance directly affects financial performance, we would expect the impact of ESG performance to persist and remains significant before and after controlling for the transmission channel (Bardos et al., 2020; Cao et al., 2022; Servaes and Tamayo, 2013).

In the asset pricing domain, the study by Cao et al. (2022) compares value-weighted average monthly abnormal returns of triple-sorted portfolios based on socially responsible ownership, ESG scores, and mispricing signals to find out whether ESG scores indirectly affect return patterns through institutional preferences or directly affect return patterns.

In the corporate finance domain, the study by Servaes and Tamayo (2013) seeks to answer whether CSR affects firm value (Tobin's Q) directly or indirectly through consumer awareness proxied by advertising intensity. To address this research question, Servaes and Tamayo (2013) regress firms' Tobin's Q on CSR and the interaction term of CSR and advertising while including firm-level control variables in the regression equation. Another research in the corporate finance domain conducted by Bardos et al. (2020) tries to answer a similar question while this time, the transmission channel is product market perception. Bardos et al. (2020) implement a mediation analysis while considering product market perception as the mediator.

3 ESG and Institutional Ownership Measures

3.1 Refinitiv ESG Scores

We collect data on firms' social (the "S" dimension of ESG) performance from the Refinitiv ESG (formerly known as Thomson Reuters ASSET4 ESG) database. Refinitiv ESG database is one of the most comprehensive databases in the industry, covering more than 9,500 companies worldwide, with about 1,000 of them dating back to 2002.

Refinitiv ESG scores are constructed in three steps. First, content research analysts collect ESG data from publicly available information sources (annual reports, company websites, non-governmental organization websites, stock exchange filings, CSR reports, and global media sources) and filter a subset of 186 most comparable ESG measures. This subset of ESG measures is then grouped into ten categories which will be used to assess firms' ESG performance, commitment, and effectiveness and compute ESG scores. The second step consists of aggregating the category scores to obtain the pillar scores (the environmental, social, and governance pillars) and overall ESG scores. Each pillar englobes three or four relevant categories. Finally, an ESG Combined score that accounts for ESG controversies captured from global media sources is computed to provide a more comprehensive view of a firm's ESG performance.

Refinitiv adopts a percentile ranking scoring methodology to calculate the ten category scores and the ESG controversies scores. Refinitiv's analysts attribute a percentile rank score less sensitive to outliers by comparing each firm to benchmark firms. The benchmark used to calculate the environmental and social category scores, as well as the controversies scores, is firms belonging to the same TRBC industry group, as firms in the same industry tend to face similar environmental and social issues. As for the calculation of the governance category scores, Refinitiv analysts use the firm having the same country of incorporation

as the benchmark, as governance practices tend to be consistent within countries. As the aggregation of category scores, ESG pillar scores and overall scores are also rank-based scores that measure a firm's ESG performance relative to all other firms in a given year. They are available in both percentages (from 0 to 100) and letter grades (from D- to A+).

The main advantage of Refinitiv ESG scores is the granularity of its scoring methodology. The large number of ESG metrics underlying the computation of ESG scores allows for the distinction between two groups of firms: ESG laggards, which lack evidence of actual implementation of ESG-related policies, and ESG leaders, which show genuine efforts in complying with ESG principles. The granularity of the scoring methodology can also be seen in the use of a materiality matrix to define the weights for each category in the computation of ESG pillar scores and overall scores. Considering discrepancies in the importance of each ESG topic to different industry groups, the Refinitiv ESG Materiality Matrix provides industry-specific magnitude weights of each category. These magnitude weights will be used to determine the category weights and ultimately, the ESG scores for the different industry groups.

While the Refinitiv ESG database is continuously updated and ESG scores are recalculated weekly, Refinitiv ESG scores are reported only once a year rather than at shorter intervals, such as quarterly. Annual reporting reduces the transparency of a firm's ESG performance, which can vary at different times of the year. In addition, the only definitive scores are those before the most recent five years. The Refinitiv ESG scores of the most recent five years may be revised to accommodate updates in the underlying data. Therefore, the data collection timing will impact empirical studies that rely on the latest Refinitiv ESG scores. The potential problems arising from revisions to ESG scores are negligible if the modifications are minor, which is an essential assumption for using Refinitiv ESG scores in this study.

Refinitiv ESG scores are far from a perfect measure of corporate ESG performance, and their shortcomings largely stem from the difficulty of accurately assessing corporate ESG performance. Still, Berg et al. (2021) consider Refinitiv ESG scores to be one of the most "exogenous" ESG measures, making them stand out among existing ESG measures.

The Refinitiv ESG database evaluates firms' social performance in four areas: workforce[4] , human rights, community, and product responsibility[5] . Following the literature (Dyck et al., 2019; Gibson Brandon et al., 2021), we use firms' social pillar scores in percentages for the empirical analysis. To maximize the sample size, we use data from the first year of coverage (2002) through year-end 2020.

3.2 From institutional holdings to institutional ownership

Quarterly institutional holdings (13F) are from Refinitiv. 13F collects data on institutional holdings while covering entire investment companies (banks, insurance companies, parents of mutual funds, pension funds, university endowments, and numerous other types of professional investment advisors). The statutory reporting requirement is quarterly for 13F.

Following the previous literature, we compute each firm's institutional ownership at a given date as the sum of a firm's shares held by institutional investors at that date divided by a firm's number of outstanding shares.

$$\text{IO (Institutional Ownership)}_{i,t} = \frac{\sum_{n=1}^{N} \text{Institutional Holding}_{n,i,t}}{\text{Shares Outstanding}_{i,t}}$$

In this formula, the index i indicates firms, the index t indicates dates, and the index n indicates institutional investors, with N institutional investors in total.

For each report date of the 13F database, institutional investors disclose not only the

[4]Workforce involves 4 themes: diversity and inclusion, career development and training, working conditions, and health and safety.

[5]Product responsibility involves 3 themes: responsible marketing, product quality, and data privacy.

number of shares held in a firm but also stock information, including share price and the total number of shares outstanding. However, the number of outstanding shares of a company reported by different institutional investors on the same date is sometimes inconsistent, jeopardizing the validity of institutional ownership calculated using 13F data. To address this issue, we use holdings data from the 13F database to compute only the number of a firm's shares held by institutional investors on a given date (the numerator in the formula of institutional ownership). As for the denominator in the formula of institutional ownership, we extract the total number of a firm's outstanding shares from the Compustat database.

3.3 Data collection and preliminary treatment

We obtain quarterly stock prices, the number of shares outstanding, and accounting data from Compustat. The list of companies belonging to the S&P 500 Index as of the end of 2021 is available on the website DataHub. Fama-French risk factors and the risk-free rate are accessible from Kenneth French's website.

After collecting data from various sources, we use CUSIP numbers and dates to match Compustat data with 13F data. CUSIP is a 9-digit firm identifier, with the 9th digit being a check number. Firms are identified with CUSIP 9 (full CUSIP) in the Refinitiv ESG database and Compustat but with CUSIP 8 in the 13F dataset and CRSP. To uniformize CUSIP numbers, we remove the last digit of CUSIP 9 in the Refinitiv ESG and Compustat datasets. Then, we merge the combined dataset with Refinitiv social scores using CUSIP numbers and the list of S&P 500 constituents using Ticker Symbol.

To increase the internal validity of results, we focus on common shares of American firms traded on NYSE, AMEX, and NASDAQ National following Cao et al. (2022). We first eliminate firms without identifiers (CUSIP numbers). Then, we exclude firms with missing social scores over the sample period, as Cao et al. (2022) did. We also remove

small firms whose last available market capitalization is below $200 million because they are prone to outliers (Cao et al., 2022; Fernando et al., 2017; Lins et al., 2017). Finally, we observe that the institutional ownership of some firms is higher than 100%, meaning that institutional investors hold more shares than what exists.

Institutional holdings above 100% appear to be technically impossible but can be rationalized in two circumstances. One possible and most obvious explanation for such high institutional holdings stems from the delay in updating publicly available data. A firm's institutional ownership is computed using the holdings data released by all institutional investors in 13F. Although 13F prescribes institutions to report the latest holdings data every quarter, some institutions may fail to abide by this obligation, thus causing errors in the computation of a firm's institutional ownership level. Short selling among investors provides an alternative explanation for institutional holdings above 100%. In a short sale, an institution (short seller) borrows a firm's shares from some institutions (stock lenders). It then sells the borrowed shares to another institution (buyer), expecting to make a profit by repurchasing the shares at a lower price. If both the stock lender and the buyer of the short sale claim ownership of the shares shorted by the short seller, the shorted shares will be double counted in the aggregation of institutional holdings, resulting in a temporarily inflated level of the firm's institutional holdings.

Although the cases where institutional ownership exceeds 100% are caused by reporting errors, they still allow us to infer a high actual institutional ownership and can be retained in the data as long as the two explanations above apply. Once reported institutional ownership breaches the 200% threshold, the economic significance of such high institutional ownership becomes too imprecise to be used for analysis. Indeed, institutional ownership above 200% means that there is a significant delay in institutional holdings updates or that the company has more than 100% of its shares sold short. In the first case, the information carried by

institutional ownership is too outdated to be useful for analysis, while the second case is simply unrealistic or extremely rare. Thus, we judge observations with institutional ownership higher than two as outliers and discard them.

3.4 Moderate social performance and high institutional ownership firms

The sample covers 2019 unique firms (97541 firm-quarter observations) for which social scores are available from 2002 to 2020, and other information (accounting data, institutional holdings data, and trading data) are available from 2003 to 2021.

Table 1 Panel A summarizes the sources and the periodicities of firms' institutional ownership, social scores, and other characteristics (market capitalization, the number of common shares outstanding, common/ordinary equity, total assets, Tobin's Q, quarterly return, 3-quarter return, and 4-quarter return volatility).

Table 1 Panel B presents the summary statistics of firms' institutional ownership, social scores, and other characteristics mentioned above. The statistics of social scores are the time-series average of cross-sectional distributions from January 2002 to December 2020, and those of institutional ownership and other firm characteristics are the time-series average of cross-sectional distributions from January 2003 to December 2021. More specifically, for each firm attribute, we compute the cross-sectional average at each period (the year for social scores and the quarter for other firm characteristics) before taking the mean of all available cross-sectional averages.

On average, sample firms have moderate social performance, large size, relatively high institutional ownership, and positive returns. The mean (median) social score of sample firms is 40.37 (42.68), whereas a perfect score would be 100. Institutional ownership has

a mean (median) of 0.7 (0.72). Regarding the size of sample firms, the average market capitalization, the average number of common shares outstanding, the average common equity, and the average total assets are, respectively, $10.11 billion, 203.74 million, $3.62 billion, and $19.5 billion. In terms of the financial performance of sample firms, the average Tobin's Q, quarterly return, and 3-quarter return are respectively 2.11, 0.05, and 0.14. Sample stocks have thus positive returns in both short-term and longer term. Moreover, 4-quarter return volatility has a mean of 0.19, indicating that quarterly returns of sample stocks are relatively stable.

3.5 Institutional ownership and social scores link

However, descriptive statistics only provide a static view of sample firms' characteristics. Graphs on the most critical firm characteristics that this research focuses on (institutional ownership and social scores) are indispensable for a complete overview of sample firms.

Figure 1 shows the evolution of average social scores over time, and Figure 2 presents the evolution of average institutional ownership over time. As time trends are influenced by sample composition, these two figures concentrate on a constant panel of firms for which social scores are available in all years between 2002 and 2020 and institutional ownership is available in all quarters between January 2003 and December 2021. This constant sample is constituted of 168 firms, a small part of the entire sample. From Figure 1, we see a steady increasing trend in average social scores from 2002 to 2020. The average social score of firms in the constant panel was 28.37 in 2002 and reached 70 in 2020. As for the average institutional ownership of firms in the constant panel, its evolution differs before and after 2008. Average institutional ownership increased from 0.68 in 2003 to an all-time high (0.88) at the end of 2007. It then declined to below 0.8 and remained mainly within the 0.7-0.8 range between 2008 and 2021. We thus observe parallel trends between social performance

and institutional ownership of firms in the constant panel in the early part (before 2008) of the sample.

Before diving into the role that institutional ownership plays in the integration of social performance into financial performance measured by stock returns, Figure 3 gives the first insight into the relationship between institutional ownership and social scores through a scatter plot. The increasing line of best fit illustrates a positive correlation between institutional ownership and social scores. This positive correlation will be empirically tested in the following sections.

4 ESG Transmission Channel to Stock Returns

In the present work, we aim to empirically test how the information contained in firms' social performance (the pillar "S" of ESG) is incorporated into stock prices through the reaction of institutional investors.

4.1 Institutional investors' preference for social leaders

We first examine institutional investors' sensitivity to corporate social performance. Following the literature that commonly uses panel regressions to capture institutional investors' sensitivity to firms' ESG performance (Fernando et al., 2017; Gantchev et al., 2021; Lopez de Silanes et al., 2022; Nofsinger et al., 2019; Pedersen et al., 2021), we examine the relation between lagged firms' social scores and aggregate institutional ownership with the following specification:

$$IO_{i,t} = \alpha + \beta \,\mathrm{Ln}\,(\ \mathrm{S}\ \ \mathrm{Score}\ _{i,t-1}) + \sum_{k=1}^{7} \gamma_k\ \mathrm{Control}\ _{i,k,t} + \Lambda + \varepsilon_{i,t} \tag{1}$$

where the dependent variable, noted $IO_{i,t}$, is the percentage of aggregate institutional ownership of firm i at quarter t as defined in the previous section. Ln(S Score $_{i,t-1}$) is the natural logarithm of the social score of firm i at quarter *t-1*. Control $_{i,k,t}$ are a set of firm-level control variables at quarter *t*. Λ are year-quarter and industry fixed effects.

Using the natural logarithm of social ratings yields better distribution features and reduces the impact of outliers (Dyck et al., 2019). Furthermore, we lag the social scores by one period to alleviate the concerns regarding reverse causality (Fernando et al., 2017). Normally, we should take the natural logarithm of the previous quarter's social score since both institutional ownership and control variables are quarterly. However, Refinitiv social scores are only available at a yearly frequency. Thus, the previous-quarter social score for all quarters each year is proxied by the social score in the previous year. For example, regardless of which quarter of year X the time indicator t in the regression equation equals, the explanatory variable is always the natural logarithm of the social score in year X-1.

Firm-level control variables are factors that might affect the breadth of institutional ownership. Inspired by prior literature, we include the natural logarithm of market capitalization Ln $\big($ Market Capitalisation $_{i,t}\big)$ in the equation to control for the size effect on institutional ownership. Larger companies are less risky and, therefore, more likely to attract the attention of institutional investors. We also include a *S&P 500 dummy* to isolate the impact of S&P 500 membership on institutional ownership. We add market-based measures, including *Tobin's Q*, Ln (End-Quarter Stock Price), *return over the current quarter*, *return over the previous 3 quarters (i.e., excluding the current quarter)*, and *volatility* to account for the impact of stock performance on institutional ownership. Furthermore, controlling for the Standard Industrial Classification (SIC)[6] division dummies and year-quarter dummies

[6]The Standard Industrial Classification (SIC) was created in the United States in 1937 to categorize businesses into industries using four-digit codes. The North American Industry Classification System (NAICS code) superseded the SIC system in 1997, however certain government organizations, such as the United States Securities and Exchange Commission (SEC), continued to use SIC codes until at least 2019.

allows for isolating the common trends that affect all firms in a year-quarter and industry specificities. Standard errors are clustered by firm to avoid the autocorrelation problem.

The regression estimates of Equation 1 are presented in Table 2. As shown in Table 2, a firm's social performance in the previous period positively affects institutional investors' interest. More specifically, the mean of institutional ownership increases by 5.1 percentage points given a one-unit shift in the natural logarithm of lagged social scores while holding other variables in the equation constant.

Previous research on the consequences of firms' ESG performance provides possible explanations for the positive correlation between institutional ownership and social scores. Better ESG performance has been shown to increase customers' willingness to pay higher prices (Servaes and Tamayo, 2013), boost trust between a firm and its stakeholders and investors (Lins et al., 2017), and improve the market perception of a firm's products (Bardos et al., 2020). More directly, better ESG performance also results in lower labor costs (Krueger et al., 2021) and higher expected future cashflows (Berg et al., 2021; Derrien et al., 2021; Edmans, 2011; Pedersen et al., 2021). These material and immaterial effects of ESG performance on firms may promote institutional investor confidence in firms' growth potential and prospects, thereby incentivizing institutional investors to allocate more capital to ESG leaders. For the overall performance of an institutional investor's portfolio, investing in companies with superior ESG performance can also be a hedge against ESG-related risks (Pástor et al., 2022).

Control variables representing firm characteristics also have explanatory power in the regression. Firms included in the S&P 500 index attract fewer institutional investments than those not included in the S&P 500 index. Firms with higher Tobin's Q are also less attractive to institutional investors. Regarding characteristics of a firm's stock, institutional ownership is positively related to the end-quarter price and stock volatility and negatively

related to quarterly stock return and stock return over three quarters.

4.2 Misleading net negative effect

To gain a deeper understanding of the relationship between the social and financial performance of firms, we seek to distinguish the direct impact of social ratings on stock returns from the indirect impact exercised through institutional ownership.

To achieve this end, we implement a mediation analysis involving three variables: an independent variable, a dependent variable, and a mediator. The mediator is defined by Baron and Kenny (1986) as "the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest." In our case, the focal independent variable is social ratings, the dependent variable of interest is stock returns, and the mediator is institutional ownership. Baron and Kenny (1986) also describe the recommended procedure for mediation analysis that is later on formalised by Preacher and Hayes (2004). In summarize, one should employ a system of three regressions to test for mediation: a first regression of the mediator on the independent variable, a second regression of the dependent variable on the independent variable, and a third regression of the dependent variable on both the mediator and the independent variable (Baron and Kenny, 1986; Preacher and Hayes, 2004).

Originally designed for psychological studies, the mediation analysis is now used in numerous fields including finance (e.g., Bardos et al., 2020; Fedaseyeu et al., 2018; Ferris et al., 2017). The study by Bardos et al. (2020) is a direct application of the mediation analysis to the relation between ESG and corporate financial performance. Bardos et al. (2020) adopt a corporate finance-oriented research perspective, considering product market perception the mediator through which CSR exercises an indirect impact on firm performance proxied by Tobin's Q and profit margin. Following Baron and Kenny (1986) and Preacher

and Hayes (2004), they estimate three regressions: the first regressing the product market perception on CSR, the second regressing firm performance on CSR, and the last regressing firm performance on both CSR and product market perception. The last regression aims at observing whether the direct impact of CSR on firm performance persists after controlling for product market perception. Bardos et al. (2020) question the validity of the first regression results because of potential endogeneity issues including reverse causality between CSR and product market perception and omitted variables that affect both CSR and product market perception. To check the robustness of the observed positive correlation between CSR and prodcut market perception, Bardos et al. (2020) carry out an IV (Instrumental Variable) analysis and a quasi-natural experiment analysis. For the second and the third regressions, Bardos et al. (2020) are also concerned that the results might be biased by the reverse causality between firm performance and CSR and the reverse causality between firm performance and product market perception. Again, to address these potential endogeneity issues, they replace CSR and product market perceptions with valid instruments and perform instrumental variable regressions.

Our mediation analysis is more closely linked to the asset pricing literature while respecting the traditional procedure. We complement the panel regression described in the previous section (Equation 1) by two additional regressions (Equation 2 and Equation 3). The mediator in our case becomes institutional ownership and our mediation analysis relies on the combination of Equation 1, Equation 2, and Equation 3.

$$R^e_{i,t} = \alpha + \beta_s \operatorname{Ln}(\mathrm{S\ \ Score}_{i,t-1}) + \theta R^e_{m,t} + \gamma SMB_t + \delta HML_t + \epsilon_{i,t} \tag{2}$$

$$R^e_{i,t} = \alpha + \beta_s \operatorname{Ln}(\mathrm{S\ \ Score}_{i,t-1}) + \beta_{io}\widehat{IO}_{l,t} + \theta R^e_{m,t} + \gamma SMB_t + \delta HML_t + \epsilon_{i,t} \tag{3}$$

In Equation 2, we regress excess returns of stock i ($R^e_{i,t}$) at quarter t on the natural

logarithm of lagged social scores (Ln (S Score$_{i,t-1}$)) and Fama-French three factors (*market excess returns, SMB and HML*). Market excess returns ($R^e_{m,t}$) refer to the market portfolio returns in excess of the risk-free rate, SMB (SMB_t) refers to the difference in returns between portfolios of small and large firms, and HML (HML_t) refers to the difference in returns between portfolios of firms with high book-to-market ratios and portfolios of firms with low book-to-market ratios. Then, in Equation 3, we slightly modify Equation 2 by adding fitted values of firms' institutional ownership ($\widehat{IO}_{l,t}$) in the regression equation. The dependent variables, noted $R^e_{i,t}$, are firms' quarterly raw returns in excess of the quarterly risk-free rate. Fitted values of firms' institutional ownership ($\widehat{IO}_{l,t}$) are obtained from Equation 1.

In both Equation 2 and Equation 3, we lag social scores by one period to avoid the potential reverse causality between stock returns and corporate social performance. Indeed, instead of "doing well by doing good", firms might also be "doing good by doing well" as firms with better financial performance have more available sources to invest in ESG activities. Lagged social scores are obtained as detailed in the previous section.

We are also concerned about the endogeneity issues in measuring the impact of institutional ownership on stock returns in Equation 3. One possible issue is the reverse causality between institutional ownership and stock returns, as stock returns are a recognised determinant of institutional ownership and are frequently used as control variables in regressions for institutional ownership (e.g., Gantchev et al., 2021; Nofsinger et al., 2019; Starks et al., 2017). Another possible issue is that institutional ownership and stock returns both depend on certain unobservable variables. For instance, firms with unstable governance structure are less likely to attract institutional investment and to generate positive returns. Eliminating potential bias caused by endogeneity issues is thus necessary for the robustness of our results. Unlike Bardos et al. (2020) who instrument the potential endogenous vari-

ables, we replace directly the actual values of firms' institutional ownership by the fitted values of institutional ownership that we obtain from Equation 1. As we replace social scores by one-period lagged social scores in Equation 2 to circumvent the reverse causality between stock returns and social scores, we judge last-period social scores to be exogenous to current-period stock returns. Thus, Equation 1 is the regression of institutional ownership on a variable that is exogenous to stock returns. In Equation 1, lagged social scores play the role of an instrumental variable for institutional ownership and the resulting fitted values of institutional ownership capture the part of institutional ownership changes that is exogenous to stock returns.

We cluster standard errors by firm and include industry fixed effects (SIC division dummies) in both Equation 2 and Equation 3, as Becker et al. (2022) do in a similar equation.

Using this stock-level approach, we aim to test two hypotheses:

H1: If firms' social performance only indirectly impacts stock returns, the coefficient of social scores (β_s) will become insignificant after controlling for institutional ownership in Equation 3.

H2: If firms' social performance directly impacts stock returns, the coefficient of social scores (β_s) will remain non-zero and significant before and after controlling for institutional ownership, i.e., in both Equation 2 and Equation 3.

Table 3 reports regression estimates of Equation 2 and Equation 3. In Equation 2, the coefficient on the natural logarithm of lagged social scores is negative and statistically significant (-1.1 percentage points with a t-statistic of -2.46). Consequently, from the results obtained in Equation 2 alone, we would conclude that corporate social performance harms

stock returns. However, the negative impact observed in Equation 2 is a mixture of direct and indirect impacts, and there can be two different scenarios. The first scenario is that both the direct and indirect impacts of social scores are negative. The second scenario, a more complex one, is that the positive direct impact of social scores is overcompensated by its negative indirect impact. Equation 3 allows identifying the actual scenario by isolating the impact of institutional ownership on stock returns.

After controlling for institutional ownership in Equation 3, the coefficient on the natural logarithm of lagged social scores becomes positive while remaining statistically significant (2.4 percentage points with a t-statistic of 5.34). As for the coefficient on institutional ownership, it is negative and statistically significant (54.8 percentage points with a t-statistic of -7.76). In absolute terms, the coefficient on institutional ownership is larger than that on social scores, showing that the negative impact of institutional ownership on stock returns is more significant than the positive impact of social scores on stock returns. As we have already established the correlation between social scores and institutional ownership, we can infer that social scores negatively affect stock returns through institutional ownership and positively affect stock returns in a direct way. Moreover, the overall negative impact of social scores on stock returns leads to the conclusion that the negative indirect impact of social scores outweighs its positive direct impact. The second scenario is thus verified.

The negative indirect impact of ESG on stock returns through institutional ownership is consistent with the literature (Gantchev et al., 2021; Pástor et al., 2022). Although Gantchev et al. (2021) and Pástor et al. (2022) consider different dimensions of ESG, they share the same reasoning. Their reasoning is also applicable to the interpretation of our results: institutional investors' demand for firms with outstanding ESG performance drives up the stock prices of these firms and therefore decreases the stock returns of these firms.

5 Comparing the "E", "S", and "G" effets

We showed that customers and investors are sensitive to corporate social ("S") concerns. When green customers are improving stock returns (cash flows effect), green investors are deteriorating stock returns (discount rate effect), and the global net effect is not so clear. In fact, it depends on the proportion of the green customers compare to the non-green customers as well as their perception of corporate actions to developp a good social environnement. Same apply on the investors' side.

In this section, we look at "E" and "G", and compare the results to that of the "S" part.

Clearly, assessing the real investment of corporates is key for both for customers and investors and may be even more difficult for customers. In fact, the perception of corporate actions by customers depends on the media and is subject to bias. The perception of investors also depends on the media but they have access to a broader set of Media (local vs international media, general vs specialized) and tools (scores). As there are clearly more "general" information on corporate environmental actions, compare to social corporate actions and even more to governance corporate actions, the strongest demand/cash flow effect should be on the E, then S and the weakest for the G.

[To be completed]

6 Sectorial and/or regional specificities

[To be completed]

7 Robustness and Discussion

In this section, we first show the documented institutional investors' sensitivity to corporate social performance is robust to rank-based measures of corporate social performance. Then, we explore the feasibility of using a portfolio-level approach to complement the empirical results on the impacts of a firm's social performance on stock returns. Although the portfolio-level analysis fails to yield valid results due to its incapacity in dynamically tracking portfolio composition and the noise in the data, it indicates future research opportunities. Furthermore, we show that the established conclusions on institutional investors' sensitivity to social scores do not arise from the parallel movements in average institutional ownership and average social score in the early part of the sample (between 2003 and 2007).

7.1 Institutional investors' preference for social leaders is more pronounced for firms with moderate social performance

Considering that the non-stationarity[7] of social scores and inconsistencies in ESG ratings from different data providers (Berg et al., 2021; Derrien et al., 2021; Gibson Brandon et al., 2021) may bias the analysis, we adopt a similar logic to Lins et al. (2017), changing the explanatory variable in Equation 1. Instead of including the natural logarithm of lagged social scores as an explanatory variable, we divide firms into lagged social scores quintiles at each quarter and include dummies for quintiles 2-5 (*S2*, *S3*, *S4*, and *S5*). The intercept captures the effect of quintile 1.

$$IO_{i,t} = \alpha + \sum_{j=2}^{5} \beta_j S_j + \sum_{k=1}^{7} \gamma_k \text{ Control }_{i,k,t} + \Lambda + \varepsilon_{i,t} \tag{4}$$

[7]Non-stationarity of social scores is characterized by the rising trend of social scores over the sample period, which can be observed in Figure 1.

This new equation (Equation 4) assesses whether institutional investors' sensitivity to social performance is more pronounced at very high or very low levels of social performance.

The regression estimates of Equation 4 are reported in Table 4. As shown Table 4, the impact of social performance on institutional ownership remains positive. It is more pronounced for intermediate quintiles (the third quintile and the fourth quintile) of lagged social scores. The difference in institutional ownership between firms in the first and second (third, fourth, or fifth) social score quintiles is captured by the coefficient on *S2* (*S3*, *S4*, or *S5*). The coefficient on *S2* is 2.6 percentage points and that on *S3* almost doubled to 4.9 percentage points. The coefficient on *S4* slightly decreases to 4.6 percentage points while that on *S5* becomes negative (-1.8 percentage points) and insignificant.

In addition, the impact of social performance on institutional ownership is non-monotonic. Institutional ownership increases by about 2.64 percentage points when moving from the lowest to the second-lowest quintile of social scores. It increases by 2.27 percentage points when moving from the second to the third quintile, while a move from the third to the fourth quintile yields a decline in institutional ownership of 0.29 percentage points. A move from the fourth to the best quintile delivers a further decrease of -6.41 percentage points, and this decline is insignificant.

The impacts of firm-level control variables (*the natural logarithm of market capitalization, S&P 500 dummy variable, Tobin's Q, the natural logarithm of end-quarter stock price, quarterly stock return, stock return over three quarters, and stock volatility*) on institutional ownership remain essentially the same as in Equation 1. The only exception is that institutional ownership this time becomes positively related to firm size captured by market capitalization.

7.2 Complementary analysis of the direct and indirect impacts of a firm's social performance on stock returns using a portfolio-level approach

By grouping stocks into portfolios and computing portfolio returns, we expect to mitigate the impact of disparity between individual stock returns and reduce potential bias. Moreover, portfolio returns allow for a more accurate estimation of the parameters. The Fama-French three factors in Equation 2 and Equation 3 of the stock-level approach are returns of portfolios of traded assets. Therefore, using portfolio returns in asset pricing models is more reasonable.

7.2.1 Portfolios constituted of stocks sorted at each quarter based on social score and institutional ownership

Following the logic of Cao et al. (2022), we perform first a single sort based on social scores to have a general view of how portfolio performance changes with the level of social scores.

Each quarter, we sort all sample stocks into five groups based on their social scores. P1 contains the stocks with the lowest social scores, and P5 includes the stocks with the highest social scores. Then, we compute the equally weighted excess returns of portfolios formed on the quintiles of social scores at each quarter. Using the time series of returns of five portfolios, we compute CAPM (Capital Asset Pricing Model) alphas and Fama-French 3-factor alphas for each portfolio and compare the alphas for P1 and P5. CAPM alphas and Fama-French 3-factor alphas are the constant terms in the regression of portfolio excess returns on the corresponding risk factors, representing returns over required returns. Equation 5 allows obtaining CAPM alphas, while Equation 6 allows obtaining Fama-French 3-factor alphas.

$$Rp^e_{j,t} = \alpha + \theta R^e_{m,t} + \epsilon_{i,t}, \forall j = 1 \dots 5 \tag{5}$$

$$Rp^e_{j,t} = \alpha + \theta R^e_{m,t} + \gamma SMB_t + \delta HML_t + \epsilon_{i,t}, \forall j = 1 \dots 5 \tag{6}$$

In these two equations,$Rp^e_{j,t}$ refers to the equally weighted excess returns of portfolio j at quarter t.

By comparing the alphas, we seek to test the following hypothesis:

H3: If firms' social performance impacts stock returns, the spread between P5 alpha and P1 alpha (P5 alpha – P1 alpha) will be non-zero and significant.

We complement the analysis with a double sort (2x5) based on institutional ownership and social scores to observe the consequences of the additional control on institutional ownership.

After dividing stocks into two groups based on their institutional ownership at each quarter, we sort stocks in the low institutional ownership group and the high institutional ownership group respectively into five groups based on their social scores. P11 contains stocks with the lowest social scores in the low institutional ownership sample, and P15 includes stocks with the highest social scores in the low institutional sample. Similarly, P21 contains stocks with the lowest social scores in the high institutional ownership sample, and P25 includes stocks with the highest social scores in the high institutional ownership. Then, we compute the equally weighted excess returns of portfolios formed on the level of both institutional ownership and social scores at each quarter. Once we extract CAPM alphas from Equation 7 and Fama-French alphas from Equation 8, we test the significance of the difference between P15 alpha and P11 alpha and of the difference between P25 alpha and

P21 alpha.

$$Rp^{e}_{k,j,t} = \alpha + \theta R^{e}_{m,t} + \epsilon_{i,t}, \forall k = 1, 2; \forall j = 1 \ldots 5 \tag{7}$$

$$Rp^{e}_{k,j,t} = \alpha + \theta R^{e}_{m,t} + \gamma SMB_t + \delta HML_t + \epsilon_{i,t}, \forall k = 1, 2; \forall j = 1 \ldots 5 \tag{8}$$

In these two equations, $Rp^{e}_{k,j,t}$ represents the equally weighted excess returns of portfolio j in the institutional ownership sample k at quarter t. Portfolios in the low institutional ownership sample are indexed by *k=1*, while portfolios in the high institutional sample are indexed by *k=2*.

The control of institutional ownership allows testing two additional hypotheses:

H4: If firms' social performance has only an indirect impact on stock returns, the spread between alphas (P15 alpha – P11 alpha and P25 alpha – P21 alpha) will be insignificant in the low and high institutional ownership samples.

H5: If firms' social performance has a direct impact on stock returns, the spread between alphas (P15 alpha – P11 alpha and P25 alpha – P21 alpha) will remain significant in all three samples—the entire sample, the low institutional ownership sample, and the high institutional ownership sample.

7.2.2 Invalid results due to the static perspective of the portfolio sorting approach and the noise in data

Table 5 presents the equally weighted CAPM alphas and the Fama-French three-factor alphas of portfolios formed based on social scores. We report these abnormal portfolio returns for three samples of firms — the entire sample, the low institutional ownership

sample, and the high institutional ownership sample. Differentiating the low institutional ownership group and the high institutional ownership group allows assessing the direct impact of social performance on stock returns by observing whether social performance still affects stock returns after controlling for institutional ownership.

At first glance, the results seem consistent with the results obtained from the stock-level approach which complements Equation 1 with a system of two regressions (Equation 2 and 3)—one controlling for only social performance, the other controlling for both social performance and institutional ownership).

For portfolios formed with stocks from all samples (the entire sample, the low institutional ownership group, and the high institutional ownership group), CAPM alphas and Fama-French three-factor alphas of P5 (portfolio containing stocks with the highest social scores) are lower than those of P1 (portfolio containing stocks with the lowest social scores). This negative correlation between social scores and abnormal returns seems to provide evidence of the negative impact of social performance on stock returns, which is in line with what we found with the stock-level approach.

Another worth-noticing feature of Table 5 is the absence of a linear relationship between social scores and portfolio performance. Even though the long-short P5-P1 CAPM alphas and Fama-French three-factor alphas are negative for all samples, the decrease in abnormal returns of portfolios with improving social performance is non-monotonic. For instance, the Fama-French three-factor alphas of the five portfolios (P1, P2, P3, P4, and P5) sorted on social scores in the low institutional ownership group are respectively 0.058, 0.038, 0.037, 0.058, and 0.029. For the five portfolios in the low institutional ownership group, the Fama-French three-factor alphas witness an abrupt and temporary rise in the course of falling.

Furthermore, the CAPM alphas and Fama-French three-factor alphas of portfolios in the low institutional ownership group are generally higher than those in the high institutional

ownership group (the only exception occurs for P5 whose CAPM alphas and Fama-French three-factors are higher in the high institutional ownership). The result confirms the negative impact of institutional ownership on stock returns found with the stock-level approach.

Nevertheless, a rigorous interpretation of the results requires us to consider not only the magnitude of the coefficients but also the statistical significance of the coefficients. The long-short P5-P1 alphas and the differences of high-minus-low spreads between the low institutional ownership group and the high institutional ownership group are statistically insignificant in all samples, making it impossible to draw firm conclusions on both the direct and indirect impact of social performance on stock returns.

Compared with other portfolios that sometimes have insignificant or weakly significant coefficients, P1 always has statistically significant CAPM alphas and Fama-French three-factor alphas. Thus, we should pay closer attention to P1 which has both the highest and the most significant abnormal returns in all three samples. As P1 is composed of firms with the lowest social scores, its overperformance might have two reasons. On the one hand, firms in P1 might be undervalued by the capital market. On the other hand, investors might shun firms in P1 because of the poor social performance of these firms. From a dynamic perspective, high abnormal returns caused by investors' stock-picking behavior are more likely to be temporary. In contrast, high abnormal returns generated by intentionally avoiding poor social performance are more likely to last over time.

However, sorting stocks into portfolios given their social performance at a specific moment and computing portfolio abnormal returns only provides a static view of the performance of different portfolios. To determine which reason is more dominant, we should adopt a dynamic view regarding the composition of P1 while focusing on the performance of individual stocks. Suppose a stock always remains in P1 and has a positive return. In that case, its overperformance is more likely to be caused by poor social performance in-

stead of temporary undervaluation. Apart from the static perspective of the portfolio-level approach, the noise in sample data may also increase the difficulty of finding valid results. More rigorous data screening and cleaning are thus needed to improve the results.

Although the Fama-French three-factor asset pricing model is more sophisticated, CAPM is more appropriate for our study. The problem with the Fama-French three-factor asset pricing model arises from the potential collinearity. Since social scores differ across companies, there may be some hidden factors in the computation of social scores. An example of hidden factors can be company size. Indeed, large companies may have more available resources to improve their social performance, while smaller companies need to make profitability and survival in the competition their top priority. Consequently, larger firms will have better social scores even though the judgment of social performance does not consider the firm size. The more we add factors to an asset pricing model, the more we risk integrating factors hidden in the social score measurement and double counting them when we compute corresponding alphas of portfolios sorted by social performance. The simplicity of CAPM becomes its advantage for this reason. Compared with the Fama-French three-factor asset pricing model, CAPM only corrects for the market factor and therefore avoids the collinearity issue to the largest extent.

7.3 The neutral impact of parallel trends in institutional ownership and social scores in the early part of the sample (2003-2007) on the established sensitivity of institutional ownership to social performance

As shown in Figure 1 and Figure 2, firms' average institutional ownership and social scores evolved in a similar way between 2003 and 2007. Indeed, average institutional ownership

and social scores both went through a rising trend between 2003 and 2007, but average institutional ownership ceased increasing and became relatively flat starting from 2008 while average social scores continued the rising trend to achieve 70 in 2020 eventually. Robustness tests are thus necessary to verify whether the inferences in the previous section arise from parallel trends in average institutional ownership and social scores in the early part of the sample (2003-2007).

7.3.1 Four approaches to test the robustness of institutional investors' preference for social leaders

In the most direct and intuitive way, we create Equation 9 by adding to Equation 1 a dummy variable, *"Crisis"*, for the turning point in the evolution of institutional ownership. The dummy variable *"Crisis"* equals one for dates in and after 2008 and zero otherwise. Compared with Equation 1, Equation 9 controls for only industry fixed effects due to the collinearity issue between the dummy variable *"Crisis"* and time fixed effects. The regression coefficient of *"Crisis"* should be statistically insignificant if parallel trends have no impact on the relationship between institutional ownership and social performance.

Dyck et al. (2019) also notice the parallel trends in institutional ownership and social scores between 2003 and 2007 and propose three other ways to test the impact of the parallel trends. First, they suggest focusing on the post-crisis period when there were no parallel trends. Second, they replace raw measures of institutional ownership and social scores with standardized measures. Finally, they add additional fixed effects to the initial regression equation to absorb any time trends.

Replicating methods proposed by Dyck et al. (2019), we create three new equations which are modified versions of Equation 1. Equation 10 re-estimates Equation 1 in the 2008-2021 period (post-crisis period). We replace the dependent and the main independent

variables in Equation 1 with standardized measures[8] of institutional ownership and lagged social scores and obtain Equation 11. Finally, we obtain Equation 12 by adding additional industry x year-quarter fixed effects to Equation 1. Suppose the inferences established in the previous section do not arise from the parallel trends in institutional ownership and social scores in the early part of the sample. In that case, the differences between the regression estimates of these equations and those of the initial equation (Equation 1) should be negligible.

7.3.2 Parallel trends in institutional ownership and social scores between 2003 and 2007 proved to have no impact on institutional investors' positive attitude towards firms with good social performance

Table 6 reports the regression estimates of the modified versions of Equation 1. The sign and the statistical significance of regression coefficients of Equation 9-12 are the same as those of Equation 1. Moreover, the *"Crisis"* dummy variable in Equation 9 is statistically insignificant. Regarding the magnitude of regression coefficients, the differences between the regression coefficients of Equation 1 and those of Equation 9, Equation 10, and Equation 12 are marginal and can be considered negligible. The differences between the regression coefficients of Equation 1 and those of Equation 11 are more significant, and the sign of the constant term in Equation 11 reverses. The particularity of Equation 11 can be explained by the change in the scale of the dependent variable (institutional ownership) and the main independent variable (social score), as both are standardized in Equation 11.

Similar results generated by the initial equation (Equation 1) and the modified equations (Equation 9-12) thus demonstrate that parallel trends in institutional ownership and social scores between 2003 and 2007 have no impact on the inferences previously established.

[8] At each quarter, institutional ownership and lagged social scores are standardized such that they have zero mean and a standard deviation of one.

8 Conclusion

The United Nations Secretary-General Kofi Annan initiated in 2005 the Principles for Responsible Investment (PRI or UNPRI) — an international network of institutional investors promising to incorporate ESG factors into their investment decisions and governance practices. In 2006, PRI had only 63 signatories with $6.5 trillion assets under management (2021). As of 2021, PRI registered 3826 signatories with $121.3 trillion assets under management (2021)[9]. The surge in the number of PRI signatories and assets under management illustrates the increasing popularity of SRI in recent years, leading us to measure in the present work the impact of corporate social performance on institutional investment policies and, subsequently, on firm stock returns. We focus on the "S" dimension of firms' ESG performance as the extant literature mainly focuses on the other two dimensions.

Using data from U.S.-listed firms, we first notice that institutional ownership positively correlates with a firm's social score. This result is consistent with the upward trend of institutional investors allocating capital based on ESG criteria and is robust to rank-based measures of firms' social performance. Institutional investors' preference for social outperformers may be due to the numerous positive impacts of ESG on business conditions shown in the literature. Moreover, the documented institutional investors' sensitivity to corporate social performance remains valid despite parallel trends between institutional ownership and social scores in the early part of the sample.

While evidence of institutional investors' sensitivity to ESG is not new in the literature (Fernando et al., 2017; Gantchev et al., 2021; Lopez de Silanes et al., 2022; Nofsinger et al., 2019; Pedersen et al., 2021; Starks et al., 2017), it sets the stage for having a complete picture of the relationship between social scores and stock returns and the intermediary role institutional investors play in this relationship. The second significant result of this study is

[9]See Principles for Responsible Investment (2021), `https://www.unpri.org/`

that social scores have both a positive (cash flows) impact on stock returns and a negative (discount rate) impact through institutional ownership. Given the stimulating impact of corporate social performance on institutional ownership, an increase in institutional investment puts upward pressure on stock prices, which naturally reduces stock returns. Overall, the negative impact outweighs the positive impact, thus leaving the superficial impression that a firm's social performance jeopardizes its financial performance.

Information is crucial for investors to accurately assess the quality of potential investment targets and design the best investment strategies in increasingly complex financial markets. By showing the impact of social scores on stock returns, we seek to shed light on the importance and the financial implications of non-financial information such as corporate social performance. Another expected contribution of this study is to add to the literature on institutional investments.

[To be completed]

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Table 1: Data Sources and Summary Statistics

This table reports general information on the main variables in the empirical analysis. Panel A shows the sources and periodicities of the main variables. Panel B presents the descriptive statistics of social scores, institutional ownership, and other stock characteristics. The statistics are the time-series average of cross-sectional distributions from 2002 to 2020 for social scores and from January 2003 to December 2021 for other variables.

Panel A. Data Source and Periodicity
The units of variables are in parentheses.

Variable	Source	Periodicity
Social Score	Refinitiv ESG	Yearly
Institutional Ownership	13F, Compustat	Quarterly
Market Capitalisation ($ billion)	Compustat	Quarterly
Common Shares Outstanding (million)	Compustat	Quarterly
Common/Ordinary Equity ($ billion)	Compustat	Quarterly
Total Assets ($ billion)	Compustat	Quarterly
Tobin's Q	Compustat	Quarterly
Return	Compustat	Quarterly
3-Quarter Return	Compustat	Every 3 quarters
4-Quarter Return Volatility	Compustat	Every 4 quarters

Panel B: Stock Characteristics: Time-Series Average of Cross-Sectional Distributions
The units of variables are in parentheses.

Variable	Period	Mean	Std	10-Pctl	Q1	Median	Q3	90-Pctl
Social Score	2002-2020	40.37	5.41	28.81	38.45	42.68	44.44	45.86
Institutional Ownership	2003-2021	0.70	0.05	0.61	0.66	0.72	0.74	0.75
Market Capitalisation ($ billion)	2003-2021	10.11	3.08	7.04	7.80	9.19	11.56	13.35
Common Shares Outstanding (million)	2003-2021	203.74	13.80	186.76	194.07	200.53	216.62	220.72
Common/Ordinary Equity ($ billion)	2003-2021	3.62	0.65	2.67	3.11	3.93	4.16	4.28
Total Assets ($ billion)	2003-2021	19.50	3.29	14.17	16.85	20.57	21.98	22.35
Tobin's Q	2003-2021	2.11	0.33	1.69	1.86	2.11	2.32	2.52
Return	2003-2021	0.05	0.11	-0.08	0.00	0.05	0.10	0.16
3-Quarter Return	2003-2021	0.14	0.23	-0.12	0.03	0.12	0.23	0.38
4-Quarter Return Volatility	2003-2021	0.19	0.06	0.14	0.15	0.16	0.21	0.28

Table 2: Social Scores and Institutional Ownership

This table presents regression estimates of institutional ownership on the natural logarithm of lagged social scores and firm-level control variables. Institutional ownership is the quarterly fraction of shares held by institutional investors. Due to the unavailability of quarterly social scores, we use a firm's social score in the previous year to proxy for the previous-quarter social score for all quarters each year. The regression equation controls for industry and year-quarter fixed effects and cluster standard errors at the firm level. T -statistics are given in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at 1%, 5%, and 10% levels, respectively.

	Institutional Ownership
Variable	Equation 1
Ln(Social Score)	0.051***
	(5.88)
Ln(Market Capitalisation)	0.003
	(0.46)
S&P 500 Dummy	-0.041**
	(-2.41)
Tobins' Q	-0.010***
	(-4.31)
Ln(End-Quarter Price)	0.061***
	(9.23)
Return	-0.039***
	(-8.47)
3-Quarter Return	-0.015***
	(-5.15)
Volatility	0.017***
	(3.77)
Constant	0.411***
	(10.49)
Industry Fixed Effect	Yes
Year-Quarter Fixed Effects	Yes
Clustering Level	Firm
Number of Observations	44,493
R^2	0.160

Table 3: Social Performance, Institutional Ownership, and Excess Returns

This table reports regression estimates of Equation 2 and Equation 3. Equation 2 regresses firms' excess returns on the natural logarithm of lagged social scores and Fama-French three factors (*market excess return, SMB, and HML*). Equation 3 re-estimates Equation 2 while including additionally fitted values of institutional ownership. The dependent variable in both Equation 2 and Equation 3 is firms' quarterly raw returns in excess of the risk-free rate. Due to the unavailability of quarterly social scores, we use a firm's social score in the previous year to proxy for the previous-quarter social score for all quarters each year. Fitted values of institutional ownership are obtained from Equation 1. Both equations control for industry fixed effects and cluster standard errors at the firm level. T-statistics are given in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at 1%, 5%, and 10% levels, respectively.

	Excess Return	Excess Return
Variable	Equation 2	Equation 3
Ln (Social Score)	-0.011**	0.024***
	(-2.46)	(5.34)
Market Excess Return	0.031***	0.035***
	(10.85)	(15.03)
SMB	-0.073***	-0.068***
	(-13.66)	(-24.14)
HML	-0.052***	-0.047***
	(-11.84)	(-17.44)
Fitted Value of Institutional Ownership		-0.548***
		(-7.76)
Constant	0.078***	0.369***
	(5.10)	(8.23)
Industry Fixed Effect	Yes	Yes
Clustering Level	Firm	Firm
Number of Observations	32,835	31,710
R^2	0.024	0.059

Table 4: Social Score Ranking and Institutional Ownership

This table presents regression estimates of institutional ownership on dummy variables for lagged social scores quintiles (*S2*, *S3*, *S4*, and *S5*) and firm-level control variables (see Equation 4 in the Robustness and Discussion section). Institutional ownership is the quarterly fraction of shares held by institutional investors. *S2* takes the value of one if the firm is in the second lagged social score quintile and zero otherwise, *S3* takes the value of one if the firm is in the third lagged social score quintile and zero otherwise, *S4* takes the value of one if the firm is in the fourth lagged social score quintile and zero otherwise, and *S5* takes the value of one if the firm is in the fifth lagged social score quintile and zero otherwise. Equation 4 has the same control variables as Equation 1: *Ln (Market Capitalization)*, *S&P 500 Dummy*, *Tobin's Q*, *Ln (End-Quarter price)*, *Return*, *3-Quarter Return*, and *Volatility*. The regression estimates of these control variables are not presented in Table 4 to conserve space and visibility and to center the analysis on institutional investors' sensitivity to social score ranking. The complete table is available upon request. The regression equation controls for industry and year-quarter fixed effects and cluster standard errors at the firm level. T -statistics are given in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at 1%, 5%, and 10% levels, respectively.

	Institutional Ownership
Variable	Equation 4
S2	0.026***
	-2.77
S3	0.049***
	-5.08
S4	0.046***
	-3.99
S5	-0.018
	(-1.20)
Constant	0.281***
	-8.34
Controls	Yes
Industry Fixed Effect	Yes
Year-Quarter Fixed Effect	Yes
Clustering Level	Firm
Number of Observations	70,603
R^2	0.253

Table 5: Abnormal Returns for Portfolios Sorted on Social Scores and Institutional Ownership

This table reports the equally weighted average quarterly returns of portfolios first single-sorted on social scores (see Equation 5 and Equation 6 in the Robustness and Discussion section) and then double-sorted on social scores and institutional ownership (see Equation 7 and Equation 8 in the Robustness and Discussion section). Regarding the single sort, all available stocks are sorted into five quintiles at each quarter based on their social scores of last year. For instance, we use the social scores of year X to sort stocks available in all quarters of year X+1. P5 includes firms with the highest social scores, and P1 includes firms with the lowest social scores. The double sorts consist of first sorting stocks into two groups based on their institutional ownership at each quarter and then sorting stocks in each group into five quintiles based on their social scores of last year. We report CAPM alphas, Fama-French three-factor alphas, and high-minus-low spread based on social scores for stocks in the entire sample, the low institutional ownership group, and the high institutional ownership group.

Additionally, we report the difference in high-minus-low spread between the low institutional ownership group and the high institutional ownership group. Stock returns and institutional ownership are quarterly and available from January 2003 to December 2021. Social scores are yearly and available from 2002 to 2020. T-statistics are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at 1%, 5%, and 10% levels, respectively.

	Social Score	P1 (Lowest Social Score)	P2	P3	P4	P5 (Highest Social Score)	P5-P1 (H-L spread)
$CAPM\ \alpha$	All Stocks	0.039**	0.028	0.032*	0.024	0.035*	-0.005
		(2.11)	(1.55)	(1.76)	(1.47)	(1.80)	(-0.18)
	Low Institutional Ownership	0.051**	0.031	0.031*	0.044	0.024	-0.027
		(2.23)	(1.54)	(1.69)	(1.37)	(1.64)	(-1.01)
	High Institutional Ownership	0.030*	0.030	0.027	0.025	0.026	-0.004
		(1.77)	(1.65)	(1.50)	(1.45)	(1.67)	(-0.18)
						Diff	0.023
							(0.65)
$FF\text{-}3\ \alpha$	All Stocks	0.045**	0.035*	0.038**	0.031*	0.043**	-0.003
		(2.49)	(1.99)	(2.19)	(1.91)	(2.34)	(-0.1)
	Low Institutional Ownership	0.058**	0.038*	0.037**	0.058*	0.029**	-0.029
		(2.60)	(1.97)	(2.08)	(1.88)	(2.10)	(-1.09)
	High Institutional Ownership	0.035**	0.035*	0.034*	0.032*	0.032**	-0.004
		(2.08)	(1.98)	(1.96)	(1.88)	(2.05)	(-0.17)
						Diff	0.025
							(0.72)

Table 6: The Impact of Parallel Trends in Institutional Ownership and Social Scores on the Relationship between Social Performance and Institutional Ownership

This table presents regression estimates of equations that explicitly investigate the impact of parallel trends in the early part of the sample (2003-2007) on the relationship between social performance and institutional ownership. As shown in Figures 1 and 2, institutional ownership and social scores both rose between 2003 and 2008, but institutional ownership became flat starting from 2008 while social scores continued increasing. Institutional ownership is the quarterly fraction of shares held by institutional investors. Due to the unavailability of quarterly social scores, we use a firm's social score in the previous year to proxy for the previous-quarter social score for all quarters each year.

Equations 9-12 are modified versions of Equation 1. Compared with Equation 1, Equation 9 adds a dummy variable of the turning point in the evolution of institutional ownership such that *Crisis* equals one for dates in and after 2008 and zero otherwise. Equation 10 re-estimates Equation 1 in the 2008-2021 period (post-crisis period) when there were no parallel trends between institutional ownership and social scores. Equation 11 replaces the dependent and main independent variables in Equation 1 by standardized measures of institutional ownership and of lagged social scores, respectively. At each quarter, institutional ownership and lagged social scores are standardized such that they have zero mean and a standard deviation of one. Equation 12 re-estimates Equation 1 while including additional industry x year-quarter fixed effects to absorb any time trends. The regression equations cluster standard errors at the firm level. Equation 10-12 control for both year-quarter fixed effects and industry fixed effects, while Equation 9 controls for only industry fixed effects. The removal of time fixed effects in Equation 9 is due to the collinearity issue between time fixed effects and the dummy variable *Crisis*.

Equations 9-12 have the same control variables as Equation 1: *Ln (Market Capitalization)*, *S&P 500 Dummy*, *Tobin's Q*, *Ln (End-Quarter price)*, *Return*, *3-Quarter Return*, and *Volatility*. The regression estimates of these control variables are not presented in Table 6 to conserve space and visibility and to center the analysis on the impact of the parallel trends in institutional ownership and social scores in the early period of the sample. The complete table is available upon request. T-statistics are reported in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at 1%, 5%, and 10% levels, respectively.

	Institutional Ownership	Institutional Ownership	Standardized Institutional Ownership	Institutional Ownership
Variable	Equation 9	Equation 10	Equation 11	Equation 12
Ln (Social Score)	0.043***	0.056***		0.052***
	-5.14	-5.98		-5.85
Standardized Social Score			0.090***	
			-4.39	
Crisis	0.001			
	-0.12			
Constant	0.410***	0.376***	-0.630***	0.419***
	-10.8	-9.36	(-4.17)	-10.68
Controls	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Year-Quarter Fixed Effect	No	Yes	Yes	Yes
Industry x Year-Quarter Fixed Effect	No	No	No	Yes
Clustering Level	Firm	Firm	Firm	Firm
Number of Observations	44,493	41,526	44,493	44,493
R^2	0.145	0.164	0.163	0.169

Figure 1: Average Social Scores Over Time

This figure shows average social scores by year. Data are from the Refinitiv database and obtained for 2002-2020 (x-axis). Average social scores are between 0 and 70 (y-axis). As time trends are influenced by sample composition, we plot the evolution of average social scores on a constant panel of firms for which social scores are available in all years between 2002 and 2020 and institutional ownership is available in all quarters between January 2003 and December 2021. The constant panel is composed of 168 firms.

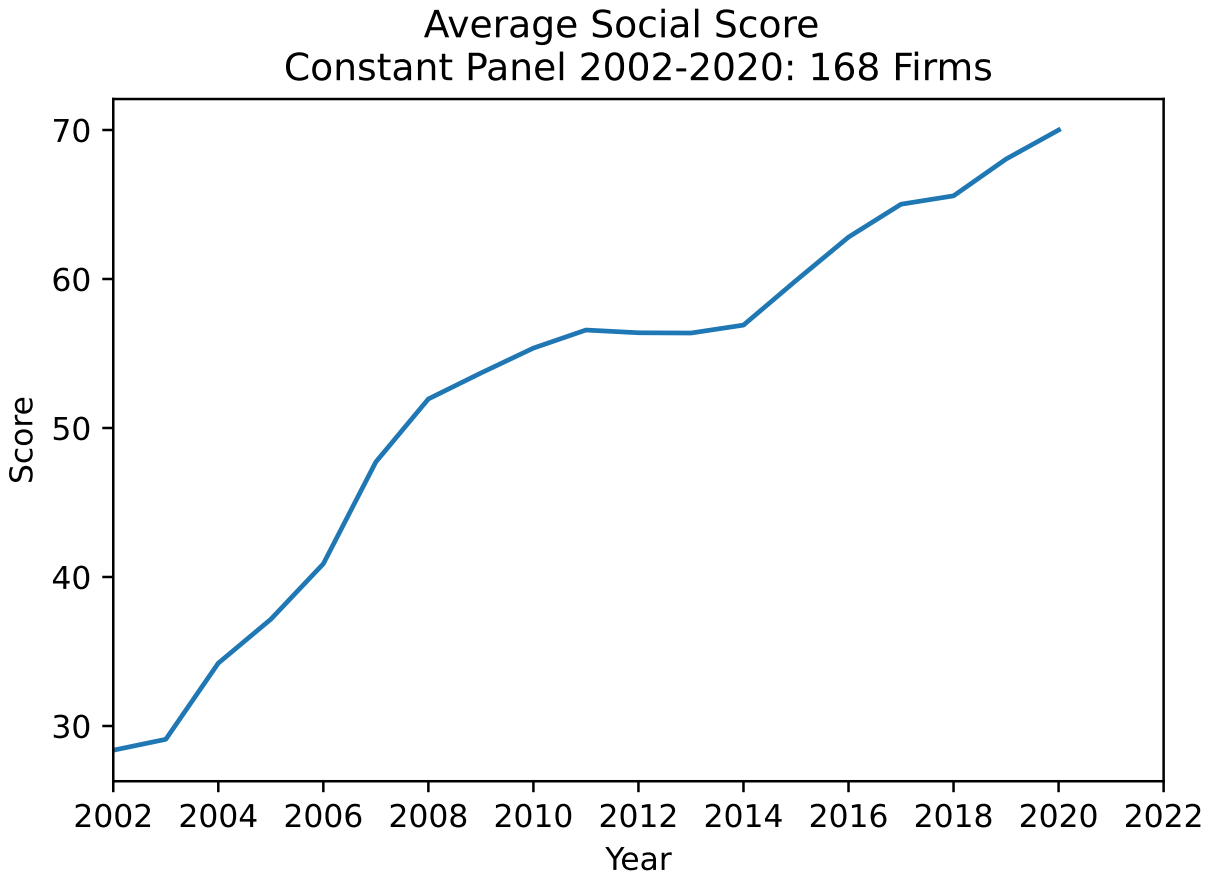


Figure 2: Average Institutional Ownership Over Time

This figure shows average institutional ownership by quarter. Data are from the 13F database and are obtained for the quarters between January 2003 and December 2021 (x-axis). Average institutional ownership is between 0.6 and 0.9 (y-axis). As time trends are influenced by sample composition, we plot the evolution of average social scores on a constant panel of firms for which social scores are available in all years between 2002 and 2020 and institutional ownership is available in all quarters between January 2003 and December 2021. The constant panel is composed of 168 firms.

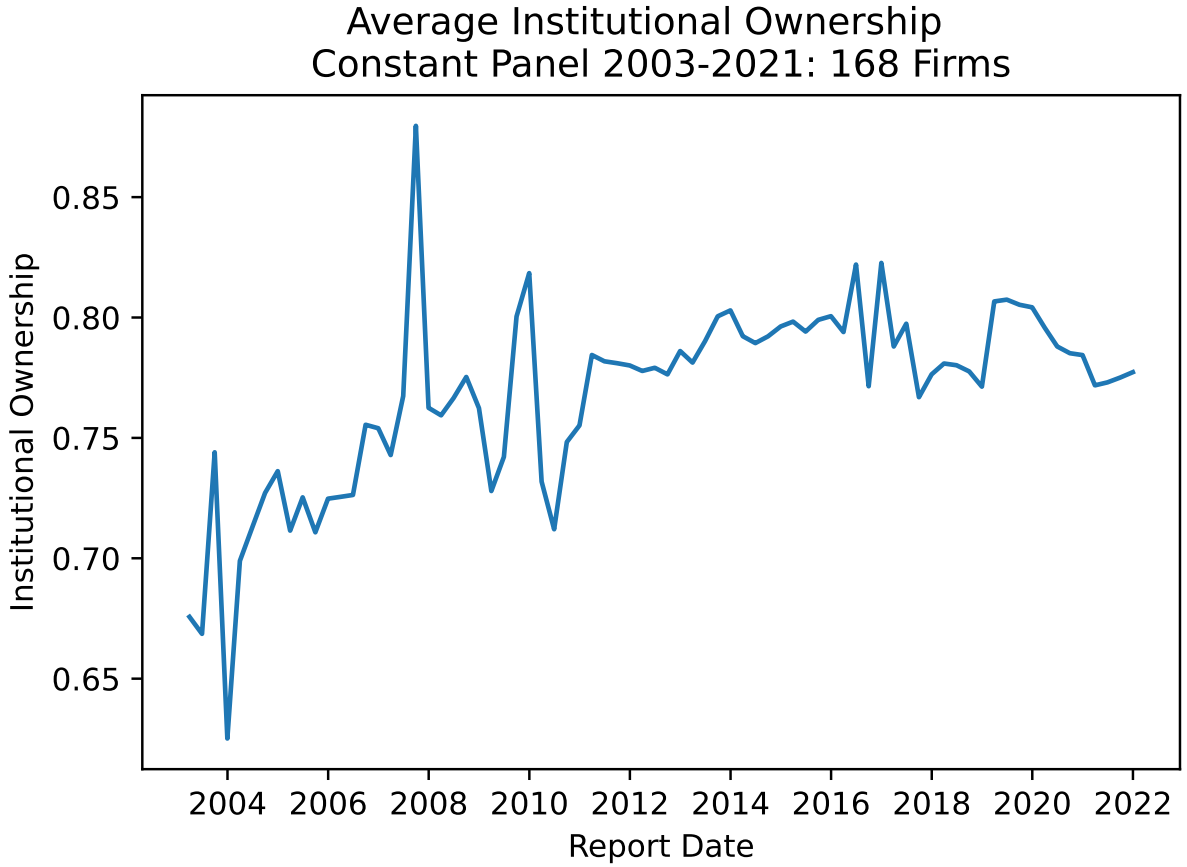
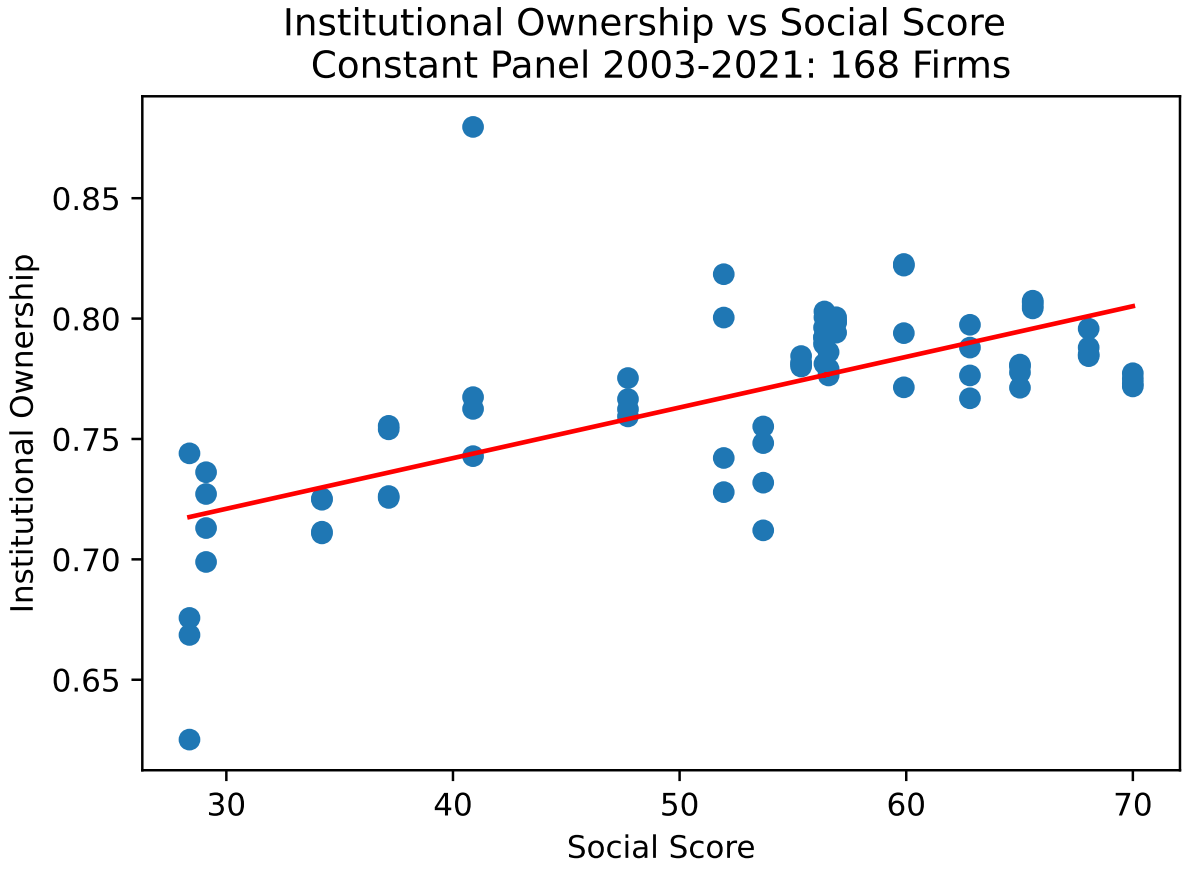


Figure 3: Relationship Between Average Institutional Ownership and Average Social Scores

This figure provides a general view of the relationship between institutional ownership and social scores. To complement Figure 1 and Figure 2 on the evolution of average social scores and institutional ownership over time, we realize this scatter plot on a constant panel of firms for which social scores are available in all years between 2002 and 2020 and institutional ownership is available in all quarters between January 2003 and December 2021. The constant panel is composed of 168 firms. Average institutional ownership is between 0.6 and 0.9 (y-axis), and average social scores are between 0 and 70 (x-axis). The red straight line is the Line of Best Fit of data.



Variable Definitions

LN (END-QUARTER STOCK PRICE) is the natural logarithm of the stock price at the end of each quarter (Compustat item PRCCQ).

MARKET CAPITALIZATION is the multiplication of the number of shares outstanding (Compustat item CSHOQ) and stock price (Compustat item PRCCQ).

MARKET EXCESS RETURNS are the differences between market portfolio returns and the risk-free rate.

RETURN OVER THE CURRENT QUARTER is computed as:

$$(\text{ Stock Price }_{t} - \text{ Stock Price }_{t-1}) / \text{ Stock Price }_{t-1},$$

where t refers to quarter.

RETURN OVER THE PREVIOUS 3 QUARTERS (i.e., excluding the current quarter) is computed as

$$(\text{ Stock Price }_{t-1} - \text{ Stock Price }_{t-4}) / \text{ Stock Price }_{t-4},$$

where t refers to quarter.

STOCK EXCESS RETURNS are the differences between stock returns and the risk-free rate.

S&P 500 DUMMY equals one if the firm belongs to the S&P 500 index at the end of 2021 and zero otherwise.

Tobin's Q is the ratio of total assets (Compustat item ATQ) minus the book value of equity (Compustat item CEQ) plus the MARKET CAPITALIZATION to total assets.

VOLATILITY refers to the natural logarithm of the standard deviation of quarterly returns measured over the previous four quarters.