September 2024

Big Data x ESG = Innovation

Final Report on Fostering Big Data Applications and Innovation to Reflect Corporate ESG Performance through Media and Social Listening (GSP/033/22)

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Acknowledgement

Disclaimer

Additional disclaimer

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1. Introduction

HKMA unveils Fintech 2025 strategy on June 8, 2021 to emphasise the roadmap of developing Hong Kong as a Fintech and innovation hub. The project PI (Prof Louis Cheng) has talked to the CEO of Cyberport (Peter Yan) in July 2022 and the CEO of HKSTP (Albert Wong) in Dec 2021. Both CEOs emphasised the importance of their wish to integrate technology, AI, Fintech into ESG measures for Hong Kong as an innovation hub. These discussions support the project based on the Hong Kong policies and initiatives initiated by the government and agencies. In fact, ESG is taking a technology-driven approach.

Under the Research Centre for ESG (CESG) at the Hang Seng University of Hong Kong, we aim to promote and improve the industry's and society's understanding of the value and application of Big Data-generated ESG intelligence for listed firms using social media information.

The scope of this report is as follows:
(a) To promote the value of big data analytics and AI engine using ESG performance-based sentiment indicator of listed companies.
(b) To educate technology professionals, business executives, and academic/students on how to apply Big Data and AI techniques to generate ESG intelligence using social media data.
(c) To explain the ESG sentiment indicator and possible alpha generation using big data analytics.

Our target audiences are stakeholders of listed companies including the IT professionals, Fintech and Big Data related employees, management team, corporate communications and investor relations professionals, buy/sell-side, and asset managers. In addition, government bodies such as HKEX, HKMA, SFC, professional organisations would be interested in understanding how Big Data analytics can be applied to ESG performance in an innovative manner. Finally, academics and students from all disciplines who want to know more about Fintech and Big Data application shall be interested in our report as well.

As the leader of the nine cities in the greater bay area, it is important for Hong Kong to commit resources to promote our technology as an innovation hub. A technology-driven ESG initiative is important for Hong Kong to maintain our competitive edge in pursuing the leading innovation hub status for the region. The Research Centre for ESG is capable of educating our target audiences using big data social listening measures for listed companies in understanding ESG sentiment as an example to utilise big data analytics.

2. Understanding ESG Sentiment and ESGi Performance Rating

The sentiment is based on media coverage of ESG/sustainability topics. The commercial data providers employ Natural Language Processing (NLP) algorithms to capture the positive and negative sentiment of the articles based on a predefined list of ESG keywords. Initially, we focus on the net sentiment (positive minus negative).

To be specific, if the net sentiment is a positive score, it indicates that the entity's actions as captured by an event may have a beneficial impact on the environment, good social consequences, or provide more transparent governance. While a negative net sentiment indicates the event signals poor performance by the entity as a steward of nature, fails to manage relationships with employees, suppliers, customers, or the communities in which it operates or fails to meet standards regarding leadership, worker pay, or internal controls. A score of 0 means that the event has a neutral sentiment or no impact on sustainability.

Depending on which is the better presentation format from a particular perspective, it is possible to use either -1 to 1 or -10 to 10 as the sentiment scale in the 3D diagram visualisation. In addition, we also employ positive sentiment scores, negative scores, and Net Senti to better illustrate our findings. The sentiment data is procured from big data social listening vendors to claw news and social media related to ESG themes of the selected listed companies.

2.1 What is i-Composite Scorecard?

We promote big data analytics through a technology-driven ESG sentiment indicator by adopting social listening measures for listed companies. The goal of the i-Composite Scorecard is designed to demonstrate the importance of a more dynamic ESG performance measure at firm level. The i-Composite Score consists of the i-Score and the Composite Sentiment Score.

The i-Score serves as a divergence-adjusted rating system regarding an investment portfolio, covering approximately the top 500 listed firms. By generating a unique and proprietary rating beyond a single number, we evaluate the overall ESG performance of a given portfolio in a fair and comprehensive manner using a peer-based approach for each composite stock. The Composite Sentiment Score is made up of RavenPack sentiment score (RP Senti) and YoujiVest sentiment score (YJV Senti).

The methodology for computing the i-Composite Score is demonstrated as follows.

1. Compute i-Score (2022) for all HK listed firms with matching RavenPack sentiment score (RP Senti) and Youjivest sentiment score (YJV Senti), resulting in 498 firms as the i-Composite universe.

2. The data used for ESG ratings is as of December 2022, which reflect the latest ESG performance of the firms reported by the data providers. For the sentiment data, we employ a 15-month rolling period up to March 2023. Both sentiment data providers use a proprietary weighting scheme to reflect the relative importance of recent media coverage.

3. Based on the i-Composite universe, we perform simulations for various weightings among i-Score and the two sentiment scores to determine optimal weights to form the composite indicator. Our optimisation KPI is based on subjective sensitivity analysis of how the various weightings may affect the ranking of the top 100.

4. Our simulation result concludes that the optimal weighting scheme should follow a range of 70-80% for the i-Score, and the remaining 20-30% to be allocated to the sentiment components. Our current weighting scheme follows this guideline.

5. Then we compute the top 100 list based on the i-Composite indicator (theoretical range is -3 to 10). This is our Top100 i-Composite Scorecard v1.0.

The Scorecard v2.0 employs a different ranking mechanism by integrating peer benchmarking into the methodology. We believe that this is an improvement from v1.0 as it is based on absolute i-Composite score, and therefore, subject to potential industry bias. The peer benchmarking procedure ensures each industry sector (GICS 1) would have a fair representation in the ranking construction process. In addition, we have two more enhancements in our data. First, we expand the news sources (both mainstream news and social media) for YoujiVest. Second, we expand the time period for both sentiment data which now covers the period of January 2022 – March 2023. The v2.0 system also compares the Top100 (v2.0) with the Bottom100(v2.0) in the scorecard. Eventually, we aim to release the complete list of the Top500.

Entering a new year of 2024, we have refreshed the raw data used in calculation of the i-Composite Scorecard v3.0, for both ESG and sentiment components. The data used for ESG ratings is updated as of December 2023, which reflects the latest ESG performance of the firms reported by the data providers. For the sentiment data, we employ a 12-month period during Jan-Dec 2023 for generating sentiment indicators from data vendors. In addition to the improved timeliness and transparency, the Scorecard v3.0 also employs a similar ranking mechanism to v2.0, i.e., integrating peer

benchmarking into the methodology. This enables better year-on-year comparison of Top100 and Bottom100 characteristics between v2.0 and v3.0.

3. Big Data x ESG: Technical Issues and Business Opportunity

3.1 ESG Data Application on FTSE

(Some materials are extracted from ITF Seminar presentations on Aug 14, 2023)

This study examines how the media views FTSE (Financial Times Stock Exchange) 100 companies' performance about SDG Goal 13, one of the United Nations (UN) 17 SDG Goals. Data are available for the total 17 SDG goals and 167 subgoals. The objective was to evaluate if the information in the reports was correctly reflected by the media, which involved a reality check whether the companies are engaging in greenwashing. A paper done by Aurora University Network was used for presenting the evaluation method. It started with the keyword search about climate actions. From applying the Python coding for extracting the dataset from RavenPack, an article was generated about oil spill. The thorough keyword search resulted in an extraction of a number of articles.

After reading the data of 10 years (2013-2022) for FTSE 100 companies, half of a million articles were located. From the data output, companies could be listed from top to bottom in terms of weighted sentiment. With the sentiment data, one can realise the relative ESG performance of the companies and their corresponding industries. The information generated can be an objective reference for making investment decisions by fund managers. The sentiment value ranged from +1 to -1, and with "0" as the neutral.

The weighted sentiment of the top performer on the list was 1.498. This implied that the media was feeling really good about the particular company in achieving SDG goal 13. By drawing a bar and line graph, one could visualise the upward trend of its ESG performance, and the increasing number of articles generated about the company. To explore factors for the good sentiment data through word cloud generation, the keyword "Partnership" and other more prominent factors were found. The partners of the top performing company probably helped reduce carbon emission at work actively, supplying guidance and handling other logistic issues. The company was putting in genuine efforts to do well in ESG in the past 10 years continuously. From reality check, there was no information regarding disasters, major mistakes and crises that happened in the company over the 10 years, showing that the company was doing well consistently.

For the bottom ESG performing company, the weighted sentiment was -0.064. This indicated that most of the ESG sentiment (-0.064) was interpreted by the media as negative. From the word cloud, the unfavourable factors for its poor sentiment performance could be located. It might involve a lot of climate issues which were damaging the environment. Accordingly, their ESG reports also reflected the unstable situation, for example, the change of CEO and the big drop of their share prices (down

20%), indicating that they were not doing well.

The implications of the data are as follows:

1) Both the top and bottom performers for SDG 13 were energy companies. It implies that the company of the same nature can either do well or poorly if they do not pay enough attention to putting in ESG efforts.

2) For the top performer, it was very active and could also draw the attention of the media to focus on their ESG activities on SDG 13. Therefore, they got strong sentiment values, showed no identified crises and also got public endorsement of their ESG efforts.

3) The factors leading to the different levels of ESG performance also reflected truthfully the good and poor ESG performance of the companies. Some of the problems found were the government interventions and the spillover issues. It will take years for the company's reputation to be reestablished once damage has been done. Therefore, it is critical for companies to pay attention to SDG 13 and tackle problems heads-on.

3.2   ESG Sentiment Data

(Some materials are extracted from ITF Seminar presentations on Aug 14, 2023)

The process of sentiment analysis from data collection by YoujiVest is based on the use of technologies to the generation of the ESG data finally. The output could be treated as alternative data to indicate the ESG performance of companies. This helped check against the data disclosed by the company itself which might be subject to the suspected greenwashing effect as positive news (good disclosed data) was the focus of reporting. As in the previous five years of research experience, it is found that there appeared no correlation between the NLP (Natural Language Processing) event-driven data from the positive sentiment data and the business returns.

YoujiVest has got a lot of quality data from different sources like mainstream news, social media, regulatory bodies, NGO independent reports etc. Together with the application of many deep learning technologies like RNNs (Recurrent Neural Networks) or CNNs (Convolutional Neural Networks) and also many new models like LlAMA (Large Language Model Meta AI) and ChatGPT, those transformer architecture-based models help to produce easy-to-understand quality output.

In Western society, it is easy to find good global providers like RepRisk which does a good job in sentiment data analysis, but the Chinese language is usually not available. To meet the market need, YoujiVest focuses on using Chinese language news to understand the data from different sources and this helps solve the understanding problem when Chinese language has been used. Therefore, by using technologies and overcoming the language barrier, YoujiVest can obtain a lot of news information daily

and to provide a very high frequency of ESG data ratings on a weekly basis. Investors do not need to rely solely on those company ESG reports or simply the annual filings. For example, YoujiVest can predict fraud of a company, say Luckin Coffee, and follow up with early investigations, much earlier before something happened by using the sentiment analysis like CERS (ESG Risk Scores). All the efforts taken can lead to support the alpha generation of companies.

YoujiVest customised the users' institutional needs, taking the collaboration with HSUHK for a research project as an example. The timeframe of the project is around two years of the news data. Even for this short time period when compared to the 10 years' time period, YoujiVest had already got like more than 1 million (1,171,747) of mainstream news and more than (10 million of social media news) (1,113,143) for the 800 companies located in i-Score universe. The exercise aims to provide a higher frequency view to the i-Score with ESG Risk Score.

Many of the current fundamental ESG data providers will dig into the company's financial reports and their own reporting. They would claim what they have done during the year in the ESG region, but the data availability would be relatively low both for the institutional message to trade or for researchers to study, making it hard to compare the price movements with the ESG scores. To solve these problems, YoujiVest can provide a weekly or even higher frequency to the scores that Prof Cheng's project can use to compare between a company's financial behaviours and net profit movements as well as its ESG behaviours. The companies are behaving quite differently between the social media and the mainstream because social media's news sentiments are quite volatile.

To carry out the i-Score project, the large language models added help improve full news article understanding and sentiment judgement. The machines are able to read the whole sentence or even paragraphs instead of just labelling the words. YoujiVest also added several new sources of news information in addition to existing sources. It also introduced more than 10,000 keywords into the data collection and processing system. With the expansion of this system, YoujiVest is able to exclude all the news that was not relevant to the ESG topics and is capable of separating the positive and negative sentiment analysis.

YoujiVest recently launched Climate Risk Model in response to the need of academic research of pollutant discharge data and the carbon emission data. It focused on elaborating the pollutant discharge data since carbon emission data has already been a popular topic for some time. The Chinese government monitors all the companies involved with heavy pollution business. Pollutant Discharge data is a kind of alternative data. It is real-time, showing the intensity of the pollution discharge. It is reliable and objective for understanding the pollution situations of the factories. From the alpha perspective, to some extent, this alternative data is a cross-reference to the company disclosure in terms of the environmental impact on Mainland China.

3.3 ESG Data Visualisation

(Some materials are extracted from ITF Seminar presentations on Aug 14, 2023)

Performance data are collected from the annual report, wrapping information and evaluation by the analysts with relevance to some corresponding regulations and stakeholders' evaluation on an annual basis. Regarding sentiment data, it reacts very fast to things happening in the company. They do not react to things that happened last year as shown in the annual report. The annual report of the past 12 months and to include the number of 3 to 6 months to prepare the data, the data reported from the latest report will be 15 to 18 months old data.

The sentiment data is reacting to the news. If something happens to a company, say HSBC yesterday, the news sentiment platform will capture the news about the events the very next day. That information, in theory, will be captured by RavenPack, YoujiVest, within the week and reflected in their sentiment indicators. With the available data, using 3D-plot visualisation system, which contains listed companies' divergence-adjusted ESG rating performance, news ESG sentiment performance and ESG risk performance can provide the cutting-edge visualisation of listed companies' full-picture of ESG performance.

We built the i-Score divergence adjusted ESG rating system which eliminated the bias raised by the different ESG rating's ESG issues' scope, ESG rating analysts' regional and cultural characteristics and weighting gap on different ESG issues to capture the divergence effect and to make comprehensive integration of effects of local and international key ESG factors in the i-Score system.

In Fig. 3.1., the 3D-plot visualisation system used the i-Score performance of Hong Kong listed companies as the z-axis, the RavenPack sentiment score based on different keywords as the x-axis, and the YoujiVest positive or negative ESG sentiment score as the y-axis. The system processed ESG information for 511 Hong Kong listed companies as the i-Score universe and 334 Hong Kong listed companies as the peers (market cap > HKD2 billion at the end of 2022) universe. For further analysis of the 3D-plot, please refer to Section 7 in which we discuss the ESG intelligence of the i-Score universe.

Fig. 3.1. 2022 i-Score vs Peers Performance based on GICS1 Industry Classification

Using ESG Performance Rating and Sentiment Data to Measure ESG Intelligence. Our visualization reflects ESGi performance for i-Score universe (n=511) and non-i-score universe (n=334) as the z-axis with RavenPack sustainability sentiment score (RP Sustain Net Senti) as the x-axis, and the YoujiVest net ESG Sentiment score (YJV ESG Net Senti) as the y-axis.
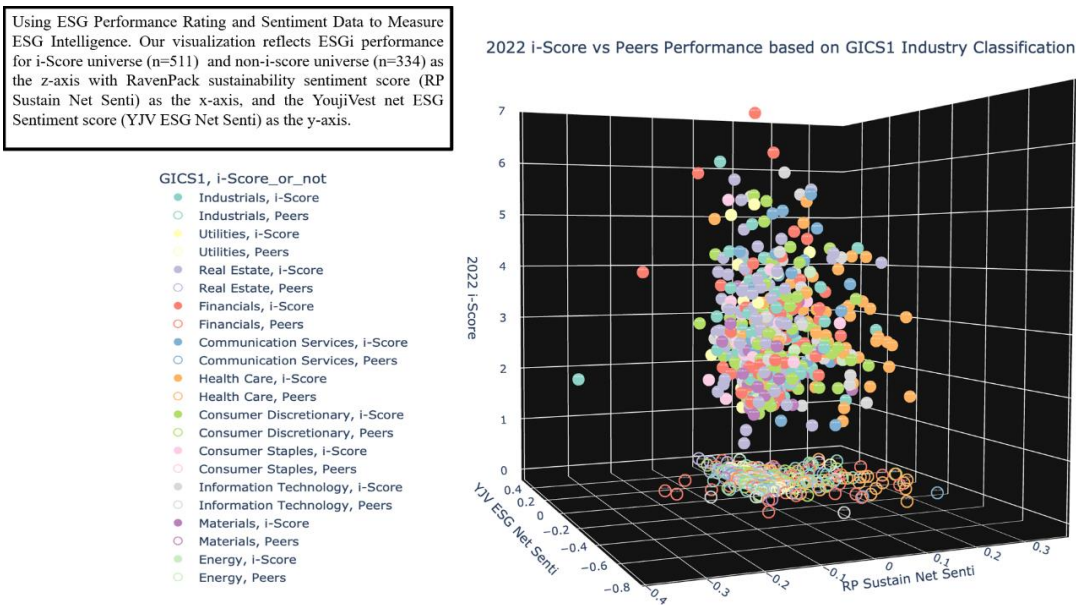
3.4 Research Application for ESG Divergence

(Some materials are extracted from ITF Seminar presentations on Aug 14, 2023)

The ESG divergence of a company was caused by the different opinions raised by multiple of rating agencies. Facing ESG divergence, it is difficult for investors to evaluate the performance of companies, funds and portfolios. The companies involved would decrease their incentives to improve their ESG performance and markets would likely price firms' ESG performance ex post.

Different agencies might use different measurement metrics, scope of attributes that are covered by a particular rating agency, or different indicators for evaluating an attribute. Accordingly, the divergence might be big between local and international rating agencies. It was indicated that disagreement correlated with a firm's financial and accounting characteristics and several US research studies had resulted in ESG divergence and ESG risk. This requires further effort to explore ESG disagreement.

ESG rating data of H-share listed companies from three ESG rating agencies from 2009 to 2018 and ESG rating data of A-share listed companies from seven ESG rating agencies from 2009 to 2020 were collected. The percentile rank of each stock in different agencies' rating universe and the pairwise rating uncertainty were computed to be the proxy for ESG disagreement. It was found that the divergence between domestic institutions and foreign institutions far surpassed the divergence among domestic institutions and the divergence among foreign institutions.

Finally, A-share listed companies in CSI300 with two or more ESG ratings and collected these companies' cumulative abnormal return were used as dependent variable and different ESG divergence as independent variable. In addition, several

financial indicators and operational indicators are used as control factors to explore whether ESG disagreement could affect the investors' perceptions on the role of ESG in dealing with crisis.

4. Big Data x ESG: News and Social Media

4.1 Overview of ESG Rating Divergence

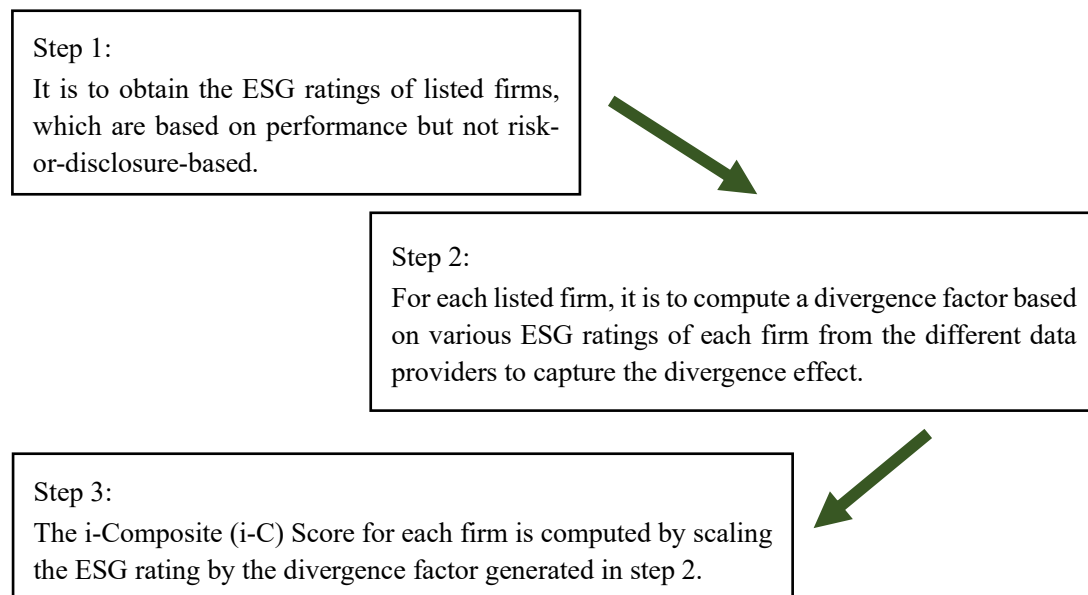(Some materials are extracted from ITF Seminar presentations on Nov 15, 2023)

It is important to learn how to use big data analytics, FinTech and machine learning tools to increase the ESG intelligence of firms, NGOs and various business entities. The i-Composite Score of the Top100 and Bottom100 firms out of the 511 listed firms in Hong Kong were presented. More information can be found on the ITF website (https://www.bigdata-esg.com/).

Theoretical Background of the i-Score Creation

Understanding the design mechanism of the i-Score can facilitate companies to design their own version of i-Score. Different measurement metrics are used by different rating agencies, which have led to disagreements or divergence of the ESG data for the same company. This causes confusion to both users and investors. Berg, Kölbel & Rigobon (2022) studied this aggregate confusion phenomenon in their paper.

The i-Composite (i-C) Score, as a solution to the confusion, is to put the mean as the numerator divided by some sorts of adjusted figure as the denominator. Basically, i-C Score is like a divergency-adjusted rating. The three key steps (www.bigdata-esg.com) for working out the i-C Score are shown in Fig. 4.1.:

Fig. 4.1. Three Key Steps for Working Out the i-C Score

Step 1:
It is to obtain the ESG ratings of listed firms, which are based on performance but not risk-or-disclosure-based.

Step 2:
For each listed firm, it is to compute a divergence factor based on various ESG ratings of each firm from the different data providers to capture the divergence effect.

Step 3:
The i-Composite (i-C) Score for each firm is computed by scaling the ESG rating by the divergence factor generated in step 2.

The "Aggregate Confusion Hypothesis" developed by Berg, Kölbel and Rigobon (2022) suggests that the rating divergence comes from 3 aspects: Scope, Rater, and Weighting differences. "Scope" refers to the type(s) of issues attributed under the ESG framework. ESG analysts (i.e., the raters) employed by different ESG data providers are subjected

to regional and corporate culture influence in rating companies, thus leading to the divergence. The third reason is the weighting of ESG being applied to different industries or even different forms of firms, for example, a conglomerate. The different weighting system will also affect the final ESG data of a firm. Firms can also follow the simple calculation process as discussed to work out a firm-based i-Score.

The use of i-Score with an individual company's ESG intelligence report based on the available data as of December 2022 is demonstrated in Fig. 4.2. below.

Fig. 4.2. Sample of the ESG intelligence Report

The report will inform the peer-based ESG ranking in terms of the overall ESG and ESG sub-score peer performance. By comparing with different benchmarks, the performance of the company in terms of divergence can be known. It follows with a description of how the company performs in terms of categories of achievement (for example, satisfactory or very satisfactory), being provided through the knowledge of the percentile level of achievement of each E, S, and G. This information of the 511 listed firms in Hong Kong can now be found on the website (myesgi.com).

The ESG report of a company is annual, and the reported information tends to be outdated when it is published six months after the data collection period. To mitigate the time lag effect, the sentiment analysis will be conducted to provide more updated ESG data of a firm, say only 2 or 3 months after data inputs. In terms of sentiment score,

ESG will be generated separately. Accordingly, negative sentiment, positive sentiment and net sentiment can be worked out. Somehow, those scores are found to be correlated with stock price and it shows the importance of sentiment data accordingly. The provision of annual report is found insufficient for provision of updated ESG performance data of a company.

4.2 Use Machine Learning to Capture ESG Sentiment Data

(Some materials are extracted from ITF Seminar presentations on Nov 15, 2023)

An educational AI platform can be utilised to teach students how to use machine learning to predict the i-Score to facilitate business decisions. Currently, only 511 out of the 2,600 listed firms in Hong Kong have rating information for computing the i-Score. The other firms of about 2,000 may not draw the attention of the rating agencies due to their lower liquidity; however, these firms still have to be evaluated on their ESG performance. Using AI to predict their ESG performance may be a solution.

ESG data processing with the flow demonstrated in the Fig. 4.3. below:

Fig. 4.3. Flow of Processing ESG Data
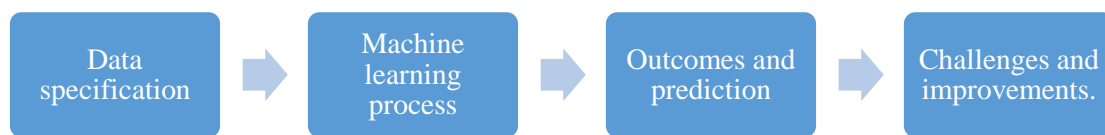
The raw data (2019 to 2022) provided are to be input into the computer for pre-processing while enabling the computer to undergo an auto-machine learning process. The following Table 4.1. presents the required pieces of data for predicting the i-Score.

Table 4.1. Variable Description

Variables of Company Profile	Financial Data
Stock Code BBG Code Company Abbreviation Name GICS1 GICS2 Year	Annual Stock Price Return (%) Market Cap (HKD) Total Asset (HKD) Total Debt to Total Assets (%) Total Debt (HKD) Common Equity (HKD) Common Equity (Share) Net Income (HKD) ROA (%) ROE (%)

The given data have to be pre-processed before input into the computer.
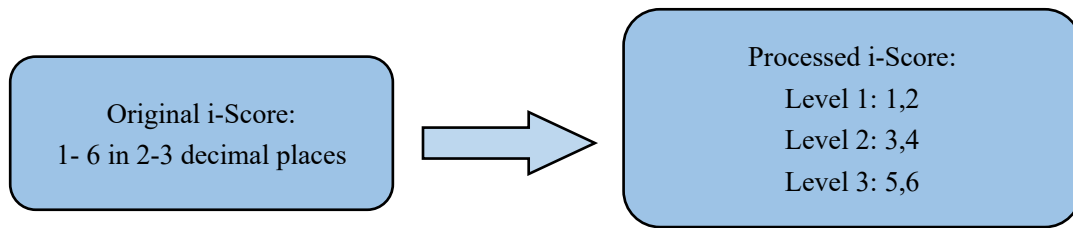
The machine learning process will undergo 5 action steps as follows:

The original i-Score will be rounded up and divided into 3 levels of numbers. The machine learning process will follow the following 5 action steps in Fig. 4.4.:

Fig. 4.4. Machine Learning Training Procedure
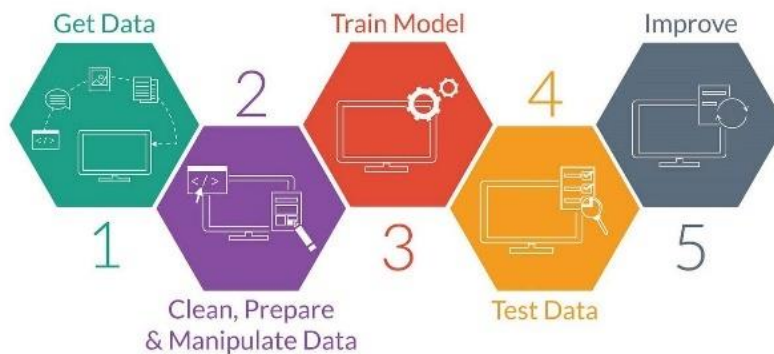
1) Get the data
2) Clean, prepare and manipulate the data: As described above, the data (original i-Scores) have to be pre-processed for the computer to understand the language and the meaning of the data.
3) Train the model built
4) Test the data
5) Improve the model

After training the model, it has to be tested to ensure its reliability and validity. The model has to be refined and improved as when a model is generated, the accuracy may not reach 100% yet, though this may never be achieved. Through this machine learning process, the accuracy of predication has been improved from 15% to 55%. The acquisition of the machine learning tool "Auto Sklearn" is to provide a user-friendly platform to enable students to learn to predict the i-Score for a firm by simply inputting the data into the required fields for the results.

Three challenges are involved in the i-Score prediction process:

1) Limited (or absent) data governance: Robust data governance is crucial for maintaining the data integrity. Not all firms have a solid governance framework,

especially the firms with lower ESG maturity.

2) No single source of truth: Due to the absence of a centralised system of record, which hinders efficient data collection, i-Score is supposed to fill this gap to supply a single source of truth.

3) Limited data quality and reliability: Though ESG has been discussed for a long time, there are still limited ESG data quality and reliability since it does not seem to directly affect the revenue of a company.

Three methods for the improvement of the accuracy of the model:

1) To increase the database size of the currently around 700 entries with data available around the world. The accuracy will be enhanced a lot as the AI machine will continue the learning with more data.

2) To use a more advanced AI tool where more types of data, in addition to company profiling data and corresponding financial data, can be processed.

3) To add more specific ESG data.

However, for the example just shown, based on the company profiling information and the corresponding financial data, the model has already been trained to 55% accuracy. It implies that the financial situation of a company is closely related to ESG development.

4.3 Understanding the Design of Big Data Analytics on Measuring ESG Performance

(Some materials are extracted from ITF Seminar presentations on Nov 15, 2023)

The China Environment Pollutant Discharge data developed by YoujiVest originates from real-time monitoring sensors embedded at over 400,000 firms. The data is involved in heavy pollution business, covering over 500 types of pollutants such as wastewater, various gases and solid particles. It is very objective in presenting the actual behaviours of the firms involved. It is also important for academic research as well because it is production data that is objectively collected. The firms running hedge funds and mutual funds should take care of the data as they will affect their investment decisions.

Practical cases to facilitate research interest:

1) The availability of the real-time data also arouses research interest and one of the areas would be the exploration of the government responding behaviours towards the pollutants' discharge behaviours. In addition, the public view and the firm factors could be added to the analysis of factors causing the actual behaviours.

2) A top-tier company had to shut down because of huge financial loss as a consequence of its failure to renew the license for discharging pollutants.

3) Through a graphic presentation of back testing of pollutants' discharge, it was

indicated that some categories of pollution did contribute to good performance portfolios of firms, which then led to a more excess return in terms of bad behaviours of firms YoujiVest had investigated further and could share insights with interested researchers.

4) Showing photos of flooding in the Forbidden City and a top luxury hotel reminds the frequent discussion of climate risk in terms of flooding. Being destroyed by flooding, a case of extreme weather condition, not only the affected company and the environment bear the consequences, but also all stakeholders (e.g., banking institutions and insurance companies) face such actual life-threatening challenges.

The conclusion can be drawn that the ESG issue is not only caused by the corporate emission industry but also by other economic activities like agriculture and mining industries, which can also cause high physical risk and financial loss across industries. With the many problems encountered due to the physical risks, there are more mandates of disclosure requirements for tightening the regulatory mechanism. YoujiVest then launched a Climate Risk Model System-YoujiCRMS in the first half of 2023. A lot of different types of data are collected, which include the global satellite and climate data as well as localised data.

Concerning that different industries have different sensitivity towards different hazards, YoujiVest also considers industrial level of risk. For example, some manufacturing industries would have a stronger linkage to temperature. The hydro-electricity power industry has a high sensitivity to drought. In another study, the quality and quantity of cow milk production is found to decrease with higher temperature. Therefore, the industry impact should be an item to measure. Accordingly, a lot of climate risks may be introduced in the insurance industry.

With the availability of data for understanding the climate issues, action can be taken to identify the risks involved and to follow up actions about mitigation and adaptation. In the future, there can be more discussions on how to leverage climate change.

4.4 Challenges of Evaluating ESG Disclosure of Hong Kong Listed Firms

(Some materials are extracted from ITF Seminar presentations on Nov 15, 2023)

Due to the huge amount of ESG report data, it is difficult to know data quality in terms of the accuracy, completeness, relevancy, the meaning of the messages and the data presented.

In the process of evaluating extracted companies' ESG reports, reporting problems were spotted. 4 to 5 of those obvious missing errors can be found in 10 to 20 ESG reports. For example, in a report from a dairy company, not only is an important missing emission chemical spotted, but there is also a huge discrepancy between the reported and actual emission amount for another key reporting item. For reporting wastewater

discharge in terms of COD (Chemical Oxygen Demand) with million tonnes, the meaning of COD was not complete, and the water quality had yet not been known. A cosmetic company in Hong Kong did not report according to the additional new disclosure requirements. The company responded that it did not have any involvement in the climate change and new disclosure requirements and therefore it took no action to report. Another company had a lot of information on recruitment, dismissal, remuneration, etc., but it had not touched on diversity, inclusion and equity.

Furthermore, three questions about the content of the report are raised:
- Are those contents unbiased?
- How meaningful are those contents?
- What can those contents tell?

The ESG reporting problems will affect the decision-making of investors. For improvement, this kind of material errors can be solved by FinTech or some other technologies if regulators can design some kind of disclosure system and frame it as a requirement. However, human judgment is also important for evaluating the ESG reports.

5. ESG Rating and Sentiment for Hong Kong Listed Firms

5.1 Alpha Generation Using ESG Sentiments and Climate

(Some materials are extracted from ITF Symposium presentations on Mar 21, 2024)

YoujiVest is combining AI and deep learning techniques to build ESG ratings, carbon/environmental metrics and climate models native to China. The products are mainly about data and modelling. The presentation was about ESG ratings and pollutant discharge, together with several real-life case studies applying different ESG data collection strategies for alpha generations.

Two Types of ESG Ratings

There are two types of ESG ratings. One is from the fundamental one which is mainly based on disclosure from consulting firms and their business is to do the disclosure and generate ESG reports for the listed companies. Such kinds of ESG reports mainly record what companies have done in the past one year and put emphasis on great things that have been doing, so it is hard to discern the greenwashing problems behind. Another type is the dynamics ESG ratings which do not look at what a company says, but what it does. This involves NLP, AI and the use of a lot of sentiment analysis, market news, regulatory filings etc. The dynamic ratings are frequently updated and relatively objective. YoujiVest favours the use of the combinations of fundamental and dynamic ratings.

Strategies for Data Collection

YoujiVest focuses on studying the negative sentiments as the information will be comparatively genuine while back-testing concerns bad issues of companies only. With the support of technologies and many partners, YoujiVest is ready to capture data frequently and from many sources as well as making smart adjustment for market cap since large companies will induce more negative news to a certain extent.

Following the negative sentiment analysis, a company will have a higher rating if it does not have records of bad issues. With CSI800 as a benchmark, the different risk portfolios of companies can be studied to evaluate their different levels of ESG performance. In the past five years, there were no bad issues found from those companies with good ESG performance. Those companies will always have good ESG performance when compared to the companies having bad ESG performance. Everyone likes to apply the strategy to pick the companies with good ESG performance to get the excess return.

High Dividend Yield with ESG Score Enhanced

Another investment strategy is to leverage on the high dividend yield which can be further enhanced. The fundamental is the dividend yield which is based on the C-score. A firm can use 30% of the YoujiVest's ESG ratings and combine this with 70% of the traditional high dividend yield strategy.-The ESG score is made as a factor to enhance the traditional high dividend yield. Surprisingly, in the past 3 years, YoujiVest has experienced 70% enhanced traditional high dividend yield strategy. It can also be possible to combine multiple factors for the traditional quant strategy to enhance the dividend yield more. Due to the greenwashing issue, disclosure data only appears to be insufficient to present timely and real data for alpha predictions. A lot of traditional ESG rating companies also integrate sentiments into their new version of ESG ratings.

China Environmental Pollutant Discharge (CEPD)

CEPD is the data collected by sensors on both hourly and daily bases and it is monitored by the government. The data presents the intensity of the pollutant discharge of companies and the amount that exceeds the government prescribed limit will be subject to the risk of penalty. The penalty will be serious and an extreme case was that the government just shut down the factory discharging pollutants but without the license to do so.

Another factory adopted the strategy did by YoujiVest. The factory had more alpha generation based on YoujiVest's feedback. The low emission portfolio contributed the excess return more both for the air pollutants and the solid particulates of the factory. The government will closely monitor the different types of pollutant discharge and once the national limit has been exceeded, regulators will investigate onsite, and this may take about four or five months. Therefore, fund managers will not care about how great the environmental protection measures are, but they really concern with whether their investment portfolios contain high emission pollutants and they will underweight those types of securities. YoujiVest got much feedback from the quant fund. They said they could rebalance on monthly basis to earn excess returns.

A study was conducted about the pollutant discharge data across top five industries (basic chemicals, machinery and equipment, automobiles, medicine and biology, and electronics) in China. The research is done in a short-term period (i.e. 2 to 3 months) based on the growth of emission across five industries. The high emission will be seen also contributing to higher excess returns but only within a very short-term period. If the companies continued to have a very strong growth of emission, there was a high correlation with their orders of production. But normally, the companies will not continue their high emission outputs because they will be facing tightened regulatory pressure as the regulators will start to do investigations. That means if stakeholders want to invest in those companies which have a strong growth of pollutant emissions continuously, they probably will not get any good returns. In a nutshell, emissions are critical alternative data to address for alpha generation. Accordingly, the employment of alternative data can help companies to gain strategic advantages in the market.

5.2 Gaining Strategic Advantages by Using Alternative Data

(Some materials are extracted from ITF Symposium presentations on Mar 21, 2024)

Alpha implies that the investment projects can outperform certain industry benchmarks and lead to their excess performances for making more money. There are several reasons for the emerging trend of adopting alternative data in the market. First, it is founded that more and more institutional investors, including the asset managers and hedge funds, are using alternative data nowadays. Alternative data is non-traditional data. Traditional data is normally composed of market data and those published or disclosed information.

Asset managers are integrating more alternative data into the investment. Historically, investment analysts will normally use the trading information or fundamental information disclosed by the listed companies to formulate their investment strategies. Everyone can obtain the same kind of traditional information. If people would like to achieve different outcomes with the same information, it will mainly rely on managers' skills. Besides, alternative data can provide additional insights for investors or asset managers other than the general traditional data in the market. The source of the alternative data may come from the proprietary research or other resources stored by different parties. However, stakeholders can make use of those types of data to create their own sets of data and incorporate them into their investment process.

Due to this emergent growth of alternative data, investment managers would subject to a strategic disadvantage if not adopting it in their investment process. This strategic disadvantage can be highlighted by three types of risk, which are the position risk, execution risk and consequence risk that asset managers may encounter in the long run. In the financial market, people have to establish strategic advantageous position for taking speedy actions instead of waiting for general information passively when making investment decisions. Taking a large supermarket as an example. Due to the technological advancement, some private satellites can capture daily sales and note the number of visitors through the number of trolleys of products and proxies of daily sales even from the underground carpark. Late comers will incur position risk when they cannot gain access to such kinds of information if exclusive agreements have been established earlier by other parties. If companies lose experienced and professional ESG talents to the market, they will be subject to execution risk. It is problematic if ESG experts are not available in the labour market, under the situation that ESG is becoming more important in the financial market. With the emerging growth of alternative data providers, the traditional data providers may be subject to reputational risk (consequence risk) as they are latecomers to the innovative space.

To strike a balance and to minimise these risks, the professional investors will mostly combine the traditional data and the alternative data to make a better-informed decision. First, when referencing to the ESG performance, they will look into the ESG ratings or scorings, but those are static data which will be subject to quarterly, half-yearly or

annually reviews, dependent on ESG data providers. Another important piece of data, which will normally be given by data vendors or data rating agencies, is called controversies score which represents a record of the ESG sentiments.

Challenges of Accessing Alternative Data

There are four challenging factors when creating own sets of alternative data. First is the "Viability", which is about whether people can find or own their own data sets that are instrumental and important for achieving good performance. Companies need to identify relevant data but not just any sets of data. It is just like different industries which will have different emphases on E, S, or G. The second factor is the "Usability". The flooding of data may be scattered and unstructured, causing it difficult to be used directly. There should be a process converting data from unstructured to structured one. The third factor is the "Actionality". It is about whether the data will be impacting on the stock performance. This is a complicated process. The data scientists will look into the current used cases by the financial markets or asset managers and try to tap and link (through linkage analyses) the outcomes to a particular factor. Finally, it is the "Accessibility" factor by the market. As the alternative data can be valuable for making money considerably, it may not be easily accessed by everyone in the public. Therefore, the alternative data providers will create ready-for-use data together with, e.g. a very simple API (Application Programming Interface) to access into it. Therefore, before adopting any ESG data, there should be evaluation process.

Today, many ESG data vendors have increasingly been incorporating alternative data sources into their analysis and reporting. For those ESG data vendors, they are not only using the disclosed data, but they also conduct interviews to gather more information from companies. Most of the ESG data vendors will try to use an ***outside-in approach*** which is gathering data from the outside sources and not from inside the listed companies. The outside data may come from NGOs and media which can be used to counter check or cross check, based on certain channels, the validity about statements, e.g. the amount of carbon emission made by the listed companies. That is why the alternative data becomes a common adoption within the ESG data vendor market. The current growth of the alternative data business signals the usefulness of it in generating returns and is attracting many asset managers to subscribe it. The proprietary data can easily be shared with others whenever disclosed. Similarly, the value of alternative data will go down once shared to the public and therefore alternative data is still highly non-transparent.

Actors in the ESG Information Flow Related to Data Availability

Fig. 5.1. ESG Information Flow
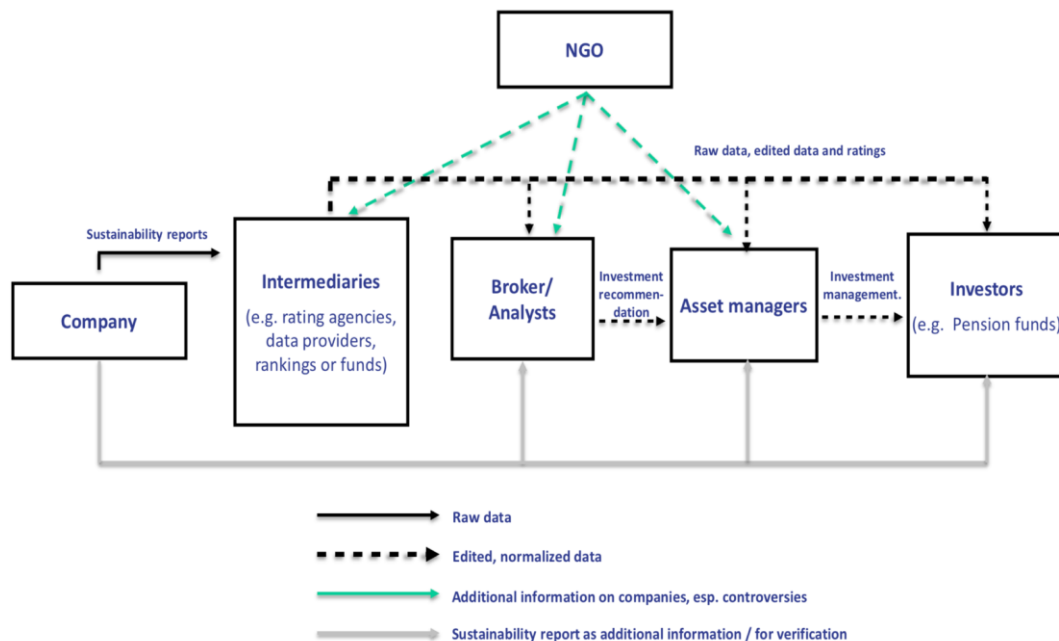
As displayed in Fig. 5.1., There are different actors in the ESG information collection process, and they have close relationships. The **listed companies** will offer the raw data only, and everyone can access this raw data since information from listed companies is transparent to the public. Stakeholders can evaluate if this homogeneous market data is very useful when everyone may possibly make the same decisions.

For intermediaries (e.g. rating agencies, those ESG data providers), they are collecting the public information from the listed companies and add values by conducting their own research and interviews, and incorporate some alternative data collected from NGOs and media into the reports. They will sell these normalised data results in the form of scoring, ratings, signals to the asset managers, brokers, or traders for their earnings. Those rating agencies and data providers are making use of alternative data to counter check or create their own sets of products called ESG data controversies. They would like to capture the ESG sentiments for listed companies.

Now, those mainstream ESG providers also use alternative data to compose their core ratings. From their institutional websites, they claim that they are using alternative data from media and NGOs to compose the controversies to offer additional insights for listed companies. They are also using a number of alternative channels, e.g. satellite imagery or web sensors, to gather information. They will also outsource to third parties to collect data. People have different benchmarks and so do the different risk-taking levels. In the alternative data market, normally people are just making use of alternative data as peer comparison rather than a proxy to compare with a particular benchmark. Alternative data providers will obtain data from different sources which show the

advantage of having rich information from diverse perspectives.

Sources of ESG data

As mentioned, alternative data providers will collect data from multiple sources and the following are some details:

Satellite Imagery: ESG data vendors can analyse satellite imagery to monitor a company's environmental impact. They can track deforestation, pollution levels, changes in land use, and other environmental indicators. This data helps to assess a company's compliance with environmental regulations and its commitment to sustainable practices.

Media and News Sentiment: ESG data vendors leverage social media and news sentiment analysis to gauge public perception and sentiment towards a company's ESG practices. By monitoring online conversations and news articles, they can identify potential reputational risks and assess stakeholder sentiment (driven by controversies).

Web Scraping: ESG data vendors employ web scraping techniques to extract data from various online sources such as corporate websites, regulatory filings, industry reports, and NGO publications. This allows them to gather information on a company's ESG policies, initiatives, and performance metrics.

Sensor Data: Some ESG data vendors utilise sensor data collected from IoT (Internet of Things) devices and other monitoring systems. For example, they can gather data on energy consumption, water usage, air quality, and waste management processes. This data provides insights into a company's resource efficiency and environmental impact.

Supply Chain Data: Alternative data sources like supplier and third-party data can provide visibility into a company's supply chain and help to assess potential ESG risks. ESG data vendors may collect data on suppliers' labour practices, human rights records, and environmental compliance to evaluate a company's supply chain sustainability.

5.3 Challenges of Evaluating ESG Disclosure of Hong Kong Listed Firms

(Some materials are extracted from ITF Symposium presentations on Mar 21, 2024)

Although there are international standards for ESG reporting format, different companies, large or small, have reported ESG performance with different formats, making comparisons difficult. The existing evaluation issues include wrong calculations of reporting items, missing important reporting items, wrong use of reporting unit, incomplete information, and irrelevant data. With the various types of reporting issues, there will be questions regarding the objectivity, meaning and accuracy of the report content. Therefore, when reading the ESG reports, investors or regulators can pay special attention to the accuracy, completeness, relevancy, the meaning, and

the quality of the figures presented in the ESG reports.

5.4 The Effect of Employee's Opinion on Corporate ESG Performance

(Some materials are extracted from ITF Symposium presentations on Mar 21, 2024)

The research design

A survey was conducted in 2023 with the employees in the USA and Hong Kong. It is to study how Corporate Social Responsibility (CSR) and green behaviours of companies will affect the green consumption behaviour of employees. The constructs under study are *perceived corporate social responsibility*, *perceived corporate environmental behaviour* and *perceived mutuality* (i.e. How do the employees see their companies? Do companies and employees agree with each other in terms of their CSR information? For example, do companies ask for opinions of as well as share their CSR information with their employees?) and consumer's environmental purchasing behaviour (i.e. employee's green purchasing behaviour).

The findings show that perceptions of companies' CSR alone are not sufficient to drive employees' green purchasing behaviour. Employees' perception of how a company behaves in environmental protection, known as perceived corporate environmental behaviour, partially affects their green purchasing behaviour. Further analysis suggests that high levels of perceived mutuality will strengthen the relationship between perceived corporate CSR behaviour and consumer's green purchasing behaviour.

This interaction effects of Perceived Mutuality on CSR and consumer environmental purchasing behaviour imply that the more the companies communicate with their staff and have their agreements, the employees will like companies' activities more (positive effect). They will believe and trust what companies are doing are genuine and it will also affect the green purchase behaviour of employees.

Comparison between Hong Kong and the USA

When the origin of the employees is considered, the relationship between perceived corporate CSR and employees' green consumption behaviour is more prominent among Hong Kong employees when compared to their US counterparts. One possible explanation could be that CSR knowledge is still a relatively new concept among Hong Kong employees (e.g. recycled paper), leading to a stronger initial effect that may diminish over time. In the USA, it will probably be more advanced in terms of the CSR and green initiatives. There is an opportunity for Hong Kong companies to start doing a lot more work in terms of engaging their employees to contribute more to CSR.

Implications

Socialisation (e.g. education) occurs when a company's CSR and environmental behaviour are positively viewed by its employees, leading to increased engagement in green consumption behaviour. The more the employees feel being consulted on

companies' CSR activities and their opinions are considered with more access to companies' CSR information, the more likely they will opt for green goods. These results suggest that there are ample opportunities for employers in Hong Kong to align their CSR efforts with their staff and turn them into advocates for CSR and green initiatives of the company, thus building green culture together as a result.

6. Stakeholders' Perspectives and Investment Opportunities

6.1 Managing Media and Social Media for ESG Issues

(Some materials are extracted from ITF Symposium presentations on June 12, 2024)

Managing Investors' Relations (IR) and Public Relations (PR)

Proactive Communications

A listed company needs to announce results and has the responsibility to compile annual reports. A REIT is a real estate investment trust under the listed company and is managing different properties. One of the key roles of IR and PR is to maintain proactive communications with different stakeholders who may be investors, tenants in the shopping malls, international or local grade offices and customers. The shopping experiences and needs of stakeholders may vary a lot but the common concern would be the capability of companies to sustain and evolve well in this changing market environment amidst all kinds of hardship and challenges. As a PR or IR professional, a key role is to present the company's strengths and strategies to stakeholders, not only good stories, but to give evidence and support with facts and data so as to let the investors or stakeholders know that the company can sustain in future.

Consistency of Messages

It is important to have a strong narrative of the company, especially in tough times. In addition to providing facts and data, ensuring consistency in messages is another important principle. This means that all stakeholders concerned are sharing the stories on what a company does, who the company is, what it does and how it does. Employees in a company probably may not know what the company does as they will care more their individual work achievements. However, employees are representatives of a company who would probably talk about stories of their company. Therefore, keeping messages consistent across all levels helps internal stakeholders to relate messages of companies with confidence.

Knowledge of the receivers

Another important consideration is to know the shareholders whom you are communicating on the other end and enable direct communication between company and shareholders. A shareholder identification system, with the help of data analytics, can help companies to understand more the investment behaviours of a particular stakeholder and follow up his/her needs more consistently.

Keep Communication Channels Open

Noting that nowadays media would pick up very nitty-gritty words to make headlines to attract readers, on top of reporting good stories of companies, it is also advisable for companies to keep communication channel open both for good and bad news, even though it is the most challenging task to answer for bad news. For bad news, it is wise to keep the enquiry call short, and to let stakeholders understand that you are busy and

would need to clarify things with management prior to the proper presentation of news.

The Pre-emptive Measures / Strategies in Bad Times and Crisis Situations

Balancing Disclosure and Confidentiality

Employees in the capacity of IR or PR need to prepare suggestions whether they are handling good or bad news. Ensuring the consistency of the messages shared is critical, but it is also useful, though difficult, to strike a balance between providing information to investors and maintaining confidentiality. This is to ensure the investors' interest but also without leaking confidentiality. A crisis situation will usually result in a press release which is also an approach to ensure that investors and media can receive consistent information while it can help correct some of the news reports already published. Still, the best way to do this is to know the issues before it goes out to the market. However, rumours are unavoidable and hard to control. Speedy reaction is still required when necessary.

Good emotional intelligence

Emotional control is also necessary as there would be unfriendly investors who would tell you things that you find unreasonable. It is wise to maintain neutrality while providing useful information to investors to ensure that they can make informed decisions.

Establish a comprehensive procedure

It is helpful to establish a thorough procedure for quick reactions during crisis as it is hard to have enough time for detailed discussions under crisis situation. Media nowadays responds extremely fast around the clock and therefore companies also need to respond hastily to the media and the netizens.

There is an incident happened about the failure of an escalator and caused injuries. The news was the top ten news in that year. Without any delay, the company formed a task force immediately and mobilised all departments to work together in real time. Not only PR, but the CEO, all property management teams worked together because they should know more what had happened. The company needed to communicate closely with the external parties, like the EMSD (Electrical and Mechanical Services Department) and also the escalator supplier, to know more.

A major focus would be really to care about the injured and how the company can provide assistance to them. The company also need to have data and facts like the frequency of the escalator suppliers to check and maintain the conditions of the escalators. At the same time, the marketing team need to align the consistency of messages about the focus in offering assistance to the injured more frequently.

Also, not only during the crisis period, but the post-event management is also very important. It is important to maintain open communications with suppliers and customers about the progress of the follow-up, about how your company will improve and maintain a stronger maintenance process. To conclude, a clear, transparent and

proactive type of communication with different stakeholders is critical nowadays.

The Use of AI and Data Analytics in Managing ESG Issues and Performance

The Importance of Data
The availability of data is really the key to addressing ESG issues as companies need lots of data, for example, environmental protection. A company is leveraging AI and big data for the optimisation of its chiller plants inside their properties because machine learning is very powerful nowadays. It can help generate some real time data and process large loads of climate data as well. Feeding in climate data from weather stations on the roof tops of their properties and feed to their BMS (Battery Management Systems), some automated calculations can be done so that they can optimise the chiller plant usage and lower the energy use in the end with the big data. Similar usage principle applies to the minimisation of energy use in the carpark while maintaining better air quality.

The Use of Data for Prediction
Some data analysts use big data, not only those from Hong Kong but also the global data so that people can better predict the severe typhoons or floodings coming in the next 10 years. This helps the forecasts of the scenarios of upcoming problems and with more knowledge in advance, it helps the development of pre-emptive measures. The information is very useful, especially for adjusting the temperature inside the shopping centres for different weather states known in advance and taking precautions against typhoons and flooding.

The Use of Data to Make Investment Decisions
Good air conditions can be maintained with the support of technologies, but equally important is the manpower supply for monitoring and controlling. The fact that investors care about credit ratings has been emphasised. For instance, a real estate company looks at credit ratings and ESG ratings carefully. Some ESG rating companies are using big data to help provide climate data like carbon emissions. This company needs the data from ESG rating companies and to follow up with specific analysis. The firm has used data on flooding to help improve the safety of the properties built on a piece of land next to a river in China because of the good river view. The firm bought the land earlier on an elevated land level which then became a natural floodgate. This is how the company used the data to end up making an important investment decision.

Manage internal communications

Engage the Employees
It is agreed that employees are the ambassadors and voices of the company. A company should align the corporate messages and motivate employees to communicate for the company, especially in rapidly changing market environment and challenging time. To facilitate internal communications, instead of a common annual gathering, a company starts a bi-monthly town hall meeting in 2024 so as to engage employees more often in

the alignment of messages across different position levels and generate new ideas.

Establish an Internal Handling Procedure for Crisis Events

During crisis situation, for example, given the spread of a piece of bad news, in the same way as for handling external stakeholders, the company will immediately form a taskforce. A few of the key management people, employees who are responsible for communications and managing relationship and that include IR, PR and HR (Human Resource) will work closely together. It is important to ensure understanding between departments. For example, for finance matters, there should be explanations to ensure the understanding of HR staff as they are handling staff relationships. There should be alignment of messages and proposed solutions for the senior management to consider.

Assess the Level of Confidentiality

The involvement of employees depends on the confidentiality of the piece of news. The employee list will be very restrictive if the news is highly confidential. We need to be very cautious about the selection of employees as representatives and they should be professional enough, having particular expertise to talk for the company. Other employees will show understanding that only some employees would be selected to present for the company. For good news and news involving all employees, like good ESG performance or appointment of key staff, it will be good to share with everyone in the company.

Involving Senior People

In response to good news or bad news or anything that is important, it is necessary to keep the top management informed and ensure that they are on board for decision making. Nowadays it is believed that all the top management's KPIs involve ESG parameters.

6.2 Using ESG Data to Generate Financial Intelligence

(Some materials are extracted from ITF Symposium presentations on June 12, 2024)

Data Validation for Data Quality

ESG data providers will provide information, and the executor will use it in a portfolio construction to make money for investors. In this real-life work process, data validation due to quality issue, can be challenging and the turn-around time may be longer than expected. There are useful approaches adopted by ESG data vendors for accessing data and ensuring data quality. An ESG data vendor adopts the globally consistent data processing and also quality assurance (QA) procedures across different markets to ensure the consistency and comparability of data. The company has been using a lot of QA data toolbox in daily production, for example, they will apply dual vendor validation and validate data from alternative data sources. They will also look into the outliers based on the percentile and the quality of data, trying to spot them if there are any large variations year on year, for example.

The data processes are edited, and it means that they have undergone multiple layers of

validation. From the input layer, they will get the data from the vendor, the issuers, the regulators, news and NGOs. The second layer is the derived data from the ESG rating agencies' proprietary small model, such as the carbon estimation model or the governance model. The output layer is, for example, the ESG rating at the issuer level. has been increasing the interactions with the issuers. The issuers can gain access to the methodology in processing data collected and also the ESG rating reports published. The issuers are also invited to participate in the data verification process.

Managing the Turn-around Time

The market does not lack data but has massive of it. For massive amounts of data, the quality and inconsistency of it require time to validate. The reliability of data from different sources needs to be judged to confirm which dataset actually fits better into our proprietary model and to make sensible adjustments in the overall financial modelling. Recently, asset management firms have been looking at several portfolios of climate data which is the carbon footprint from different data vendors and finds that one of them is actually higher than all the other data subsets they received. On such occasion, asset management firms should investigate before concluding which datasets to choose from. From a buy-side perspective, asset management firms need to validate and understand the data to be used. Usually, asset management firms have to investigate further for variance and add its own judgment.

Another concern is the traceability of the data. This question is to find out whether the data is coming straight from the reported data or from vendors using proxy estimations. It is to ensure those proxy estimations methodologies to be in line with the expectations of the buyers. Therefore, there will be quite a lot of deep dive kind of approaches and practices that the buy-side professionals need to engage.

The Use of AI in Data Processing

ESG is called non-financial data and is gaining importance lately. Unlike financial data which has been used for many years with rich information in its applications, it is rather easy to know whether it is a cheated piece of information or not. But with the newly developed ESG data, how can people use it for prediction of alpha generation accurately and what will be the challenging issues?

Many ESG data providers utilise AI in data processing. First of all, there will be a comprehensive review annually of a large number of companies and the available public data sources, which are translated into a huge amount of news as well as a considerable number of documents. Rating agencies can issue a company report with millions of data points on annual basis. To look into the massive amount of data, the rating agencies can leverage technologies in every step of the content creation in order to provide the scale, the speed, the uniqueness and a variety of different contents. The AI techniques have also been applied to detect anomalies.

AI also has the capability to identify the entities whether they are organisations or

people from semi-structured or unstructured sources. But equally important is the inputs of a strong team of different expertise backgrounds, for example, carbon emissions, data governance as well as the industry leads. On average, for each single ESG rating report, it will be reviewed and contributed by 6 to 8 different ESG analysts. There will be different layers of checking when gathering insights from these public data sources for ESG assessments.

Broader View of ESG Data, Alpha and AI

It is hard to consider ESG as non-financial data and to distinctively differentiate it from the fundamental financial data. ESG is definitely a broad topic that comes with a lot of different sectoral considerations. ESG integration is an additional lens to add to the fundamental analysis.

Alpha is excess return but it comes in different forms. From an ESG perspective, excess return does not have to come with a tangible growth data as the ESG factor may not be imminently reflected by share price performance. For example, a property developer has invested a lot in using renewable energy on buildings. It does not mean that the company is telling you that energy efficiency facilitates the rise of share price, at least not imminently, not on the day when the news has been announced. But in longer terms, it could easily attract higher quality tenants, who may be willing to pay more rents. Therefore, ESG may not be an imminent factor for immediate growth but definitely plays a role in the long-term alpha generation.

People will also think that excess return means additional return. If the index generates 10%, when you get 12%, then 2% is the excess return. If the index drops 10% and if you manage to drop 2%, that is also about 8% excess and in this regard, ESG plays a role in mitigating downside risk as well. ESG provides a good perspective of risk mitigations, investors can look into the reputation risks from ESG data sets. They could set up alerts in their databases and when negative news pops up, they could be able to make some tactical changes in their investment.

Alpha may be very intangible in a broader perspective. For example, a company cares about people's well-being. In their buildings, their premises and their offices, they have acoustics guidelines on how to make the staff feel better. The outcome may not be materialised in our considerations, but in the longer term it may potentially lead to tenants' retention. Tenants' intentions are actually involved in ESG considerations. That is not something tangible or you could visualise immediately. This positive intangible effect should not be neglected.

Implications of Regulators' Requirements

The different regulations or regulators' requirements can be perceived as guidance for companies to review different kinds of risk and place companies in a better position to capture the upside business opportunity. For example, in the EU (European Union), there is a CSRD (Corporate Sustainability Reporting Directive) requirement that

requires companies to conduct double materiality assessment. The companies have to look into whether the sustainability issues have any material impact on the financial position (outside-in), and also to review the impacts of their business activities on the environment and society (inside-out). Through this kinds of analysis, companies or investors will be able to do quick examination of the risk exposure and also assess the upside opportunity based on the positive or negative impacts of the value change in their investments.

From a product creation perspective, for example, in the EU, we have the MiFID II and the investors are asked to integrate the clients' sustainability preferences as part of their suitability assessment. So rating agencies need to seek many asset managers to integrate the SFDR (Sustainable Finance Disclosure Regulation) and the MiFID II consideration into their product design. They have to come up with the sustainable investing definitions and the characteristics of their funds in order to attract a sustainable investment flow.

6.3 How to Use Climate Data to Generate Financial Predictions Issues

(Some materials are extracted from ITF Symposium presentations on June 12, 2024)

Climate-related Products and Services

Catastrophe bond (CAT) is of new potential in the market. Recently, YoujiVest has cooperated with quite a few of insurance companies, reinsurance companies and also asset managers on catastrophe related products. There are investment opportunities as well. The catastrophe bond is a comparatively high-yield debt instrument when compared to traditional financial products. When hedge funds and insurance companies issue them, they want to transfer their risks to the market. Investors of the catastrophe bond bear some product risks. Reinsurance companies also do that when they cannot bear some tail risks, they then send it out to the market. Interested parties will have choices since there are many different types of disasters taking place globally so that the market can offer investment products with different yields.

The features of CAT

CAT has a very low correlation with the traditional financial market because it is all about climate disasters. As CAT bond is not related to financial market trends or economic conditions, it's a very good tool to do the diversification of portfolio. It has more competitive yield compared to other fixed-income bonds and dividend-paying stocks. CAT helps insurance companies to transfer risks and provides them with cash when needed while preventing issuers from bankruptcy from a natural disaster.

For retail investors, depending on the level of risk they want to engage in, there will be different outcomes. Only if retail investors buy something that is really of high risk, they will lose more principal capital. But in general, if they are risk aversive and would only want to earn a little higher yield, the chance of their covering for the disaster's risk

is not that high.

The Climate Risk Model, launched in 2023, of YoujiVest covers eight hazards with reference to IPCC (The Intergovernmental Panel on Climate Change). The eight hazards are: Water Stress, Tropical Cyclones, Floods, Extreme High Temperatures, Extreme Low Temperatures, Wildfires, Landslides and Sea Level Rise. The Climate Riks Model is helpful for climate assessment. According to the IPCC (The Intergovernmental Panel on Climate Change) new guidelines, YoujiVest also works on climate predictions for 5 years, 10 years, 20 years and 50 years. YoujiVest is doing predictions for long-term periods.

With new technologies like AI, the accuracy of predictions has been increased. The collaborations with insurance companies help to perform risk transfers functions. There are quite a few of catastrophe-related products among industries and there is a very good business opportunity in the future.

6.4 Relating Financial and ESG Disclosure: A Double-materiality Issue Issues

(Some materials are extracted from ITF Symposium presentations on June 12, 2024)

In the past like 20 years' ago, financial disclosure and ESG disclosure hardly had any cross-over between them. However, we all experience climate change, and its associated risks can have huge impacts on financial formulas.

The Development of Disclosure Requirements

Historical Development – TCFD and IRFS
In 2015, the FSB (Financial Stability Board) established the TCFD (Task Force on Climate-related Financial Disclosures) to develop recommendations for more effective climate-related disclosures. Since then, there have been more discussions about the financial impact of climate change. Starting from 2017, people in the world have started to integrate TCFD into the ESG standards. TCFD contains domains of risks and opportunities. For risks, there are physical risks and transitional risks. For opportunities, a lot of companies, like BYD, have taken opportunities from climate change. The risks and opportunities analysed will be reflected in the financial statements such as cash-flow statement, balance sheet and income statement. The vision of TCFD since 2017 is to integrate financial and ESG reporting. The TCFD recommendations are structured around four thematic areas that represent core elements of how organisations operate: governance, strategy, risk management, and metrics and targets. The disclosure items proposed by TCFD are different from those recommended for traditional ESG reporting. Regarding the environmental aspect, TCFD only concerns GHG (Green House Gas) emission issues. The traditional ESG reporting items covers a lot of different issues, for example, the use of water, the use of resources, waste treatment etc. TCFD emphasises climate change and does not touch upon social issues.

In 2023, IFRS (International Financial Reporting Standard) saw the issue of two papers S1 and S2. S1 is about sustainability disclosure and S2 is climate-related disclosure. The contents (governance, strategy, risk management, metrics and targets) of TDFC and IFRS are pretty much duplicated, but S1 emphasises sustainability related risk and opportunities, which is not the focus in TCFD. And IFRS only concerns financial impacts on the companies and wants to have figures being reflected in the financial reports.

Challenges of Disclosure in S1 and S2

For IFRS, there is a stringent requirement of scenario analysis and scope 3 disclosure. Concerning Scope 3, there are 15 reporting categories and most of them are very difficult to collect, for example, the "purchased goods and services" and "end-of-life treatment of sold products". When the supply chain involves many primary and secondary suppliers, it is difficult to collect all those gas emissions figures from their respective supply chains. With the availability of big data and its associated analysis, there may be tools for producing more accurate figures. However, the different units of measurements again cause another problem. HKEX has issued a consultation paper with the resultant plan to handle the alignment issue of TCFD and IRFS in future.

The Impacts of Disclosure Requirements

Guidance to Corporates

The exercise of disclosure creates many business opportunities from professional service perspective. People have had decades of experience in financial reporting, which has already been a very mature process and position in the market, but this ESG space appears to be developed in the recent decade. Lots of companies are still learning how to handle this issue. There should be room for further development. Even the regulators only start to issue new regulations and requirements while a lot of alignment issues need to be handled well. People will share that there is much information to digest. There will be different kinds of enquiries from clients, thereby creating opportunities to help clients to navigate the challenges as well as to comply with the regulators' requirements precisely and efficiently. The whole concept regarding climate change is not only about risks and compliances but also opportunities. This is because through this exercise, the idea of setting different kinds of compliance standards etc. help companies to revisit their business models to avoid risks and grasp business opportunities as well.

Common Goal Attainment through Collaborations

Climate change and risks are common challenges to people and stakeholders (individuals, corporates and governments) who do not refute against the importance of sustainability related disclosure requirements. For transition to a low carbon economy and attaining the goal of carbon neutrality, the governments and the corporates have to work together. The investors are very concerned about the impacts of this disclosure requirement on the corporates as this affects their interests. All these compliance requirements add burdens and costs to the corporates because they are new requirements. However, people have to get used to these changes because they guide

them to the right direction. Meanwhile, the investors are concerned about how the corporates can meet the transition requirements.

In fact, there is a common understanding of the direction and requirements and some corporates are also putting effort into presenting their transition plans to their stakeholders and the impacts on the companies regarding climate change. Due to different business nature, some corporates will be affected more by climate change and therefore the requirements or the compliance rules also have some flexibilities. Companies may need to do a deeper dive analysis when businesses are highly influenced by climate change. For companies which are less impacted by climate change factors, they would be allowed to make a preliminary high-level analysis to explain to stakeholders why climate change is not so important to their businesses.

The Implications of Meeting Disclosure Requirements
ESG, with its associated disclosure and reporting, requires professional knowledge and experiences in both financial and non-financial aspects. Why is it the concerns of all stakeholders and even every citizen?

A possible explanation is that ESG does concern everyone in society. The financial economy and the environmental conditions not only affect the businesses of corporates but also employees of companies. The current valuation process for a particular company is not perfect yet as companies still afford to pay attention to a financial driven model while lots of non-financial considerations may be overlooked by many, though not all, analysts. In fact, the employee well-being is an important element in the social pillar of ESG.

It is anticipated that a consensus is gradually built up across the investors' space regarding the need to have ESG-related considerations as well as the disclosure requirements by regulators. Investors should pay attention to both sets of information, the financial performance and the specific ESG performance of a company. Nowadays, regulators mention the need to have "connectivity" between the financial information and the ESG information. It is therefore also advisable for companies' management to provide investors with a full picture, rather than the financial side only, of their companies.

People will be forward looking and ESG data and the disclosure concept implies the need of predictions of the future business development of a company. For investors of some companies in the energy sector, they will be very concerned about the forward-looking opportunities since every country is talking about the commitment to "carbon neutrality". This is not only for the institutional investors, but also for the retail investors as well because both of them care about the long-term investment in the next 10 or 20 years. In this exercise, they also need to make a lot of assumptions or projections. For example, we do not have any carbon test in Hong Kong or mainland China right now. Think about one day we have to follow the practice in Europe or Singapore since they

already have the carbon test.

6.5 Opportunities and Challenges in Consulting for ESG/Climate Change

(Some materials are extracted from ITF Symposium presentations on June 12, 2024)

The opportunities and challenges on ESG/Climate Change can be concluded as follows:

Opportunities
- Buy-side analyst or fund manager for building ESG or green integrated portfolios
- Carbon neutrality and transition planning
- ESG/Low carbon products and services (including consultancy service)
- ESG/Green standard consultancy
- Green bond/carbon certification consultancy or verifier services

Challenges
- Lack of data (scope 3) and specific knowledge, especially for SMEs
- Identifying greenwashing risks
- Unlike other services, the scope is too big
- Standards are not clear enough and keep on changing rapidly

7. Discussion and Implications

(The content of the section is contributed by Prof Louis Cheng)

7.1   Overall ESG

The 3D-plot visualisation system used the i-Score performance of Hong Kong listed companies as the z-axis, the RavenPack sentiment score based on different keywords as the x-axis, and the YoujiVest positive or negative ESG sentiment score as the y-axis. The system processed ESG information for 511 Hong Kong listed companies as the i-Score universe and 334 Hong Kong listed companies as the peers (market cap larger than HKD 2 billion at the end of 2022) universe.

Fig. 7.1a. and 7.1b. show the i-Score universe in green circles and non i-Score universe are overlapping, indicating that there are no significant differences between the two groups of firms, in terms of sentiment performance.

Fig. 7.1. 2022 i-Score Universe (green circles, n=511) vs Peers (grey circles, n=334) Performance

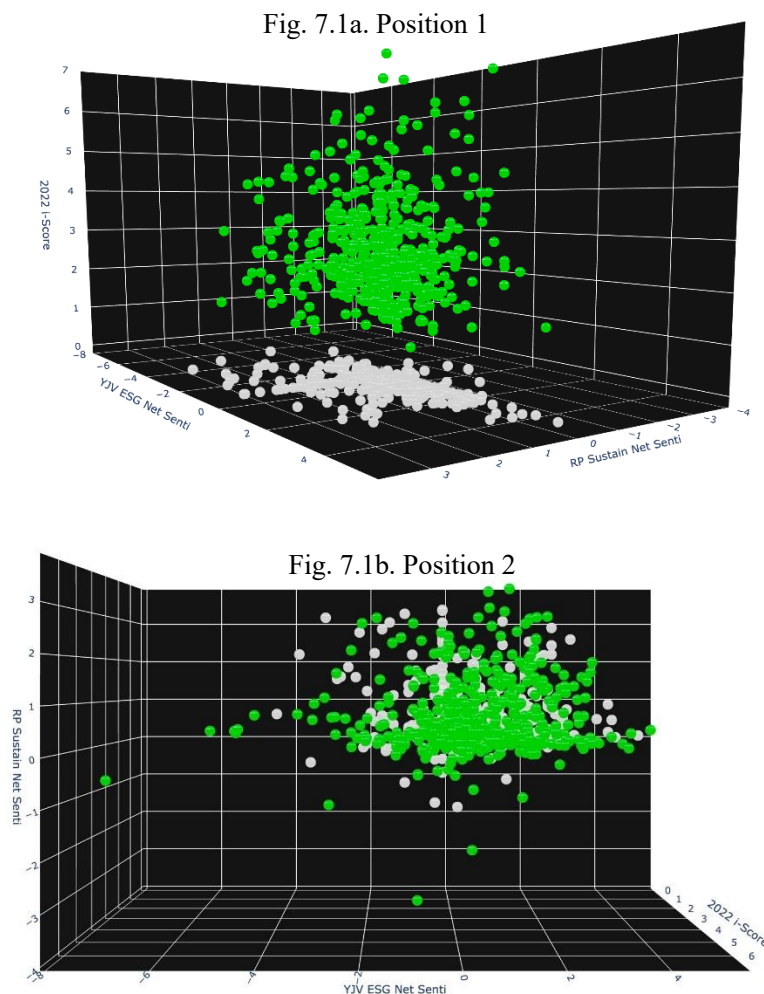Fig. 7.1a. Position 1

Fig. 7.1b. Position 2

Fig. 7.2. shows the 2022 i-Score universes' sector-average performance distribution including the i-Score and non i-Score. This figure implies that the sector-average performance of health care sector (the solid orange circle) is obviously better than other sectors in RavenPack sustainability sentiment average score and YoujiVest net ESG score.

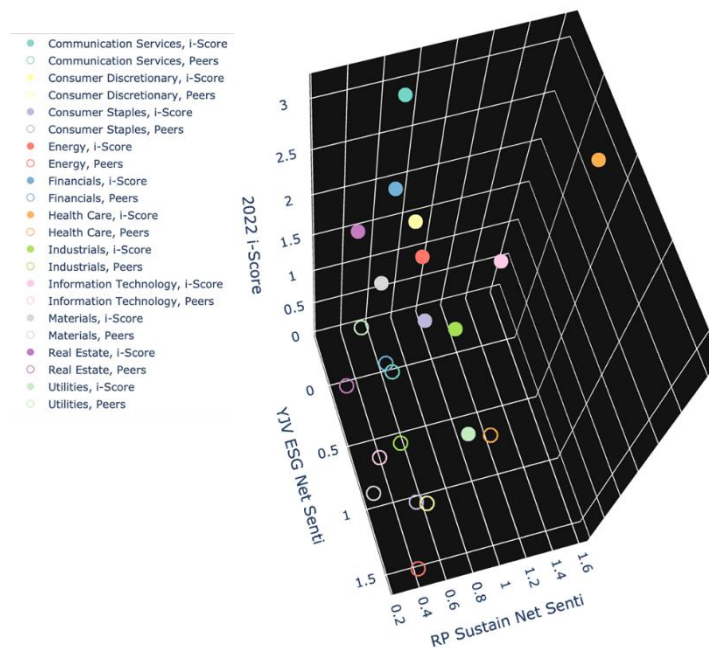Fig. 7.2. 2022 i-Score (n=11) vs Peers (hollow circles, n=11) Average Performance Distribution in GICS1

Fig. 7.3. shows the i-Score universes' performance distribution including i-Score and non i-Score in 2022.

It reflects that the i-Score covers most of the large-cap[1] entities. These large-cap entities are more condensed in the positive zones of RavenPack sustainability net sentiment and YoujiVest ESG net sentiment score than mid-cap and small-cap entities. In addition, there are some small-cap and mid-cap entities located in the negative zone of RavenPack sentiment and YoujiVest sentiment, but not for the large-cap.

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[1] Large-cap entities have a market cap larger than HKD 100 billion, mid-cap entities have a market cap lies between HKD 10 billion to HKD 100 billion, and small-cap entities have a market cap smaller than HKD 10 billion.

Fig. 7.3. 2022 i-Score Performance and RP vs YJV ESG Sentiment (i-Score (n=511) and non i-Score Universe (hollow circle, n=334)) Categorised by Market Cap
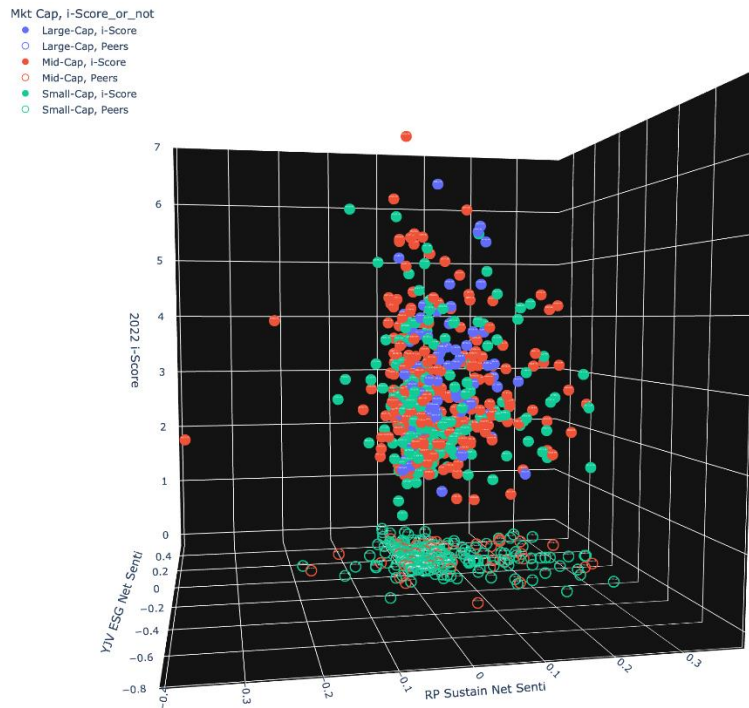
7.2 Pillar and Media Type Comparison

Based on this bird's-eye view from top to bottom (Fig. 7.4b.), we can see that the listed firms are clustered at the same region for both the i-Score and non-i-Score universes, suggesting that the relationship between E Senti and S Senti are the same for both samples. Overall pattern strongly indicates that there's a positive correlation between E Senti and S Senti.

Fig. 7.4. i-Score and RP E-pillar vs RP S-pillar Sentiment for i-Score and non i-Score Universe
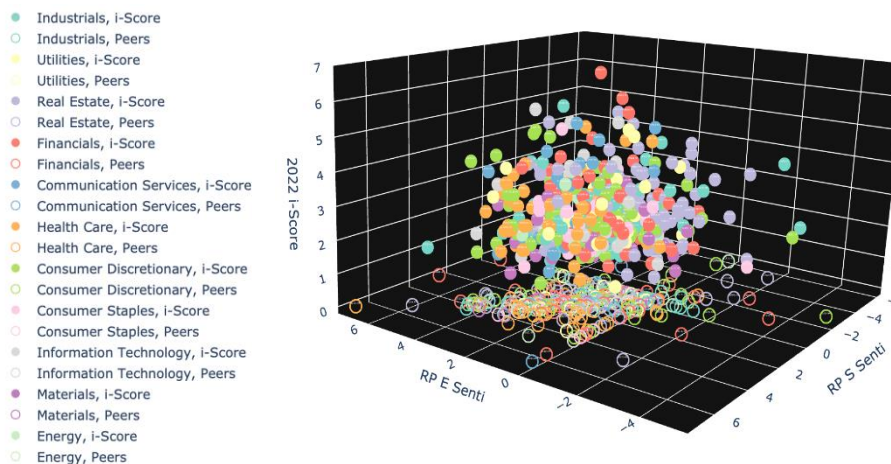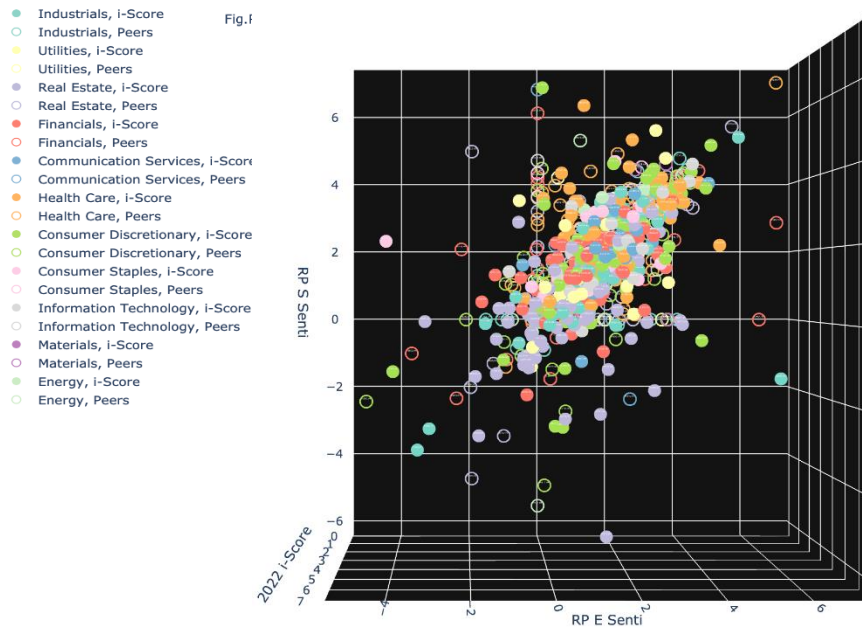
Fig. 7.4a. Position 1

Fig. 7.4b. Position 2

For Fig. 7.5a., we focus on mainstream news. The i and non-i universes basically are scattered in a similar fashion with not much presence in the high positive and negative sentiment zone. For Fig. 7.5b, we focus on the social media news. However, the i universes are more spread out to the high negative senti areas while the non-i universe seems to cluster within the low value zone for both positive and negative sentiment.

This pattern indicates that the i-Score universes has more negative social media sentiment than the non-i universes. There was more negative social media news of the i-Score firms than those of the non i-Score firms, suggesting that social media KOLs may tend to generate criticisms (unsubstantiated) of the i-Score firms in order to gain more subscribers for their channels.

Fig. 7.5. i-Score and YJV ESG Positive Sentiment vs YJV ESG Negative Sentiment for i-Score and non i-Score Universe
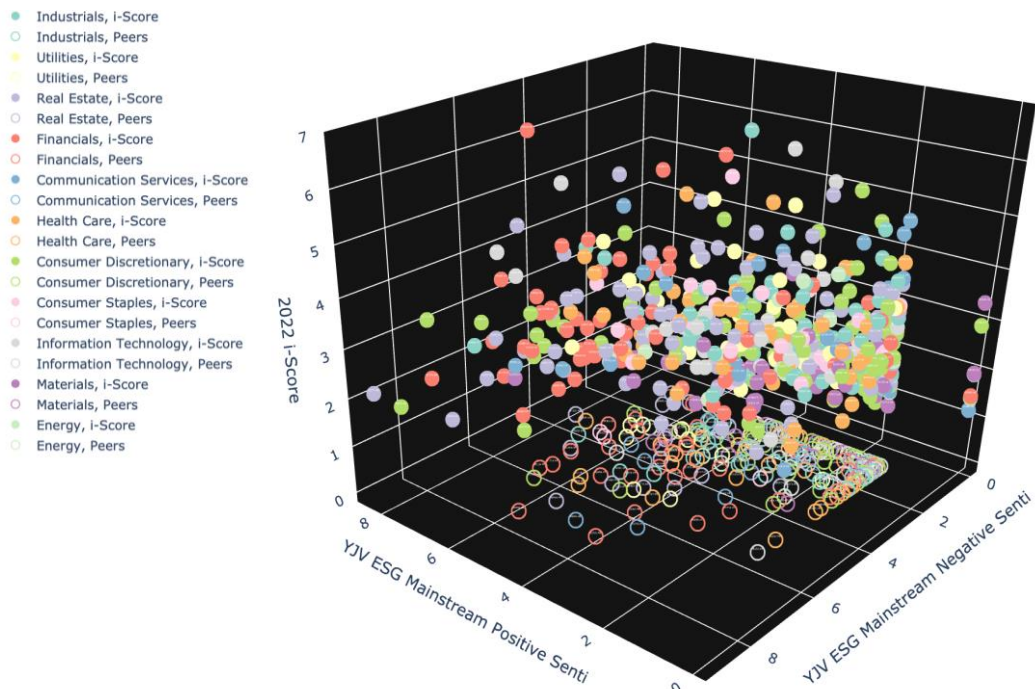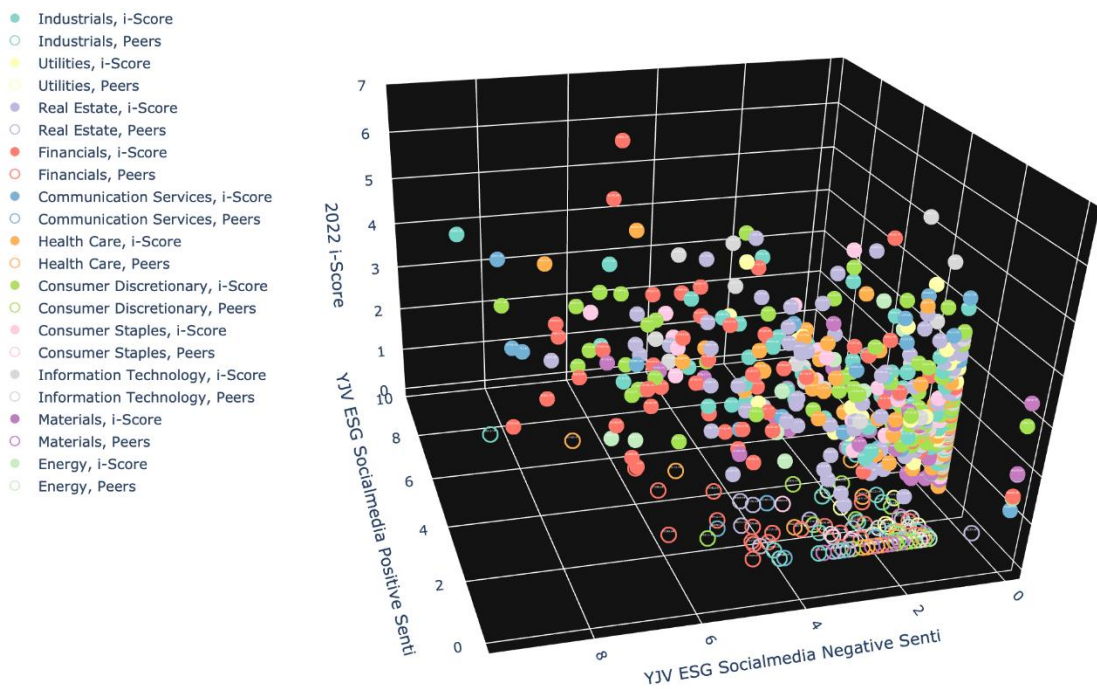
## Fig. 7.5a. Mainstream news only

Fig. 7.5b. Social media news only

According to Fig. 7.6., the *Top100* (Red circles) demonstrates a more spread-out pattern for all three dimensions: Net Senti, Mainstream Net Senti and Social Media Net Senti. On the other hand, the *Bottom100* (Blue circles) has a very limited range for Social Media Net Senti.

Fig. 7.6. YJV Net Senti vs YJV Mainstream and Social Media Net Senti: Top100/ Bottom100 (Mar 2023)
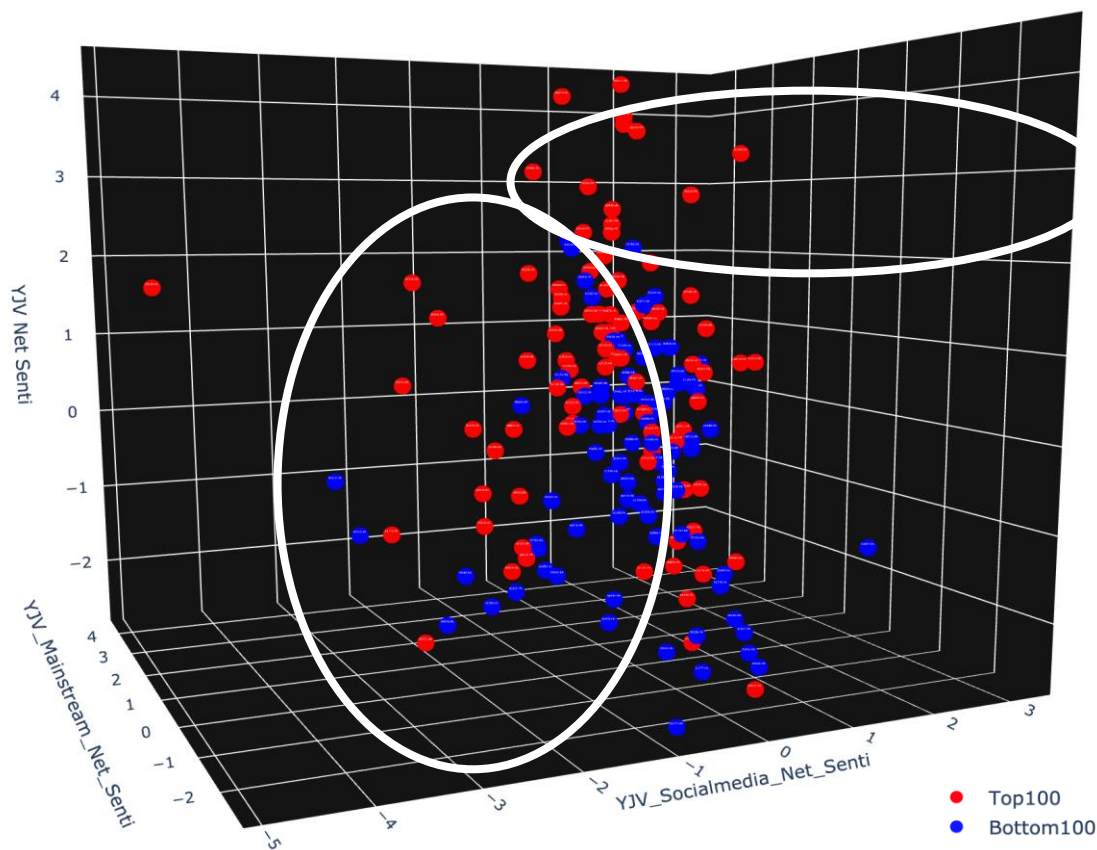
Sentiment matters as it enhances overall i-C (i-Composite) performance if done properly. Even though all firms in the Top500 are large firms with sufficient resources, there are still significant differences in sentiment performance between the *Top100* and the *Bottom100*. From another perspective looking at this issue, there are 15 firms with negative sentiment among the *Top100*, while there are 34 firms having negative sentiment among the *Bottom100*. Since our *Top100* and *Bottom100* have the same number of firms in each sector, the numbers of negative sentiment firms are free from industry bias.

A conclusion can be drawn from 3D scattergrams that being the top 100 in the i-C Score does not mean that they can control the sentiment, even though they have a large market cap. It is difficult to or even cannot control the media's reaction to firms in terms of ESG performance. Rather, larger firms will be subject to negative sentiment more easily because social media aims at drawing the attention of the public to something big. Therefore, it may be more challenging for the top 100 firms to control media's ESG

sentiment. In short, the ESG performance erosion due to sentiment is an important issue for the Bottom100. The Bottom100 firms should seriously consider stepping up their ESG communication strategy to avoid sentiment erosion of ESG performance.

Stakeholders should be advised to have a clear understanding of their own ESG preferences (i.e. E-pillar, S-pillar, and G-pillar respectively) for their investment strategies and product choices. For institutional clients, the investment policy statement would document in detail how ESG should be integrated into the portfolio allocation and product selection process. The KPIs for evaluating the real impact and the financial impact (i.e. double materiality) should also be clearly specified.

7.3 Financial Performance

Finally, we explore the relationship between the ESGi and firm-level financial performance. Two financial variables are used. They are market to book and profit margin. The 3D diagram (Fig. 7.7.) indicates that there is no significant difference in financial performance (market to book and profit margin) between the *Top* and *Bottom 100* firms. At this stage, there is no evidence to suggest that better ESGi can lead to better financial performance for the same year. It is suggested that longer term relationship should be explored.

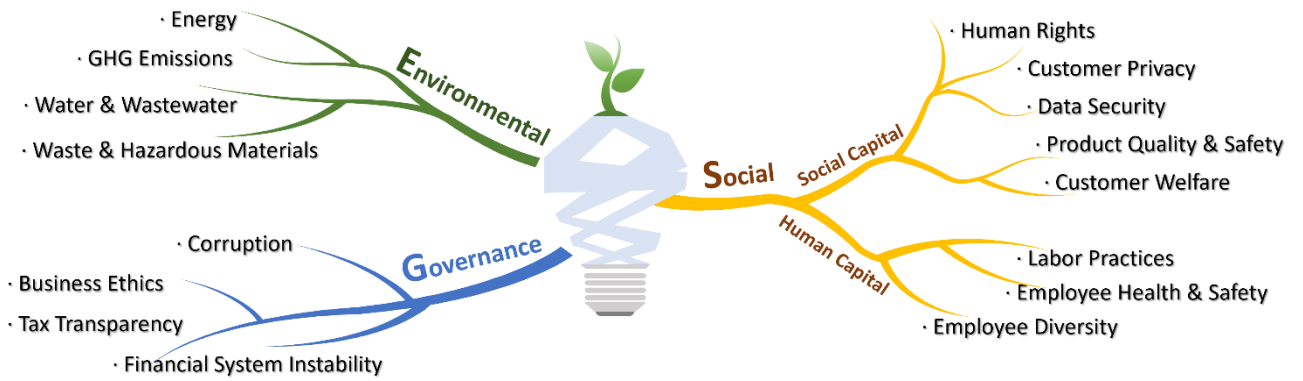Fig. 7.7. Relating ESGi with Market to Book and Profit Margin
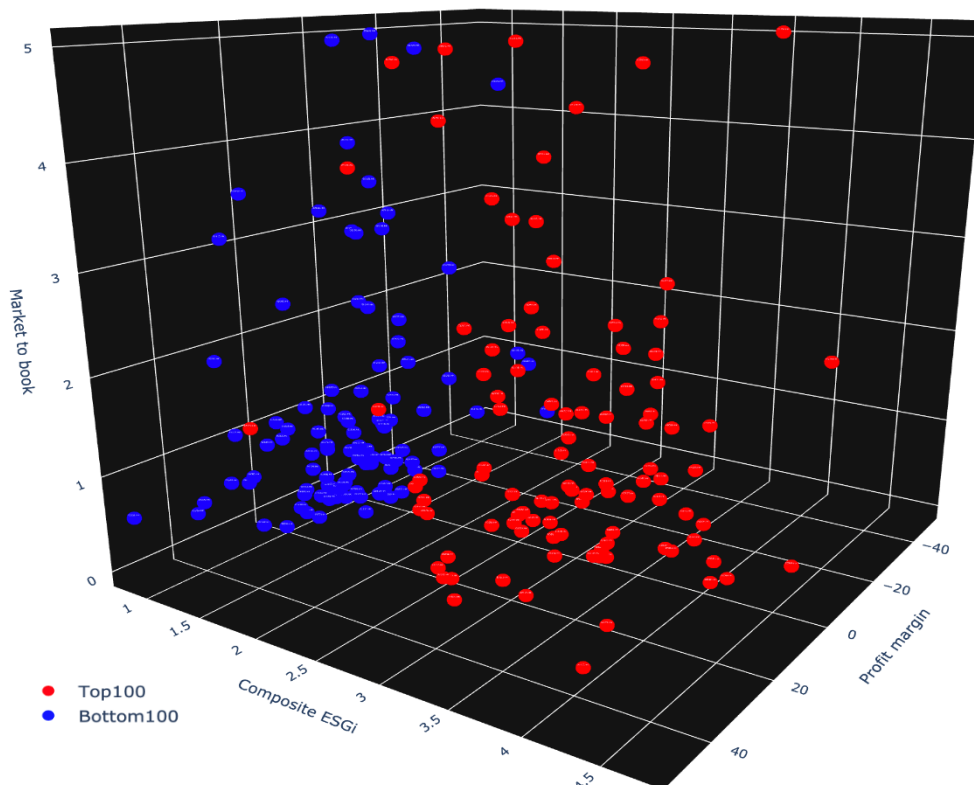
7.4 Future Direction of ESG Intelligence and Alpha Generation

Using ESG performance as part of the valuation model for listed firms is an obvious trend globally. In the distant future, ESG integration in private equity (PE) valuation is also unavoidable. Our report provides an important road map for listed firms' senior executives in allocating needed resources to obtain ESG intelligence (including both rating and sentiment information) to support their business decisions.

In terms of the relationship between ESG intelligence and financial performance, we do not find a significant result. However, we do demonstrate some alpha generation based on high i-score portfolio. Nevertheless, the role of news sentiment is not clear. More investigation is needed to provide guidance on this subject matter. In the near future, climate change data and carbon targets will play an important role in firm level performance and portfolio construction. Negative ESG news (i.e., ESG controversies) is expected to be integrated evaluation model in an efficient manner using real-time big data analytics. A lot of work is needed to fully incorporate these non-financial data under the framework of double materiality to assess firm value.

~End~

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ESGi
ESG 研究中心
RESEARCH CENTRE FOR ESG

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· GHG Emissions
· Water & Wastewater
· Waste & Hazardous Materials

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· Corruption
· Business Ethics
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