The Value of Sustainable Property Management in Real Estate: Evidence from Hong Kong

Jianfu Shen*; Kwok Yuen Fan, Eddie C.M. Hui, Sik Man Ho

Department of Building and Real Estate, the Hong Kong Polytechnic University

Abstract:

This study investigates whether sustainability in property management is valued by property buyers. Using a sample of 365,201 property transactions in Hong Kong from 2007 to 2021 and based on a hedonic pricing model, we find that the environmental, social and governance (ESG) performance of property management companies is positively associated with housing price; and housing price drops if property management companies incur ESG related risk incidents. The results are robust if the sample is restricted to transactions with repeated sales and a location-based matching approach is used. Further analysis suggests that housing prices increase with social and governance performance but not environmental performance of property management companies. The negative effect of ESG accidents on property prices is exaggerated if the accidents are reported by high reach media. Home buyers and non-local buyers are more willing to pay a premium for sustainability in property management than housing speculators and local buyers. Additional evidence suggests that ESG practices play a more significant role in determining property value through lower risk rather than higher rents. Taken together, this study provides evidence on the value of sustainable property management in real estate.

*Corresponding author, email: jeff.jf.shen@polyu.edu.hk

The Value of Sustainable Property Management in Real Estate: Evidence from Hong Kong

Introduction

There has been a growing awareness of environmental, social, and governance (ESG) issues among firms, driven by a number of factors, including increased stakeholder pressure, changing regulations, and a growing understanding of the importance of sustainability and responsible business practices. Firms are recognizing that ESG issues can impact their long-term financial performance and reputation, as well as their ability to attract and retain employees, customers, and investors. However, whether ESG and sustainable practices in the business is valuable is still debatable. Numerical studies suggest that corporate ESG (or corporate social responsibility; CSR) performance is positively associated with corporate financial performance (Orlitzky et al., 2003). However, some studies reveal that there are no relationships or even negative relationship between the sustainability and corporate financial performance, probably because sustainable practices are costly (Margolis, Elfenbein, and Walsh, 2009; Wang et al., 2016). Most prior studies examine the impacts of sustainability on the corporations[1]. Although real estate represents the largest asset class in the world, the studies on the value of sustainability in real estate assets remain scant[2]. This study fills in this notable research gap by focusing specifically on the value of sustainable activities in property management and its impact on housing prices.

Property management services are critical for the successful operation and management of high-rise residential buildings, especially those in the Asia. Property management companies are responsible for regular inspections of the building's structure, elevators, and fire safety systems, manage the flow of people and goods within the building, create a sense of community by organizing social events, managing common areas such as clubs and handling issues or disputes arising from residents, etc. Sustainable property management from property management companies who place more concerns on environmental, social and governance, can add value to residential users by ensuring the safety, comfort, and satisfaction, maintaining

---

[1] Another strand of literature explores the relationships between ESG/CSR and stock returns. The evidence on whether ESG/CSR is associated with positive stock returns is also mixed (see, e.g., Hong and Kacperczyk, 2009; Edmans, 2011; Dimson et al., 2015; Lins et al., 2017; Pastor et al., 2021; 2022; Pedersen et al., 2021)

[2] The studies of sustainability in real estate focus on the effect of CSR/ESG on the performance of Real Estate Investment Trusts (Eichholtz et al., 2012; Chiang et al., 2019; Feng and Wu, 2021) and the premium of green buildings (e.g., Eichholtz et al., 2010). Our study differs from these studies as we investigate the value of sustainable property management in real estate.

good building condition, and reducing the risk of accidents within the buildings[3]. Thus, it is expected that sustainable property management adds value to residential properties. We test this hypothesis based on a large volume of property transactions in Hong Kong where most of residential buildings are managed by professional property management companies.

Based on a sample of 365,201 property transactions in Hong Kong from 2007 to 2021, this study applies a hedonic pricing model to investigate whether responsible property management is valued by housing buyers. We measure the sustainability of property management by the ESG ratings of property management companies provided by MSCI, a leading ESG rating agency, and the ESG risk accidents of property management companies provided by RepRisk. The findings of this study can be summarized as follows. First, we find that housing prices increase significantly with the ESG performance of property management companies and while decrease significantly if property management companies incur ESG risk accidents. The results are robust in the repeat-sale transactions sample and location-based matched transactions samples. Second, the impacts of ESG factors of property management on housing prices are more significantly in the governance and social performance but not environmental performance of property management companies. The ESG risk accidents of property management companies with high reach have more negative effects on housing price. Lastly, we find that non-local buyers and home buyers are more likely to pay premium to the properties managed by property management companies with strong ESG performance. Non-local buyers and home buyers value responsible property management more than local buyers and speculators, probably due to their risk aversion to avoid the loss of property value arising from future ESG related accidents within the buildings. The association between ESG practices of property management and property prices is derived from low risk rather than higher rents.

This study contributes to the understanding of the value of sustainability in the real estate. Prior studies focus on the effects of CSR/ESG in the real estate investment companies (e.g., REITs) and the impacts of green features of buildings on property prices (Eichholtz et al., 2010; Eichholtz et al., 2012; Chiang et al., 2019; Feng and Wu, 2021). This study explores the value of sustainability from one type of important stakeholders in real estate – the companies that

---

[3] We use "responsible property management" and "sustainable property management" interchangeably in this study. There is no official definition of responsible property management. According to RICS (2021), responsible business in the real estate management is to focus on the long-term sustainability and incorporate the ESG factors into managing property and facilities.

provide property management service to residential users. This study is the first paper that documents positive value of sustainable property management to property buyers.

Background, literature review and hypotheses development

Background

The densely populated development with confined developable areas in Hong Kong is renowned globally. Under such characteristics, high-rise and compacted residential buildings are constructed ubiquitously in HK, which vary from most of the foreign regions (especially beyond Asian countries) that the residential flats constructed in detached or semi-detached housing style (Gifford, 2007). Within the dwellings in multi-storey style, each homeowner bears inescapable duty in the common space of the buildings. Yet, the repair and maintenance in those areas are normally neglected by the property owners due to the exclusive features in the common areas out of their private dwellings. The neglection of maintenance in public areas is capable to depreciate property prices inside the building, and hence damage the private interests of those building owners. "Tragedy of anti-commons" could be used to describe the above phenomenon, it was defined and introduced by Heller (1998), describing the excessive breakdown of property rights, leading to insufficient coordination in the public, which causes loss to their assets and properties.

To prevent the existence of such a phenomenon and its negative impacts on the properties, property management service thus becomes an essential component for residential buildings in Hong Kong[4]. In Hong Kong, there are various guides and practices developed by recognized professional bodies to specify the duties of property managers. According to the Hong Kong Institute of Surveyors (2015), property managers are responsible for all services related to the operation of the properties, security and cleaning service, repair and maintenance (including the procurement and tender for repair jobs), financial management of income and expenditures related to common areas, emergence handling, etc[5]. Property owners normally pay property management fees each month and extra fees to use some facilities such as swimming pool. The property management fees vary with the type and size of the property, the level of services

---

[4] The real-life example of the "tragedy of anti-commons" have been existing in Hong Kong in some old-aged buildings for more than half a century, they are usually called "three-nil buildings" in society (no owners' corporation, no residents' organization, and no property management companies) (Legco, 2020).

[5] For the maintenance part, the works include repair and cleaning works in common areas, routine checking of building services provisions to maintain the functionality of the properties, and so on. In the operation part, security checking, complaints handling, and even dispute resolution between clients are also under the liabilities of property managers.

required, and the location of the property. The monthly property management fee paid by property owners could be equivalent to around 5% of monthly rent on a property.

Property management companies in Hong Kong have incorporated ESG factors in their practices. Property management companies usually place concerns on the "environmental" part and conducted a variety of strategies to achieve green targets, like carbon neutrality, energy saving, waste reduction, etc. Therefore, some green building features and sourcing renewable energy were executed by property management companies for a long period, e.g., installing solar-energy panels and deploying Internet of Things (IoT) technology to optimise energy consumption (Deloitte, 2022). For the "social" element in ESG, community contribution takes a major role to determine the socially responsible property management companies, including the ordinary charity works and volunteering services. Large PMCs keep enhancing the professionality of through continuous training and development of employees. The governance quality of property management companies is improved through establishing anti-corruption and bribery policies, disclosing insiders' information to increase transparency, raising the female ratio on the management level to promote gender equality, etc. (Kerry Properties Limited, 2022; Kowloon Development Company Ltd., 2021; SHKP, 2022). Yet, the "governance" component has often been neglected by the small- and medium-sized property management companies (Deloitte, 2022).

Literature review

Since the seminal paper by Rosen (1974), studies have explored factors that can affect housing price, mostly physical characteristics such as location, size, age, building features, neighbourhood, etc. Some studies have explored the impacts of intangible characteristics property transaction prices, e.g., school quality (e.g., Brasington, 1999; Seo and Simons, 2009; Gibbons, Machin and Silva, 2013), crime and violence (e.g., Pope, 2008; Ihlanfeldt and Mayock, 2010; Besley and Mueller, 2012), environmental externalities (Chay and Greenstone, 2005; Greenstone and Gallagher, 2008; Currie et al., 2015; Muehlenbachs et al., 2015), etc. Buyers are willing to pay a premium for the anticipated benefits of improved transport infrastructure. Jayantha et al. (2015) reveal that announcement of the project had a positive effect on property prices in Hong Kong. These studies indicate that housing prices indeed reflect the values from social and environmental activities.

In Hong Kong, several studies have found that unnatural deaths and superstition have a negative effect on housing prices. Particularly, prices drop by 20 percent for units associated with haunted properties. In addition, the negative impact spilled over and resulted in a price reduction of 10% for units on the same floor, 7% for units in the same block, and 1% for units in the same estate (Bhattacharya et al., 2021). Furthermore, property buyers can distinguish between private space and shared space. Chan et al. (2008) reveals a negative relationship between the amount of shared space and housing prices in Hong Kong. Homebuyers, however, are sensitive to different forms of shared space, such as clubhouses, and are discerning about how gross housing space is distributed. Hui et al., (2017) find that property buyers are willing to pay a higher price for office properties that have been certified as green compared to residential properties. Their findings indicate that commercial property buyers are concerned about improvements in environmental or energy performance.

Hypothesis development

Property managers play an essential role in the operation and management of real estate properties. Real estate property managers are increasingly required to integrate ESG considerations into their management. Several factors contribute to the ESG performance of property managers, including the ability to incorporate sustainable and socially responsible practices into their property management practices, including energy efficiency, waste management, tenant satisfaction, community engagement, employee training and governance, among others. As a result, there can be a reduction in costs of repair and maintenance, an increase in user satisfaction, and a positive impact on the environment within the buildings they managed. Residential users can receive better housing service from property management companies (after considering the property management fees they paid), leading to a higher monthly rental for properties. With well-functioned routine checking, repair and maintenance, residential buildings managed by property managers with strong ESG practices could have more stable future rental growth and slower value depreciation and hence larger future property value. An improvement of ESG performance of property management companies could also reduce the chance of misusing property management fees and other incomes from the common areas and the probability of incidents occurred within the buildings (e.g., unnatured death), which can decrease the loss of property value due to reputation damage and negative events. As the ESG performance of property management companies can enhance the quality of housing service and rental income, and decrease the risk of unexpected value loss, property

buyers can be more willing to pay a premium to the properties they managed. Therefore, the following hypothesis is formulated in our study:

H1: Residential properties managed by property managers with a better ESG performance are traded at higher prices.

Data and sample

This study utilizes individual-level housing transaction data sourced from the Economic Property Research Centre (EPRC), which meticulously maintains all residential transaction records documented by the Hong Kong Land Registry (Hui et al., 2007; Hui et al., 2017). In addition to offering comprehensive information on transactions and housing characteristics such as transaction prices, property area, floor number, number of bedrooms, and number of dining rooms, this dataset also provides the names of the buyers. This information enables us to identify non-local buyers by analyzing the spelling of their names (Fan et al., 2023). This information is also used by our study to identify homebuyers, who are also known as non-flippers, who hold on to their properties for at least two years (Agarwal et al., 2022). Our study excludes buyers from companies and organizations.

The list of property managers is obtained from the Hong Kong Association of Property Management Companies. The association provides information regarding its members and the properties they manage. It consists of 113 members that provide property management service to over 70% of Hong Kong's residents, commercial buildings, car parks, and private and government facilities. The property managers are then manually matched with the ESG scores data provided by MSCI and ESG risk incidents from the RepRisk database by identifying the name of the property manager and their parent companies. We use both the ESG rating and ESG risk incidents to capture the ESG performance of property management companies.

MSCI ESG ratings have been updated monthly since 2007 by assessing a firm's exposure to ESG issues. MSCI provides an overall ESG score, and three subcategory components, environmental pillar score, social pillar score, and governance pillar score for a firm. Prior studies have used MSCI ESG data to examine the link between ESG performance of companies and asset pricing using (e.g., Pastor et al., 2022; Giese et al., 2020). RepRisk screens daily updated data from 100,000 public sources in 23 languages. It flags and monitors ESG incidents and international standards violations that may negatively impact a company's reputation,

compliance, and financials. As the world's largest database, it covers over 200,000 public and private companies worldwide (Li and Wu, 2020; Dai et al., 2021). In total, MSCI provides ESG scores for 21 property managers, while RepRisk provides ESG incidents for 31 property managers.

This paper relies on two sources to identify the address information of properties managed by the members and housing transaction data from the EPRC. The address information is obtained through the Address Lookup Service provided by the Office of the Government Chief Information Officer (OGCIO) of the Hong Kong government and the Location Search API provided by the Land Department of the Hong Kong government. By matching the address information from the EPRC housing transaction data with the property manager data, we establish the connection between the two datasets. The sample period for our analysis spans from 2007 to 2021, as both MSCI ESG scores and RepRisk ESG incidents were initiated in 2007. To ensure the robustness of our analysis and eliminate outliers, we apply winsorization to the transaction prices and property area at the top and bottom 1% levels. This procedure helps mitigate the influence of extreme values. In our sample, which consists of 337,838 transactions, we capture approximately 29.8% of the total residential property transactions[6].

[Insert Table 1 here]

Table 1 presents the summary statistics for the variables used in this study. Detailed definitions of the variables can be found in Appendix A1. The average logarithm of transaction prices (LNPRICE) is 15.263, corresponding to approximately 4.25 million Hong Kong dollars. The logarithm of property area (LNAREA) has an average value of 6.279, which is equivalent to 533 square feet. Property prices per square foot (LNPFT) amount to around 7,990 Hong Kong dollars, reflecting housing prices in 2012[7].

Regarding the ESG information of property managers, the overall ESG score (ESGSCORE) averages at 4.816. The average scores for the environmental (ENVSCORE), social

---

[6] Our sample size is highly representative as the EPRC covers transactions related to various types of residential properties, including buildings managed by property managers, as well as independent houses and other forms of residential property without property managers. Furthermore, not all property managers in our sample have associated ESG information, particularly smaller privately owned companies. Additionally, buyers affiliated with companies are excluded from our sample to focus on individual homebuyers.

[7] According to the Rating and Valuation Department of the Hong Kong government, the average price per square meter for residential properties within the size range of 40 square meters (430 square feet) to 69.9 square meters (752 square feet) is reported to be 90,158 Hong Kong dollars, which is equivalent to approximately 8,380 Hong Kong dollars per square foot. Furthermore, there is a significant decline in housing transactions following the implementation of the special stamp duty in November 2010, which was further intensified in October 2012 to curb speculative investments in residential property (Agarwal et al., 2022).

(SOCSCORE), and corporate governance (GOVSCORE) pillars are 5.407, 4.757, and 4.627, respectively. Our study reveals that 33.3% of residential properties are managed by property managers who have had ESG incidents (RISK) within the past year. Of these incidents, 13.5% had a limited reach level (LIMITEDRISK), meaning they circulated in local media, local governmental bodies, and social media. Additionally, 14.2% of incidents had a medium reach level (MEDIUMRISK), involving circulation in most national and regional media. Furthermore, 24.7% of incidents had a high reach level (HIGHRISK), signifying circulation in globally recognized media outlets.

Furthermore, our analysis indicates that 34.2% of property buyers are non-local buyers (NONLOCAL), while 79.5% are considered homebuyers (HOMEBUYER) who have held their property for at least two years. The average number of floors (FLOORNUM) is 18.828, and 3.2% of properties include a parking space (CARPARK). On average, there are 1.913 bedrooms (BEDRMNUM) and 1.62 living rooms (LIVDINNUM) per house. Moreover, 57.9% of properties are purchased with a clubhouse (CLUBHSE), and 65.4% include a swimming pool (SWIMPOOL) within their estate.

Empirical results

Baseline estimates

To explore the association between the ESG performance of property managers and housing transaction prices, this study utilizes a hedonic model, which has been widely used in previous research (Rosen, 1974; Agarwal et al., 2022; Fan et al., 2022). The model is specified as follows:

$$LNPRICE_{i,t} / LNPFT_{i,t}$$
$$= \alpha + \beta_1 ESGSCORE_{i,t} + CONTROLS_{i,t} + ESTATE_i + YearMonth_t + \varepsilon_{i,t}$$

where $LNPRICE_{i,t}$ is the logarithm of the housing transaction prices for house *i* at time *t*. $LNPFT_{i,t}$ is the logarithm of the transaction price per square foot. *ESGSCORE* represents the overall ESG score of the property manager of the corresponding transacted property. *CONTROLS* consist of a number of variables, including the size of the house (LNAREA, the logarithm of the area measured in square feet), the number of floors (FLOORNUM), a dummy variable indicating whether the transaction included a car park (CARPARK), a dummy variable indicating whether the house has a garden (GARDEN), the number of bedrooms (BEDRMNUM) and living or dining rooms (LIVDINNUM), a dummy variable indicating

whether the transacted property has a club house (CLUBHSE) and a swimming pool (SWIMPOOL) in the estate (or building). To control the time-invariant characteristics of the estate and time-variant trends of property prices in Hong Kong, our model further includes the estate fixed effect (ESTATE) and year-month fixed effect (YearMonth).

[Insert Table 2 here]

Table 2 presents the regression results. In column (1), the regression of ESGSCORE on property transaction prices shows a coefficient of 0.024. This indicates that a one-unit increase in ESGSCORE is associated with a 2.4% increase in property transaction prices, equivalent to approximately 116 thousand Hong Kong dollars[8]. The coefficient is both economically and statistically significant, with a t-statistic of 4.03. Column (2) displays the regression results of ESGSCORE on transaction prices per square foot. The coefficient on ESGSCORE is also 0.024 and statistically significant at the 1% level. A one-unit increase in ESGSCORE corresponds to an increase of 214 Hong Kong dollars per square foot in property transaction prices.

Our study also incorporates several control variables to account for additional factors that may influence property transaction prices. The results indicate that the property area has a significant positive association with transaction prices. Moreover, properties located on higher floors are associated with higher transaction prices. Specifically, for every 10-floor increase, the property transaction prices increase by 3%. Additionally, properties with a garden exhibit a substantial price premium of approximately 25%. The presence of a garden enhances the desirability and value of the property. Furthermore, the number of bedrooms in a house has a positive effect on transaction prices, while the number of living or dining rooms has a negative impact on prices. Regarding the presence of amenities within an estate or building, our results indicate that having a clubhouse or a swimming pool does not have a significant impact on transaction prices. This is likely because our model accounts for the fixed effects of the estate.

Moving forward, the next step of our study involves investigating the impact of ESG risk incidents attributed to property managers on housing transaction prices. Our model builds upon the following foundation:

---

[8] In our untabulated ESG score subsample, the average transaction price amounts to 4.81 million Hong Kong dollars (exp(15.387) = 4,813,812). On average, a one-unit increase in ESG scores is associated with a 116 thousand Hong Kong dollars increase in housing prices (0.024 * 4,813,812 = 115,531). Additionally, an increase of one standard deviation (1.165) in ESG scores leads to a 2.8% increase in property prices, equivalent to approximately 135 thousand Hong Kong dollars.

$$LNPRICE_{i,t}/LNPFT_{i,t} = \alpha + \beta_1 RISK_{i,t} + CONTROLS_{i,t} + ESTATE_i + YearMonth_t + \varepsilon_{i,t}$$

where $RISK_{i,t}$ is a dummy variable equal to one if the property managers of the corresponding house i have experienced an ESG risk incident within one year of the time of transaction t.

[Insert Table 3 here]

Table 3 presents the results of our analysis, focusing on the impact of ESG risk incidents attributed to property managers on residential property transaction prices. The findings reveal that these incidents have a significant negative effect on property prices, leading to a decrease of 2.3% in transaction prices and prices per square foot over a one-year period. This corresponds to a reduction of approximately 97.8 thousand Hong Kong dollars for a property and 183 Hong Kong dollars per square foot.

The results of our study highlight a positive correlation between ESG performance and the appreciation of residential property prices. Properties associated with better ESG performance tend to experience higher price appreciation. Conversely, the occurrence of ESG risk incidents negatively impacts residential property values, resulting in a decline in prices. These findings emphasize the importance of considering ESG factors in the evaluation of property investments and the potential impact that ESG risks can have on property values. Property buyers incorporate ESG considerations into their decision-making processes, thereby affecting property valuations.

Robustness

To assess the robustness of our findings, we conducted a repeat-sales analysis, a widely used methodology in real estate valuation that compares the current price of a property with its previous purchase price. This approach helps maintain most unit characteristics in a constant state, providing valuable insights. However, it is important to note that this methodology is limited to properties that have been transacted multiple times during the specified period (Gupta et al., 2022), resulting in a reduced sample size.

[Insert Table 4 here]

Table 4 presents the results of the repeat-sales sample analysis. In columns (1) and (2), we observe a positive association between the ESG score of property managers and residential property transaction prices. Specifically, a one-unit increase in the ESG score is associated with

a 1.5% increase in total transaction prices and a 1.4% increase in prices per square foot. Columns (3) and (4) focus on the impact of ESG risk incidents attributed to property managers on housing transaction prices. The results indicate that housing prices have decreased by 2.2% following the occurrence of ESG incidents within the past year. In general, the magnitude of the results in the repeat-sales sample is slightly reduced compared to the overall sample. Our conclusions remain robust. The repeat-sales analysis provides further evidence supporting the positive correlation between ESG performance and residential property prices, as well as the adverse effect of ESG risk incidents on housing values.

To address concerns regarding potential spurious correlations between ESG performance and property transaction prices due to the influence of property location, our study implements a matching strategy. This strategy aims to account for the time-variation in housing prices across different regions and ensures a more rigorous analysis. In our study, property managers are classified into high and low ESG score groups based on the median ESG score for each month. To further refine the analysis, our study retains only the observations where residential properties in the high ESG score group are within a 500-meter radius of residential properties in the low ESG score group, based on their coordinates. This distance matching approach helps control for location-specific factors that may confound the relationship between ESG performance and property prices.

[Insert Table 5 here]

Table 5 presents the results of this distance matching sample analysis. Columns (1) and (2) reveal that a unit increase in property managers' ESG scores is associated with a 1.4% increase in property transaction prices and a 1.3% increase in prices per square foot. These results are statistically significant at the 10% level, indicating a robust relationship between ESG performance and property prices even after controlling for location-based influences.

[Insert Table 5 here]

Our study extends the matching strategy to analyze the impact of ESG risk incidents on property transaction prices. Specifically, we match residential properties managed by property managers who have experienced ESG risk incidents within the past year with those that have not, considering a 500-meter radius for the matching process. This approach helps mitigate the potential influence of geographical and time-variant factors, enabling us to isolate the effect of ESG risk incidents on property prices. Columns (3) and (4) demonstrate that ESG risk incidents of property managers lead to a significant reduction in property transaction prices, with a

12

decrease of 1.8%, and prices per square foot, with a decrease of 1.9%. These results are statistically significant at the 5% level. Hence, our study provides robust evidence that ESG risk incidents have a negative impact on housing transaction prices, even after accounting for geographical and temporal variations.

The use of the matching methodology helps establish a causal relationship between ESG risk incidents and property prices, by effectively controlling for confounding factors and isolating the influence of these incidents on market valuations. These findings highlight the importance of ESG risk management for property managers and suggest that such incidents can have tangible financial implications in the real estate market.

ESG heterogeneity

This section focuses on investigating the impact of heterogeneous characteristics of ESG factors on housing transaction prices. To begin the analysis, our study examines the ESG performance of property managers across three key pillars: environmental, social, and corporate governance. The objective is to determine which pillar holds the greatest significance for property buyers in influencing their transaction decisions. Property managers incorporating sustainable practices like water conservation and waste management can reduce operational costs and environmental footprints. This can attract environmentally conscious users, potentially leading to increased demand and higher property prices. Property managers with a higher sense of social responsibility are more likely to take part in community initiatives and promote social inclusion, which is likely to generate goodwill and a positive reputation. By focusing on amenities, responsive maintenance, and community engagement, they can create positive living experiences for residential users. The demand for properties is likely to increase as a result of increased user satisfactions, thus enhancing the property's value. Property managers with strong corporate governance practices, transparent communication, and ethical standards can inspire confidence among buyers and users. Housing buyers seeking well-managed properties are likely to pay a higher price for properties managed by managers with good corporate governance practices, which will ensure efficient operations and increase capital gains.

To achieve this, our study applies the following model:

$$LNPRICE_{i,t} / LNPFT_{i,t}$$
$$= \alpha + \beta_1 ENVSCORE_{i,t}/SOCSCORE_{i,t}/GOVSCORE_{i,t} + CONTROLS_{i,t}$$
$$+ ESTATE_i + YearMonth_t + \varepsilon_{i,t}$$

where $ENVSCORE_{i,t}/SOCSCORE_{i,t}/GOVSCORE_{i,t}$ represent the environmental score, social score and corporate governance score of the property managers of the corresponding house i at time t.

Table 6 Panel A presents the results of the aforementioned regressions. In columns (1) and (2), the relationship between environmental scores and housing transaction prices is examined. However, the analysis does not find a significant correlation between environmental scores and housing prices or prices per square foot. Conversely, columns (3) and (4) reveal a positive association between the social scores of property managers and housing transaction prices. The coefficient for the social score in the regression on transaction prices is 0.006, and for prices per square foot, it is 0.005. These coefficients are statistically significant at the 10% level. An increase of one standard deviation in the social score corresponds to a 1.1% increase in transaction prices and a 0.9% increase in prices per square foot. Moving on to columns (5) and (6), the impact of corporate governance performance of property managers on housing transaction prices is examined. The coefficients for corporate governance score are 0.10 for both transaction prices and prices per square foot, and they are statistically significant at the 1% level. An increase of one standard deviation in the corporate governance score leads to a 1.85% increase in prices. Overall, the findings indicate that corporate governance performance of property managers has the most substantial influence on housing transaction prices, followed by their social performance. However, property buyers do not appear to prioritize the environmental performance of property managers.

[Insert Table 6 here]

Our study then examines how the intensity of ESG risk incidents affects housing transaction prices. The Reprisk database categorizes risk incidents into three levels: limited reach, medium reach, and high reach. The limited reach level signifies that news of risk incidents is confined to local media, local government agencies, and social media. The medium reach level indicates that risk incidents are covered by a broader range of national and regional media outlets. Lastly, the high reach level implies that risk incidents receive extensive coverage in global media outlets. Property managers may circulate ESG risk incidents via various media with varying effects on property prices. If the circulation is restricted to local media or extends to global

media, the extent of this impact may vary. The circulation of global media exposes ESG risk incidents to a broader audience, including local investors and non-local property buyers. This can result in a reduction in investor confidence, a withdrawal of capital, and a consequent decrease in property values. Conversely, ESG risk incidents communicated through local media may only affect the perception of local investors. To analyze the impact of ESG risk incident intensity on housing transaction prices, the following model is employed:

$$LNPRICE_{i,t} / LNPFT_{i,t}$$
$$= \alpha + \beta_1 LIMITEDRISK_{i,t} + \beta_2 MEDIUMRISK_{i,t} + \beta_3 HIGHRISK_{i,t}$$
$$+ CONTROLS_{i,t} + ESTATE_i + YearMonth_t + \varepsilon_{i,t}$$

where $LIMITEDRISK / MEDIUMRISK / HIGHRISK$ indicate that the property manager has experience a limited reach, medium reach or high reach risk incident in the past year.

Table 6 Panel B presents the results of the regression analysis on the impact of ESG risk incident intensity on housing transaction prices. For the limited reach risk incidents, the coefficient suggests a 1.1% reduction in housing transaction prices. However, this result is not statistically significant, indicating that the effect may not be robust. On the other hand, the coefficients for medium reach risk incidents are -0.16 for property transaction prices and -0.15 for transaction prices per square foot, both statistically significant at the 10% level. This indicates that the occurrence of medium risk incidents leads to a 1.6% decrease in property prices. The most significant impact is observed for high risk incidents. The coefficients for high reach risk incidents are -0.043 for transaction prices and -0.042 for prices per square foot, both statistically significant at the 1% level. This implies that widely known risk incidents result in a substantial 4.3% reduction in property prices. These results suggest that as risk incidents become more widely known, they have a stronger negative impact on property transaction prices. This could be attributed to increased awareness among potential buyers regarding the associated ESG risks, leading to decreased willingness to purchase the property.

To examine the duration of ESG risk incidents on property prices, our study analyzes the impact of the time elapsed since the occurrence of the risk incidents. Our study includes a variable representing the number of months since the risk incidents took place and investigate its relationship with housing transaction prices:

$$LNPRICE_{i,t}/ LNPFT_{i,t}$$
$$= \alpha + \beta_1 RISK1MONTH_{i,t} + \beta_2 RISK3MONTH_{i,t} + \beta_3 RISK6MONTH_{i,t}$$
$$+ \beta_3 RISK12MONTH_{i,t} + \beta_3 RISK36MONTH_{i,t} + \beta_3 RISKLT_{i,t}$$
$$+ CONTROLS_{i,t} + ESTATE_i + YearMonth_t + \varepsilon_{i,t}$$

where *RISK1MONTH* represents a dummy variable equal to one if the property transaction occurs within 1 months after the occurrence of risk incident by the corresponding property manager and zero otherwise. *RISK3MONTH/RISK6MONTH/ ISK12MONTH/RISK36MONTH* indicate that the housing transaction took place within 3/6/12/36 months but over 1/3/6/12 months after the occurrence of the risk incident. *RISKLT* indicates the transaction happened over 36 months after the occurrence of the incident.

Table 6 Panel C presents the results of the regression analysis on the impact of the timing of ESG risk incidents on housing transaction prices. The results indicate that there is a negative impact of ESG risk incidents on property transaction prices, and this impact diminishes over time. Within one month after the occurrence of the risk incident, property prices are reduced by 4.1% and prices per square foot are reduced by 4.2%, both significant at the 5% level. This suggests that property buyers react quickly to ESG risk incidents and incorporate the risk into their pricing decisions. In the subsequent two months, the price reduction attenuates to 2.7%, which remains significant at the 10% level. This indicates that the initial impact of the risk incident gradually diminishes over this period. Afterward, the magnitude of the price reduction decreases substantially and ceases to be statistically significant. This suggests that as more information becomes available and the incident is better understood, property prices tend to revert to pre-incident levels. These results highlight the short-term nature of the negative impact of ESG risk incidents on property prices. Property buyers appear to react swiftly to the occurrence of risk incidents, but as time progresses and more information becomes available, the market adjusts, and the effect diminishes.

Property buyer heterogeneity

The study examines how different types of property buyers perceive the ESG performance of property managers. It acknowledges that non-local buyers and home buyers may have distinct perspectives and reactions to ESG information compared to local buyers and speculators. Non-local buyers, who may be less familiar with the local market and have limited

access to local property management information, may rely more heavily on ESG information when evaluating the quality of property management. Given their limited knowledge about local property managers, ESG performance could serve as a valuable indicator for them to assess the overall management quality and social responsibility of property managers.

On the other hand, home buyers, who prioritize the reputation of the property management company and its social responsibility, may place greater importance on the ESG performance of property managers. They may have a higher level of concern regarding the quality of property management and may consider ESG factors as significant criteria in their decision-making process. In contrast, speculators, who are primarily motivated by short-term investment opportunities, may not attach as much importance to the ESG performance of property managers. Their focus may be more on financial indicators and potential returns rather than the long-term sustainability and social responsibility aspects associated with ESG.

By considering these different buyer segments and their varying perceptions of ESG information, the study aims to provide insights into how ESG performance influences the decision-making processes and preferences of different types of property buyers. To begin with, our study evaluates how different buyers pay for residential property by employing the following model:

$$
\begin{aligned}
LNPRICE_{i,t} &/ LNPFT_{i,t} \\
&= \alpha + \beta_1 NONLOCAL_{i,t}/HOMEBUYER_{i,t} + CONTROLS_{i,t} + ESTATE_i \\
&+ YearMonth_t + \varepsilon_{i,t}
\end{aligned}
$$

where *NONLOCAL* is a dummy variable equal to one if the property buyer is not a local resident. A non-local resident can be identified by that the spelling of the buyer's name is not Cantonese. *HOMEBUYER* is a dummy variable that is equal to one if the property buyer is a home buyer, or not a flipper. Flippers are buyers who purchase a flat and then sell it within two years.

Table 7 Panel A presents the results of the regressions analyzing the differences in property prices based on buyer types. Columns (1) and (2) show that non-local buyers tend to pay a higher price for residential properties compared to local buyers. Specifically, non-local buyers pay a premium of 0.9% over local buyers, and this difference is statistically significant at the 1% level. This suggests that non-local buyers, possibly due to their limited knowledge of the local market, pay more for residential properties than local buyers. Columns (3) and (4) does not find any significant difference in purchase prices between homebuyers and speculators.

17

This indicates that both these buyer types are willing to pay similar prices for residential properties.

[Insert Table 7 here]

The following difference-in-differences model is applied to determine how different types of buyers perceive the ESG performance of property managers:

$$
\begin{aligned}
LNPRICE_{i,t}/\ LNPFT_{i,t} \\
&= \alpha + \beta_1 NONLOCAL_{i,t}/HOMEBUYER_{i,t} \times ESGSCORE_{i,t} \\
&+ \beta_2 ESGSCORE_{i,t} + \beta_3 NONLOCAL_{i,t}/HOMEBUYER_{i,t} + CONTROLS_{i,t} \\
&+ ESTATE_i + YearMonth_t + \varepsilon_{i,t}
\end{aligned}
$$

Our interest lies in the intersection variable of $NONLOCAL_{i,t}/HOMEBUYER_{i,t} \times ESGSCORE_{i,t}$. If non-local buyers rely more on ESG information and home buyers value higher ESG scores of property managers, it is expected that the interaction terms between these buyer types and the ESG scores of property managers would have positive coefficients. These positive coefficients would indicate that non-local buyers and home buyers are willing to pay a premium for properties managed by property managers with better ESG performance.

Panel B indicate that both non-local buyers and home buyers are willing to pay a premium for properties managed by property managers with higher ESG scores. Columns (1) and (2) show that non-local buyers are willing to pay a 1.2% premium for a one unit increase in ESG scores, while home buyers are willing to pay a 0.9% premium. These findings support the hypothesis that non-local buyers rely more heavily on ESG information when evaluating the management quality of property managers, and home buyers place a higher value on the ESG performance of property managers compared to speculators. It suggests that ESG considerations play a role in the decision-making process of these buyer segments and that they are willing to pay more for properties managed by socially responsible property managers.

Lastly, our study apply a difference-in-differences model to evaluate how different types of buyers respond to incidents of ESG risk associated with property managers:

$$
\begin{aligned}
LNPRICE_{i,t}/\ LNPFT_{i,t} \\
&= \alpha + \beta_1 NONLOCAL_{i,t}/HOMEBUYER_{i,t} \times RISK_{i,t} + \beta_2 RISK_{i,t} \\
&+ \beta_3 NONLOCAL_{i,t}/HOMEBUYER_{i,t} + CONTROLS_{i,t} + ESTATE_i \\
&+ YearMonth_t + \varepsilon_{i,t}
\end{aligned}
$$

If non-local buyers are more cautious and sensitive to negative ESG events, due to their limited knowledge of the local market, our study would expect negative coefficients for interaction terms between non-local buyers and ESG risk incidents. Similarly, a negative coefficient for the interaction term between home buyers and ESG risk incidents would indicate that home buyers are more concerned about negative ESG risks and prefer properties managed by property managers with a better track record in managing ESG risks. This implies that home buyers are more risk-averse and are willing to pay a premium for properties that have a lower likelihood of experiencing negative ESG incidents.

In panel C, columns (1) and (2) reveal that the coefficients linked to the interaction between ESG risk incidents and non-local buyers amount to -0.014 for transaction prices and -0.012 for prices per square foot. These coefficients exhibit statistical significance at the 1% level. When property managers have been exposed to ESG risks within the previous 12 months, non-local buyers exhibit a 1.4% lower willingness to pay compared to local buyers for corresponding properties. However, in columns (3) and (4), the coefficients pertaining to the interaction between ESG risk incidents and home buyers display negative values of -0.005, yet these coefficients do not demonstrate statistical significance. Overall, our findings suggest that non-local buyers demonstrate greater sensitivity towards ESG risk incidents associated with property managers and only proceed with a purchase decision when they are presented with discounted prices.

Rental analysis

The increase in property prices resulting from sustainable property management can arise from either higher rents that housing users are willing to pay for property management services or reduced risk associated with properties (Gupta et al., 2022). In this section, we aim to differentiate between these two arguments by testing whether the ESG performance of property management companies affects property rents. If the positive association between ESG performance and property transaction prices is driven by an increase in rents rather than a decrease in risk, we would expect a positive correlation between the ESG performance of property managers and property rental income. To conduct this study, we utilized agency-reported rental transaction data from the EPRC and applied the following model:

$$LNRENT_{i,t} / LNRFT_{i,t}$$
$$= \alpha + \beta_1 ESGSCORE_{i,t}/RISK_{i,t} + CONTROLS_{i,t} + ESTATE_i + YearMonth_t$$
$$+ \varepsilon_{i,t}$$

where $LNRENT_{i,t}$ is the logarithm of the rental income per month for house i at time t. $LNRFT_{i,t}$ is the logarithm of the rental income per square foot.

[Insert Table 8 here]

The results of our analysis are presented in Table 8. Columns (1) and (2) indicate that there is no significant correlation between the ESG scores of property managers and the rental income of a property. In addition, columns (3) and (4) demonstrate that ESG risk incidents do not significantly impact rental income. These findings suggest that the positive relationship between the ESG performance of property managers and property transaction prices is not driven by higher rents. Instead, it is attributable to the reduction of risk associated with properties, such as accidents in common areas or unexpected deaths.

Conclusion

Our study indicates that ESG performance of property managers is indeed valued by property buyers. Firstly, our study documents a positive association between the ESG performance of property managers and housing prices. A decline in housing prices has also been observed when property management companies have been exposed to ESG-related risk incidents. It appears that buyers are sensitive to ESG performance and see relevant incidents as indicators of poor management practices.

In addition, our study indicates that social and governance performance of property managers is more likely to affect housing prices, while environmental performance did not exhibit a similar impact. Our study further illuminates how media coverage influences perceptions of ESG incidents. Property prices are negatively affected by ESG accidents when reported by high-reach media outlets. Thus, media exposure plays an important role in shaping buyer perceptions and influencing their willingness to pay for sustainable property management. In addition, different buyer groups exhibited varying preferences. Compared to local buyers, non-local buyers exhibited a greater inclination towards sustainable practices. Property owners, as opposed to housing speculators, were more likely to pay a premium for

sustainability in property management. The positive relationship between property value and ESG practices is driven by lower risk rather than higher rents from properties.

Our study provides empirical evidence of the benefits associated with sustainable property management, indicating that incorporating ESG practices can have a positive impact on property prices. Companies involved in property management should place a high priority on ESG performance and minimize the negative impact on housing prices and their reputation. Policymakers should encourage and incentivize sustainable practices in property management in accordance with this study. Standards and regulations that encourage the integration of ESG factors into the real estate sector can contribute to an appreciation of social wealth and to a more sustainable and resilient community.

Reference

Agarwal, S., Chau, K. W., Hu, M., & Wan, W. X. (2022). Tobin Tax Policy, Housing Speculation, and Property Market Dynamics. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3641624

Besley, T., & Mueller, H. (2012). Estimating the Peace Dividend: The Impact of Violence on House Prices in Northern Ireland. *American Economic Review*, *102*(2), 810–833. https://doi.org/10.1257/aer.102.2.810

Bhattacharya, U., Huang, D., & Nielsen, K. M. (2021). Spillovers in Prices: The Curious Case of Haunted Houses*. *Review of Finance*, *25*(3), 903–935. https://doi.org/10.1093/rof/rfaa030

Brasington, D. (1999). Which Measures of School Quality Does the Housing Market Value? *Journal of Real Estate Research*, *18*(3), 395–413. https://doi.org/10.1080/10835547.1999.12091004

Chan, E. H.-W., So, H.-M., Tang, B.-S., & Wong, W.-S. (2008). Private space, shared space and private housing prices in Hong Kong: An exploratory study. *Habitat International*, *32*(3), 336–348. https://doi.org/10.1016/j.habitatint.2007.11.004

Chay, K. Y., & Greenstone, M. (2005). Does Air Quality Matter? Evidence from the Housing Market. *Journal of Political Economy*, *113*(2), 376–424. https://doi.org/10.1086/427462

Chiang, K. C. H., Wachtel, G. J., & Zhou, X. (2019). Corporate Social Responsibility and Growth Opportunity: The Case of Real Estate Investment Trusts. *Journal of Business Ethics*, *155*(2), 463–478. https://doi.org/10.1007/s10551-017-3535-1

Currie, J., Davis, L., Greenstone, M., & Walker, R. (2015). Environmental Health Risks and Housing Values: Evidence from 1,600 Toxic Plant Openings and Closings. *American Economic Review*, *105*(2), 678–709. https://doi.org/10.1257/aer.20121656

Dai, R., Liang, H., & Ng, L. (2021). Socially responsible corporate customers. *Journal of Financial Economics*, *142*(2), 598–626. https://doi.org/10.1016/j.jfineco.2020.01.003

Deloitte. (2022). *Sustainable Buildings: Designing, building, and operating to help create a greener future*. https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-eri-delivering-sustainable-construction.pdf

Dimson, E., Karakaş, O., & Li, X. (2015). Active Ownership. *Review of Financial Studies*, *28*(12), 3225–3268. https://doi.org/10.1093/rfs/hhv044

Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics*, *101*(3), 621–640. https://doi.org/10.1016/j.jfineco.2011.03.021

Eichholtz, P., Kok, N., & Quigley, J. M. (2010). Doing Well by Doing Good? Green Office Buildings. *American Economic Review*, *100*(5), 2492–2509. https://doi.org/10.1257/aer.100.5.2492

Eichholtz, P., Kok, N., & Yonder, E. (2012). Portfolio greenness and the financial performance of REITs. *Journal of International Money and Finance*, *31*(7), 1911–1929. https://doi.org/10.1016/j.jimonfin.2012.05.014

Fan, Y., Hu, M. R., Wan, W. X., & Wang, Z. (2023). A Tale of Two Cities: Mainland Chinese Buyers in the Hong Kong Housing Market. *Review of Finance*, rfad006. https://doi.org/10.1093/rof/rfad006

Feng, Z., & Wu, Z. (2021). ESG Disclosure, REIT Debt Financing and Firm Value. *The Journal of Real Estate Finance and Economics*. https://doi.org/10.1007/s11146-021-09857-x

Gibbons, S., Silva, O., & Weinhardt, F. (2013). Everybody Needs Good Neighbours? Evidence from Students' Outcomes in England. *The Economic Journal*, *123*(571), 831–874. https://doi.org/10.1111/ecoj.12025

Giese, G., Nagy, Z., & Lee, L.-E. (2021). Deconstructing ESG Ratings Performance: Risk and Return for E, S, and G by Time Horizon, Sector, and Weighting. *The Journal of Portfolio Management*, *47*(3), 94–111. https://doi.org/10.3905/jpm.2020.1.198

Gifford, R. (2007). The Consequences of Living in High-Rise Buildings. *Architectural Science Review*, *50*(1), 2–17. https://doi.org/10.3763/asre.2007.5002

Greenstone, M., & Gallagher, J. (2008). Does Hazardous Waste Matter? Evidence from the Housing Market and the Superfund Program [*]. *Quarterly Journal of Economics*, *123*(3), 951–1003. https://doi.org/10.1162/qjec.2008.123.3.951

Gupta, A., Van Nieuwerburgh, S., & Kontokosta, C. (2022). Take the Q train: Value capture of public infrastructure projects. *Journal of Urban Economics*, *129*, 103422. https://doi.org/10.1016/j.jue.2021.103422

Heller, M. A. (1998). The Tragedy of the Anticommons: Property in the Transition from Marx to Markets. *Harvard Law Review*, *111*(3), 621. https://doi.org/10.2307/1342203

Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Economics*, *93*(1), 15–36. https://doi.org/10.1016/j.jfineco.2008.09.001

Hong Kong Institute of Surveyors. (2015). *Green Property Management Practices*. https://www.hkis.org.hk/ufiles/gpmp2015.pdf

Hui, E. C. M., Chau, C. K., Pun, L., & Law, M. Y. (2007). Measuring the neighboring and environmental effects on residential property value: Using spatial weighting matrix. *Building and Environment*, *42*(6), 2333–2343. https://doi.org/10.1016/j.buildenv.2006.05.004

Hui, E. C. M., Tse, C., & Yu, K. (2017). The effect of BEAM Plus certification on property price in Hong Kong. *International Journal of Strategic Property Management*, *21*(4), 384–400. https://doi.org/10.3846/1648715X.2017.1409290

Ihlanfeldt, K., & Mayock, T. (2010). Panel data estimates of the effects of different types of crime on housing prices. *Regional Science and Urban Economics*, *40*(2–3), 161–172. https://doi.org/10.1016/j.regsciurbeco.2010.02.005

Jayantha, W. M., Lam, T. I., & Chong, M. L. (2015). The impact of anticipated transport improvement on property prices: A case study in Hong Kong. *Habitat International*, *49*, 148–156. https://doi.org/10.1016/j.habitatint.2015.05.023

Legco. (2020). *Providing support for owners of three-nil buildings*. https://www.info.gov.hk/gia/general/202001/15/P2020011400595.htm

Li, J., & Wu, D. (Andrew). (2020). Do Corporate Social Responsibility Engagements Lead to Real Environmental, Social, and Governance Impact? *Management Science*, *66*(6), 2564–2588. https://doi.org/10.1287/mnsc.2019.3324

Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis: Social Capital, Trust, and Firm Performance. *The Journal of Finance*, *72*(4), 1785–1824. https://doi.org/10.1111/jofi.12505

Margolis, J. D., Elfenbein, H. A., & Walsh, J. P. (2009). Does it Pay to Be Good...And Does it Matter? A Meta-Analysis of the Relationship between Corporate Social and Financial Performance. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1866371

Muehlenbachs, L., Spiller, E., & Timmins, C. (2015). The Housing Market Impacts of Shale Gas Development. *American Economic Review*, *105*(12), 3633–3659. https://doi.org/10.1257/aer.20140079

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate Social and Financial Performance: A Meta-Analysis. *Organization Studies*, *24*(3), 403–441. https://doi.org/10.1177/0170840603024003910

Pástor, Ľ., Stambaugh, R. F., & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics*, *142*(2), 550–571. https://doi.org/10.1016/j.jfineco.2020.12.011

Pástor, Ľ., Stambaugh, R. F., & Taylor, L. A. (2022). Dissecting green returns. *Journal of Financial Economics*, *146*(2), 403–424. https://doi.org/10.1016/j.jfineco.2022.07.007

Pedersen, L. H., Fitzgibbons, S., & Pomorski, L. (2021). Responsible investing: The ESG-efficient frontier. *Journal of Financial Economics*, *142*(2), 572–597. https://doi.org/10.1016/j.jfineco.2020.11.001

Pope, J. C. (2008). Fear of crime and housing prices: Household reactions to sex offender registries. *Journal of Urban Economics*, *64*(3), 601–614. https://doi.org/10.1016/j.jue.2008.07.001

RICS. (2021). *Sustainability Report 2021*. https://www.rics.org/news-insights/research-and-insights/sustainability-report-2021

Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, *82*(1), 34–55. https://doi.org/10.1086/260169

Seo, Y., & Simons, R. (2009). The Effect of School Quality on Residential Sales Price. *Journal of Real Estate Research*, *31*(3), 307–328. https://doi.org/10.1080/10835547.2009.12091255

Wang, H., Tong, L., Takeuchi, R., & George, G. (2016). Corporate Social Responsibility: An Overview and New Research Directions: Thematic Issue on Corporate Social Responsibility. *Academy of Management Journal*, *59*(2), 534–544. https://doi.org/10.5465/amj.2016.5001

Table 1. Summary statistics

	N	Mean	Std. Dev.	Min	Max
LNPRICE	337,838	15.263	0.735	13.561	17.281
LNAREA	337,838	6.279	0.352	5.472	7.389
LNPFT	337,838	8.986	0.597	7.462	10.245
ESGSCORE	242,024	4.816	1.165	1.504	7.644
ENVSCORE	242,024	5.407	1.354	0	9.200
SOCSCORE	242,024	4.757	1.822	0	9.200
GOVSCORE	242,024	4.627	1.854	0	10
RISK	337,838	0.333	0.471	0	1
LIMITEDRISK	337,838	0.135	0.342	0	1
MEDIUMRISK	337,838	0.142	0.349	0	1
HIGHRISK	337,838	0.247	0.431	0	1
RISK1MONTH	337,838	0.081	0.273	0	1
RISK3MONTH	337,838	0.096	0.294	0	1
RISK6MONTH	337,838	0.076	0.265	0	1
RISK12MONTH	337,838	0.081	0.273	0	1
RISK36MONTH	337,838	0.133	0.339	0	1
RISKLT	337,838	0.023	0.150	0	1
NONLOCAL	337,838	0.342	0.474	0	1
HOMEBUYER	337,838	0.795	0.404	0	1
FLOORNUM	335,354	18.828	13.311	1	80
CARPARK	337,838	0.032	0.176	0	1
GARDEN	337,838	0.008	0.087	0	1
BEDRMNUM	337,838	1.913	1.094	0	6
LIVDINNUM	337,838	1.620	0.736	0	7
CLUBHSE	337,838	0.579	0.494	0	1
SWIMPOOL	337,838	0.654	0.476	0	1

Table 2. ESG scores and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT
ESGSCORE	**0.024*****	**0.024*****
	(4.03)	**(3.99)**
LNAREA	0.998***	0.020
	(40.87)	(0.83)
FLOORNUM	0.003***	0.003***
	(14.40)	(14.57)
CARPARK	0.094***	0.093***
	(5.62)	(5.96)
GARDEN	0.247***	0.249***
	(9.10)	(10.24)
BEDRMNUM	0.013**	0.011**
	(2.56)	(2.29)
LIVDINNUM	-0.026***	-0.027***
	(-3.48)	(-3.52)
CLUBHSE	0.070	0.070
	(0.84)	(0.83)
SWIMPOOL	-0.000	-0.001
	(-0.01)	(-0.02)
Observations	228,334	228,334
R-squared	0.909	0.869
Estate FE	YES	YES
Year-Month FE	YES	YES

The *t*-statistics are reported in parentheses calculated with robust standard errors.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level

Table 3. Reputational risk and housing transaction prices

VARIABLES	(1) LNPRICE	(3) LNPFT
RISK	**-0.023*****	**-0.023*****
	(-2.67)	**(-2.76)**
LNAREA	0.997***	0.012
	(44.38)	(0.55)
FLOORNUM	0.003***	0.003***
	(17.11)	(17.24)
CARPARK	0.088***	0.089***
	(5.79)	(6.23)
GARDEN	0.214***	0.201***
	(6.82)	(5.43)
BEDRMNUM	0.008	0.008
	(1.53)	(1.58)
LIVDINNUM	-0.021***	-0.021***
	(-2.86)	(-2.88)
CLUBHSE	-0.083	-0.083
	(-1.52)	(-1.51)
SWIMPOOL	0.129***	0.129***
	(2.64)	(2.66)
Observations	312,474	312,474
R-squared	0.916	0.882
Estate FE	YES	YES
Year-Month FE	YES	YES

The *t*-statistics are reported in parentheses calculated with robust standard errors.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level

Table 4. Robustness (repeated sales sample): ESG scores, reputational risk and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT	(3) LNPRICE	(4) LNPFT
ESGSCORE	**0.015****	**0.014****		
	(2.38)	**(2.36)**		
RISK			**-0.022****	**-0.022****
			(-2.39)	**(-2.45)**
LNAREA	0.960***	-0.025	0.954***	-0.034
	(32.90)	(-0.90)	(37.83)	(-1.39)
FLOORNUM	0.003***	0.003***	0.003***	0.003***
	(12.04)	(12.22)	(14.68)	(14.85)
CARPARK	0.094***	0.091***	0.088***	0.088***
	(4.83)	(5.03)	(5.10)	(5.52)
GARDEN	0.249***	0.241***	0.200***	0.194***
	(10.08)	(10.02)	(5.22)	(4.87)
BEDRMNUM	0.016**	0.014**	0.010*	0.010*
	(2.54)	(2.53)	(1.82)	(1.88)
LIVDINNUM	-0.028***	-0.029***	-0.024***	-0.024***
	(-3.28)	(-3.48)	(-2.85)	(-2.88)
CLUBHSE	0.023	0.023	-0.096*	-0.097*
	(0.31)	(0.32)	(-1.87)	(-1.88)
SWIMPOOL	0.008	0.009	0.127**	0.128**
	(0.14)	(0.14)	(2.54)	(2.56)
Observations	125,680	125,680	181,234	181,234
R-squared	0.894	0.849	0.905	0.869
Estate FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

The *t*-statistics are reported in parentheses calculated with robust standard errors.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level

Table 5. Robustness (nearby matching sample): ESG scores, reputational risk and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT	(3) LNPRICE	(4) LNPFT
ESGSCORE	**0.014***	**0.013***		
	(1.83)	**(1.84)**		
RISK			**-0.018****	**-0.019****
			(-2.02)	**(-2.10)**
LNAREA	0.976***	-0.009	0.946***	-0.037
	(30.47)	(-0.29)	(40.78)	(-1.52)
FLOORNUM	0.004***	0.004***	0.004***	0.004***
	(20.97)	(21.58)	(21.94)	(22.33)
CARPARK	0.095***	0.098***	0.093***	0.098***
	(4.90)	(4.97)	(5.21)	(5.43)
GARDEN	0.168***	0.127***	0.230***	0.188***
	(3.51)	(3.91)	(4.12)	(5.91)
BEDRMNUM	0.012**	0.012**	0.014***	0.014***
	(2.24)	(2.29)	(2.76)	(2.85)
LIVDINNUM	-0.011	-0.014	-0.008	-0.011
	(-0.90)	(-1.18)	(-1.09)	(-1.44)
CLUBHSE	-0.007	-0.008	-0.114***	-0.117***
	(-0.15)	(-0.16)	(-4.95)	(-5.15)
SWIMPOOL	0.097*	0.106**	0.223***	0.215***
	(1.91)	(2.02)	(2.70)	(2.68)
Observations	91,783	91,783	133,178	133,178
R-squared	0.906	0.867	0.908	0.865
Estate FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

The t-statistics are reported in parentheses calculated with robust standard errors.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level

Table 6: The heterogeneity of ESG in property management companies and housing transaction price

Panel A. E/S/G components and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT	(3) LNPRICE	(4) LNPFT	(5) LNPRICE	(6) LNPFT
ENVSCORE	**-0.003**	**-0.003**				
	(-0.62)	**(-0.65)**				
SOCSCORE			**0.006***	**0.005***		
			(1.88)	**(1.71)**		
GOVSCORE					**0.010*****	**0.010*****
					(3.79)	**(3.86)**
LNAREA	1.000***	0.021	1.000***	0.021	0.998***	0.020
	(40.59)	(0.89)	(40.70)	(0.88)	(40.79)	(0.83)
FLOORNUM	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	(14.44)	(14.61)	(14.40)	(14.57)	(14.40)	(14.57)
CARPARK	0.092***	0.091***	0.093***	0.092***	0.093***	0.092***
	(5.47)	(5.79)	(5.54)	(5.87)	(5.59)	(5.93)
GARDEN	0.248***	0.250***	0.248***	0.250***	0.247***	0.249***
	(9.07)	(10.24)	(9.07)	(10.22)	(9.09)	(10.24)
BEDRMNUM	0.012**	0.010**	0.012**	0.011**	0.013**	0.011**
	(2.30)	(2.03)	(2.38)	(2.11)	(2.54)	(2.28)
LIVDINNUM	-0.026***	-0.026***	-0.026***	-0.026***	-0.026***	-0.026***
	(-3.35)	(-3.39)	(-3.40)	(-3.43)	(-3.45)	(-3.50)
CLUBHSE	0.069	0.068	0.067	0.067	0.071	0.071
	(0.73)	(0.72)	(0.73)	(0.72)	(0.86)	(0.86)
SWIMPOOL	0.000	-0.001	0.002	0.001	-0.001	-0.002
	(0.00)	(-0.01)	(0.02)	(0.01)	(-0.02)	(-0.03)
Observations	228,334	228,334	228,334	228,334	228,334	228,334
R-squared	0.908	0.868	0.908	0.868	0.909	0.869
Estate FE	YES	YES	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES	YES	YES

Panel B. Reach of ESG incidents and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT
LIMITEDRISK	**-0.011**	**-0.011**
	(-0.82)	**(-0.84)**
MEDIUMRISK	**-0.016***	**-0.015***
	(-1.85)	**(-1.79)**
HIGHRISK	**-0.043*****	**-0.042*****
	(-4.63)	**(-4.66)**
LNAREA	0.997***	0.012
	(44.47)	(0.54)
FLOORNUM	0.003***	0.003***
	(17.13)	(17.26)
CARPARK	0.088***	0.090***
	(5.83)	(6.28)
GARDEN	0.214***	0.201***
	(6.84)	(5.44)
BEDRMNUM	0.008	0.008
	(1.56)	(1.61)
LIVDINNUM	-0.021***	-0.021***
	(-2.87)	(-2.89)
CLUBHSE	-0.092*	-0.092
	(-1.65)	(-1.64)
SWIMPOOL	0.135***	0.135***
	(2.74)	(2.76)
Observations	312,474	312,474
R-squared	0.916	0.883
Estate FE	YES	YES
Year-Month FE	YES	YES

Panel C. ESG risk event and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT
RISK1MONTH	**-0.041****	**-0.042****
	(-2.26)	**(-2.41)**
RISK3MONTH	**-0.027***	**-0.028***
	(-1.73)	**(-1.89)**
RISK6MONTH	**-0.020**	**-0.022**
	(-1.29)	**(-1.46)**
RISK12MONTH	**-0.004**	**-0.006**
	(-0.29)	**(-0.48)**
RISK36MONTH	**0.006**	**0.003**
	(0.34)	**(0.18)**
RISKLT	**-0.007**	**-0.007**
	(-0.30)	**(-0.32)**
LNAREA	0.997***	0.012
	(44.47)	(0.55)
FLOORNUM	0.003***	0.003***
	(17.08)	(17.22)
CARPARK	0.089***	0.091***
	(5.91)	(6.36)
GARDEN	0.215***	0.202***
	(6.85)	(5.45)
BEDRMNUM	0.008	0.008
	(1.54)	(1.61)
LIVDINNUM	-0.021***	-0.021***
	(-2.87)	(-2.89)
CLUBHSE	-0.084	-0.085
	(-1.54)	(-1.53)
SWIMPOOL	0.130***	0.130***
	(2.66)	(2.68)
Observations	312,474	312,474
R-squared	0.916	0.883
Estate FE	YES	YES
Year-Month FE	YES	YES

The *t*-statistics are reported in parentheses calculated with robust standard errors.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level

Table 7: The buyer heterogeneity and housing transaction price

Panel A. Buyer characteristics and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT	(3) LNPRICE	(4) LNPFT
NONLOCAL	**0.009*****	**0.009*****		
	(2.93)	**(2.88)**		
HOMEBUYER			**-0.002**	**-0.002**
			(-0.53)	**(-0.57)**
LNAREA	0.996***	0.011	0.996***	0.012
	(44.68)	(0.50)	(44.56)	(0.53)
FLOORNUM	0.003***	0.003***	0.003***	0.003***
	(17.08)	(17.22)	(17.03)	(17.17)
CARPARK	0.089***	0.090***	0.088***	0.090***
	(5.82)	(6.27)	(5.80)	(6.25)
GARDEN	0.215***	0.202***	0.216***	0.203***
	(6.80)	(5.42)	(6.80)	(5.42)
BEDRMNUM	0.009	0.008*	0.009	0.008
	(1.59)	(1.65)	(1.59)	(1.64)
LIVDINNUM	-0.022***	-0.022***	-0.022***	-0.022***
	(-2.90)	(-2.92)	(-2.89)	(-2.90)
CLUBHSE	-0.078	-0.078	-0.078	-0.078
	(-1.44)	(-1.44)	(-1.45)	(-1.45)
SWIMPOOL	0.125**	0.125**	0.125**	0.125***
	(2.56)	(2.58)	(2.58)	(2.60)
Observations	312,474	312,474	312,474	312,474
R-squared	0.916	0.882	0.916	0.882
Estate FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

Panel B. Buyer characteristics, ESG performance in property management companies and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT	(3) LNPRICE	(4) LNPFT
ESG x NONLOCAL	**0.012***	**0.011***		
	(2.68)	**(2.68)**		
ESG x HOMEBUYER			**0.009***	**0.008***
			(3.03)	**(2.93)**
ESGSCORE	0.021***	0.020***	0.018***	0.017***
	(3.30)	(3.25)	(2.75)	(2.73)
NONLOCAL	-0.045**	-0.044**		
	(-2.45)	(-2.44)		
HOMEBUYER			-0.040***	-0.038***
			(-3.18)	(-3.09)
LNAREA	0.997***	0.018	0.998***	0.019
	(41.07)	(0.78)	(40.89)	(0.82)
FLOORNUM	0.003***	0.003***	0.003***	0.003***
	(14.47)	(14.65)	(14.43)	(14.60)
CARPARK	0.094***	0.093***	0.094***	0.093***
	(5.66)	(5.99)	(5.64)	(5.97)
GARDEN	0.247***	0.248***	0.248***	0.250***
	(9.19)	(10.35)	(9.09)	(10.23)
BEDRMNUM	0.013**	0.011**	0.013**	0.011**
	(2.56)	(2.29)	(2.55)	(2.29)
LIVDINNUM	-0.026***	-0.027***	-0.026***	-0.027***
	(-3.48)	(-3.53)	(-3.47)	(-3.52)
CLUBHSE	0.072	0.071	0.071	0.070
	(0.85)	(0.84)	(0.85)	(0.84)
SWIMPOOL	-0.001	-0.002	-0.001	-0.002
	(-0.02)	(-0.03)	(-0.01)	(-0.02)
Observations	228,334	228,334	228,334	228,334
R-squared	0.909	0.869	0.909	0.869
Estate FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

Panel C. Buyer characteristics, ESG incidents in property management companies and housing transaction prices

VARIABLES	(1) LNPRICE	(2) LNPFT	(3) LNPRICE	(4) LNPFT
RISK x NONLOCAL	**-0.014***	**-0.012***		
	(-2.99)	**(-2.72)**		
RISK x HOMEBUYER			**-0.005**	**-0.005**
			(-1.17)	**(-1.26)**
RISK	-0.018**	-0.019**	-0.019**	-0.019***
	(-2.33)	(-2.48)	(-2.53)	(-2.60)
NONLOCAL	0.014***	0.013***		
	(3.57)	(3.43)		
HOMEBUYER			0.000	0.000
			(0.03)	(0.04)
LNAREA	0.996***	0.012	0.997***	0.012
	(44.56)	(0.53)	(44.44)	(0.56)
FLOORNUM	0.003***	0.003***	0.003***	0.003***
	(17.14)	(17.27)	(17.09)	(17.23)
CARPARK	0.088***	0.089***	0.088***	0.089***
	(5.79)	(6.24)	(5.78)	(6.23)
GARDEN	0.214***	0.201***	0.214***	0.201***
	(6.79)	(5.41)	(6.82)	(5.43)
BEDRMNUM	0.008	0.008	0.008	0.008
	(1.54)	(1.60)	(1.53)	(1.58)
LIVDINNUM	-0.021***	-0.021***	-0.021***	-0.021***
	(-2.88)	(-2.89)	(-2.86)	(-2.88)
CLUBHSE	-0.083	-0.083	-0.083	-0.083
	(-1.50)	(-1.49)	(-1.52)	(-1.51)
SWIMPOOL	0.128***	0.129***	0.129***	0.129***
	(2.63)	(2.65)	(2.64)	(2.66)
Observations	312,474	312,474	312,474	312,474
R-squared	0.916	0.882	0.916	0.882
Estate FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

The *t*-statistics are reported in parentheses calculated with robust standard errors.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level

Table 8: Rental analysis

VARIABLES	(1) LNRENT	(2) LNRFT	(3) LNRENT	(4) LNRFT
ESGSCORE	**0.000**	**-0.001**		
	(0.03)	**(-0.17)**		
RISK			**0.003**	**0.002**
			(0.35)	**(0.21)**
LNAREA	0.866***	-0.132***	0.871***	-0.127***
	(39.90)	(-5.96)	(43.42)	(-6.23)
MIDFLOOR	0.018***	0.018***	0.018***	0.018***
	(9.10)	(8.85)	(9.83)	(9.65)
HIGHFLOOR	0.036***	0.036***	0.036***	0.036***
	(9.88)	(9.96)	(10.17)	(10.27)
GARDEN	0.016	0.018	0.015	0.016
	(1.12)	(1.20)	(1.10)	(1.19)
BEDRMNUM	0.021***	0.020***	0.022***	0.021***
	(4.05)	(3.71)	(4.25)	(3.98)
LIVDINNUM	-0.034***	-0.032***	-0.034***	-0.032***
	(-5.06)	(-4.60)	(-5.44)	(-5.00)
CLUBHSE	-0.024	-0.028	-0.127***	-0.129***
	(-0.74)	(-0.90)	(-8.47)	(-8.65)
SWIMPOOL	0.013	0.017	0.116***	0.118***
	(0.37)	(0.54)	(7.15)	(7.33)
Observations	52,424	52,424	59,857	59,857
R-squared	0.957	0.916	0.957	0.919
Estate FE	YES	YES	YES	YES
Year-Month FE	YES	YES	YES	YES

The *t*-statistics are reported in parentheses calculated with robust standard errors.

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level

Appendix A1. Variable definition

Variable	Definition
LNPRICE	The natural logarithm of transaction prices.
LNAREA	The natural logarithm of square feet of transacted residential property.
LNPFT	The natural logarithm of transaction prices per square feet.
LNRENT	The natural logarithm of rental income per month.
LNPFT	The natural logarithm of rental income per square feet.
RISK	A dummy variable equals to one if the transaction occurred over within 12 months after the occurrence of risk incident by the corresponding property manager and zero otherwise.
LIMITEDRISK	A dummy variable equals to one if the transaction occurred over within 12 months after the occurrence of a risk incident circulated in limited reach level by the corresponding property manager and zero otherwise. The limited reach level means that the news of risk incidents circulates include local media, local governmental bodies and social media.
MEDIUMRISK	A dummy variable equals to one if the transaction occurred over within 12 months after the occurrence of a risk incident circulated in medium reach level by the corresponding property manager and zero otherwise. The medium reach level includes most national and regional media.
HIGHRISK	A dummy variable equals to one if the transaction occurred over within 12 months after the occurrence of a risk incident circulated in high reach level by the corresponding property manager and zero otherwise. The high reach level indicates that the incidents circulate in the truly global media outlets.
RISK1MONTH	A dummy variable equals to one if the transaction occurred within 1 months after the occurrence of risk incident by the corresponding property manager and zero otherwise.
RISK3MONTH	A dummy variable equals to one if the transaction occurred within 3 months but over 1 months after the occurrence of risk incident by the corresponding property manager and zero otherwise.
RISK6MONTH	A dummy variable equals to one if the transaction occurred within 6 months but over 3 months after the occurrence of risk incident by the corresponding property manager and zero otherwise.
RISK12MONTH	A dummy variable equals to one if the transaction occurred within 12 months but over 6 months after the occurrence of risk incident by the corresponding property manager and zero otherwise.
RISK36MONTH	A dummy variable equals to one if the transaction occurred within 36 months but over 12 months after the occurrence of risk incident by the corresponding property manager and zero otherwise.
RISKLT	A dummy variable equals to one if the transaction occurred over 36 months after the occurrence of risk incident by the corresponding property manager and zero otherwise.
ESGSCORE	The overall environmental social and governance scores of the corresponding property manager.
ENVSCORE	The environmental scores of the corresponding property manager.
SOCSCORE	The social scores of the corresponding property manager.
GOVSCORE	The governance scores of the corresponding property manager.

NONLOCAL	A dummy variable equals one if the buyer is not local and zero otherwise. A local buyer is identified by the name of buyer according to Fan et al. (2022).
HOMEBUYER	A dummy variable equals to one if the buyer is not a flipper and zero otherwise. A flipper is a buyer who buy and then sell the same flat within two years (Agarwal et al., 2022).
FLOORNUM	The floor number.
CARPARK	A dummy variable equals to one if transaction includes a car park and zero otherwise.
GARDEN	A dummy variable equals to one if the estate has a garden and zero otherwise.
BEDRMNUM	The number of bedrooms.
LIVDINNUM	The number of living or dining rooms.
CLUBHSE	A dummy variable equals to one if the estate has a club house and zero otherwise.
SWIMPOOL	A dummy variable equals to one if the estate has a swimming pool and zero otherwise.