Digging into the data:

Using machine learning to evaluate ESG in China

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IN BRIEF

- We have created two proprietary machine learning tools which discover and distill material ESG information on Chinese companies, drawing on a wide range of data and information sources, complemented by input from local experts.
- One tool uncovers corporate controversies and provides discussion topics for timely engagements with portfolio companies; another estimates ESG performance for companies that do not disclose it. We believe such Insights are more complete than third-party ESG data and ratings providers', which often rely on industry averages.
- To be clear, machine learning is not a substitute for actual company disclosures. Meetings with investee companies to understand their impacts and internal processes complement our machine learning research.
- New regulations took effect in China in 2022 requiring certain listed and private companies to disclose specific environmental data and metrics. Though China still lags other countries in corporate ESG disclosure, the new regulations mark a meaningful step towards greater transparency.

As the world's biggest consumer market and a production hub for many other markets, companies in China may play an important role in our client portfolios. Understanding Chinese companies' environmental, social and governance (ESG) practices is important for us to assess their financial viability for our long-term investment decision-making. For example, 'E' metrics would include greenhouse gas emissions, 'S' metrics would include the gender split of a company's workforce, and 'G' would include the composition of a company's board. According to numerous studies, companies that take ESG considerations into account are better positioned to deliver long-term value[1].

Company disclosures are an important way to gain an understanding of a company's ESG-related risks and potential opportunities. Recently, regulatory changes in China require certain listed and private companies to make additional disclosures, specifically on carbon emissions. The rules marked an important step on the country's path to 2030, when the government projects carbon emissions may peak[2].

To meet the challenge of addressing data gaps, we have developed two proprietary machine learning tools. The first tool approximates for financially material metrics what a company would have disclosed when they do not, based on other data available. We have found this tool useful for filling in data gaps. The second tool seeks to distill relevant and material ESG information from a wide range of complex Chinese alternative data sources, ranging from corporate litigation to government fines. The tool seeks to parse relevant information and assess corporate controversies that aren't normally considered in third party ESG score cards but which may affect risk-adjusted investment returns. An integral part of this tool is the input of inhouse professionals who understand the nuances of local language, law and industry sectors.

As active stewards of our clients' assets, we engage with our portfolio companies. One value of the tools above is providing us with discussion topics for timely engagements with companies. These meetings are informative and can stimulate the disclosure of more material ESG data by the companies in the future.

How we integrate ESG and financial materiality at JPMAM

There is no standard method in which companies integrate ESG considerations and frameworks. At J.P. Morgan Asset Management we define ESG integration to be the systematic inclusion of financially material ESG factors (alongside other relevant factors) in investment analysis and investment decisions. As an active manager, we embed ESG considerations into our governance process, and we systematically assess financially material ESG factors including sustainability risk in our investment decisions with the goals of managing risks and improving long-term returns. ESG factors encompass a wide range of issues including (but not limited to) climate risk, natural resource use, human capital management, diversity, business conduct, governance practices, shareholder rights and executive compensation, as they can impact negatively the value of an investment. J.P. Morgan Asset Management considers financially material ESG factors when assessing an investee company's performance. ESG integration is used to support mitigating risk and can unlock opportunities in an investment portfolio. By considering financially material ESG factors, we believe that ESG integration can inform better long-term investment decision making and can help build stronger portfolios for our clients.

1 Gunnar Friede, Timo Busch and Alexander Bassen, "ESG and financial performance: aggregated evidence from more than 2000 empirical studies," Journal of Sustainable Finance & Investment, 5:4 (2015): 210-233.

2 https://reader.elsevier.com/reader/sd/pii/S2096519222000131?token=9B577ADC5762DFCDCF9D28CF717CB57FA1C9AB881F3F92EDFDAB324E5EA05773AAFE745648894CD303D79ECBEF18CDEB&originRegion=us-east-1&originCreation=20221205061322

A tool to fill gaps in ESG disclosure

Data challenges persist despite new ESG disclosure regulations. Although disclosure rates have risen in the past two years, as we discussed, Chinese companies still lag their global peers. Some companies only release ESG information in Chinese and/or on social media. Broadly speaking, Chinese companies, particularly smaller firms that are new to corporate sustainability reporting, may disclose policy updates or disclosures on Weibo[3] before they publish a sustainability report. Companies may also disclose metrics in Chinese reports that don't appear in their English language reports.

These sources may be easily missed by third-party global data vendors and ESG ratings providers. To fill these gaps, we collaborate with China-specific data vendors with expertise in pulling disclosures from alternative datasets, including Chinese-language social media.

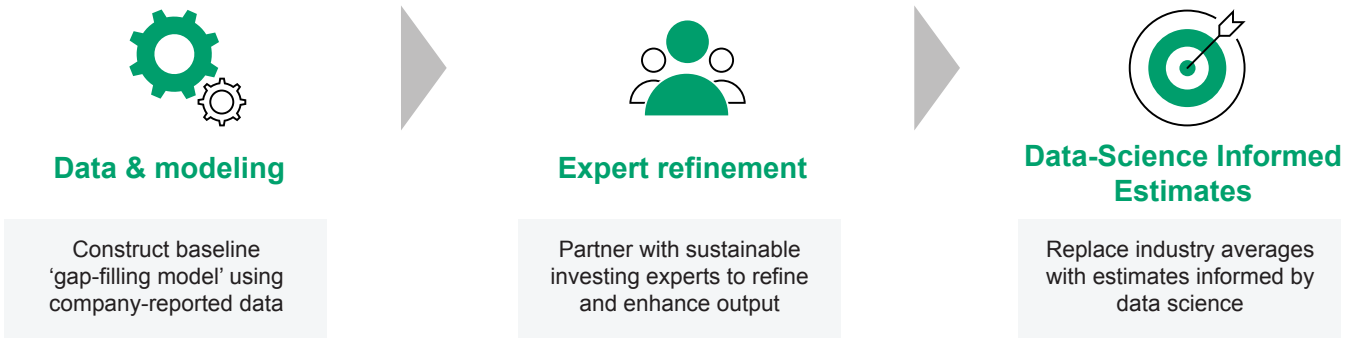
How the model generates more accurate estimates

Our proprietary 'gap-filling' tool incorporates a diverse collection of metrics reported by the company, including revenue breakdown. The tool uses a machine learning model to identify features that can be used to estimate missing company data points.[4] These features are used to produce baseline estimates that are further refined through the expertise of J.P. Morgan Asset Management's Sustainable Investing team.

The resulting output consists of ESG metric estimates for missing company ESG datapoints that are informed by data science (Exhibit 1). We find this approach to be a very powerful tool to mitigate the lack of disclosures and strengthen ESG scoring in Chinese companies.

How analytics can fill in ESG data gaps in China

Exhibit 1: Our approach to generating estimates of ESG metrics for Chinese companies



Source: J.P. Morgan Asset Management; information as of November, 2022.

To be clear, machine learning cannot fully substitute for, or offer the same value as an actual disclosure — analytics has its limits. One example is Scope 3 GHG emissions — defined as a company's emissions beyond the firm's direct ownership (such as by its suppliers and distributors).[5] In 2020 less than 5% of China's largest onshore companies disclosed this key metric,[6] according to our internal analysis, vs. 38% of comparable U.S. firms.[7] Without data, even the most sophisticated approach will fall short of accurately approximating a non-disclosing company's Scope 3 emissions performance.

3 Weibo is a Chinese online app tool similar to Twitter capabilities.
4 Gradient boosting, a technique that generates predictions from an ensemble of weak prediction models.
5 According to the nonprofit Greenhouse Gas Protocol, Scope 3 emissions come from an entire corporate value chain, and should be accounted for, reported and reduced. "Corporate Value Chain (Scope 3) Accounting and Reporting Standard," World Resources Institute and World Business Council for Sustainable Development, retrieved November, 2022.
6 This data comes from our review of Scope 3 emissions disclosures for CSI 300 index constituents (the CSI 300 is a capitalization-weighted index that of the 300 largest and most liquid Shanghai & Shenzhen listed companies.)
7 "Number of companies in the S&P 500 reporting energy- and emissions-related metrics," International Energy Agency, October 2022. IEA looked at Scope 3 emissions disclosures for S&P 500 index constituents. S&P 500 is capitalization-weighted index of the 500 largest publicly traded companies in the United States.

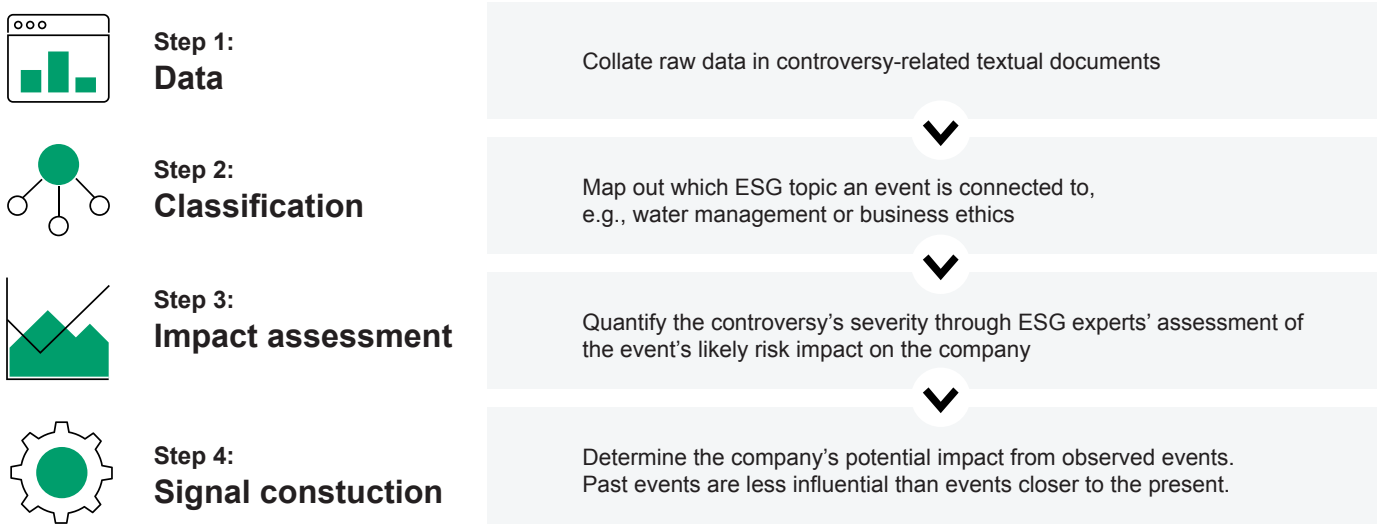
Uncovering controversies to assess company risk

We also find value in extending our data-driven analysis to ESG controversies—events in which poor ESG risk management could have a significant negative effect on a business' financial performance. Knowing about controversial events can be useful, providing insight into company practices and policies that can impact long-term risk adjusted returns.

Companies are often reluctant to report potential controversies proactively or, after one emerges, to share information about it in a timely manner. The ability to unearth controversies early is extremely valuable but requires not just information but local language and market understanding.

We have partnered with a China-focused vendor that creates data sets on Chinese corporate controversies by extracting raw text from a broad range of sources within the country, and from documents written in both simplified and traditional Chinese characters. Some documents contain terminology specific to China's market that must be interpreted carefully, to accurately assess an event's severity. To draw actionable insights from this dataset, our internal team of China-focused data scientists developed a controversy signal using natural language processing. (Exhibit 2).

Our data scientists' controversy signal can serve as an early-warning system for investment teams
Exhibit 2: How the ESG controversy signal works



Source: J.P. Morgan Asset Management; information as of November, 2022.

We have found it key to build and train the model on a curated set of ESG controversies. To do this, we leaned into the expertise of different China-dedicated teams in J.P. Morgan Asset Management to create a broad collection of events, drawing on their knowledge of specialized subject matter. Professionals from the onshore China legal team, for example, provided insights on the relative severity of various types of enforcement actions in China. Simply feeding litigation data into a model would not produce meaningful results due of the complexity of local laws and practices.[8]

We find this quantified approach to controversies to be a powerful tool when assessing financially material ESG risks of Chinese firms, yet there are two caveats. First, controversies datasets by themselves do not provide a holistic view of a company's ESG risks and opportunities. For example, we believe such datasets should also be considered in the context of the effectiveness of a company's ESG policies and programs. These could then demonstrate that the relevant company is sufficiently managing the risk of future incidents. Second, controversy datasets have a notable market cap bias. While smaller firms and their controversies may draw less media attention and focus, they are not necessarily managing their material ESG risks more competently than larger companies. Our view is that controversy data adds important nuance when assessing Chinese companies' ESG performance, but analytical and local market expertise is needed for a more complete understanding.

8 For example, different types of administrative penalties can be imposed in China: a fine (罚款) is, in general, less severe than a license revocation (吊销许可证件) or restriction on business production activities (限制开展生产经营活动). Civil litigation may be brought in parallel to administrative actions, with compensation usually proportional to damages. The initiation of criminal proceeding (移送涉罪) indicates there might be serious wrongdoing.

Engaging with companies to enrich our understanding and research

Changes in regulations, and the maturing of sustainability reporting standards, will drive better sustainability-related disclosure from companies in China, in our view. Over time, Chinese companies' ESG data gaps should gradually close. But, as mentioned, as active stewards of our clients' assets, we also engage with our portfolio companies. One important subject of these discussions: encouraging them to enhance their disclosure of material ESG data.

Some companies may consider reporting ESG data as a box-ticking exercise. We do not agree. We believe it is in a company's best interest to report on material ESG topics, including GHG emissions and internal carbon prices. We rely on these data points to track their progress toward managing risks in the context of China's carbon neutrality commitments. Other ESG data may be material and should be reported, depending on the industry and the company's business model (which may differ from its peers).

We identify companies' material ESG data gaps. Through engagement, we may highlight good ESG reporting practices and encourage them to fill these gaps as soon as possible. As investors, we are interested in both standardized ESG disclosure and company-specific information, including controversies and breaches of norms that may not be voluntarily reported. In 2021, we established a process to monitor controversies, such as breaches of the United Nations Global Compact.[9] We may engage with companies to understand the truth and accuracy portrayed in the media or by third-party assessors.

9 The Ten Principles of the UN Global Compact (https://www.unglobalcompact.org/what-is-gc/mission/principles)

Case studies in engagement: Pressing Chinese companies on sustainability

Here are two recent examples of direct discussions and their outcomes:

Company A : Beginning to fill its disclosure gaps

Company A, an appliance manufacturer with sales and distribution worldwide, produced corporate social responsibility reports for 2019 and 2020. As the name suggests, this report focused on the social-related data and initiatives. We had an ESG-specific engagement with Company A in 2021 to share our thoughts and explained that the absence of environmental and governance topics was a major challenge in assessing the company's sustainability risks and opportunities.

Company A's latest report, in May 2022, was revamped in format and content. Notably, it was renamed an ESG report and included far broader coverage including:

- Greater transparency on company policies, internal governance and supply-chain management practices
- One-year targets for emission reduction, water consumption and other environmental issues
- One to three-year targets for other sustainability topics such as completing the internal due diligence for all suppliers having conflict minerals, increasing the social responsibility audit for 90% of suppliers and having zero service delay and zero complaint from customers.
- Following Global Reporting Initiative (GRI) and Sustainability Accounting Standards Board (SASB) recommendations and reporting according to these standards

Our engagement with Company A is long-term and ongoing. The company understands it needs to fill other data gaps, for example, the ratio of recycled material in their final products to help address China's regulations for more disclosure concerning ecological and environmental protection[10]. As more material information feeds into our research, the company can be more fairly assessed. We will continue our efforts to drive the company not only to improve its disclosure but more importantly, to begin initiatives to further improve its supply chain sustainability and manage its climate and wider environmental risks.

Company B : understanding more about its controversy

Company B is a large-scale China-based mining company with mineral resources and logistic assets around the world. We reached out to the company to find out more about an allegation that it was sourcing conflict minerals.[11] Company B acknowledged the problem and explained that it was an isolated incident. The company operation in Brazil occasionally purchases phosphate ores from a supplier, the vendor, which operates phosphate mines in Morocco and also has a mine in occupied Western Sahara. Company B had used a third-party system to review its suppliers' compliance about conflict mineral sourcing which failed to detect this issue.

The company has stopped sourcing Western Sahara ores and asked its vendor to provide certification of origin for its ores. It reiterated its commitment to supply chain management and said it will strengthen due diligence on high-risk suppliers in the future.

10 JPMAM's assessment of companies using machine learning and analysis and its estimates and conclusions may not be effective in identifying risks and opportunities of companies. While the adviser looks to a variety of data inputs, JPMAM cannot guarantee the accuracy of its process or the reliability of data including information self-reported by companies.

11 The controversy was raised by Western Sahara Resource Watch, a watchdog group.

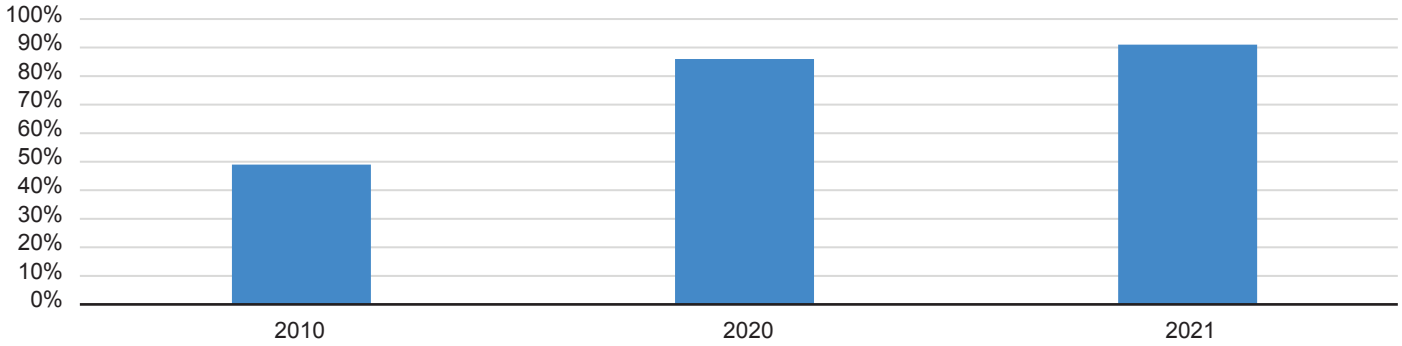
Regulatory change: An update on corporate ESG disclosure in China

ESG issues are part of the issues that we routinely consider in seeking to identify factors that are likely to materially impact a company's future profitability and competitiveness. However, corporate disclosures of ESG practices differ widely and in China, as we wrote previously, some of which were insufficient.[12] In the 18 months since that publication[13], however, China has moved quickly and made significant progress in ESG disclosures. While it is still not on par with certain other countries, it is starting to make progress (**Exhibit 3**).

Over 90% of A-share companies released ESG reports in 2021, nearly double the number in 2010

ESG Reports by CSI300 Companies

Exhibit 3: CS1300 companies releasing ESG reports (%)

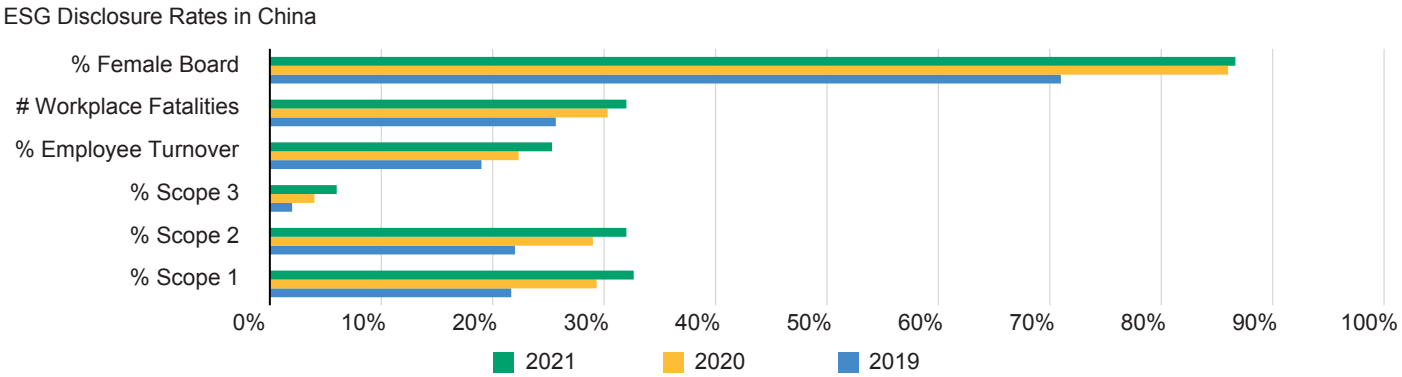


Source: AlphaSense; data as of August 3, 2022. CS1300 companies are those that trade on the Shanghai and Shenzhen Stock Connect exchanges.

The bulk of corporate ESG disclosures in China concern GHG emissions, employee turnover, workplace fatalities and the percentage of women on corporate boards (**Exhibit 4**). The improvement in disclosure of carbon emissions data can be linked to the government's plan for carbon neutrality by 2060, with important milestones in 2025 (creating an initial framework) and 2030 (reaching peak carbon).[14]

Most corporate ESG disclosures in China were made voluntarily but that is set to change

Exhibit 4: ESG disclosure rates among Chinese companies



Source: J.P. Morgan Asset Management; data as of August 18, 2022.

12 Until very recently, we had relied on on-the-ground fundamental analysis and active corporate engagement to integrate financially material ESG considerations into the investment process. Felix Lam, Joe Leung and Howard Wang, "Overcoming the ESG Data Challenge in China," J.P. Morgan Asset Management, June 2021.

13 "Overcoming the ESG Data Challenge in China", Lam, Felix, Leung, Joe and Howard Wang, June 2021, J.P. Morgan Asset Management.

14 The first milestone is establishing a green, low-carbon circular economy and enhancing energy efficiency, among other transitions. People's Republic of China National Development and Reform Commission "Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy," Department of Resource Conservation and Environmental Protection, October 24, 2021.

Regulatory changes in the past year

In February 2022, China's Ministry for Ecology and Environment issued a new requirement that mandates listed companies and their subsidiaries who have displayed environmental violations recently, and certain private companies, disclose information related to climate change and ecological and environmental protection, and specifically relating to carbon emissions.[15] These disclosures include any environmental penalties to which the company has been subjected.

The new regulation is a welcome initiative, and a step in the right direction in expanding corporate transparency and data availability. Once companies work through how to implement it, we expect a broader release of data to come as they look to meet this regulation. We also expect China will issue additional ESG mandates as the country moves forward on its sustainability journey.

Looking forward

As new regulations take effect, corporations will need to comply by producing more in-depth ESG reports that cover additional ESG metrics. This will generate more ESG data, which will give investors a more comprehensive understanding of Chinese companies' practices and processes from a sustainability perspective. More details and data will need to be analyzed and understood, making a tool like ours even more helpful as the volume of ESG disclosure continues to grow.

15 The Plan for the Reform for the Legal Disclosure System of Environmental Information/Measures for Enterprises to Disclose Environmental Information by Law.

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