Greener deals, noisier ratings

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Abstract: Using ESG ratings from seven major agencies to construct a firm-level measure of ESG risk based on cross-rater dispersion, we document robust evidence that firms undertaking green mergers and acquisitions (M&As) exhibit higher ESG risk. This effect is stronger when information disclosure quality is lower, when institutional ownership is lower, and when managerial agency costs are higher, consistent with asymmetric information, weak external monitoring, and opportunistic implementation elevating both ESG performance risk and information risk. To strengthen causal inference, we construct a propensity score matched sample, estimate an instrumental variable specification, utilize the Heckman correction, and find qualitatively similar results. Importantly, we exploit China's New Energy Polit City program as a quasi-natural experiment, design a difference-in-differences analysis, and document that the positive effect of green M&As on ESG risk becomes weaker for firms located in the pilot cities after policy implementation. Cross-sectional tests further indicate stronger effects among state-owned enterprises, financially constrained firms, and firms with lower managerial environmental awareness. Finally, mediation analysis suggests that green M&As are associated with a higher likelihood of greenwashing, which in turn amplifies ESG risk. Overall, our findings highlight how strategically motivated sustainability transactions can intensify ESG-related uncertainty and information frictions in external assessments.

Keywords: Green mergers and acquisitions; ESG risk; ESG rating disagreement; Information asymmetry; Greenwashing

JEL Classification: G34, M14, Q56

1. Introduction

Over the past two decades, environmental, social, and governance (ESG) criteria have become a critical benchmark for assessing firms' sustainability, resilience, and long-term value. Since the United Nations promoted ESG principles in 2004, responsible investment has grown rapidly. By the end of 2024, Principles for Responsible Investment signatories managed approximately USD 128 trillion in assets. China has closely followed this trajectory, and by 2024 all the Shanghai Stock Exchange 180 A-Share Index constituents disclosed ESG reports. Despite this broad diffusion, ESG ratings remain strikingly inconsistent, which reflects inherent ESG risk.[1] ESG risk has both a performance component and an information component. Even when firms invest in sustainability and expand disclosure, their future ESG-related cash-flow exposure remains uncertain because ESG outcomes are multi-dimensional, path dependent, and contingent on implementation quality. At the same time, ESG information risk persists because the market must infer those underlying outcomes from heterogeneous data, overlapping standards, and intermediaries that apply different scopes and aggregation logics, which can impair comparability across firms and weaken capital allocation efficiency even when the underlying performance is improving.

Amid mounting climate risks and heightened environmental challenges, green mergers and acquisitions (M&As) have become an increasingly important means to deliver measurable improvements in environmental performance. By acquiring green technologies, assets, human capital, and governance practices, firms may strengthen their ESG standing (Salvi et al., 2018).[2] Yet green M&As can also affect a firm's ESG risk profile along two distinct dimensions. First, they affect ESG performance risk, because the ESG value creation of these deals depends on

[1] More than 600 rating agencies use divergent scopes, weighting schemes, and indicator definitions, which produces contradictory assessments of the same firms. For example, in 2023 SynTao Green Finance (STGF) rated Shede Spirits Co., Ltd. (600702) A-, whereas Menglang ESG assigned BBB-. Yunnan Aluminium Co., Ltd. (000807) received BB from CSI but A- from STGF.

[2] On February 7, 2025, the China Securities Regulatory Commission issued the Implementation Opinions on Advancing the "Five Key Financial Articles," which explicitly encourage the use of M&As to support green industrial upgrading.

long-horizon integration, uncertain realization of synergies, and execution choices that may either generate substantive improvements or devolve into symbolic implementation. Second, they affect ESG information risk, given that the evaluation of green M&As relies heavily on disclosures and other signals about motivations, deal design, and post-acquisition capabilities that outside observers cannot verify in real time. Given the complexity of green M&As, ESG ratings have become a chief lens for the markets and regulators to assess both the underlying sustainability outcomes and the credibility of related claims. However, it still remains unclear whether green M&As mitigate or amplify ESG risk overall. On the one hand, green M&As may reduce ESG risk by strengthening real environmental capacity and improving the information environment through broader disclosure and greater coherence and verifiability, which can lower uncertainty about both outcomes and reporting. On the other hand, complex deal structuring and integration, together with asymmetric information about post-acquisition environmental capabilities, can increase execution uncertainty and widen the scope for selective disclosure and interpretation, thus elevating both performance-related downside risk and information-related ambiguity (Christensen et al., 2022). These competing forces motivate us to examine whether corporate green M&As influence ESG risk and, if so, through which mechanisms.

China offers a particularly informative setting for us to investigate this question because both ESG practices and ESG evaluation infrastructure are still being institutionalized. In China, ESG disclosure remains less standardized and less consistently assured across firms, which makes it harder for outsiders to verify the motives, design, and post-deal integration quality of green M&As in real time, which enhances ESG information risk. In addition, China's green transition is strongly influenced by policy guidance and heterogeneous local enforcement, so the realized ESG outcomes of green M&As are more contingent on implementation discipline and regulatory context, elevating ESG performance risk. China also features pronounced cross-

sectional variation in ownership structures, institutional investor monitoring, and agency conflicts, which helps identify when green M&As are more likely to be substantive versus symbolic. Finally, policy initiatives such as the New Energy Pilot City (NEPC) program provide plausibly exogenous shocks that strengthen causal inference and allow us to examine whether improved ESG incentives attenuate the adverse ESG risk effects of green M&As.

Using 29,459 firm-year observations on a large sample of Chinese A-share firms from 2010 to 2023, we identify green M&As through conducting a content analysis of corporate M&A announcements following Li et al. (2020). Drawing on Gibson Brandon et al. (2021), we measure ESG rating divergence as the cross-rater standard deviation across seven agencies, namely CSI, Hexun, Menglang ESG, Bloomberg, STGF, FTSE Russell, and Wind. We document that ESG ratings exhibit higher levels of divergence for firms that undertake green M&A activities, after controlling for a battery of firm-level characteristics along with industry fixed effects and year fixed effects. In terms of the economic significance, compared to firms that take no green M&A, pursuing at least one green M&A leads to a 0.5873 increase in ESG risk in absolute magnitude, which is 3.90% of its sample mean or 8.62% of its sample standard deviation. This baseline finding survives a large set of robustness checks.

Next, we explore the underlying mechanisms through which green M&As affect ESG risk. First, poor information disclosure quality increases information asymmetry, worsens adverse selection and moral hazard in project choice and post deal execution, and leaves rating agencies to interpret noisy, nonverifiable signals in different ways, a problem that is especially salient in China's less standardized reporting environment. Second, higher institutional ownership is expected to dampen the adverse impact of green M&As on ESG risk because institutional investors monitor and guide deal rationale and implementation, curb greenwashing, and promote more comparable evidence for external assessment. Third, higher managerial agency costs intensify the effect by increasing the likelihood of symbolic acquisitions and weak

integration effort, thereby raising uncertainty about realized ESG outcomes and widening cross agency dispersion when governance red flags are discounted differently. Consistent with these arguments, our evidence shows that the positive relation between green M&As and ESG risk is stronger when disclosure quality is lower, institutional ownership is lower, and agency costs are higher.

To strengthen causal inference, we employ several complementary designs to address potential endogeneity concerns. First, we implement propensity score matching (PSM) to construct a comparable control sample, and the positive association between green M&As and ESG risk still holds in the matched data under alternative matching ratios. Second, we estimate an instrumental variable (IV) specification that uses firms' exposure to transition climate risk, measured from annual report text, as a source of plausibly exogenous variation in green M&A incentives. The second-stage estimates continue to indicate a positive effect of instrumented green M&As variable on ESG risk. Third, we apply a Heckman two-stage correction to account for potential sample selection in the decision to undertake green M&As, with results that remain aligned with the baseline findings. Finally, and more importantly, we exploit China's NEPC program as a quasi-natural experiment in a difference-in-differences (DiD) framework and show that the green M&A effect attenuates after the policy is implemented, consistent with strengthened ESG incentives and heightened external scrutiny dampening the adverse consequences of green M&As on ESG risk.

Our cross-sectional evidence and mediating analysis further clarify when and why green M&As translate into higher ESG risk. In heterogeneity tests, the positive association is concentrated in settings where external evaluation is more challenging, and implementation capacity is weaker. Specifically, the effect is stronger for state-owned enterprises (SOEs), consistent with rating agencies differing in how they parse policy mandates, disclosure style, and the persistence of ESG outcomes in transactions with implicit government ties. It is also

more pronounced among financially constrained firms, for which limited resources can impede post-deal integration and encourage less informative or more selective disclosure, thereby heightening opacity and ESG risk. Finally, the relation is driven by firms with lower managerial environmental awareness, where green M&As are less likely to be executed with disciplined ESG intent and follow-through, making outcomes harder to assess. In addition, we provide evidence on a plausible channel. Using a text and enforcement-based proxy for greenwashing, we show that green M&As are associated with a higher likelihood of greenwashing, and that greenwashing is positively related to ESG risk and partially mediates the green M&A effect. This finding is consistent with green M&As creating incentives for symbolic claims that aggravate information asymmetry and uncertainty in both underlying ESG performance and external assessments.

Our study makes the following contributions to the literature. First, we integrate green M&As into an ESG risk framework and, in doing so, extend emerging scholarly work on the determinants of ESG risk. Prior research links ESG risk to institutional and market conditions, disclosure regimes, rating agency heterogeneity, investor influence, and firm-level governance (Berg et al., 2022; Rubino et al., 2024; Kurbus & Rant, 2025). Yet strategic corporate behaviour has received far less attention as a source of ESG risk. Green M&A is a salient setting because it can reshape firms' underlying sustainability prospects while also altering the information set through which outsiders assess those prospects. Although existing evidence suggests that green M&As can improve corporate ESG performance and alleviate environmental responsibility concerns through innovation and relaxed financing constraints (Shi & Huang, 2024), their implications for ESG risk have not been examined. By positioning green M&A as a strategic shock to both ESG fundamentals and the ESG information environment, we extend the framework of Berg et al. (2022) by introducing corporate strategic choices as an antecedent of ESG risk, with implications for firms, investors, and regulators.

Second, our study identifies the mechanisms via which green M&As elevate ESG risk. We show that low-quality information disclosure, limited institutional monitoring, and ill-structured managerial incentives heighten the uncertainty about post-deal ESG outcomes and widen the information frictions faced by external evaluators. These conditions increase the likelihood that promised ESG improvements fail to materialize and, at the same time, complicate outsiders' ability to verify deal motives and implementation progress. Our results complement disclosure-centered perspectives (Christensen et al., 2022; Kimbrough et al., 2024) by demonstrating that corporate actions can endogenously reshape the informational setting in which ESG assessments are produced. The heterogeneity evidence further shows that ownership structure, financing capacity, and managerial environmental awareness condition the extent to which green M&As translates into ESG risk. Together, these findings position green M&As as a determinant linking corporate finance and sustainability strategy to ESG risk, and they speak to policy debates on improving assessment credibility as more countries have now decided to move toward mandatory ESG disclosure.

Third, the findings of this study help deepen our understanding of the role of ethical and sustainability considerations in shaping corporate strategies. Green initiatives are often treated as unambiguously value enhancing. Yet our evidence suggests that strategic actions such as green M&As can also introduce additional uncertainty and ethical ambiguity. By linking green M&As to elevated ESG risk, we show that even ostensibly responsible strategies may generate ESG risk when information asymmetry persists, disclosure remains inconsistent, governance capacity is limited, or incentive schemes are ill-designed. Put differently, the ethical content of green strategies appears to depend less on symbolic signaling and more on credible execution and transparency. When firms pursue green M&As without credible execution or a clear ESG intent, such transactions may weaken rather than strengthen ethical and sustainable legitimacy.

2. Theoretical framework

In this study, we define ESG risk as the expected variation in firm value that arises from ESG factors through two conceptually distinct channels, performance risk and information risk. In particular, ESG performance risk is the uncertainty that a firm fails to achieve and measurable ESG outcomes that matter for cash flows and cost of capital. It reflects exposure to physical hazards, regulatory changes, supply chain and human capital frictions, and governance failures that impair compliance, operations, or reputation. Performance risk is outcome-based. It is high when a firm's technologies, processes, or internal controls make target attainment uncertain, when the downside from shortfalls is economically material, or when a firm engages in opportunistic green-washing activities. ESG information risk is the uncertainty stakeholders face because ESG signals are noisy, incomplete, or difficult to verify ex post. It reflects dispersion in disclosure practices, heterogeneity in rater methodologies, and limited assurance, which together reduce the reliability and comparability of reported ESG attributes. Information risk is signal-based. It is high when disclosure precision is low, when agencies disagree in scope, measurement, or weighting, and when external validation is weak. It is important to note that these two risk components are closely related but separable. Performance risk concerns what a firm actually does and achieves, while information risk is related to what outsiders can credibly observe and agree upon.

A growing body of literature argues that ESG rating disagreement is not merely a methodological artifact but an observable manifestation of corporate ESG risk. Given that ESG ratings are developed to capture firm-level exposure to and management of material ESG risks (Christensen et al., 2022; Serafeim & Yoon, 2022), ESG rating divergence across different agencies indicates heightened uncertainty and information asymmetry in the ESG information environment. Consistent with this risk-based interpretation of ESG rating disagreement, prior studies document that greater ESG disagreement is associated with higher risk premia (Gibson

Brandon et al., 2021), signals of information risk (Billio et al., 2021), and increased volatility and financing costs (Quotb et al., 2026). According to this strand of literature, we conceptualize ESG risk as the theoretical construct of interest and use cross-agency rating disagreement as its empirical proxy.

ESG ratings have become essential tools for assessing firms' long-term sustainability and resilience, and ESG risk has attracted growing scholarly attention. Scholars have explored this issue from multiple angles, including market dynamics, institutional contexts, disclosure practices, rating methodologies, and other firm-specific traits. For example, Rubino et al. (2024) document that firms with higher market value tend to exhibit lower ESG risk due to their resource advantages, while industry sensitivity and regulatory environments also affect rating consistency (Rubino et al., 2024; Kurbus & Rant, 2025). Christensen et al. (2022) observe that heterogeneous reporting methods can fail to mitigate, and may even exacerbate, ESG risk when they invite divergent interpretations. In terms of the agency-level differences, Berg et al. (2022) identify scope, measurement, and weighting as the main sources of external evaluations of corporate ESG risk, with measurement gaps playing the dominant role. Biju et al. (2023) and Bissoondoyal-Bheenick et al. (2024) further highlight that variation in business models and aggregation approaches may amplify inconsistency across ESG rating providers, thus reinforcing the importance of agency design choices for observed ESG risk.

Building on the prior literature, we posit that ESG rating disagreement reflects both ESG performance risk and ESG information risk. It captures performance risk because raters observe different facets of a firm's true exposure and capability to deliver ESG outcomes. When technologies, operations, or governance practices make outcomes uncertain across time and scenarios, independent assessments by agencies would naturally diverge, so greater dispersion signals real uncertainty about future ESG performance and financial consequences. ESG rating disagreement also captures information risk because raters rely on disclosures, third-party data,

and their own proprietary methodologies that may vary in scope, measurement, and weighting. When signals are noisy, non-comparable, or weakly verified, rating agencies cannot align on common priors or benchmarks, so disagreement rises even if underlying outcomes are similar.

While prior empirical studies have provided a solid foundation for the determinants of ESG disagreement, the question of whether and how strategic corporate behavior, in particular green M&As, would shape ESG risk has largely been overlooked. As a proactive response to sustainability pressures, green M&As can affect compliance, resource allocation, and industrial upgrading (Shi & Huang, 2024; Hussain & Kumar, 2025). Green M&As may improve acquirers' ESG performance by helping them strengthen external governance, build environmental capacity, and realize synergistic gains. Meanwhile, they likely introduce disclosure complexity, strategic opacity, integration uncertainty, and greenwashing incentives, which can elevate ESG risk and widen rating dispersion (Wang & Liu, 2024; He et al., 2025).

To capture these dynamics, we develop a theoretical framework based on the tripartite model of scope, measurement, and weighting disagreement proposed by Berg et al. (2022), and map each of these three components to both ESG performance risk and information risk. Green M&As may elevate performance risk if the newly acquired target expands acquirer's exposure to uncertain domains in terms of the environmental technologies and compliance requirements. At the same time, green M&As involve activities and assets that rating agencies may classify under different categories, which raises scope-related information risk by fragmenting the set of indicators. Outcomes from green M&As are long-horizon, unpredictable, idiosyncratic, and partly intangible. Related disclosures are often qualitative rather than standardized. All of these heighten the measurement-related information risk because of greater reliance on proprietary methods and weak verification, while also increasing performance risk as actual environmental improvements and cost trajectories remain uncertain during the integration and scale-up stages. The environmental emphasis of the acquisition coexists with governance and social integration

challenges, so agencies apply heterogeneous weighting schemes that widen evaluation gaps and reflect information risk, whereas the underlying trade-offs among environmental gains, governance frictions, social impacts, and subcomponents in each ESG dimension likely create genuine performance risk that can alter cash flows and the cost of capital. Taken together, scope, measurement, and weighting disagreements operate as conduits for both ESG performance risk and ESG information risk in the wake of green M&As, which provides the theoretical basis for the hypotheses that follow.

3. Hypothesis development

3.1. Green M&As and ESG risk

ESG uncertainty or ESG risk, often operationalized through ESG rating disagreement, has become a critical concern in both academia and practice. A long line of literature documents systematic differences across different rating agencies in ESG indicator selection, information acquisition, scoring and weighting schemes, and evaluation logic. These differences map into three core reasons for ESG risk, and in particular, ESG information risk due to rating disagreement (Berg et al., 2022). The first reason, scope difference, refers to variation in indicators selected by each rating agency in different categories; the second one, measurement difference, reflects divergence in scores within the same category across agencies; and the third one, weighting difference, is related to disagreement in the relative importance attached to the same category. Among these, measurement difference is generally viewed as the most influential, but all three dimensions jointly shape the manifestation of ESG risk in external evaluation (Capizzi et al., 2021; Bissoondoyal-Bheenick et al., 2024).

Green M&A deals provide a setting in which these frictions are likely to intensify. By definition, green M&As target assets in areas of clean energy, pollution abatement, or other complicated green technologies, and therefore, inject new, complex, and often ambiguous ESG information into the market. The interpretation of this information is not straightforward, and

its impact on the overall ESG profile of the acquirer is inherently subjective. Hence, we posit that Green M&As can elevate corporate ESG risk through the following three pathways.

First, from the scope perspective, green M&As typically span multiple ESG domains at once. ESG risk arises over which parts of the E, S, and G dimensions will deliver outcomes and on what timetable. In the E dimension, rating agencies face ambiguity about the material subcomponents, including direct and indirect carbon emissions, the balance between abatement technologies and end-of-pipe controls, and the life-cycle boundaries applied to acquired assets. In the S dimension, risks may involve workforce integration, health and safety during transition, supply chain labor standards, and community impact. In the G dimension, execution depends on board oversight of climate strategy, incentive alignment, the credibility of ESG disclosure, and the monitoring of the entire green M&A process. These cross-domain and cross-subcomponent interdependencies create real execution trade-offs that are unobservable to rating agencies, which raises performance risk about which ESG outcomes lie within the scope. Furthermore, in the absence of a standardized taxonomy for classifying these multifaceted actions, agencies may disagree on which indicators are relevant. One agency may emphasize a newly created construct "green innovation integration," while another analyzes the influences of green M&As across existing ESG indicators. This reflects the differences in theorization and categorization (Chatterji et al., 2016; Berg et al., 2022). Green M&As, by introducing novel strategic actions, force agencies to make these subjective judgments, leading to scope-related information risk.

Second, in terms of the measurement issue, the performance of green M&As is highly uncertain in the short run, with synergies and environmental benefits taking years to materialize. Therefore, early measurements provide imperfect signals about the real and final improvements in emissions, resource efficiency, or compliance. This uncertainty about near-term realizations makes it difficult to gauge the magnitude and timing of the economic consequences of green

M&As, which increases performance risk even when agencies agree on the relevant categories and measurement approaches. In addition, disclosure related to green M&As frequently relies on qualitative, symbolic, or boilerplate language (e.g., “green transformation” or “strategic synergy”), rather than standardized, detailed, and verifiable data (Liu, 2022; Wang & Liu, 2024). According to theories of information economics and voluntary disclosure, low-precision and partly unverifiable signals are filtered through heterogeneous priors, which may lead to divergent interpretations when the quantity of disclosure increases (Christensen et al., 2022). Given non-standardized, qualitative disclosures about a Green M&A, rating agencies often rely on proprietary models and subjective judgment to assess its authenticity and implications for ESG performance (Hu et al., 2023). One rating agency may interpret a green M&A as a genuine commitment to sustainability, while another might view it as being greenwashing or a high-risk strategic gamble (Slager et al., 2012). This fundamental difference in interpreting the same event directly amplifies measurement-related ESG information risk (Berg et al., 2022).

Third, from the weighting perspective, green M&As may heighten the performance risk. A single M&A deal can generate competing effects across the ESG dimensions. Environmental gains could be offset by governance frictions in deal execution or by social costs from labor restructuring and community impact. The net effect on cash flows and compliance is therefore uncertain, and the relative importance of each pillar is itself part of the performance question, which will increase performance-related ESG risk associated with green M&As. Rating agencies may also differ in how they translate cross-dimension trade-offs and the relative importance of each ESG dimension into composite scores, since weighting schemes embed methodological choices and interpretive judgments. If a green M&A deal is interpreted as being largely cosmetic, evaluators tend to assign greater weight to governance weakness and less to environmental promise, whereas a reading of credible commitment induces the opposite emphasis. Consistent with our reasoning, recent research on corporate hypocrisy reveals that

symbolic actions can induce cognitive dissonance among evaluators, thus leading to divergent assessments and increased weighting-related information risk (He et al., 2025).

According to the arguments above, we state the following hypothesis:

H1. Green M&As are positively associated with ESG risk.

3.2. The moderating effect of information disclosure quality

The unequal distribution of information and knowledge between transacting parties is a chief driver of divergent judgments and risk perceptions (Akerlof, 1970). Green M&As are characterized by particularly high information asymmetry because value creation depends on intangible, forward-looking environmental and climate outcomes that are difficult to quantify and verify. Managers hold inside information about motivations such as genuine transformation versus symbolic greenwashing and about execution risks, whereas rating agencies, as outsiders, face material barriers to observing these details in real time (He et al., 2025). This results in an information gap that compels agencies to evaluate green M&A behavior based on incomplete or ambiguous signals.

Information disclosure quality directly conditions the degree of information asymmetry. High-quality disclosure that is standardized and verifiable can offer consistent benchmarks and increases the signal-to-noise ratio, which facilitates convergence in assessments across rating agencies (Verrecchia, 2001). By revealing detailed information about firms' true environmental exposure, project selection, and implementation progress, such disclosure provides transparent and comparable evidence on the consequences of green M&As, which narrows the space for adverse selection and moral hazard, lowers the likelihood that governance problems will later materialize, and reduces ESG performance risk. Meanwhile, detailed and quantitative metrics reduce reliance on subjective judgment, align evaluative baselines across agencies, and weaken the positive relation between green M&As and ESG information risk (Khanchel & Lassoued, 2022; Liu, 2022; Kimbrough et al., 2024).

In contrast, low-quality environmental disclosure that relies on vague narratives and/or lacks independent assurance fails to bridge the information gap. In such a scenario, it is difficult for outsiders to distinguish high-quality from low-quality green projects or monitor post-M&A effort. In turn, aggravated adverse selection regarding the type of green M&As undertaken and moral hazard in their implementation increase the likelihood that promised environmental and governance improvements will not materialize and raise ESG performance risk. Performance risk could be persistent, since opportunistic green behaviour is difficult to detect and discipline. Moreover, rating agencies lack a sufficient basis to verify the authenticity or effectiveness of green M&A transactions. They must substitute their own assumptions, preferences, and models, so identical activities can be read as credible transition by one agency and as greenwashing by another (He et al., 2025). The increased ESG information risk is particularly salient in countries with weak institutional environments, such as China, where corporate environmental disclosure lacks unified standards and firms emphasize qualitative narratives over quantitative data (Yuan et al., 2025). This reasoning leads to our second hypothesis.

H2. The positive association between Green M&As and ESG risk is more pronounced for firms with lower information disclosure quality.

3.3. The moderating effect of institutional ownership

Institutional investors are widely deemed as key capital market participants in corporate governance. Their ownership stakes give them incentives and capability to monitor managerial behavior, enhance transparency, and discipline opportunistic actions (Boone & White, 2015). In the ESG setting, institutional investors increasingly regard environmental performance as part of long-term value creation and risk management. Green M&As are prone to agency issues, since the execution and disclosure of such deals can be utilized for greenwashing rather than genuine environmental transformation. Institutional investors serve as an external governance mechanism that can limit these problems. They scrutinize the strategic rationale for green M&A,

demand credible evidence on post-merger integration plans and environmental targets, and hold managers accountable for delivering promised synergies (Jia et al., 2022). By monitoring and advising firms in this way, institutional investors can help steer green M&As toward disciplined implementation and increase the likelihood that the transactions achieve their stated objectives and lowers ESG performance risk. Prior empirical evidence is consistent with our proposition, as higher institutional holding constrains corporate greenwashing by enforcing accountability for substantive outcomes (Li & Xiao, 2025).

Institutional investors also influence ESG information risk by directly influencing the behavior of rating agencies. Li et al. (2024) show that the presence of institutional investors can mitigate rating biases by exerting market pressure on agencies to adopt more objective and consistent standards. Without this disciplining force, rating agencies rely more heavily on their own methodological preferences and proprietary models, which increases dispersion in assessments of the same green M&A transaction and raises perceived ESG risk as reflected in the inter-agency rating disagreement. Taken together, these arguments suggest that institutional investors strengthen governance, curbs greenwashing risk, and promotes more consistent ESG assessments, thereby lowering both ESG performance risk and information risk for given green M&A activities. Accordingly, our third hypothesis is stated as follows.

H3. The positive association between Green M&As and ESG risk is more pronounced for firms with lower institutional ownership.

3.4. The moderating effect of managerial agency costs

A specific manifestation of managerial agency costs is on-the-job consumption, which encompasses perks and discretionary expenditures that provide private benefits to managers. Agency theory views high levels of such consumption as a symptom of severe agency problems and managerial entrenchment, where managers divert firm resources to themselves rather than to value-enhancing projects (Jensen & Murphy, 1990; Yermack, 2006). We argue that such a

perk-intensive incentive environment strengthens the positive effect of green M&As on both uncertainty about ESG performance and information asymmetry faced by external evaluators.

High levels of on-the-job consumption indicate that managers enjoy substantial private benefits and exercise wide discretion over firm resources. Under these conditions, the agency conflict around green M&As becomes more acute. From a project-selection perspective, rating agencies know that entrenched managers may engage in empire building or value-reducing acquisitions for personal benefit (Jensen, 1986). Green M&As, framed as an environmental or strategic initiative, can be used to justify resource expansion while leaving underlying agency costs unaddressed. This raises doubts about whether green M&As are motivated by genuine green transformation or by managerial self-interest, which increases ESG performance risk. From an implementation perspective, a perk-intensive culture makes superficial or symbolic integration more likely. Environmental technologies and governance mechanisms may be only partially embedded, with limited follow-through after the initial announcement. Some rating agencies may interpret the transaction as a credible step towards sustainability, while others highlight it as a further manifestation of agency costs, which naturally widens dispersion in ESG risk assessments as captured by rating disagreement.

On-the-job consumption also affects post-merger behavior in ways that reinforce these concerns. A managerial environment tolerant of high agency costs often leads to short-termism and weak discipline in integration. Managers who are accustomed to extracting private benefits may initiate green M&As for signalling and reputational effects yet underinvest in less visible tasks such as green technology assimilation, environmental management system redesign, or monitoring of realized emission reductions (Al-Shaer & Zaman, 2019). This pattern of strong initial rhetoric followed by weak execution is characteristic of corporate hypocrisy (He et al., 2025). As rating agencies observe a growing gap between promised and realized outcomes, perceived ESG performance risk rises.

At the same time, rating agencies who observe the identical set of green M&A activities may attach different weights to the governance red flags implied by the on-the-job consumption behavior. Some rating methodologies treat generous perk consumption as a serious signal of opportunism and therefore heavily discount the impacts of green M&As, while others either fail to identify such red flags or focus more on the stated strategy and announced ESG targets and impose only modest governance penalties. Since the underlying information set is already noisy and partly unverifiable, these heterogeneous reactions to the same agency-cost signal magnify dispersion in how green M&As are interpreted. As a result, managerial agency costs deepen the uncertainty surrounding the informational content of green M&As and increase ESG information risk. Therefore, we propose the following hypothesis.

H4. The positive association between Green M&As and ESG risk is more pronounced for firms with higher managerial agency costs.

The hypotheses are summarized graphically in Figure 1.

4. Research design

4.1. Sample and data

The sample of our study starts with all the A-share listed firms over the period from 2010 to 2023. Data on ESG ratings are obtained from multiple ESG rating providers, including CSI, Hexun, Menglang ESG, Bloomberg, STGF, FTSE Russell, and Wind. Data on M&As and financial and corporate governance variables are sourced from the CSMAR database.

To get the final sample, we implement the following sample selection procedure. First, financial firms are excluded. Second, we remove firms with special treatment or particular treatment status and exclude observations with missing values. Third, we drop transactions involving asset divestitures, swaps, restructurings, or share buybacks. Fourth, we retain only equity acquisitions and drop purely asset-based deals such as land purchases. Fifth, deals with a transaction value below RMB 1 million or an acquisition stake below 30% are deleted. Sixth,

cases in which the acquirer already holds more than 30% of the target before the M&A transaction are excluded. Seventh, failed deals and those with incomplete information are removed. Eighth, repeat transactions involving the same acquirer and target within a single year are consolidated. Ninth, when a given acquirer completes multiple deals in a year, only the transaction with the largest value and stake is retained. After these steps, the final sample consists of 29,459 firm-year observations.

4.2. Dependent variable

Building on the approach in Gibson Brandon et al. (2021), we use ESG rating disagreement as a proxy of a firm's ESG risk exposure. We first collect ESG assessments from seven major rating agencies, namely CSI, Hexun, Menglang ESG, Bloomberg, STGF, FTSE Russell, and Wind. We then standardize all ratings to the identical 0-100 scale. In particular, numeric scores are proportionally rescaled, while letter-based ratings are converted via the midpoint mapping. For firm-year observations covered by at least two rating agencies, we compute ESG risk as the standard deviation of the standardized scores, which captures inter-agency disagreement in ESG assessments. Firm-year observations covered by fewer than two rating agencies are coded as missing.

4.3. Key independent variable

Following the method of Li et al. (2020), we first collect all the M&A announcements disclosed by listed firms. We then conduct content analysis of each announcement to assess the contextual background and strategic motivation of the deal, as well as the business domains of the acquiring and target firms. The transaction's possible operational, financial, and marketing implications for the acquirer are further evaluated. Based on this evaluation and classification, we construct a dummy indicator that equals one for green M&A, and zero otherwise.

4.4. Model specification

To examine the effect of green M&As on ESG risk, we estimate the following baseline

specification:

$$ESG_risk_{i,t} = \beta_0 + \beta_1 \times Green_MA_{i,t} + \gamma' \times Controls_{i,t} + Industry\ FEs + Year\ FEs + \varepsilon_{i,t} \quad (1)$$

where *i* represents firms, *t* proxies for years, and $\varepsilon_{i,t}$ denotes the error. *ESG_risk* captures inter-agency ESG rating disagreement and serves as our proxy for ESG risk. *Green_MA* is a dummy variable for green M&As, and *Controls* denotes a vector of control variables. We include industry fixed effects and year fixed effects to absorb time-invariant industry heterogeneity and common time shocks that may simultaneously affect a firm's green M&A decision and its ESG risk. We estimate Equation (1) using ordinary least squares, and cluster standard errors at the firm level to account for error serial correlation.

The main objective of our study is to identify the causal effect of green M&As on ESG risk. Following Liu (2022) and Huang et al. (2024), we include a broad set of control variables. For firm fundamental characteristics, we include firm size (*Ln_assets*), firm age (*Ln_firm_age*), financial leverage (*Leverage*), profitability (*ROA*), market-to-book ratio (*MB*), tangible assets (*PPE*), Tobin's Q (*Tobin_Q*), and earnings volatility (*EBIT_volatility*). For firm governance characteristics, we control for administrative expenses (*AE*), the separation between ownership and control rights (*Separation*), board size (*Ln_board*), ownership of the largest shareholder (*Largest*), ownership concentration (*Concentration*), managerial ownership (*Mgr_holding*), and Big 4 auditors (*Big4*). For external governance characteristics, we further include analyst coverage (*Ln_coverage*) and mean ESG ratings (*ESG*). All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers.

4.5. Descriptive statistics

Table 1 reports descriptive statistics. *ESG_risk* has a mean of 15.0418 and a median of 14.9782, with a standard deviation of 6.8173. The 25th and 75th percentiles are 10.3167 and 19.3929, respectively, suggesting relatively large variation in ESG risk across firms and over

time. The mean of *Green_MA* is 0.0323, indicating that around 3.23% of firms undertake green M&As in a given firm-year during the sample period.

5. Empirical results

5.1. Baseline regression results

We present the baseline results in Table 2. The coefficients on *Green_MA* are positive and statistically significant at the 1% level in specifications with and without fixed effects. For column (2), the estimated coefficient on *Green_MA* implies that green M&As increase ESG rating divergence by 0.5873 in absolute terms, which represents 3.90% relative to the mean (15.0418) or 8.62% of the standard deviation (6.8173), suggesting that the baseline effect is economically reasonable and meaningful. We note that the mean ESG score, *ESG*, is not statistically significant, suggesting that the aggregate-level metric of ESG performance has limited incremental power for explaining ESG risk.

5.2. Mechanism analysis

5.2.1. The moderating effect of information disclosure quality

H2 hypothesizes that low-quality information disclosure strengthens the effect of green M&As on firm ESG risk. Following Yang et al. (2022), we construct an information disclosure quality index (*IDQ*) using a large battery of multidimensional items obtained from the CSMAR, including environmental management, environmental liabilities, environmental performance and governance, disclosure carriers, and regulatory certification status. The index ranges from 0 to 37, with higher values indicating more comprehensive and standardized disclosure. We retain only firm-year observations with complete *IDQ* data and split the sample at the median *IDQ* value. Panel A of Table 3 reports that the coefficient on *Green_MA* is 0.9276 in the low *IDQ* group (column 1) and 0.1661 in the high *IDQ* group (column 2). The difference between these two estimates is positive and statistically significant at the 1% level. These results support H2 and suggest that poor disclosure quality amplifies the positive association between green

M&As and ESG risk.

5.2.2. The moderating effect of institutional ownership

In H3, we predict that the positive relationship between green M&As and ESG risk is stronger when institutional investor ownership is lower. We measure external monitoring using the fraction of shares held by institutional investors (*IO*) and split the sample at the median *IO* value into low *IO* and high *IO* groups. The results in Panel B of Table 3 show that the coefficient on Green_*MA* is 1.0297 and significant at the 1% level in the low *IO* group while the effect decreases to 0.1888 and is not statistically significant in the high *IO* group. More importantly, the difference between the two estimates is positive and statistically significant at the 1% level. These results support H3 and suggest that stronger external monitoring by institutional investors mitigates the increase in ESG risk associated with green M&As.

5.2.3. The moderating effect of managerial agency costs

H4 predicts that the positive effect of green M&As on ESG risk is more evident in firms with higher managerial agency costs, which is consistent with more opportunistic post-deal ESG activities. We proxy managerial agency costs with the amount of administrative expenses as a proportion of operating revenue (*AE*) and split the sample at its median value. Panel C of Table 3 shows that the coefficient on *Green_MA* is 1.0302 and significant at the 1% level for the high *AE* group (column 1) and that the corresponding effect is 0.1428 and not significant for the low *AE* group (column 2). The difference between the two coefficients is positive and statistically significant at the 5% level. These results are consistent with H4, suggesting that greater agency conflicts between managers and shareholders are associated with higher ESG risk.

5.3. Endogeneity tests

Although the baseline results reliably show a positive association between green M&As and ESG risk, the estimated relation may not be causal. Firms' decisions to undertake green

M&As are unlikely to be random and may be jointly determined with unobserved factors such as governance quality, information transparency, or regulatory pressure that also shape firm ESG risk, which introduces omitted variable bias. In addition, ESG risk itself may affect firms' incentives to pursue green M&As. To mitigate these endogeneity concerns, we adopt the following multi-pronged identification strategies.

5.3.1. Propensity score matching approach

We partition the full sample into a treatment group of firm-year observations with green M&As and a control group of firm-year observations without green M&As. We first estimate a Probit model to obtain the propensity scores using the full set of control variables and then implement a 1:1 nearest-neighbor matching. Using the matched sample, we refit the baseline model and report the regression result in column (1) of Panel A, Table 4. The coefficient on *Green_MA* is positive and significant at the 5% level. Untabulated post-matching balancing test results indicate that the covariate differences between the treated and control groups are statistically nonsignificant. In addition, as reported in column (2) and column (3), the results remain qualitatively similar when we use 1:2 and 1:4 nearest-neighbor matching.

5.3.2. Instrumental variable approach

To further address the endogeneity issue, we utilize the IV approach and use a firm's transition climate risk exposure as the instrument. Sautner et al. (2023) posit that climate risk can be decomposed into physical risk, regulatory risk, and opportunity risk. Transition risk aggregates regulatory and opportunity risks and captures policy constraints and market opportunities that arise during the transition to a low-carbon economy. Following Sautner et al. (2023), we use text analysis implemented with the Jieba Python library and measure climate transition risk (*CT_risk*) as the frequency of climate transition risk dictionary hits in the annual report, computed as the raw count divided by 1,000.. Since tightening climate policies disproportionately affect high-emission industries, transition risk provides plausibly exogenous

variation in firms' incentives to engage in green M&As. At the same time, our measure of ESG risk, ESG rating disagreement, primarily reflects firms' ESG performance, disclosure practices, financial characteristics, and governance conditions, rather than economy- and industry-wide exogenous transition risk exposure, which supports the exclusion restriction.

In Panel B of Table 5, column (1) presents the result of first-stage regression, in which the effect of *CT_risk* is positive and significant at the 1% level. Firms with higher exposure to transition climate risk are more likely to engage in green M&A activities, which supports the relevance condition. The second stage regression result is reported in column (2). The coefficient on instrumented *Green_MA* is positive and significant at the 1% level, which is consistent with the baseline finding.

5.3.3. Heckman two-stage procedure

We then implement the Heckman two-stage procedure to address potential sample selection concerns related to the decision of pursuing green M&As. In the first-stage selection equation, we use *CT_risk* as the exclusion variable. In the second-stage outcome equation, we regress *ESG_risk* on *Green_MA*, control variables, and inverse Mills ration obtained from the first-stage regression. Panel C of Table 5 reports the result of the second-stage regression. The coefficient on *Green_MA* remains positive and is statistically significant at the 5% level. Overall, the Heckman results corroborate the baseline evidence and strengthen the robustness of our main findings to endogeneity concerns related to sample selection.

5.3.4. Quasi-natural experiment: New Energy Polit City program

As the last strategy to identify the causal relationship, we exploit China's NEPC program as a quasi-natural experiment. This policy is expected to attenuate the positive association between green M&As and ESG risk through both policy guidance and enhanced external monitoring. On the one hand, the policy strengthens local environmental governance and improves the allocation of green resources, which can encourage firms to frame green

M&As around strategic compliance and longer-horizon value creation. In addition, policy implementation can raise expectations for more detailed and comparable disclosure, including quantitative information related to new energy technology deployment and carbon emission reduction, which narrows the scope for heterogeneous interpretation across rating agencies and reduces ESG information risk. On the other hand, the policy can increase market scrutiny by drawing greater attention from analysts and the media, thereby strengthening reputational and monitoring pressure for firms to align their M&A activities with consistent ESG narratives and verifiable outcomes, which should reduce ESG performance risk. Moreover, local cooperation platforms and certification systems associated with the policy may provide more comparable benchmarks for external evaluators, further mitigating ESG risk.

To test our prediction, we estimate the following DiD specification:

$$ESG_risk_{i,t} = \beta_0 + \beta_1 \times Green_MA_{i,t} \times NEPC_{i,t} + \beta_2 \times Green_MA_{i,t} + \beta_3 \times NEPC_{i,t} + \gamma' \times Controls_{i,t} + Industry\ FEs + Year\ FEs + \varepsilon_{i,t} \quad (2)$$

NEPC equals one if the firm is registered in a program polit city, and zero otherwise. We expect β_1 to be negative. Consistent with our expectation, as shown in Panel A of Table 5, while green M&As activities have a positive influence on ESG risk before the policy (i.e., the main effect of *Green_MA* is positive and significant at the 1% level), the coefficient on the interaction term between *Green_MA* and *NEPC* is negative and significant at the 5% level, suggesting that the positive effect of green M&As on ESG risk diminishes after the policy is implemented.

A key identifying assumption of our DiD analysis is that treatment and control firms follow parallel trends in ESG risk prior to policy implementation. We assess this assumption by replacing *NEPC* with event-time indicators and using $t < -3$ as the omitted baseline. Panel B of Table 5 shows the regression result of this dynamic analysis. We find no statistically significant coefficient before the policy is implemented, which is consistent with parallel trends. The post-policy effect emerges with a lag, which is consistent with the interpretation that it

takes time for firms to adjust their ESG activities and for rating agencies to modify subsequent evaluation of ESG performance. Taken together, these results are consistent with the view that the policy encourages more substantive ESG behavior and mutes the adverse impact of green M&As on ESG risk, further strengthening the causal interpretation of our main findings.

5.4. Heterogeneity analysis

To further establish causality and exclude alternative explanations, this section examines whether and how the baseline association varies across different settings, including ownership structure, financial constraints, and managerial environmental awareness.

5.4.1. Ownership structure

SOEs, as important policy implementers, often play a strategic role in environmentally oriented M&As. Meanwhile, rating agencies usually differ in how they interpret SOEs' policy mandates and market incentives. Some might view SOEs' more extensive ESG reporting as an institutional advantage that improves transparency (Baumann-Pauly et al., 2013), whereas others could argue that greater reliance on narrative and non-financial content can expand room for subjective interpretation and information risk (Wang & Liu, 2024). In addition, implicit government–firm ties surrounding SOE transactions may raise questions about the persistence and verifiability of ESG performance outcomes, particularly in green transition sectors (Geng et al., 2024). These features make assessments of SOE green M&As less uniform across rating agencies, resulting in higher ESG risk. We therefore split the sample into SOEs and non-SOEs and use the Chow's test to evaluate differences in the estimated *Green_MA* coefficients. Panel A of Table 6 shows that the effect of *Green_MA* on *ESG_risk* is stronger among SOEs, with the positive difference being significant at the 5% level.

5.4.2. Financial constraints

Firms facing tighter financial constraints operate under more limited external financing capacity, which can restrict their ability to fund post-deal integration and the longer-horizon

investments required for substantive ESG performance improvements (Almeida et al., 2004). Resource scarcity may also lead firms to provide less detailed disclosure, or to selectively highlight favorable aspects of green M&As, thereby increasing opacity and ESG information risk. We classify firms as high- or low-constraint based on whether their financial constraint (*FC*) index is above or below the industry median. As presented in Panel B of Table 6, green M&As have a significantly positive influence on *ESG_risk* among highly constrained firms, whereas the effect is not statistically significant among less constrained firms. Their difference is positive and significant at the 5% level.

5.4.3. Managerial environmental awareness

Managerial environmental awareness can shape the credibility and implementation of firms' ESG strategies. Du et al. (2018) show that stronger environmental awareness helps translate environmental initiatives into sustained performance improvements. Hence, green M&As undertaken by firms with higher managerial environmental awareness are more likely to reflect clearer strategic intent and more disciplined execution, which will lower ESG risk. We follow Wang et al. (2022) and measure managerial environmental awareness (*MEA*) using an eight-point disclosure index that captures environmental philosophy, goals, management systems, education, initiatives, incident response, awards, and the "three simultaneous" system. We then split the sample at the median *MEA* value. Panel C of Table 6 shows that in the low *MEA* subsample, *Green_MA* significantly increases *ESG_risk*, with a positive coefficient that is significant at the 1% level, while the effect is nonsignificant in the high *MEA* subsample. The cross-subgroup difference is positive and significant at the 5% level.

5.5. The mediating role of corporate greenwashing behavior

Greenwashing refers to misleading or unsubstantiated claims regarding a firm's green practices (Flammer, 2021). Green M&As may increase incentives for such behavior because firms can leverage the transaction to cultivate an environmentally responsible image even when

substantive performance improvements are uncertain or delayed. In this setting, firms may overstate environmental benefits, shift attention toward favorable narratives, or selectively disclose green-related information after the deal, which can mislead ESG rating agencies and increase both ESG performance and information risk. Prior studies suggest that greenwashing reduces transparency and exacerbates information asymmetry among external evaluators (Parguel et al., 2011; Marquis et al., 2016), which contributes to greater ESG risk (Christensen et al., 2022; He et al., 2025).

Following Hu et al. (2023), we construct a greenwashing indicator (*Greenwashing*) using the frequency of four keywords in firm annual reports, namely "green," "environmental," "environment," and "low carbon". *Greenwashing* equals one if the keyword frequency exceeds the industry median and the firm is penalized for environmental violations, and zero otherwise. We then conduct a mediation analysis with *Greenwashing* as the mediating variable. Table 7 reports the results. Column (1) shows that *Green_MA* is positively related to greenwashing, and this effect is significant at the 1% level. In column (2), we show that the coefficient on *Green_MA* is still positive and significant after including *Greenwashing*, while *Greenwashing* is also positively related to *ESG_risk*. The Sobel test result further confirms that greenwashing significantly mediates the effect of green M&As on ESG risk. Overall, the evidence supports the partial mediating role of greenwashing and is consistent with the interpretation that green M&As spur corporate greenwashing activities, which in turn elevate ESG risk.

5.6. Robustness tests

Before concluding this study, we conduct a series of robustness checks. First, we use ESG risk measured in the next year as the dependent variable. Second, we exclude observations from 2019 to 2020, when the pandemic may have affected both corporate M&A activities and ESG risk. Third, we control for the number of rating agencies available for each firm-year to mitigate mechanical variation in ESG risk due to differences in rating coverage. Fourth, we

control for three additional deal-level characteristics, including purchase price (*Price*), equity stake acquired (*Ratio*), and payment method (*Paymethod*). Fifth, we use an alternative measure of ESG risk based on the coefficient of variation of standardized ESG ratings. As reported in Table 9, our results survive all these robustness tests. Finally, we conduct a placebo test by randomly assigning the green M&A status to the sample firms. According to the empirical *p*-value (untabulated), the effect of *Green_MA* is not significant at conventional significance levels.

6. Conclusion and discussion

This study examines whether and how green M&As influence firm ESG risk. Using a large sample of Chinese firms, we find that green M&As increase ESG risk as measured using ESG rating disagreement, and this result remains robust to a battery of endogeneity tests and robustness checks. Importantly, after the 2014 NEPC program strengthens ESG governance and external monitoring, the positive effect of green M&As on ESG risk weakens. Consistent with the proposed information asymmetry, governance, and incentive mechanisms, green M&As have a more pronounced influence for firms with poorer information disclosure quality, lower institutional ownership, and higher agency costs. Heterogeneity analyses show stronger effects for SOEs, financially constrained firms, and firms with lower managerial environmental awareness. Mediation analysis further suggests that greenwashing is an important path, with the main effect being partially mediated by greenwashing activities.

Recent work in management, strategy, and capital markets has advanced understanding of ESG risk and its empirical measure based on rating disagreement, emphasizing the effects of market conditions (Rubino et al., 2024), institutional characteristics (Huang et al., 2024; Kurbus & Rant, 2025), information environment and disclosure quality (Christensen et al., 2022; Liu, 2022; Kimbrough et al., 2024; Wang & Liu, 2024), differences in scope, measurement, and weighting (Chatterji et al., 2016; Berg et al., 2022; Biju et al., 2023;

Bissoondoyal-Bheenick et al., 2024), investor-related factors (Wu & Song, 2023; Liu et al., 2024), and governance or behavioral forces such as cross-listing (He et al., 2025; Yuan et al., 2025). Our study contributes to this line of literature by bringing an active corporate strategic choice, namely green M&A, into the ESG risk framework and by articulating a coherent linkage between corporate strategy, the evolution of information and governance environment, and ESG risk. Prior research has largely emphasized static determinants or single channel, leaving limited evidence on how firms' endogenous strategic actions can reshape ESG risk.

Green M&As are particularly relevant in this respect because it can simultaneously alter the breadth and the credibility of ESG-relevant information. On one hand, green acquisitions introduce multi-dimensional and often non-standardized information, such as technology integration, environmental liability treatment, and post-merger governance arrangements, which can increase uncertainty and raise ESG information risk. On the other hand, the same transactions can be used symbolically, including through greenwashing narratives that exaggerate environmental benefits or obscure implementation, thereby widening information asymmetry and increasing ESG performance risk. By jointly considering these two forces, our analysis clarifies why green M&As can heighten ESG risk even when it is ostensibly aligned with sustainability objectives.

This integrated perspective helps reconcile disparate findings in prior work by showing how corporate strategy affects ESG risk through both the expansion of information inputs and variation in information credibility and coherence. Rather than treating rating disagreement as driven only by agency methodology or disclosure volume, our evidence highlights the role of strategic actions that reshape what is disclosed and how reliably it maps into future ESG outcomes. More broadly, the results suggest that the quality of ESG strategy execution, rather than the mere adoption of an ESG-oriented strategy, is central to understanding ESG risk. They also imply that ESG assessments relying primarily on static disclosure snapshots, without

considering the dynamic informational consequences of strategic behaviour, may produce less comparable evaluations and attenuate the usefulness of ESG ratings for investors and regulators.

Our study offers several important theoretical implications. First, we show that green M&As can increase ESG risk by elevating information asymmetry and amplifying differences in how evaluators interpret complex ESG signals. In doing so, our study complements Berg et al. (2022) by bringing corporate strategic behaviour into the analysis of rating disagreement, which helps explain why ESG uncertainty and evaluation risk may intensify even when firms undertake ostensibly pro-ESG actions. Second, our study develops a coherent conceptual link between corporate strategy, information and governance environment, and ESG risk, extending the application of information economics and corporate governance in sustainable finance settings. Third, we find that corporate ownership structure, financial condition, and managerial ESG expertise can shape how information related to green M&As is produced and interpreted, which offers an integrated view of how internal governance interacts with external ESG evaluation systems to influence the magnitude of ESG risk.

Our findings also yield practical implications for managers, investors, rating agencies, and regulators. First, managers should recognize that green M&As may improve ESG performance yet increase ESG risk. They can mitigate such risk by improving the transparency, comparability, and verifiability of disclosures about deal rationale, implementation plans, and post-merger environmental outcomes, while avoiding overly general narratives and practices that resemble greenwashing. Second, institutional investors should remain attentive to potential signal distortion in strategic ESG actions and incorporate governance quality and implementation credibility into their assessments when evaluating green M&As. Third, rating agencies may improve the consistency and validity of ESG performance and risk assessments by explicitly accounting for strategic behavior, strengthening the treatment of deal-related information that is difficult to standardize, and enhancing procedures that evaluate credibility

and follow-through. Finally, regulators can reduce ESG risk arising from green M&A by advancing disclosure standardization and strengthening oversight of ESG evaluation practices. As many countries now move toward mandatory ESG disclosure, policies that encourage substantive sustainability strategies alongside higher-quality information provision will be important for limiting unintended increases in ESG risk.

Our study has several limitations. First, although the results provide evidence consistent with several key mechanisms such as information asymmetry, external monitoring, and internal governance, the empirical design does not fully capture the dynamic path through which green M&As increase ESG risk. Future studies can examine how the effects differ across integration stages and horizons and how rating agencies update their frameworks as post-merger outcomes become observable. Second, the sample is limited to China, which may constrain generalizability because institutional environments differ in ESG regulation and rating market maturity. Future cross-country studies may evaluate whether the relationship between green M&As and ESG risk varies under alternative regimes and whether greater international convergence in ESG evaluation moderates these effects. Third, this study focuses on the direct effect of green M&As on ESG risk and does not examine how it interacts with other corporate strategies or broader shocks. Future research could explore joint effects with green innovation and carbon targets, as well as the role of macro-level forces such as ESG capital flows or extreme weather events, to develop more comprehensive accounts of corporate ESG risk.

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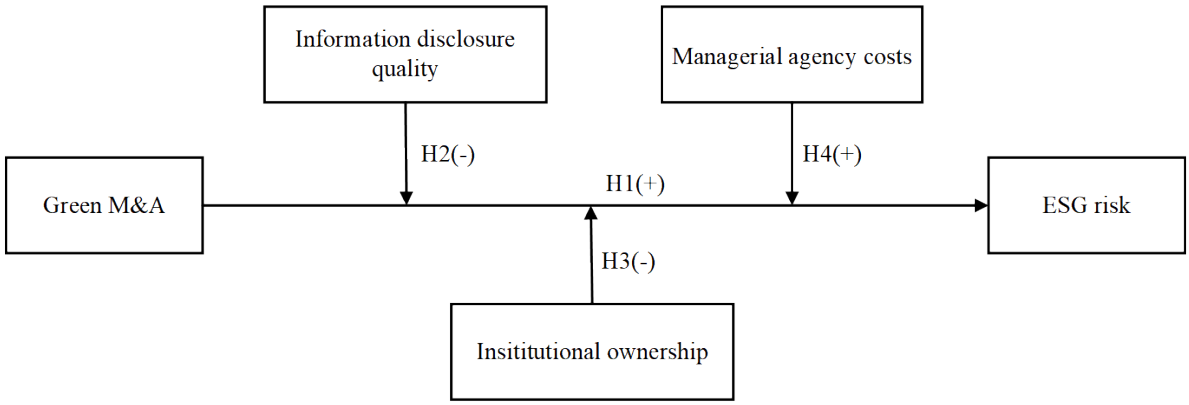


Figure 1. Conceptual model

Table 1. Descriptive statistics

(N=29,459)	Mean	Std. Dev.	P25	Median	P75
ESG_risk	15.0418	6.8173	10.3167	14.9782	19.3929
Green_MA	0.0323	0.1768	0	0	0
Ln_assets	22.2452	1.3207	21.2921	22.0709	23.0102
Ln_firm_age	2.1887	0.8946	1.6094	2.3979	2.8904
Leverage	0.4269	0.2069	0.2613	0.4200	0.5830
ROA	0.0515	0.0642	0.0267	0.0509	0.0816
MB	3.5105	3.0231	1.6595	2.6040	4.2359
PPE	0.2112	0.1591	0.0870	0.1780	0.3022
Tobin_Q	2.0039	1.2735	1.2289	1.5939	2.2823
EBIT_volatility	0.0337	0.0427	0.0091	0.0189	0.0399
AE	0.0896	0.0707	0.0433	0.0722	0.1122
Separation	0.0478	0.0741	0	0	0.0800
Ln_board	2.2456	0.1754	2.0794	2.3026	2.3026
Largest	0.3434	0.1471	0.2289	0.3213	0.4433
Concentration	0.3711	0.2189	0.1880	0.3688	0.5402
Mgr_holding	0.1246	0.1919	0	0.0033	0.2144
Big4	0.0564	0.2307	0	0	0
Ln_coverage	1.4402	1.1815	0	1.3863	2.4849
ESG	37.9103	11.3617	29.8900	37.3367	46.0493

Notes. This table reports the descriptive statistics of main variables for the full set of observations used to estimate the baseline regression (i.e., the second column in Table 2). Variables are defined in Appendix A.

Table 2. The main effect of green M&As on ESG risk

	(1)	(2)
	ESG_risk	ESG_risk
Green_MA	0.5877***	0.5873***
	(2.7240)	(2.7089)
Ln_assets	0.4819***	0.3637***
	(9.4963)	(4.7563)
Ln_firm_age	-0.2318***	0.1937**
	(-3.5263)	(1.9990)
Leverage	-2.5453***	-1.5855***
	(-9.3398)	(-3.9057)
ROA	-17.6578***	-18.8779***
	(-23.8000)	(-19.7715)
MB	0.1611***	0.1647***
	(6.1697)	(4.8573)
PPE	2.2503***	2.0295***
	(9.2142)	(4.9986)
Tobin_Q	-0.4285***	-0.4587***
	(-6.7118)	(-5.8047)
EBIT_volatility	-3.4552***	-2.6896**
	(-3.5510)	(-2.1617)
AE	2.0999***	3.1101***
	(3.3689)	(3.5565)
Separation	-1.8150***	-2.2582***
	(-3.3731)	(-2.9984)
Ln_board	-1.3600***	-0.7702**
	(-6.0009)	(-2.3851)
Largest	-2.3458***	-1.2966***
	(-8.0430)	(-3.0781)
Concentration	1.5384***	0.2857
	(6.4059)	(0.9243)
Mgr_holding	1.4749***	0.1642
	(5.4462)	(0.4232)
Big4	0.3990**	0.5297**
	(2.2719)	(2.2181)
Ln_coverage	0.1014**	0.1347**
	(2.4679)	(2.3106)
ESG	-0.0274***	0.0066
	(-7.6379)	(1.0731)
Observations	30,760	29,459
R-squared	0.0386	0.1093
Industry fixed effects	No	Yes
Year fixed effects	No	Yes

Notes. This table reports the OLS regression results. Variables are defined in Appendix A. Robust *t*-statistics listed in parentheses below the point estimates are based on standard errors clustered along the firm dimension. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 3. Green M&As and ESG risk – Analysis of the economic mechanisms

Panel A. The moderating effect of information disclosure quality

	(1)	(2)
	Low *IDQ*	High *IDQ*
	ESG_risk	*ESG_risk*
Green_MA	0.9276***[A]	0.1661[B]
	(3.1488)	(0.5383)
Observations	16,095	13,363
R-squared	0.1128	0.1608
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
p-value of testing A>B	0.0384**	

Panel B. The moderating effect of institutional ownership

	(1)	(2)
	Low *IO*	High *IO*
	ESG_risk	*ESG_risk*
Green_MA	1.0297***[A]	0.1888[B]
	(3.1595)	(0.6776)
Observations	14,734	14,725
R-squared	0.1284	0.1054
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
p-value of testing A>B	0.0241**	

Panel C. The moderating effect of managerial agency costs

	(1)	(2)
	High *AE*	Low *AE*
	ESG_risk	*ESG_risk*
Green_MA	1.0302***[A]	0.1428[B]
	(3.3921)	(0.4827)
Observations	14,725	14,734
R-squared	0.1184	0.1161
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
p-value of testing A>B	0.0353**	

Notes. This table reports the OLS regression results. Variables are defined in Appendix A. Robust *t*-statistics listed in parentheses below the point estimates are based on standard errors clustered along the firm dimension. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 4. Tests addressing the endogeneity problems

Panel A. Propensity score matching approach

	(1)	(2)	(3)
	1:1 matching	1:2 matching	1:4 matching
	ESG_risk	*ESG_risk*	*ESG_risk*
Green_MA	0.6475**	0.7182***	0.7881***
	(2.2478)	(2.7311)	(3.2605)
Observations	1,901	2,735	4,376
R-squared	0.1109	0.106	0.1023
Control variables	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

Panel B. Instrumental variable approach

	(1)	(2)
	Green_MA	*ESG_risk*
Green_MA (instrumented)		34.8439***
		(4.2179)
CT_risk	0.1805***	
	(4.9202)	
Observations	29,376	29,376
R-squared	0.0221	-0.6669
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

Panel C. Heckman two-stage procedure

	(1)
	ESG_risk
Green_MA	0.5685***
	(2.6296)
Observations	29,246
R-squared	0.1098
Control variables	Yes
Inverse Mills ratio	Yes
Industry fixed effects	Yes
Year fixed effects	Yes

Notes. This table reports the OLS regression results. Variables are defined in Appendix A. Robust *t*-statistics listed in parentheses below the point estimates are based on standard errors clustered along the firm dimension. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5. Quasi-natural experiments: New Energy Pilot City program

Panel A. Green M&As, New Energy Pilot City program, and ESG risk

	(1)
	ESG_risk
Green_MA×NEPC	-1.3229**
	(-2.0114)
Green_MA	1.0588***
	(3.2350)
NEPC	0.3483**
	(2.1543)
Observations	18,931
R-squared	0.1221
Control variables	Yes
Industry fixed effects	Yes
Year fixed effects	Yes
SE clustered by	Firm

Panel B. Test of the parallel trends assumption

	(1)
	ESG_risk
$Green_MA\times NEPC_{=-3}$	-0.7208
	(-0.3514)
$Green_MA\times NEPC_{=-2}$	-0.0356
	(-0.0214)
$Green_MA\times NEPC_{=-1}$	-1.5502
	(-1.1340)
$Green_MA\times NEPC_{=+1}$	-0.0518
	(-0.0390)
$Green_MA\times NEPC_{\geq+2}$	-1.8300**
	(-2.5411)
Green_MA	1.1957***
	(3.4181)
Observations	18,931
R-squared	0.1222
Main effects of $NEPC$s	Yes
Control variables	Yes
Industry fixed effects	Yes
Year fixed effects	Yes
SE clustered by	Firm

Notes. This table reports the OLS regression results. Variables are defined in Appendix A. Robust *t*-statistics listed in parentheses below the point estimates are based on standard errors clustered along the firm dimension. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6. Green M&As and ESG risk – Heterogeneity tests

Panel A. Ownership structure

	(1)	(2)
	SOE=1	*SOE*=0
	ESG_risk	*ESG_risk*
Green_MA	0.7686**[A]	0.4476[B]
	(2.3976)	(1.5868)
Observations	11,182	18,274
R-squared	0.1575	0.1003
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
p-value of testing A>B	0.0164**	

Panel B. Financial constraints

	(1)	(2)
	High *FC*	Low *FC*
	ESG_risk	*ESG_risk*
Green_MA	1.1218***[A]	0.0709[B]
	(3.5222)	(0.2529)
Observations	14,581	14,878
R-squared	0.1235	0.1264
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
p-value of testing A>B	0.0260**	

Panel C. Managerial environmental awareness

	(1)	(2)
	Low *MEA*	High *MEA*
	ESG_risk	*ESG_risk*
Green_MA	0.8581***[A]	0.1573[B]
	(3.0475)	(0.4995)
Observations	17,957	11,502
R-squared	0.1113	0.1612
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
p-value of testing A>B	0.0483**	

Notes. This table reports the OLS regression results. Variables are defined in Appendix A. Robust *t*-statistics listed in parentheses below the point estimates are based on standard errors clustered along the firm dimension. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7. Green M&As, greenwashing incentives, and ESG risk – Mediation analysis

	(1)	(2)
	Greenwashing	*ESG_risk*
Green_MA	0.0492***	0.5633***
	(3.8734)	(2.6058)
Greenwashing		0.4361***
		(3.3810)
Observations	29,419	29,419
R-squared	0.1858	0.1093
Control variables	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
p-value of Sobel test	0.0017***	

Notes. This table reports the OLS regression results. Variables are defined in Appendix A. Robust *t*-statistics listed in parentheses below the point estimates are based on standard errors clustered along the firm dimension. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 8. Robustness tests

	(1)	(2)	(3)	(4)	(5)
	ESG_risk	*ESG_risk*	*ESG_risk*	*ESG_risk*	*ESG_risk_CV*
Green_MA	0.4145*	0.7402***	0.6076***	0.5260**	0.0116*
	(1.9370)	(3.0384)	(2.8134)	(2.1451)	(1.7261)
ESG_coverage			0.9461***		
			(17.6215)		
Price				-0.0709	
				(-1.0834)	
Ratio				-0.3943	
				(-0.8806)	
Paymethod				0.5487	
				(1.3311)	
Observations	28,650	24,597	29,459	4,282	29,459
R-squared	0.1032	0.1028	0.1217	0.0501	0.3620
Control variables	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
ESG_risk measured at *t*	No	Yes	Yes	Yes	Yes
ESG_risk measured at *t*+1	Yes	No	No	No	No
Excluding Covid-19 period	No	Yes	No	No	No

Notes. This table reports the OLS regression results. Variables are defined in Appendix A. Robust *t*-statistics listed in parentheses below the point estimates are based on standard errors clustered along the firm dimension. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Appendix A. Variable definitions

Variable	Definition
ESG_risk	Rating disagreement across seven agencies (CSI, Hexun, Menglang ESG, Bloomberg, STGF, FTSE Russell, and Wind). All ratings are standardized to a 0–100 scale by linearly rescaling numeric scores and converting letter-based ratings using midpoint mapping. *ESG_risk* is then computed as the standard deviation of the standardized scores for firm-year observations with at least two available ratings.
Green_MA	A dummy variable equal to one if the firm undertakes at least one green M&A, and zero otherwise. An M&A deal is categorized as green if any predefined "green" keywords appear in the transaction overview, the name of the target, the description of the target, or the business scope of the target or the seller. The "green" keywords include environment, ecology, sustainability, conservation, green, clean, virescence, lucid waters and lush mountains, low carbon, carbon neutrality, carbon assets, carbon management, carbon market, carbon trading, carbon cycle, energy saving, low energy consumption, new energy, emission reduction, pollution, desulfurization, denitrification, dust removal, waste, recycling, regeneration, circulation, and transformation and upgrading.
Ln_assets	Natural logarithm of total assets.
Ln_firm_age	Natural logarithm of one plus the difference between current year and the listing year.
Leverage	Total liabilities divided by total assets.
ROA	Sum of total profit and financial expenses divided by total assets.
MB	Market value of equity divided by book value of equity.
PPE	Net fixed assets divided by total assets.
Tobin_Q	Market value of assets divided by book value of assets.
EBIT_volatility	Standard deviation of earnings before interest and taxes divided by total assets, computed over the current and previous two years.
AE	Administrative expenses divided by operating revenue.
Separation	Difference between the control rights and ownership rights of the ultimate controlling shareholder.
Ln_board	Natural logarithm of one plus the number of board directors.
Largest	Shares owned by the largest shareholder as a percentage of total shares outstanding.
Concentration	Sum of shares owned by the ten largest negotiable shareholders as a percentage of total shares outstanding.
Mgr_holding	Sum of shares owned by directors, supervisors, and senior managers as a proportion of total shares.
Big4	A dummy variable equal to one if the audit is provided by a Big four audit firm, and zero otherwise.
Ln_coverage	Natural logarithm of one plus the number of analysts following the firm.
ESG	Mean ESG rating.
IDQ	Sum of scores for firms' environmental management, environmental liabilities, environmental performance, governance, disclosure channels, and regulatory certification status. The index evaluates the sufficiency, salience, and reliability of environmental disclosure and ranges from 0 to 37, with higher values indicating more comprehensive and standardized environmental information disclosure.

Continued

Variable	Definition
Inst_holding	Proportion of shares owned by institutional investors.
CT_risk	The frequency of climate transition risk dictionary hits in the annual report, computed as the raw count divided by 1,000. The transition risk bigram dictionary is constructed following Sautner et al. (2023) and extended to the Chinese setting
NEPC	A dummy variable equal to one if the firm is located in a New Energy Pilot City after the implementation of the policy, and zero otherwise.
$NEPC_{=-3}$	A dummy variable equal to one if the firm is located in a New Energy Pilot City in *t*=-3 relative to the policy's implementation, and zero otherwise.
$NEPC_{=-2}$	A dummy variable equal to one if the firm is located in a New Energy Pilot City in *t*=-2 relative to the policy's implementation, and zero otherwise.
$NEPC_{=-1}$	A dummy variable equal to one if the firm is located in a New Energy Pilot City in *t*=-1 relative to the policy's implementation, and zero otherwise.
$NEPC_{=+1}$	A dummy variable equal to one if the firm is located in a New Energy Pilot City in *t*=+1 relative to the policy's implementation, and zero otherwise.
$NEPC_{\geq+2}$	A dummy variable equal to one if the firm is located in a New Energy Pilot City in $t\geq+2$relative to the policy's implementation, and zero otherwise.
SOE	A dummy variable equal to one for state-owned firm, and zero otherwise.
FC	We construct *FC_index* in three steps. First, for each year, we standardize firm size, firm age, and cash dividend payout ratio and get the z-score for each variable. We then take the mean of these three standardized variables for each firm and sort firms in ascending order using this composite score. We define a dummy variable *QUFC*, which equals one for firms in the bottom tercile of this composite score, and zero otherwise. Second, we estimate a logit model for the probability of being financially constrained: $QUFC_{i,t} = \alpha_0 + \alpha_1 \times Size_{i,t} + \alpha_2 \times Lev_{i,t} + \alpha_3 \times \frac{Dividends_{i,t}}{Assets_{i,t}} + \alpha_4 \times MB_{i,t} + \alpha_5 \times \frac{NWC_{i,t}}{Assets_{i,t}} + \alpha_6 \times \frac{EBIT_{i,t}}{Assets_{i,t}} + \varepsilon_{i,t}$, where $Size$ is natural logarithm of total assets, Lev is total liabilities divided by total assets, $Divideneds$ is cash dividends, MB is market-to-book ratio, NWC is net working capital and $EBIT$ is earnings before interest and tax. Third, we compute the fitted probability and denote it *FC*.
MEA	An eight-point disclosure index covering environmental philosophy, goals, management systems, education, initiatives, incident response, awards, and the "three simultaneous" system (Wang et al., 2022).
Greenwashing	A dummy variable equal to one if the green keyword frequency (i.e., green, environmental, environment, and low carbon) in the firm's annual report exceeds the industry median and the firm is penalized for environmental violations, and zero otherwise (Hu et al., 2023).
ESG_coverage	Number of rating agencies.
Price	Natural logarithm of the deal purchase price.
Ratio	Proportion of shares acquired.
Paymethod	A dummy variable equal to one if the M&A transaction is paid with stock and zero otherwise.
ESG_risk_CV	Coefficient of variation of standardized ESG ratings.