The Effect of ESG on the Global Equities Lending Market

Institutional ownership, securities lending supply, borrowing demand, and investor engagement are significantly impacted by ESG preferences

Travis Whitmore

Head of Securities Finance Research,
State Street Associates

Christian Nadeau

Quantitative Researcher,
State Street Associates

STATE STREET

It is well known that ESG has become an important factor in investment decision-making, but to what degree has it directly influenced the holdings of institutional investors and their engagement over proxy votes? What about the borrowing demand of short sellers?

The paper looks to answer these questions with a unique empirical study of ESG's effect on the global equities lending market.

By combining equities lending, ESG, and proxy vote data, we quantify the impact ESG has had on lending supply, short selling demand, and institutional investor engagement.

Our findings suggest that ESG-considerations are deeply embedded in the securities lending market and are growing in importance.

Importantly, the analysis identifies ways in which institutional investors can balance the revenue earned through securities lending with the pursuit of their ESG objectives.

Key Findings

ESG significantly impacts securities lending supply
A significant positive relationship exists between a company's performance on ESG attributes and the shares available on the securities lending market.

Evidence of "green shorting"
Firms that perform poorly on material ESG attributes are associated with significantly higher fees and increased levels of borrowing demand, a proxy for short selling.

ESG influences institutional engagement
Trends in securities lending share recalls over proxy record dates suggest institutions engage more with companies with poor ESG characteristics.

Little evidence of "empty voting"
A concern cited by some beneficial owners; we find minimal evidence of borrowing securities to increase short-term influence over proxy votes.

Sourcing ESG, Securities Lending, and Institutional Ownership Data

The underlying data used in our study is sourced from several data sets. Firm-level ESG scores are produced by MSCI and measure a company's resilience to long-term industry material ESG risks. Higher scores indicate better performance in mitigating ESG risks material to that industry.[1] Given there are many ways in which we can measure ESG, we also use ESG sentiment scores sourced from TrueValueLabs for further testing.

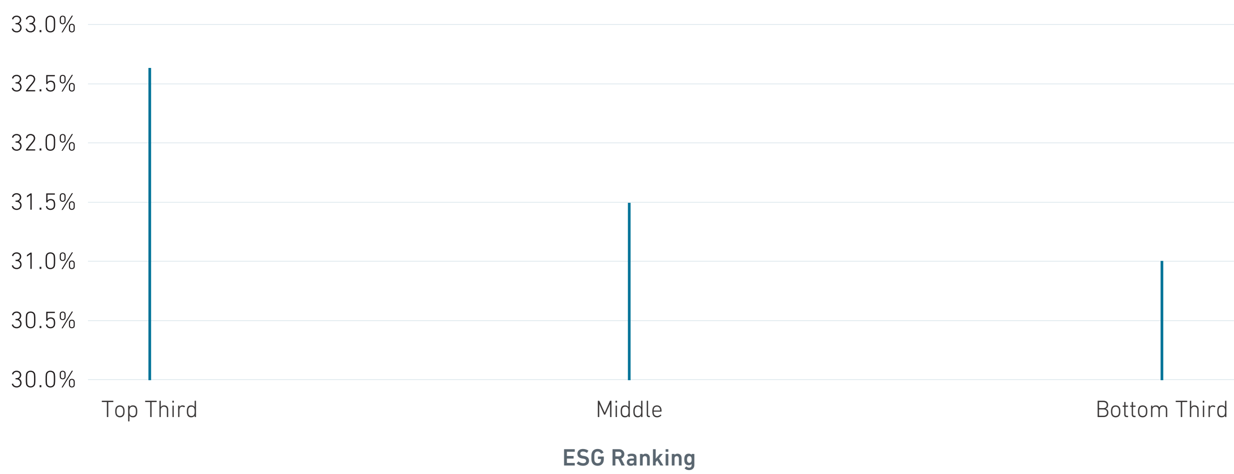
We use IHS Markit® to source daily global equities lending data, including fees, supply, demand, and utilization. Institutional ownership is captured by Thomson-Reuters Institutional Holdings (13F) Database. The combined study covers roughly 3,500 global equities from 2015 to 2021, including more than 33,000 proxy record dates.

ESG Performance of a Firm Directly Impacts Securities Lending Supply

To start our analysis, we examine how a firm's performance on ESG attributes impacts the average number of shares available in the lending market. In other words, is the ESG performance of a firm correlated with its level of lending supply? Taking a high-level approach, we rank the yearly average ESG scores of each company and group them into terciles - the bottom tercile being the poorest performing. It is clear in **Figure 1** that companies performing poorly on material ESG attributes have fewer shares available for lending relative to their market cap – close to 1.5% on average.

Figure 1: ESG is a significant driver of securities lending supply

Lending Supply (% of Market Cap) by ESG Ranking



Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters. 2015 - 2021

[1] MSCI ESG Fund Ratings Summary (2021). MSCI ESG Research LLC.

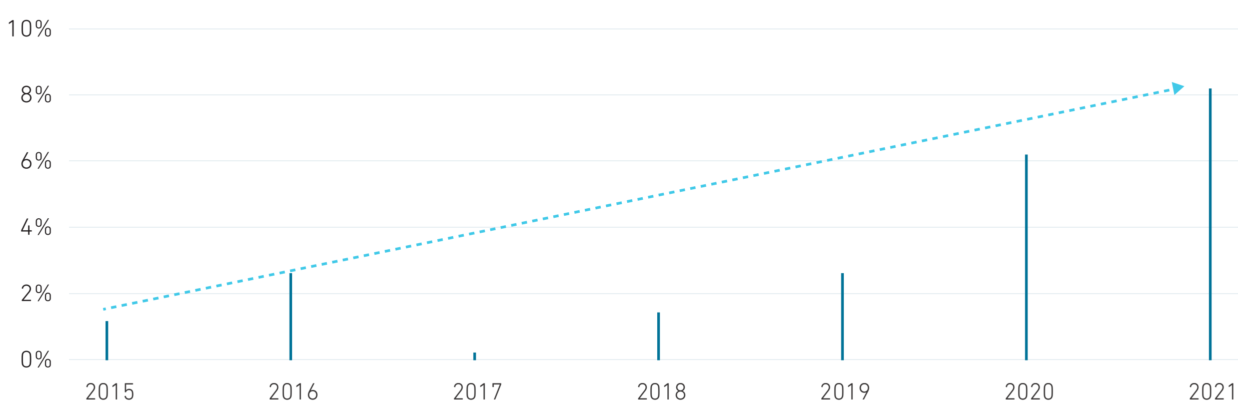
As many readers will note, a number of market factors explain differences in securities lending supply. For example, it is well understood that market cap, concentration of institutional ownership, and other factors can contribute to supply differences. To understand if a company's ESG performance explains differences in securities lending supply above and beyond that of typical equity factors, we run a panel regression controlling for year and firm fixed effects. We include a number of common controls, such as market cap, institutional ownership concentration, book-to-market, and momentum. We find a statistically significant positive relationship between ESG performance and securities lending supply. The results can be found in **Appendix**.

What explains this relationship? Digging deeper, we find two contributing factors. The biggest contributor, not surprisingly, is the level of institutional ownership. It is well understood that institutional ownership is a significant predictor of lending supply as institutional investors are the primary participants in lending programs. As ESG has become an important factor of investment decisions, institutions have increasingly shifted ownership away from stocks that perform poorly on ESG characteristics to stocks that are considered more sustainable. This trend results in Figure 2, in which we observe the average difference in institutional ownership relative to market cap for top ESG performing firms versus the bottom performers each year.

In 2021, a firm in the top third of ESG scores had, on average, 8% more of its market cap owned by institutional investors relative to a firm in the bottom third. This is 16-times greater than the equivalent measure in 2015, indicating ESG is of growing importance in explaining institutional holdings.

Figure 2: Institutional investors are paying more attention to ESG performance of firms

Difference in Institutional Ownership (Top Minus Bottom ESG Companies)



Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters.
2015 - 2021

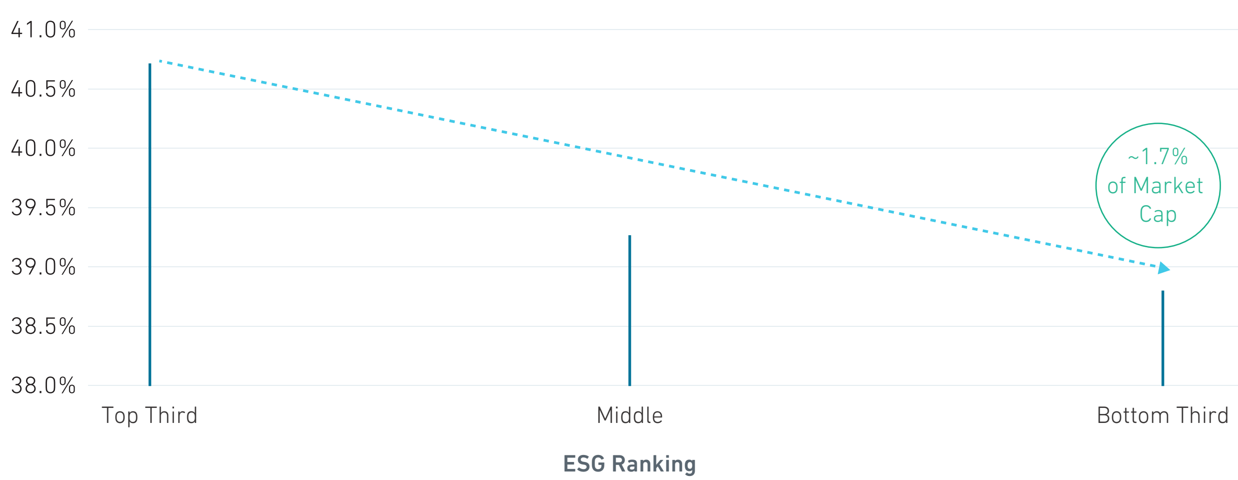
The preference of institutional investors to hold positively ranked ESG stocks is not the only driver of differences in securities lending supply. Investors seem to also restrict the lending of shares of poorly performing ESG companies. This is apparent when we observe the level of securities lending supply relative to institutional ownership in **Figure 3**.

Not only do institutional investors own fewer shares of poorly performing ESG firms but we also find they are less willing to lend those shares out. The average percent of institutional ownership that is available on the securities lending market for the poorly ranked (bottom third) ESG firms is 39%, relative to 40% for the top third.

Supply is only one side of the securities lending market. For a full picture of how ESG effects investor preferences, we turn our analysis to borrower demand.

Figure 3: Institutional investors restrict lending on holdings of stocks with poor ESG performance

Supply as a Percent of Institutional Ownership



Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters.
2015 - 2021

ESG Effects on Short Selling Demand

The positive relationship between ESG rankings and securities lending supply raises interesting questions. For example, given lower supply levels for poorly ranked ESG stocks, are these stocks more expensive to short? What about short sellers, do they demand more of these stocks? Does this mean lenders can earn more on them?

Let's start with what we expect to find. With lower levels of aggregate supply and demand being equal, we expect poorly ranked ESG stocks to be more expensive to short, thus providing an opportunity for lenders to earn higher revenue.

Figure 4: Higher utilization and fees for poorly ranked ESG firms

Fees and Utilization by ESG Ranking

Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters. 2015 - 2021

Indeed, this is what we observe in **Figure 4**. Utilization — the ratio of shares on loan versus total supply — for poorly-performing ESG firms is significantly greater than that of good performers. This in turn impacts borrowing fees, which are also almost twice as high for the bottom third of poorly ranked ESG firms.

As with supply, the difference in demand between positively and negatively ranked ESG firms increased substantially over the years since 2015.

However, it is unclear if the results in **Figure 4** are driven by differing levels in supply or if it is also due to differences in demand.

Figure 5: Energy sector, short sellers identify firms performing poorly on ESG attributes

Fees and Utilization by ESG Ranking

Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters.
2015 - 2021

In **Figure 5**, we isolate demand as a proportion of market cap. Specifically, we view this through the energy sector. Our evidence suggests that there is considerable effort exerted in determining unsustainable firms within ESG risky industries or sectors. For example, within the energy sector, companies in the bottom third of ESG scores are nearly twice as expensive and have double the level of shorting demand compared to their peers; suggesting that green shorting is an active endeavor rather than blanket selling of ESG-risky industries.

As with supply, there are a number of factors that contribute to differences in shorting demand (onloan value). Industry hedging demand, market cap, short-term momentum are example market factors that can explain differences in borrowing demand. Controlling for these factors, we find that ESG performance explains differences in borrowing demand above and beyond documented market factors. The results are presented in the **Appendix**.

There are Significant Changes in Supply and Demand Dynamics Over Proxy Record Dates

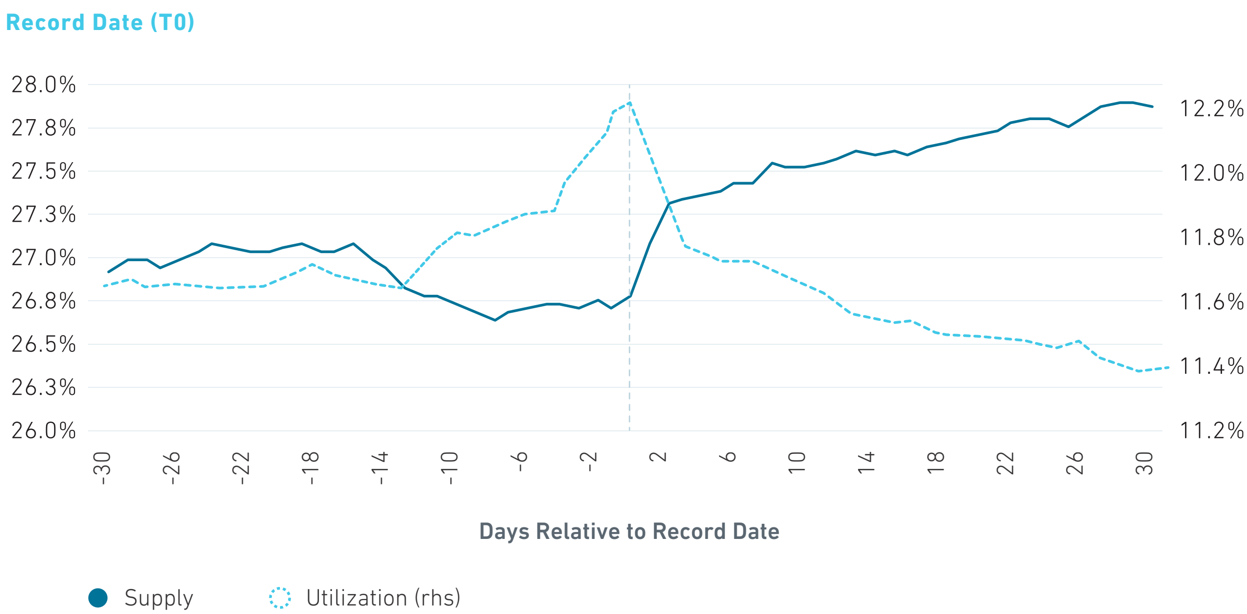
A central tenant of responsible asset stewardship is engagement with shareholder investments. Having uncovered how a firm's performance on ESG attributes influences aggregate securities lending, we want to understand how the supply level changes surrounding proxy votes.

Proxy events serve as an important channel for institutions to exert their influence and long-term company vision, a process of which is often required by law and scrutinized by third parties. This is also a core principle of responsible asset stewardship.

To participate in a proxy vote, firms must hold the shares of a company on the date of proxy record, called the proxy record date. As a result, it is critical to understand the market dynamics of securities lending leading up to and after the proxy record dates.

Institutional investors wanting to engage in a proxy vote must recall or restrict their supply of shares **before the proxy record date**. As we expect, we observe a significant decrease in available lending supply within 30 days leading up to the record date. Immediately after the record date, supply snaps back, accounting for a 1% increase in lending supply relative to a firm's market cap, on average.

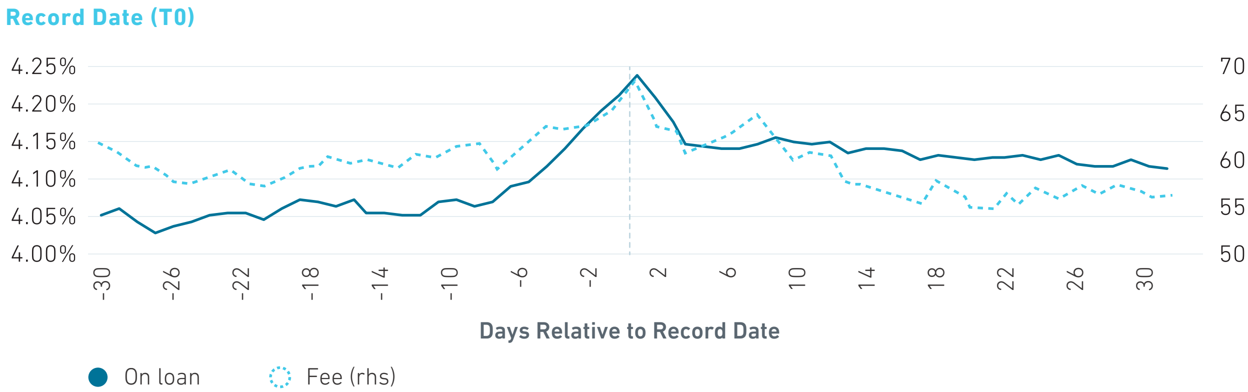
Figure 6: Supply dynamics around proxy record dates



Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters.
2015 - 2021

On the other hand, demand is observed to rise approaching the date of record, as illustrated in **Figure 7**. At face value, this spurs a concern of malicious "empty voting" practices, in which an investor can increase their short-term influence on a vote by borrowing shares over the proxy record date. This would be a concern for asset owners with a long-term mindset.

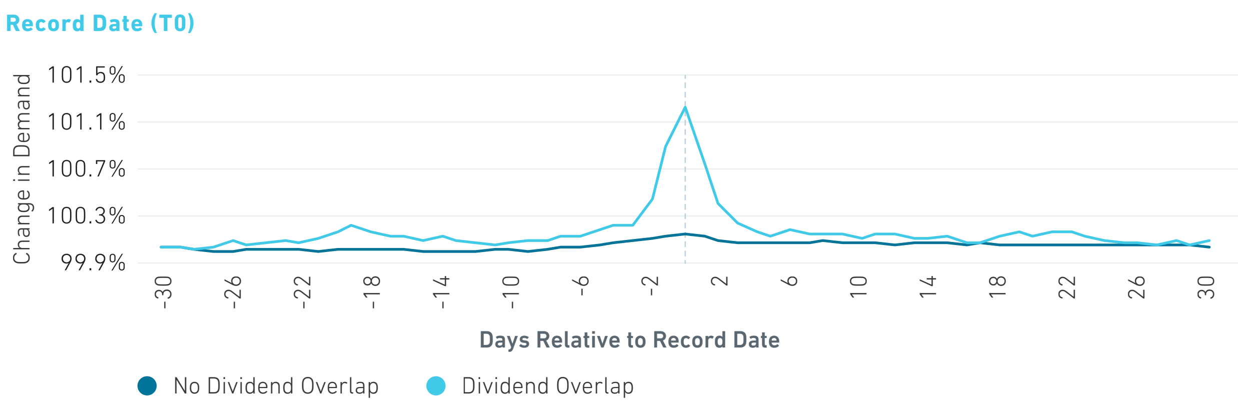
Figure 7: Demand dynamics around record dates



Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters. 2015 - 2021

However, as we dig deeper, we find evidence rejecting the notion that increased demand is driven by empty voting practices. In **Figure 8** we breakout record dates into two groups: (1) those with overlapping ex-dividend dates and (2) those that only have a proxy record date. Increases in demand are negligible for proxy-only record dates (i.e., driven by ex-dividend dates), alleviating concerns that lending facilitates the expression of views not aligned with longer-term asset stewardship endeavors.

Figure 8: No evidence of 'empty voting'

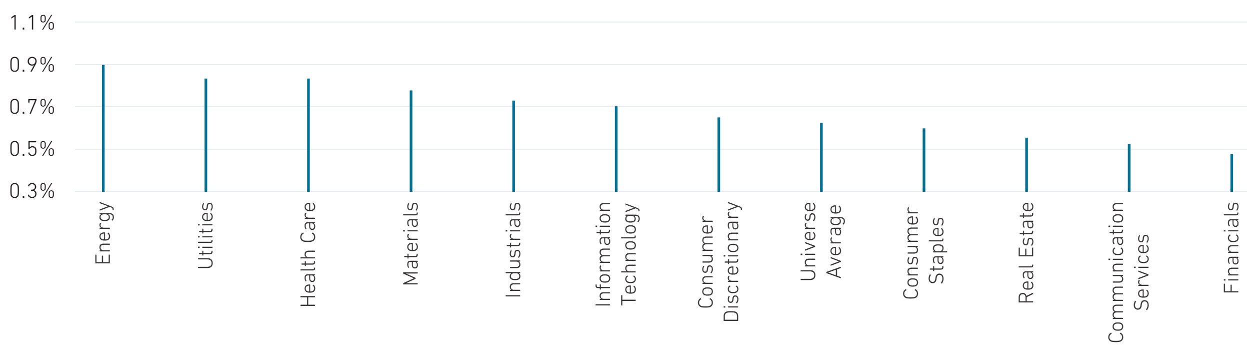


Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters. 2015 - 2021

Next, we examine how ESG might influence the level of institutional engagement. At the sector level (GICS level 1), we expect to observe increased engagement (proxied by changes in supply leading up to proxy record date) in sectors that are "at risk" of negative ESG-stocks. Indeed, we find that sectors such as Energy, Utilities, and Materials have twice the level of engagement than those less at risk.

Figure 9: Average firm engagement by sector

Institutional Engagement Over Proxy Record Dates by Sector

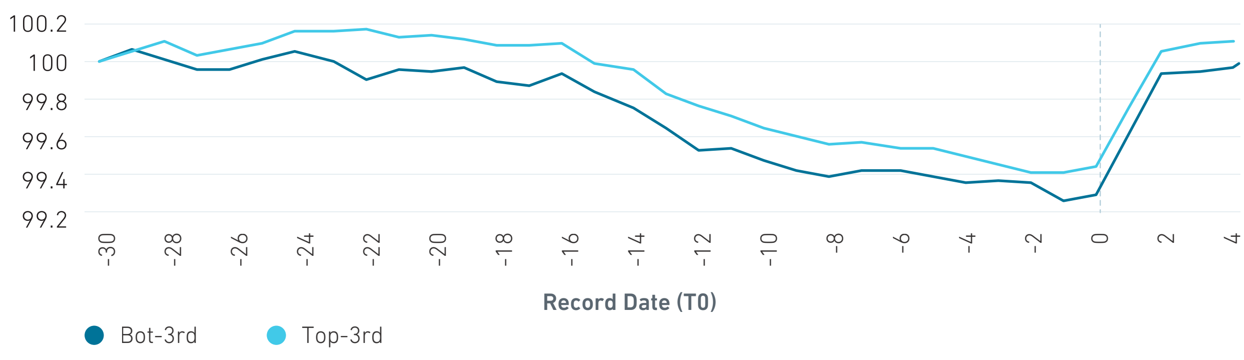


Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters. 2015 - 2021

We also expect the average level of institutional engagement to be higher for firms performing poorly on their ESG attributes, as we expect investors to push for more positive ESG outcomes through their voting power. **Figure 10** presents the average decreases in supply (level of recall/ restrictions) for the bottom third and top third of ESG ranking firms.

Figure 10: ESG-driven recall

ESG and Supply Restrictions



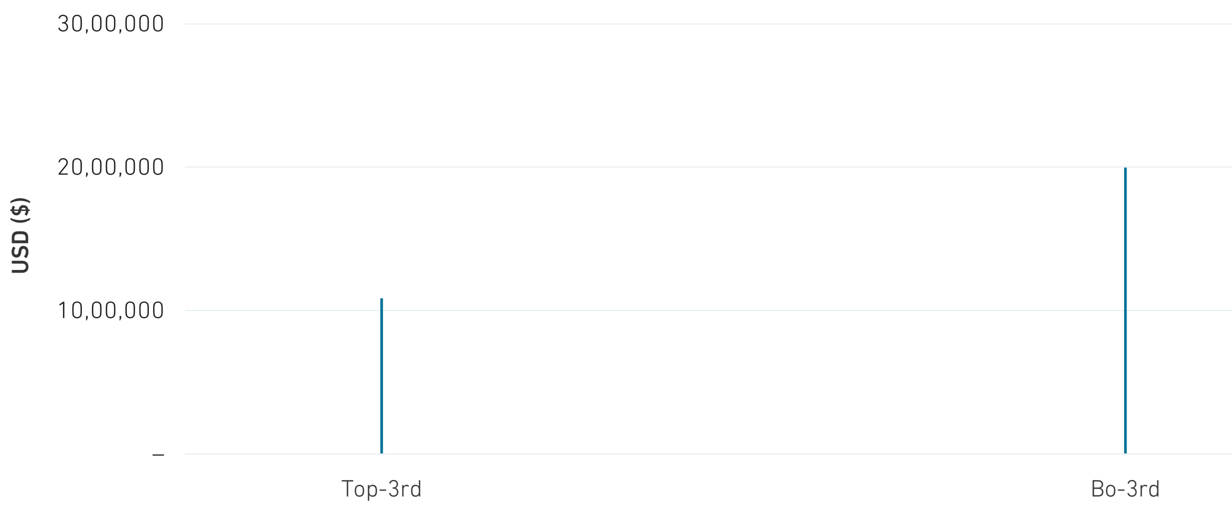
Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters. 2015 - 2021

At first glance, it seems like institutions may not be considering the ESG performance of a firm when engaging, as there was only a marginal difference in supply recalls/ restrictions for the poorly ranked firms. However, it is only part of the story.

While it is true that there is only a marginal increase in engagement on firms with poor ESG rankings, when we consider the lending revenue that can be earned over those periods, a different story appears. Poorly ranked ESG firms earn twice the level of revenue over proxy record dates, Figure 11. This suggests institutional investors are willing to forgo twice the amount of revenue in order to engage with those firms.

Figure 11: Opportunity cost of engagement

Lending Revenue over Proxy Record Dates (annualized)



Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters.
2015 - 2021

Conclusion

We find evidence that ESG considerations play an important role in institutional investment decisions, which in turn, has significant implications on the securities lending market. There are lower levels of institutional ownership, increased levels of shorting, and more engagement for firms that perform poorly on material ESG characteristics. We observe these trends strengthening through time as institutional investors appear to be place greater emphasis on ESG characteristics.

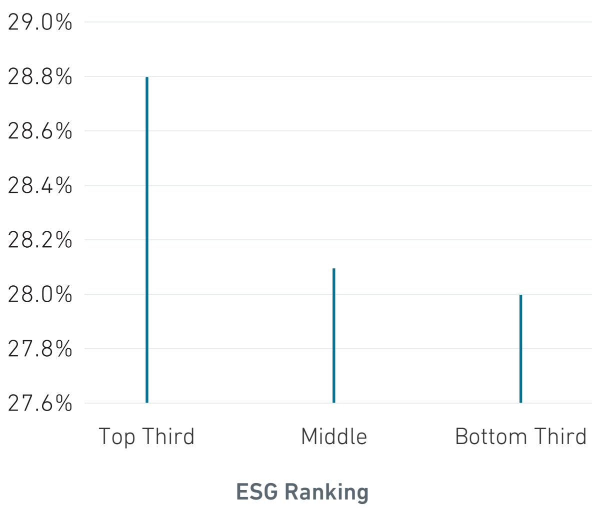
Our analysis provides insights into how asset owners and managers are balancing the incremental revenue earned through securities lending with their ESG-objectives. We hope that this helps market participants think through their securities lending program and understand how ESG is impacting the market as a whole.

Appendix

Supply Trends in the Small Cap Universe

We find similar trends in securities lending supply with the small cap universe.

ESG Scores and Lendable Supply – Small Caps



Source: State Street Global Markets, MSCI, IHS Markit, Thomson Reuters.
2015 - 2021

Regression Controls

To test for statistical significance we run multivariate ordinary least squares (OLS) regressions, including a constant and our control variables. We control for equity factors adding in the log of market capitalization (SIZE), book-to-market ratio (BM), turnover (TURNOVER), bid-ask spread (SPREAD), short-term momentum (SHORT-TERM MOM) measured as a stock's cumulative return over the last 5 trading days, and long-term momentum (LONG-TERM MOM), the cumulative return over the previous 252 trading days. We add dummy variables to control for penny stocks worth less than five dollars (PRICE < $5) and signify the proxy record date (RDATE). We account for institutional ownership (INST), and ownership concentration (INST CONC) measured by Herfindahl index. All our regressions contain year-fixed and firm-fixed effects to each of regression, and include robust standard errors clustered at firm level. Year-fixed effects are accomplished through the inclusion of year dummy variables (i.e., 2016_DUMMY).

Supply Regression

Using SUPPLY as the dependent variable along with our set of control variables, our results found that the proxy record date (RDATE) was a statistically significant variable in describing the amount of lendable supply. All else equal, proxy record dates result in a ~1.23% decrease in the lending supply for firms.

Adding ESG to our regression, all else equal, we expect a firm with an ESG score that is 1 point higher, to have ~.3% more of its market cap available for lending.

As with all our regressions, we implemented firm-fixed and year-fixed effects to ensure robust standard errors.

Explaining Supply With Market Factors

OLS Regression Results				
SUPPLY				
	COEF	STD ERR	t	P>|t|
CONSTANT	0.1606	0.040	4.017*	0.000
RDATE	-0.0123	0.001	-13.911*	0.000
INST	0.2858	0.010	29.130*	0.000
INST CONC	0.0849	0.009	9.006*	0.000
SIZE	-0.0266	0.010	-2.714*	0.007
BM	0.0110	0.003	3.751*	0.000
TURNOVER	-0.2021	0.148	-1.369	0.171
SPREAD	0.0000	0.000	-0.577	0.564
PRICE<$5	-0.0657	0.003	-7.772*	0.000
Short-Term Mom	-0.0343	0.003	-12.759*	0.000
Long-Term Mom	-0.0005	0.001	-0.372	0.710
2016_dummy	0.0087	0.002	5.703*	0.000
2017_dummy	0.0239	0.002	10.674*	0.000
2018_dummy	0.0608	0.003	20.994*	0.000
2019_dummy	0.0694	0.003	26.628*	0.000
2020_dummy	0.0998	0.003	37.037*	0.000
2021_dummy	0.1256	0.003	43.413*	0.000
Firm FE	Yes			
Year FE	Yes			
Adj. R-Squared	0.525			
Number of Firms	3,469			

$$\mathbf{SUPPLY_t = \alpha + \beta_1 Record\ Date + \delta Controls_t + \varepsilon}$$

Including ESG Metrics

OLS Regression Results				
SUPPLY				
	COEF	STD ERR	t	P>|t|
CONSTANT	0.1594	0.040	3.976*	0.000
RDATE	-0.0121	0.001	-13.863*	0.000
INST	0.2893	0.010	29.630*	0.000
INST CONC	0.0819	0.009	8.715*	0.000
SIZE	-0.0300	0.010	-3.047*	0.002
BM	0.0117	0.003	3.969*	0.000
TURNOVER	-0.1943	0.143	-1.358	-1.358
SPREAD	0.0000	0.000	-0.534	0.593
PRICE<$5	-0.0635	0.008	-7.533*	0.000
Short-Term Mom	-0.0341	0.003	-12.790*	0.000
Long-Term Mom	-0.0004	0.001	-0.319	0.750
MSCI ESG SCORE	0.0030	0.001	3.601*	0.000
2016_dummy	0.0085	0.002	5.611*	0.000
2017_dummy	0.0236	0.002	10.585*	0.000
2018_dummy	0.0598	0.003	20.420*	0.000
2019_dummy	0.0682	0.003	25.778*	0.000
2020_dummy	0.0983	0.003	35.681*	0.000
2021_dummy	0.1239	0.003	41.763*	0.000
Firm FE	Yes			
Year FE	Yes			
Adj. R-Squared	0.528			
Number of Firms	3,469			

$$\text{SUPPLY}_t = \alpha + \beta_1 \text{MSCI ESG Score} + \delta\ \text{Controls}_t + \varepsilon$$

Demand Regression

Using ONLOAN as the dependent variable along with our set of control variables, our results found that the proxy record date (RDATE) was a statistically significant variable in describing the amount of demanded supply. All else equal, proxy record dates result in a ~0.14% increase in demand for shares.

This raised concerns that there may be evidence of the practice of "Empty Voting", a major criticism of securities lending practices. To investigate, we control for ex-dividend date through the addition of a dividend date dummy variable (DDATE), in our ONLOAN regression. With the inclusion of the dividend date dummy (DDATE), the proxy record date (RDATE) becomes insignificant in explaining demand increases. All else equal, dividend record dates result in a ~0.41% increase in demand for shares.

Adding ESG to our regression, all else equal, we expect a firm with an ESG score that is 1 point lower, to have ~.4% more of its market cap shorted.

As with all our regressions, we implemented firm-fixed and year-fixed effects to ensure robust standard errors.

~0.14%

increase in demand for shares as per proxy record date.

~0.41%

increase in demand for shares as per dividend record date.

Explaining Demand With Market Factors

OLS Regression Results				
ONLOAN				
	COEF	STD ERR	t	P>|t|
CONSTANT	0.2935	0.021	14.087*	0.000
RDATE	0.0014	0.000	2.865*	0.004
INST	0.0245	0.004	6.463*	0.000
INST CONC	-0.0061	0.004	-1.713	0.087
SIZE	-0.0620	0.005	-13.324*	0.000
BM	0.0024	0.002	1.517	0.129
TURNOVER	0.1906	0.136	1.403	0.161
SPREAD	0.0000	0.000	-6.382*	0.000
PRICE<$5	0.0157	0.004	4.208*	0.000
Short-Term Mom	-0.0101	0.002	-5.469*	0.000
Long-Term Mom	-0.0016	0.001	-1.723	0.085
2016_dummy	0.0024	0.001	2.337*	0.020
2017_dummy	-0.0013	0.001	-0.921	0.357
2018_dummy	-0.0018	0.002	-1.037	0.300
2019_dummy	0.0001	0.002	0.084	0.933
2020_dummy	-0.0036	0.001	-2.474*	0.013
2021_dummy	-0.0061	0.002	-4.029*	0.000
Firm FE	Yes			
Year FE	Yes			
Adj. R-Squared	0.115			
Number of Firms	3,469			

ONLOAN = $\alpha + \beta_1$Record Date + δControls$_t$ + ε

Demand Regression With Ex-Dividend Date

OLS Regression Results				
		ONLOAN		
	COEF	STD ERR	t	P>|t|
CONSTANT	0.2936	0.019	15.275*	0.000
RDATE	0.0007	0.000	1.447	0.148
DDATE	0.0041	0.001	3.087*	0.002
INST	0.0583	0.004	14.134*	0.000
INST CONC	0.0126	0.004	3.494*	0.000
SIZE	-0.0664	0.004	-15.158*	0.000
BM	0.0013	0.001	1.105	0.269
TURNOVER	0.1393	0.056	2.467*	0.014
SPREAD	0.0000	0.000	-7.737*	0.000
PRICE<$5	0.0176	0.003	6.192*	0.000
Short-Term Mom	-0.0115	0.002	-5.317*	0.000
Long-Term Mom	-0.0016	0.001	-2.454*	0.014
2016_dummy	0.0031	0.001	3.052*	0.002
2017_dummy	0.0003	0.001	0.228	0.819
2018_dummy	0.0000	0.002	-0.025	0.900
2019_dummy	0.0013	0.002	0.791	0.429
2020_dummy	-0.0042	0.001	-2.837*	0.005
2021_dummy	-0.0084	0.002	-5.524*	0.000
Firm FE	Yes			
Year FE	Yes			
Adj. R-Squared	0.145			
Number of Firms	3,469			

$ONLOAN_t = \alpha + \beta_1 \text{Record Date} + \beta_2 \text{Ex Div. Date} + \delta \text{Controls}_t + \varepsilon$

Demand Regression With ESG

OLS Regression Results				
ONLOAN				
	COEF	STD ERR	t	P>|t|
CONSTANT	0.3042	0.020	14.876*	0.000
RDATE	0.0013	0.000	2.613*	0.009
INST	0.0234	0.004	6.214*	0.000
INST CONC	-0.0043	0.004	-1.203	0.229
SIZE	-0.0603	0.005	-13.101*	0.000
BM	0.0020	0.002	1.280	0.201
TURNOVER	0.1857	0.133	1.398	0.162
SPREAD	0.0000	0.000	-6.248*	0.000
PRICE<$5	0.0142	0.004	3.849*	0.000
Short-Term Mom	-0.0102	0.002	-5.559*	0.000
Long-Term Mom	-0.0017	0.001	-1.760	0.078
MSCI ESG SCORE	-0.0038	0.001	-4.234*	0.000
2016_dummy	0.0026	0.001	2.508*	0.012
2017_dummy	-0.0012	0.001	-0.801	0.423
2018_dummy	-0.0008	0.002	-0.473	0.636
2019_dummy	0.0011	0.002	0.689	0.491
2020_dummy	-0.0025	0.001	-1.678	0.093
2021_dummy	-0.0051	0.002	-3.316*	0.001
Firm FE	Yes			
Year FE	Yes			
Adj. R-Squared	0.120			
Number of Firms	3,469			

$$\text{ONLOAN} = \alpha + \beta_1 \text{MSCI ESG Score} + \delta \text{Controls}_t + \varepsilon$$

Disclaimers and Important Risk Information

State Street Global Markets® is the business name and a registered trademark of State Street Corporation® and is used for its financial markets business and that of its affiliates. State Street Associates® is a registered trademark of State Street Corporation, and the analytics and research arm of State Street Global Markets.

The products and services outlined herein are only offered to professional clients or eligible counterparties through State Street Bank and Trust Company, authorized and regulated by the Federal Reserve Board. State Street Bank and Trust Company is registered with the Commodity Futures Trading Commission as a Swap Dealer and is a member of the National Futures Association. Please note that certain foreign exchange business, including spot and certain forward transactions, are not regulated.

This document is a communication intended for general marketing purposes, and the information contained herein has not been prepared in accordance with legal requirements designed to promote the independence of investment research. It is for clients to determine whether they are permitted to receive research of any nature. It is not intended to suggest or recommend any transaction, investment, or investment strategy, does not constitute investment research, nor does it purport to be comprehensive or intended to replace the exercise of an investor's own careful independent review and judgment regarding any investment decision.

This communication is not intended for retail clients, nor for distribution to, and may not be relied upon by, any person or entity in any jurisdiction or country where such distribution or use would be contrary to applicable law or regulation. This communication and the information herein does not constitute investment, legal, or tax advice and is not a solicitation to buy or sell securities or any financial instrument nor is it intended to constitute a binding contractual arrangement or commitment by State Street of any kind. The information provided does not take into account any particular investment objectives, strategies, investment horizon or tax status. This communication or any portion hereof may not be reprinted, sold or redistributed without the prior written consent of State Street Global Markets.

The views expressed herein are the views of State Street Global Markets as of the date specified and are subject to change, without notice, based on market and other conditions. The information provided herein has been obtained from sources believed to be reliable at the time of publication, nonetheless, we make no representations or assurances that the information is complete or accurate, and you should not place any reliance on said information. State Street Global Markets hereby disclaims any warranty and all liability, whether arising in contract, tort or otherwise, for any losses, liabilities, damages, expenses or costs, either direct, indirect, consequential, special, or punitive, arising from or in connection with any use of this document and/or the information herein.

State Street Global Markets may from time to time, as principal or agent, for its own account or for those of its clients, have positions in and/or actively trade in financial instruments or other products identical to or economically related to those discussed in this communication. State Street Global Markets may have a commercial relationship with issuers of financial instruments or other products discussed in this communication.

This document may contain statements deemed to be forward-looking statements. These statements are based on assumptions, analyses and expectations of State Street Global Markets in light of its experience and perception of historical trends, current conditions, expected future developments and other factors it believes appropriate under the circumstances. All information is subject to change without notice. Clients should be aware of the risks trading foreign exchange, equities, fixed income or derivative instruments or in investments in non-liquid or emerging markets. Derivatives generally involve leverage and are therefore more volatile than their underlying cash investments. Past performance is no guarantee of future results.

The products and services outlined in this document are generally offered in the **United States and Latin America** by State Street Bank and Trust Company. This communication is made available in **Japan** by State Street Bank and Trust Company, Tokyo Branch, which is regulated by the Financial Services Agency of Japan and is licensed under Article 47 of the Banking Act. **EMEA/UK:** (i) State Street Bank and Trust Company, London Branch, authorised and regulated by Federal Reserve Board, authorised by the Prudential Regulation Authority, subject to regulation by the Financial Conduct Authority and limited regulation by the Prudential Regulation Authority. Details about the extent of regulation by the Prudential Regulation Authority are available upon request; and/or (ii) State Street Bank International GmbH, authorised by Deutsche Bundesbank and the German Federal Financial Supervisory Authority and, in respect of State Street Bank International GmbH, London Branch, subject to limited regulation by the Financial Conduct Authority and Prudential Regulation Authority. Details about the extent of regulation by the Financial Conduct Authority and Prudential Regulation Authority are available upon request. **Brazil:** The products in this marketing material have not been and will not be registered with the Comissão de Valores Mobiliários - the Brazilian Securities and Exchange Commission ("CVM"), and any offer of such products is not directed to the general public within the Federative Republic of Brazil ("Brazil"). The information contained in this marketing material is not provided for the purpose of soliciting investments from investors residing in Brazil and no information in this marketing material should be construed as a public offering or unauthorized distribution of the products within Brazil, pursuant to applicable Brazilian law and regulations. The products and services outlined in this document are generally offered in **Canada** by State Street Bank and Trust Company. This communication is made available in **Hong Kong** by State Street Bank and Trust Company which accepts responsibility for its contents, and is intended for distribution to professional investors only (as defined in the Securities and Futures Ordinance). Information provided is of a general nature only and has not been reviewed by any regulatory authority in Hong Kong. This communication is made available in **Australia** by State Street Bank and Trust Company ABN 70 062 819 630, AFSL 239679 and is intended only for wholesale clients, as defined in the Corporations Act 2001. This communication is made available in **Singapore** by State Street Bank and Trust Company, Singapore Branch ("SSBTS"), which holds a wholesale bank license by the Monetary Authority of Singapore. In Singapore, this communication is only distributed to accredited, institutional investors as defined in the Singapore Financial Advisers Act ("FAA"). Note that SSBTS is exempt from Sections 27 and 36 of the FAA. When this communication is distributed to overseas investors as defined in the FAA, note that SSBTS is exempt from Sections 26, 27, 29 and 36 of the FAA. This advertisement has not been reviewed by the Monetary Authority of Singapore. The products and services outlined in this document are made available in **South Africa** through State Street Bank and Trust Company, which is authorized in South Africa under the Financial Advisory and Intermediary Services Act, 2002 as a Category I Financial Services Provider; FSP No. 42671. This communication is made available in **Israel** by State Street Bank and Trust Company, which is not licensed under Israel's Regulation of Investment Advice, Investment Marketing and Portfolio Management Law, 1995. This communication may only be distributed to or used by investors in Israel which are "eligible clients" as listed in the First Schedule to Israel's Regulation of Investment Advice, Investment Marketing and Portfolio Management Law 1995. This communication is made available in **Qatar** by State Street Bank and Trust Company and its affiliates. The information in this communication has not been reviewed or approved by the Qatar Central Bank, the Qatar Financial Markets Authority or the Qatar Financial Centre Regulatory Authority, or any other relevant Qatari regulatory body. This communication is made available in **Malaysia** by State Street Bank and Trust Company, which is authorized and regulated by the Federal Reserve Board. State Street Bank and Trust Company is not licensed within or doing business within Malaysia and the activities that are being discussed are carried out off-shore. The written materials do not constitute, and should not be construed as constituting: 1) an offer or invitation to subscribe for or purchase securities or futures in Malaysia or the making available of securities or futures for purchase or subscription in Malaysia; 2) the provision of investment advice concerning securities or futures; or 3) an undertaking by State Street Bank and Trust Company to manage the portfolio of securities or futures contracts on behalf of other persons. This communication is made available in **Turkey** by State Street Bank and Trust Company and its affiliates. The information included herein is not investment advice. Investment advisory services are provided by portfolio management companies, brokers and banks without deposit collection licenses within the scope of the investment advisory agreements to be executed with clients. Any opinions and statements included herein are based on the personal opinions of the commentators and authors. These opinions may not be suitable to your financial status and your risk and return preferences. Therefore, an investment decision based solely on the information herein may not be appropriate to your expectations. This communication is made available in **United Arab Emirates** by State Street Bank and Trust Company and its affiliates. This communication does not, and is not intended to, constitute an offer of securities anywhere in the United Arab Emirates and accordingly should not be construed as such. Nor does the addressing of this communication to you constitute, or is intended to constitute, the carrying on or engagement in banking, financial and/or investment consultation business in the United Arab Emirates under the rules and regulations made by the Central Bank of the United Arab Emirates, the Emirates Securities and Commodities Authority or the United Arab Emirates Ministry of Economy. Any public offer of securities in the United Arab Emirates, if made, will be made pursuant to one or more separate documents and only in accordance with the applicable laws and regulations. Nothing contained in this communication is intended to endorse or recommend a particular course of action or to constitute investment, legal, tax, accounting or other professional advice. Prospective investors should consult with an appropriate professional for specific advice rendered on the basis of their situation. Further, the information contained within this communication is not intended to lead to the conclusion of any contract of whatsoever nature within the territory of the United Arab Emirates. This communication has been forwarded to you solely for your information, and may not be reproduced or passed on, directly or indirectly, to any other person or published, in whole or in part, for any purpose. This communication is addressed only to persons who are professional, institutional or otherwise sophisticated investors. This communication is made available in **Saudi Arabia** by State Street Bank and Trust Company and its affiliates. The information contained in this communication is not intended to invite or induce any person to engage in securities activities nor does it constitute an offer to sell securities or the solicitation of an offer to buy, or recommendation for investment in, any securities within the Kingdom of Saudi Arabia or any other jurisdiction. The information in this communication is not intended as financial advice. Moreover, this communication is not intended as a prospectus within the meaning of the applicable laws and regulations of the Kingdom of Saudi Arabia or any other jurisdiction and this communication is not directed to any person in any country in which the distribution of such communication is unlawful. This communication provides general information only. The information and opinions in this communication are stated as at the date indicated. The information may therefore not be accurate or current. The information and opinions contained in this communication have been compiled or arrived at from sources believed to be reliable in good faith, but no representation or warranty, express or implied, is made by State Street Bank and Trust Company and its affiliates as to their accuracy, completeness or correctness. This communication is made available in **South Korea** by State Street Bank and Trust Company and its affiliates, which accept responsibility for its contents, and is intended for distribution to professional investors only. State Street Bank and Trust Company is not licensed to undertake securities business within South Korea, and any activities related to the content hereof will be carried out off-shore and only in relation to off-shore non-South Korea securities. This communication is made available in **Indonesia** by State Street Bank and Trust Company and its affiliates. Neither this communication nor any copy hereof may be distributed in Indonesia or to any Indonesian citizens wherever they are domiciled or to Indonesian residents except in compliance with applicable Indonesian capital market laws and regulations. This communication is not an offer of securities in Indonesia. Any securities referred to in this communication have not been registered with the Capital Market and Financial Institutions Supervisory Agency (BAPEPAM-LK) pursuant to relevant capital market laws and regulations, and may not be offered or sold within the territory of the Republic of Indonesia or to Indonesian citizens through a public offering or in circumstances which constitute an offer within the meaning of the Indonesian capital market law and regulations. This communication is made available in **Oman** by State Street Bank and Trust Company and its affiliates. The information contained in this communication is for information purposes and does not constitute an offer for the sale of foreign securities in Oman or an invitation to an offer for the sale of foreign securities. State Street Bank and Trust Company is neither a bank nor financial services provider registered to undertake business in Oman and is neither regulated by the Central Bank of Oman nor the Capital Market Authority. Nothing contained in this communication report is intended to constitute Omani investment, legal, tax, accounting, investment or other professional advice. This communication is made available in Taiwan by State Street Bank and Trust Company and its affiliates, which accept responsibility for its contents, and is intended for distribution to professional investors only. State Street Bank and Trust Company is not licensed to undertake securities business within Taiwan, and any activities related to the content hereof will be carried out off-shore and only in relation to off-shore non-Taiwan securities. **Peoples Republic of China ("PRC")**. This communication is being distributed by State Street Bank and Trust Company. State Street Bank and Trust Company is not licensed or carrying on business in the PRC in respect of any activities described herein and any such activities it does carry out are conducted outside of the PRC. These written materials do not constitute, and should not be construed as constituting: 1) an offer or invitation to subscribe for or purchase securities or futures in PRC or the making available of securities or futures for purchase or subscription in PRC; 2) the provision of investment advice concerning securities or futures; or |3) an undertaking by State Street Bank and Trust Company to manage the portfolio of securities or futures contracts on behalf of other persons.

Products and services may not be available in all jurisdictions. Please contact your State Street representative for further information. SSA MMD 2022-01

To learn how State Street looks after your personal data, visit: https://www.statestreet.com/utility/privacy-notice.html.

STATE STREET

State Street Corporation
One Lincoln Street, Boston, MA 02111

www.statestreet.com