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MASTER THESIS FINANCIAL ECONOMICS

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## **On the relative pricing of A- and H-shares: The impact of ESG performance and ESG reporting transparency**

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### ABSTRACT

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This paper uses a sample of 78 dual-listed Chinese companies in the A- and H-share market to measure the impact of ESG performance and ESG reporting transparency on the relative pricing of A- and H-shares. This study finds that ESG performance is related with a higher relative pricing of H-shares compared to A-shares, while ESG reporting transparency does not affect the relative pricing of A- and H-shares. The impact of ESG performance is driven by the Environmental sub-component, as Environmental performance increases the relative pricing of H-shares. Governance decreases the relative pricing of H-shares and the Social sub-component does not have a significant effect. Overall, the results support the notion that the H-share market prices ESG performance higher than the A-share market.

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# 1 Introduction

Chinese equity markets have been displaying a striking violation of the fundamental principles of finance, as domestically-listed A-shares carry a significant premium over their offshore-listed H-share counterpart <sup>1</sup>. Why do domestic Chinese investors price A-shares higher than global investors price the equivalent H-shares in Hong Kong? Since the inception of the Chinese equity market in the early 1990's, the majority of the Chinese public firms has been solely listed on China's domestic equity market. However, since 1993, Chinese-incorporated firms are also allowed to dual-list their stocks on the offshore market in Hong Kong, giving rise to the AH-share premium. Even though many global firms have dual domestic and foreign stock market listings, the situation in China's equity market is rather unique. The Chinese equity market is strictly regulated and up until 2002, foreign non-Chinese investors were unable to purchase stocks from mainland China and up until 2006, domestic Chinese investors were unable to purchase stocks from the offshore market in Hong Kong. This unique regulatory framework created a separation in domestic Chinese investors and foreign non-Chinese investors, which ultimately led to a considerable discrepancy in share prices between the domestic market and the offshore market. Remarkably, despite China's recent efforts to ease capital restraints and enhance trading, the price disparity between the domestic and offshore market has been persistent and remains a challenging equity premium puzzle.

The price discrepancy between domestically-listed A-shares and offshore-listed H-shares has been a growing topic in academic literature, as a rational economic foundation for the premium seems to lack. The law of one price indicates that A- and H-shares should be equivalent as the shares represent the same firm and constitute an identical claim on the same cash flow. The no-arbitrage principle further assumes that any premium should be diminished by arbitrageurs who are able to take advantage of any mispricing. Even though China's unique regulatory framework might be a reason for the premium to persist, recent liberalisation developments should, in theory, diminish the premium. However, the premium has remained persistent. Even other academic findings regarding price discrepancies in cross-listed firms do not seem to apply; higher institutional ownership should lead to higher valuations, and given that H-shares are mainly traded by institutional investors, one would expect the valuations given to H-shares to be higher than A-shares (Borochin & Yang, 2017). Also, higher reporting standards should lead to higher valuations, and given that the Hong Kong Stock Exchange has a higher reporting standard than the Shanghai and Shenzhen Stock Exchange, one would again expect H-shares to have a higher valuation than A-shares (Borochin & Yang, 2017). Yet, Chi-

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<sup>1</sup>See figure 2 for the development of the premium.

nese investors consistently price the domestic A-shares considerably higher than global investors price their H-share counterpart, raising questions about the drivers behind the AH-share premium.

This paper examines the impact of a factor not previously considered as a contributor to the AH-share premium, namely the impact of Environment, Social and Governance (ESG) performance. Corporate ESG performance has been receiving sustained attention in the last decades and has become a key consideration for investors. Although not every investors follows the same principle, many aim to include ESG considerations into their investment decisions as to get a socially and environmentally responsible portfolio. But, besides the societal and environmental value considerations, ESG performance is also increasingly recognized as an indicator of a firm's financial performance; however, the evidence regarding the latter is mixed. Whether incorporating ESG performance allows investors to reach their risk-and-return investment objectives, or if ESG performance only suffices to fulfil value-based and impact investment objectives is debatable. The fact remains that corporate ESG scores are increasingly taken into account by investors (Chen & Yang, 2020; Giese et al., 2019; Pástor et al., 2021; Broadstock et al., 2021).

The key question that arises is whether ESG performance is priced differently by domestic Chinese investors than by foreign non-Chinese investors. If so, then ESG performance is not only one of the factors that contributes to the AH-share premium, but also a factor that has implications for companies and investors. Companies would have to keep into account that ESG improvements might be perceived and priced differently depending on the exchange, which has serious implications for financing activities. Investors should keep ESG performance into account when deciding on which exchange to buy and sell stocks and what the impact of changes in ESG performance might be, depending on the exchange. Hence, the main research question of this paper is as follows:

*Does ESG Performance affect the relative pricing of A- and H-shares?*

Despite the increased attention ESG has been receiving, companies are not yet forced to report on their ESG performance. However, ESG reporting transparency is receiving increased attention. Already the European Union legislated a bill that enforces firms with listings in the EU to comply with a new directive that radically increases the existing reporting requirements regarding all relevant ESG elements<sup>2</sup>. Yet, to this day, most ESG

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<sup>2</sup>In April 2021, the Commission presented the Corporate Sustainability Reporting Directive (CSRD), aimed at improving the transparency of firms w.r.t. ESG. For more information, see <https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-review-of-the-non-financial-reporting-directive>

reporting is still considered voluntary reporting. Firms are free to decide if they want go beyond the standards of providing solely a financial account and disclose extra information on their social and environmental economic impacts (Gray et al., 1995). A key benefit of reporting on ESG performance is that firms maintain a good relationship with their stakeholders and demonstrate their willingness to be transparent (Gray et al., 1995). ESG reporting transparency differs from ESG performance, as a high ESG performance does not necessarily imply that a company is also transparent regarding its ESG activities.

The second key question that arises is whether ESG reporting transparency is priced equally between domestic Chinese investors and foreign non-Chinese investor. If ESG transparency is priced differently, then besides influencing the AH-share premium, ESG reporting transparency also has implications for firms and investors. Firms should consider whether increasing transparency with respect to ESG will have the desired effects and what the impact will be on each exchange. Investors will have to consider the impact of changes in transparency on their holdings and their future investments. Therefore, the second question this research tries to answer is:

*Does ESG Reporting Transparency affect the relative pricing of A- and H-shares?*

Dual-listed firms have the disadvantage that these firms should not only consider the impact ESG has on their share prices, but also on the AH-share premium. Having a premium that persists is not necessarily negative for a firm, as long as the market remains inefficient. The question is, what happens when the barriers to trading are removed and the market will adjust? Certain factors regarding systematic risk are outside of the control of the firm; however, idiosyncratic risk factors, such as ESG, are partly within the control of the firm. Understanding what a firm can do to diminish the premium, to understand which factors are priced differently between markets and have an impact on the premium, can help prepare a firm for when the barriers to trading are removed and the market will be in equilibrium. It can also help a firm to determine its strategy; why focus on ESG performance or spend time and effort on becoming more transparent if it only widens the discrepancy between your A- and H-shares?

Using a sample of 78 cross-listed A- and H-share from 2001 until 2020, this study investigates the impact of ESG performance and ESG reporting transparency on the AH-share premium. In doing so, the first contribution of this paper is that this study is the first to analyze the impact of ESG on the relative pricing of cross-listed A- and H-shares. Second, this paper extends the existing research model of Zheng et al. (2018) by testing if the proposed factors are valid in a longer time-period and by checking the validity of these factors

during different monetary regimes. Third, this paper extends the work of Li et al. (2015) regarding the ability of investors to incorporate firm-specific information into stock prices.

The remainder of this paper is structured as follows. Section 2 explains the history of the Chinese equity market and examines the relevant academic literature. Section 3 describes the data and section 4 explains the methodology and variable construction. Section 5 presents the results of this study and section 6 concludes.

## 2 Literature Review

The discrepancy between A- and H-shares is a multifaceted topic of which several aspects should be considered, as to understand the context and history. This section first explains the history of the Chinese domestic and offshore market, which explains why there is a distinction between these markets in the first place. Second, this section describes China's regulatory regimes, which gives a first explanation as to why there is a significant difference between A- and H-shares. Lastly, this section describes the relevant academic literature regarding the AH-share premium and discusses the impact of ESG performance.

### 2.1 A brief history of China's stock markets

The development of China's stock markets is rather different than that of Western economies; whereas the first stocks were already being exchanged in Amsterdam in the 17<sup>th</sup> century, China only opened its first stock market in June, 1866. By 1910, there were 47 firms officially listed on the Shanghai Stock Exchange, mainly dominated by rubber plantations. However, by 1941, share trading was put to an end in mainland China, as the Japanese occupied Shanghai in the preamble to WWII. After the war, trading in mainland China briefly resumed, but was halted again as the communists came to power in 1949. Meanwhile, the stock market in Hong Kong had also been set up in 1866, but trading had not been not halted as Hong Kong was a colony controlled by the British. As a result, the Hong Kong market developed fairly different from mainland China and Chinese companies that wanted to become public would turn to the Hong Kong Stock Exchange to list their shares. In 1978, China reopened its economy to foreigners under the direction of China's great reformer, Deng Xiaoping, and in December 1990, the Shanghai Stock Exchange opened again after being closed for nearly half a century. A second exchange was also opened in Shenzhen, in order to raise funds for technology companies (Pong et al., 2017). Since the reopening of the economy firms can list their shares on both exchanges if they meet the requirements, but the historic colonial influences caused a separation in the exchanges in China of which the effects are noticeable until this day.

Due to China's complex history, investing in the Chinese equity market can be split into two main categories, namely inside mainland China and outside mainland China. The stock markets in mainland China consist of the Shanghai Stock Exchange and the Shenzhen Stock Exchange, whereas the market outside of mainland China consists of the Hong Kong Stock Exchange (Pong et al., 2017)<sup>3</sup>. Most of the firms incorporated in

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<sup>3</sup>There are several other stock exchanges in mainland China; however, these are not considered as they are not of interest to this study



China are listed on either the Shanghai or Shenzhen stock exchange and these shares are generally known as A-shares <sup>4</sup>. In the 1990's, the Chinese government decided to allow Chinese State Owned Enterprises to cross-list shares outside of mainland China on the Hong Kong Stock Exchange as a means to raise capital and to improve corporate governance and management, since listings on the Hong Kong market require firms to meet international listing standards (Pong et al., 2017). The decision of the Chinese government to allow Chinese firms to be cross-listed in Hong Kong embarked the beginning of dual-listed H-shares and the first firms were approved for dual-listing on October 6, 1992 (Pong et al., 2017). Ever since its reopening, the Chinese equity market has grown rapidly and the number of firms that are dual listed has steadily increased.

## 2.2 Chinese Regulatory Framework

Since 1978, China has been slowly reopening its economy to foreigners and Chinese stock markets have experienced incredible growth in the last decades. In part, this is due to the changes in the market in general, but it is also due to the changes in the regulatory environment (M. Chan & Kwok, 2017). This subsection gives an overview of the changes in China's regulatory framework and the implications for trading and capital restrictions. The timeline of the events is summarized in the Appendix, Section C.

### 2.2.1 Institutional investor programs

Since the reopening of the stock exchanges in mainland China, only Chinese mainland citizens could buy A-shares, due to restrictions on foreign direct investment. However, since 2002, China has changed its policy allowing a selection of foreign institutional investors to purchase shares through the Qualified Foreign Institutional Investor (QFII) system. In 2006, China started the Qualified Domestic Institutional Investor program (QDII) to also allow Chinese institutional investors to invest in foreign financial markets. Both programs allocate investment quotas, which are the approved investment limits of the investor during a certain time period, only to institutional investors (M. Chan & Kwok, 2017). In order to obtain an investment quota, investors need to satisfy certain criteria regarding their qualifications and requirements regarding their years of operation and scale (M. Chan & Kwok, 2017). The requirements differ considerably per sector;

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<sup>4</sup>There are several types of shares and trading venues that are part of China's equity market, such as B-shares, Red Chips and N-shares. However, these are not discussed in this paper as the market for A-shares is by far the most dominant in terms of market share and analyzing these shares and trading venues is irrelevant for the AH share premium. For more information, see for instance FTSE Russell's Guide to Chinese Share Classes [https://research.ftserussell.com/products/downloads/Guide\\_to\\_Chinese\\_Share\\_Classes.pdf](https://research.ftserussell.com/products/downloads/Guide_to_Chinese_Share_Classes.pdf)

commercial banks need to have at least 10 billion USD in assets under management and have to be in the global top 100 of commercial banks in terms of total assets, whereas securities companies need to have at least 30 years of operating history (M. Chan & Kwok, 2017). After a successful application, a fixed investment quota is allocated to the institution.

In 2011, China introduced the Renminbi Qualified Foreign Institutional Investor program (RQFII). This program allowed foreign institutional investors to invest in China's domestic bonds and equity market through offshore Renminbi accounts (M. Chan & Kwok, 2017). The RQFII program eased the regulation of its predecessor, the QFII, as RQFII eased the restrictions regarding cross-currency settlement, added permitted asset classes and increased investor eligibility. The program started in Hong Kong in 2011 with a quoting ceiling of 3.1 billion USD, and subsequently expanded to other financial institutions in Singapore, London, Luxembourg etc (M. Chan & Kwok, 2017). In 2014, the investment quota had already increased from 3.1 billion USD to 29.4 billion USD.

In 2020, China announced the Qualified Foreign Investor (QFI) program, which combines the RQFII and the QFII program. Under the QFI rules, there are no more investment quota requirements and the stricter requirements regarding minimum operating period and asset management quantity have been removed. The QFI program further expands the investment product categories in which investors can invest, such as derivatives, options and futures. Also, the application process is considerably simplified and the approval timeline of the application process has been halved.

Even though Chinese domestic institutional investors have been allowed to invest in foreign financial instruments since 2006, the investment quotas are still fairly constraining. The investment quota for domestic institutional investors totaled 154 billion USD in 2020; however, the total market cap of the SSE and the SZSE totaled 12.2 trillion. Ultimately, this means that the quota are still relatively small and force institutional investors to allocate a large part of their capital domestically. This increases the demand for A-shares and could be part of the reason A-shares are usually at a premium compared to H-shares.

### **2.2.2 Short-sale restrictions**

Besides the regulatory framework that imposes restrictions on buying stocks, the Chinese government has also imposed restrictions short-selling stocks. Short-selling is considered an important medium to incorporate both the positive and negative views of investors.

Investors go long in a stock if they believe it will increase and short in a stock if they believe it will decrease. Restraining short-selling, in essence, means that only optimistic investors can participate in trading, as pessimistic investors cannot act on their beliefs on upcoming downturn (Miller, 1977). The lack of short-sellers can ultimately lead to an overvaluation of shares and the Chinese short-sell restrictions in combination with the regulatory frameworks could be part of the reason the AH-share premium exists and persists (Miller, 1977).

China's history regarding the short-selling of A- and H-shares is intricate as the regulations change throughout the years. Before 2007, it was not permitted to short-sell any stock listed in mainland China. However, the counterpart of certain dual-listed A-shares could be shorted on the H-share market, though the number of shares eligible for shorting remained limited. H-shares that could be shorted had to fulfil a number of requirements regarding the constituency of a stock index, availability of liquidity or availability underlying futures or options (K. Chan et al., 2010). In 2007, the Chinese government considered lifting the ban on short-selling Chinese domestic shares in an attempt to increase the financial instruments available to investors. In 2010, the first institutional investors were allowed to short a limited number of A-shares. However, during the Chinese stock market collapse in 2015, firms were encouraged by the government to halt all short-selling activity. During 2016, the government devised a set of strict rules and regulations that regulate the short-sell market. Overall, certain stocks could be shorted during 2001-2020, either through the offshore H-share market or the domestic A-share market, whereas certain stocks were not eligible for shorting at all.

The problem with the exclusion of short-selling A-shares but allowing it for H-shares is twofold. On the one hand, the restrictions could lead to an overvaluation of A-shares as the lack of short-sellers ultimately leads to an over-representation of optimistic investors. This could explain part of why A-shares are almost always at a premium compared to H-shares (K. Chan et al., 2010; Miller, 1977). On the other hand, the restrictions could cause the price of H-shares to decrease far more rapidly than the price of A-shares. During (upcoming) economic downturn, when investors are more inclined to sell stocks than to buy stocks, H-shares will decrease quicker due to the presence of short-sellers (K. Chan et al., 2010). Ultimately, this increases the premium of A-shares compared to H-shares.

### **2.2.3 Stock Connect Program**

Evidently, China has attempted to liberalize its economy through the various changes in its regulatory frameworks. In addition to these regime shifts, China also introduced the

Shanghai - Hong Kong Stock Connect Program; a centralized platform that allows institutional and non-institutional investors to trade a subgroup of stocks, while being able to remain anonymous and evade China's foreign exchange controls (M. Chan & Kwok, 2017).

The Stock Connect Program considerably changed cross-border investments. Initially, firms that wanted to sell shares to foreign investors would issue USD denominated B-shares in the Shanghai B-share market, or cross-list their shares in Hong Kong through H-shares (M. Chan & Kwok, 2017). Certain firms that are cross-listed in Hong Kong can also issue American Depository Receipts on the New York Stock Exchange. The problem with the B-share market is that the market is considered as illiquid, as it only constitutes a small part of the entire market capitalization of the Shanghai market. The market for B-shares was set up in the early 1990's, in order to give domestic firms access to foreign capital and was initially only accessible to foreign investors (M. Chan & Kwok, 2017). Since 2001, also domestic investors with access to foreign capital can purchase B-shares. The B-share market is part of China's domestic market, even though B-shares encounter stricter requirements than locally listed shares. The market for H-shares is considered the offshore market, but is far more liquid than the market for B-shares due to the size of the Hong Kong Stock Exchange. Firms that are dual-listed in Hong Kong are also subject to listing requirements that are much stricter than the local listing requirements. Initially, B-shares and H-shares were the only cross-border investment opportunities, but the Stock Connect Program provides a third option.

The Stock Connect Program allows Hong Kong and international investors to directly access the market for A-shares, which was previously restricted to domestic Chinese investors and institutional investors through RQFII, QFII and QDII (M. Chan & Kwok, 2017). The requirements regarding the years of operation and the asset management quantity do not apply, allowing small-scale institutional investors and retail investors to access the Shanghai market. However, there is a maximum daily trading quota of 1.7 billion USD and an overall maximum of 40 billion USD to foreign investment in the Shanghai market (M. Chan & Kwok, 2017).

The stocks that were initially eligible for the Stock Connect Program are the constituent stocks in the SSE180 and SSE380 indices and stocks that are cross-listed on the Hong Kong Stock Exchange (M. Chan & Kwok, 2017). The SSE180 comprises the most representative A-shares and serves as a benchmark for the investment performance of the Shanghai market. The SSE380 is comprised of 380 stocks with a mid-size market cap and a high profitability and growth profile, which are selected from the remaining A-

shares<sup>5</sup>. However, the universe of stocks eligible for the Stock Connect Program has been expanding since its inception and currently there are more than 1400 stocks available to international investors.

## 2.3 The AH-share premium

Since the reopening of the Chinese economy in 1978 and the inception of the Chinese equity markets in the early 1990's, Chinese firms have been attempting to gain access to capital from international investors through cross-listing Chinese incorporated A-shares on the H-share market. Tsingtao Brewery was the first firm to be cross-listed and started issuing H-shares on July 15, 1993; the day that marks the beginning of the AH-share premium (Pong et al., 2017). Despite the increased integration between the Chinese domestic market and the offshore market, the domestic A-shares are usually at a premium compared to their corresponding offshore H-share counterpart (Chung et al., 2013). This is a rather unique situation, as usually foreign investors have to pay a premium compared to domestic investors (Bailey et al., 1999; Hietala, 1989). As a result, scholars have been attempting to dissect the AH-share premium and a variety of factors have been examined throughout the years.

### 2.3.1 Market segmentation

The Chinese regulatory framework has had a direct impact on the AH-share premium, as the regime created a clear distinction between the capabilities of domestic Chinese investors and foreign offshore investors. For a considerable amount of time, foreign investors were unable to buy A-shares and domestic investors were unable to buy H-shares. These restraints prevent arbitrageurs to take advantage of the mispricing in the market, allowing the AH-share premium to persist. Hietala (1989) argues that the price disparity between onshore and offshore markets, in general, is due to the segmentation between the two markets. Offshore investors demand a different risk premium than domestic investors and hence, require a different return, leading to a discrepancy in share price. Domowitz et al. (1997) examine the impact of market segmentation through ownership restrictions in the Mexican market and show that the demand for certain stocks between offshore and onshore markets can differ, as investors face different investment opportunities. Chakravarty et al. (1998) further argue that there is an information asymmetry between onshore and offshore investors, leading to different valuations. Chung et al.

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<sup>5</sup>See the index methodology of the SSE180 and SSE380 for a detailed description of the selection process of the constituent stocks: [http://www.sse.com.cn/market/sseindex/indexlist/indexdetails/indexmethods/c/Index%20Handbook\\_EN\\_SSE%20180.pdf](http://www.sse.com.cn/market/sseindex/indexlist/indexdetails/indexmethods/c/Index%20Handbook_EN_SSE%20180.pdf) and [http://english.sse.com.cn/indices/indices/list/indexmethods/c/000009\\_000009hbooken\\_EN.pdf](http://english.sse.com.cn/indices/indices/list/indexmethods/c/000009_000009hbooken_EN.pdf)

(2013) confirm the findings of Chakravarty et al. (1998) as Chung et al. (2013) indicate that, even though domestic and offshore investors might use the same valuation model, it is inevitable that the final valuations are different due to the parameter uncertainty the investors face. The difference in parameter uncertainty is ultimately caused by the market segmentation and information asymmetry (Chung et al., 2013). Hence, the market segmentation between the Chinese domestic market and the offshore market can contribute to the AH-share premium.

Due to the colonial history, Hong Kong has become a special administrative region of China and is considered a separate market, despite being part of China. Even the macroeconomic conditions differ between Hong Kong and mainland China; e.g. Hong Kong uses a different currency than mainland China, has substantially different tax rates and is characterized by free trade (Chung et al., 2013). As a result, Hong Kong is subject to different market fluctuations than the Chinese domestic market. Both Wang & Jiang (2004) and Ma (1996) show that the AH-share premium is influenced by the differences in aggregate markets conditions between domestic China and offshore Hong Kong. Malmendier & Nagel (2011) find that individual macroeconomic experiences affect investor risk-preferences and investment attitudes and, given that the onshore and offshore market is segmented, the individual experiences of investors of the A-share market differ from those of the H-share market. The study of Fong et al. (2008) confirms this notion, as Fong et al. (2008) indicate that domestic Chinese investors are inclined to save more money due to China's trade surplus and the appreciation of the Chinese Yuan Renminbi, leading to a higher demand for A-shares. Consequently, the difference in aggregate market conditions further enlarged the distinction between the two markets and could also be a factor impacting the premium.

### **2.3.2 The impact of the Stock Connect Program**

The introduction of the Shanghai - Hong Kong Stock Connect program marks a liberalisation of the Shanghai market and a number of studies is focused on the impact of the Stock Connect Program on the AH-share premium. Generally, the Stock Connect Program is seen as a positive development. However, Zheng et al. (2018) note that the impact of external funds may lead to an increase in fluctuations in the stock market and might increase the AH-share premium. Fan & Wang (2017) examine the impact of the Shanghai-Hong Kong Stock Connect policy on the AH-share premium and show that the the policy can reduce the premium over the period 2013 until 2015. M. Chan & Kwok (2017) examine the role of risk-sharing factors starting from the time of the announcement of the Stock Connect Program until shortly after the implementation, and

show that liberalizations reduce systematic risk and that risk-sharing impacts the price revaluation during the liberalization period. M. Chan & Kwok (2016) analyze the impact of the reform announcement of the Stock Connect Program on the A- and H-share prices and indicate that the financial reform strengthens the co-movement of A- and H-shares, while also narrowing the equilibrium level of price disparity. These studies seem to indicate that the introduction of the Stock Connect Program is a positive development that narrows the premium, even though the increased external funds may lead to higher fluctuations.

### **2.3.3 Institutional and individual investors**

One of the most notable distinctions between the A- and H-share market is the proportion of retail investors versus institutional investors. The domestic Chinese market is dominated by retail investors, whereas the Hong Kong market is dominated by institutional investors. In 2019, 82% of the A-shares were held by retail investors, whereas 77% of the H-shares were held by institutional investors (Schroders, 2019).

Generally, it seems to be accepted that institutional investors differ substantially from retail investors, mainly due to their capacity and the level of sophistication (Schmelting, 2007). Schmelting (2007) finds that there is a sharp distinction between institutional investors and retail investors, as the former seems to proxy for "smart money" and the latter for "noise trader risk". Institutional investor proxy for smart money as institutional investor sentiment accurately forecasts stock returns on average, whereas individual investors proxy for noise trader risk as individual sentiment negatively predicts market movements (Schmelting, 2007). The behaviour of individual investors is in line with the hypothesis that individual investors are noise traders that drive share prices from the intrinsic value. These findings are in line with Borochin & Yang (2017), as Borochin & Yang (2017) point out that dedicated institutional ownership decreases future firm misvaluations, as well as the degree of misvaluation. Hence, institutional investors seem more inclined to rationally invest based on intrinsic valuations and asset pricing factors, whereas retail investors are more likely to be noise traders and invest based on sentiment.

Besides the general differences between institutional and individual investors, K. Chan & Kwok (2005) give several reasons that explain why the demand for stocks is notably high for retail investors in China. First, it is difficult for domestic Chinese investors to invest overseas due to the regulatory framework, increasing the demand for domestic A-shares (K. Chan & Kwok, 2005). Second, the historic interest rate paid on bank deposits has

been fairly unattractive (K. Chan & Kwok, 2005). Third, the liquidity of government securities is low, making government securities an unattractive investments (K. Chan & Kwok, 2005). Consequentially, there is a large demand for A-shares by domestic Chinese retail investors. In line with the notion that individual investors proxy for noise trader risk, K. Chan & Kwok (2005) point out that these retail investors are generally poorly informed and have little knowledge of the financial models used to determine the equity value of a company. This causes the A-share market to be severely influenced by the irrational behaviours and sentiments of retail investors. The Hong Kong market on the other hand, is dominated by institutional investors, who are considered to be more rational investors and less exposed to the same constraints as domestic Chinese investors.

## **2.4 ESG investing**

In addition to the factors related to market segmentation, the Stock Connect Program and the differences between institutional and individual investors, the AH-share premium might also be related to ESG performance. ESG investing has received mainstream interest from investors as ESG performance has become a pressing matter in general society. It covers a wide range of issues, from reducing carbon footprints to fighting corruption, and ESG performance ultimately reflects a firm's legitimacy to do business with the external world.

Recently, ESG performance is increasingly examined as a factor that investors take into account when making investment decisions. Certain studies find that ESG can enhance the performance of a firm; however, the findings regarding the matter are contrasting (Broadstock et al., 2021; Pástor et al., 2021). This section aims to explain two main questions: the first being why investors would consider ESG performance when making investment decision, the second being why ESG would be priced differently between domestic Chinese investors and foreign offshore investors.

### **2.4.1 ESG as an investment consideration**

The early evidence regarding the monetary benefits of ESG investments seems to indicate that the monetary benefits of ESG are limited. The extensive review on socially responsible investments by Renneboog et al. (2008) concludes that, as indicated by several studies, socially responsible investors are willing to accept a sub-optimal performance of stocks, if it allows investors to pursue social, environmental or ethical objectives. The study of Hartzmark & Sussman (2019) further indicates that investors move towards portfolios with a high sustainability rating, without any evidence that high-sustainability



firms outperform low-sustainability firms. Hong & Kacperczyk (2009) find that supposed "sin" stocks, such as firms that produce tobacco and alcohol, outperform non-sin stocks, due to the compensation required for holding sin stocks. Zerbib (2019) and Baker et al. (2018) find that sustainable bonds offer a lower yield than regular bonds, since sustainable bonds are priced at a premium due to investor's demand for green bonds (Pástor et al., 2021). These findings seem to imply that ESG investments are more important from an intrinsic viewpoint than from a monetary viewpoint, as ESG is priced with a premium and the associated returns are not necessarily higher.

Nonetheless, emerging evidence is supporting the view that ESG also provides investment benefits, as sustainable firms have lower downside risk and seem to be a better investment during unstable economic times (Broadstock et al., 2021). Broadstock et al. (2021) find that high ESG portfolios outperform low ESG portfolios during the recent financial crisis in China, caused by Covid-19, and that ESG performance mitigates financial risk. These findings complement the findings of Lins et al. (2017), who found that firms with a high ESG performance have stock returns four to seven times higher than firms with a low ESG performance during the Global Financial Crisis. High ESG firms also experienced a higher growth, profitability and sales per employee (Lins et al., 2017). Also, Cornett et al. (2016) find that ESG performance is positively correlated with financial performance in the banking sector during the Global Financial Crisis. Albuquerque et al. (2020) demonstrate that corporate social responsibility investments can be used to improve portfolio diversification and enhance product differentiation, which allows firms to reduce their systematic risk exposure (Broadstock et al., 2021). Hoepner et al. (2018) demonstrate that successful ESG engagements by shareholders can reduce a company's downside risk, with the largest reduction achieved when addressing environmental issues. Ilhan et al. (2021) further show that firms with a higher carbon emission profile, resulting in a low ESG performance, have higher tail risk. Overall, the evidence indicates that ESG mitigates financial risk during crises, reduces systematic risk and lowers downside risk.

Even though the findings on the monetary benefits of ESG performance are contrasting, it is clear that ESG performance ultimately impacts asset prices and corporate behaviour (Pástor et al., 2021). In line with the above-mentioned findings, Pástor et al. (2021) find that investor's ESG preferences affect share prices as agents are willing to pay a higher price for assets that are more sustainable. As a result, the price for 'green' assets increases, lowering the cost of capital for the respective firms (Pástor et al., 2021). Pástor et al. (2021) also show that ESG oriented portfolios earn a lower expected return, as these assets have a negative CAPM alpha (Pástor et al., 2021). However, Pástor et al. (2021) does not account for the risk-adjusted returns. Regardless of whether ESG stocks

increase in price due to the demand for ESG stocks or for their actual monetary benefit, the literature unequivocally indicates that ESG performance influences asset prices.

#### 2.4.2 ESG investing in China

Given that ESG performance influences asset prices, the key question is: Does ESG performance influence the AH-share premium. In other words, do investors in Hong Kong price ESG performance differently than in investors mainland China? If investors price ESG performance equally, then ESG performance should not impact the AH-share premium. However, if investors do price ESG performance differently, it will affect the AH-share premium, as the discrepancy between the investors influences the price disparity.

According to Broadstock et al. (2021), ESG investing in China remains fairly behind compared to other developed markets. This is due to the relatively low presence of institutional investors (Broadstock et al., 2021). Institutional investors highlight the ESG performance of their portfolios and confront firms about their ESG scores, ultimately positively impacting ESG investment practices (Broadstock et al., 2021). The supposed added benefit of ESG performance is clearly present in the investment behaviour of institutional investors, as institutional investors are willing to pay a premium for 'green' stocks. However, the Chinese domestic market is dominated by retail investors. Retail investors are not necessarily as concerned about ESG performance as institutional investors, which can lead to a lower demand for ESG products compared to developed markets. Hence, given that the more developed institutional investors dominate the Hong Kong market, it is likely that H-share market will differ in pricing ESG performance compared to the A-share market.

Complementary to the notion that institutional investors in Hong Kong price ESG performance different than retail investors in mainland China, Li et al. (2015) find that the domestic Chinese market incorporates less firm-specific information than the Hong Kong market. The contribution of Li et al. (2015) to the argument that the H-share market will price ESG performance different than the A-share market is twofold. First, even if A-share market investors would want to price ESG performance equally to H-share investors, A-share investors would be less able to incorporate ESG performance information into their investment decision. Ultimately, this would lead to a price discrepancy. Second, even though the evidence regarding the monetary benefits of ESG are mixed, the conclusion remains that a high ESG performance can lower the cost of capital for the

respective firm. However, the Chinese domestic market is less capable of incorporating firm-specific information into their investment decision, and since ESG performance is firm-specific, these investors would also be less able to incorporate information about ESG performance. Again, this supports the idea that the Hong Kong market ultimately prices ESG performance different than the domestic Chinese market. Therefore, the main research question is as follows:

### **Does ESG performance impact the AH-share premium?**

The relationship of ESG performance with the AH-share premium depends on the construction of the AH-share premium and the state of the premium itself. Generally, A-shares are priced higher than H-shares, but for a brief period of time H-share were priced higher than A-shares. It is therefore difficult to hypothesize the relationship of ESG performance with the AH-share premium, as it depends on which shares were priced higher at the time. However, it is possible to hypothesize which market prices ESG performance higher. Ultimately, this is the same as predicting the relationship between the two variables, while keeping into account that the premium might be positive or negative. Based on the literature, it is expected that the Hong Kong market will price ESG performance higher than the market of mainland China. This is because the H-share market is dominated by institutional investors, who are more concerned with the ESG performance of their portfolio than domestic Chinese retail investors. This preference for ESG stocks and the willingness to pay a premium drives up the price for ESG stocks on the Hong Kong market (Broadstock et al., 2021) The investors in mainland China will price ESG performance lower than the Hong Kong investors, as retail investors dominate the A-share market, which are expected to be less concerned with ESG performance and less willing to pay a premium. In addition, investors in mainland China are expected to incorporate ESG performance less, as these investors have less access to information, are less informed and are less capable of incorporating firm-specific information. Hence, the first hypothesis supporting the main research question is as follows:

### **Hypothesis 1 : The H-share market prices ESG Performance higher than the A-share market**

Next to ESG performance, another important factor is ESG reporting transparency. ESG reporting transparency refers to the extent that firms are transparent regarding their ESG performance. Based on the literature, ESG reporting transparency is expected to reduce the AH-share premium for the following reasons. First, increased ESG reporting transparency increases information transparency, which is important to reduce informa-

tion asymmetry Zheng et al. (2018). Information asymmetry between investors could translate into different expectations about the firm's future performance. Consequently, when investors' expectations diverge, the valuations regarding the future profitability and growth also diverge. Hence, information asymmetry could lead to different firm valuations, which leads to a discrepancy in share prices (Chakravarty et al., 1998). The work of Chung et al. (2013) supports this notion, as Chung et al. (2013) argue that parameter uncertainty, which increases the AH-share premium, is also driven by information asymmetry. It follows that ESG reporting standards reduce information asymmetry with respect to ESG performance. Second, Li et al. (2015) find that information improvement leads to a higher incorporation of firm-specific information, which reduces the AH-share premium. It follows that increased ESG reporting transparency increases information improvement and could decrease the AH-share premium. Hence, the second hypothesis is:

## **Hypothesis 2: ESG Reporting Transparency reduces the AH-share premium**

The intricate history of China's equity markets resulted in a separation of its own markets into a domestic and offshore market. This has led to one of the most exorbitant equity premium puzzles that remains difficult to fully comprehend. Several factors have been identified in the literature, most of which relate to aggregate market conditions, systematic risk factors or idiosyncratic risk factors. Yet, scholars have not yet been able to fully dissect or predict the premium.

This study sets out to determine whether ESG performance, a topic that continues to grow in importance, impacts the AH-share premium. The outcome of this study will not only have implications on the pricing of A- and H-shares, but also implications for investors and dual-listed companies.

### 3 Data

This study uses a customized database supplied by a leading investment bank in Hong Kong. The sample consists of 78 firms that are cross-listed on the Shanghai, Shenzhen and Hong Kong Stock Exchange. The entire sample, including corresponding industries can be found in the Appendix, Section A.

The sample covers a 19-year period from October 1<sup>st</sup>, 2001 to December 31<sup>st</sup>, 2020. Only firms that are currently active are included in the sample. The final sample includes 78 firms that are cross-listed. The daily closing stock prices and market indices are collected from Datastream. The data regarding industry classification and the number of shares outstanding are collected from Worldscope. The data regarding the ESG performance scores and transparency are obtained through Refinitiv.

Figure 1 displays the number of cross-listed firms by year and industry and Table 1 presents the industry count in 2020. Over the years, the composition of the dual-listed firms changes. Until 2006, the sample was dominated by Industrials, by 2020, most firms belong to the Financials industry. The number of firms gradually increases over time, though there is a considerable uptake in the number of cross-listings starting 2007.

Table 1: Industry count in 2020

Basic Materials	Consumer Discretionary	Consumer Staples	Energy	Financials	Health Care	Industrials	Real Estate	Telecommunications	Utilities
9	8	1	7	21	6	18	2	2	4

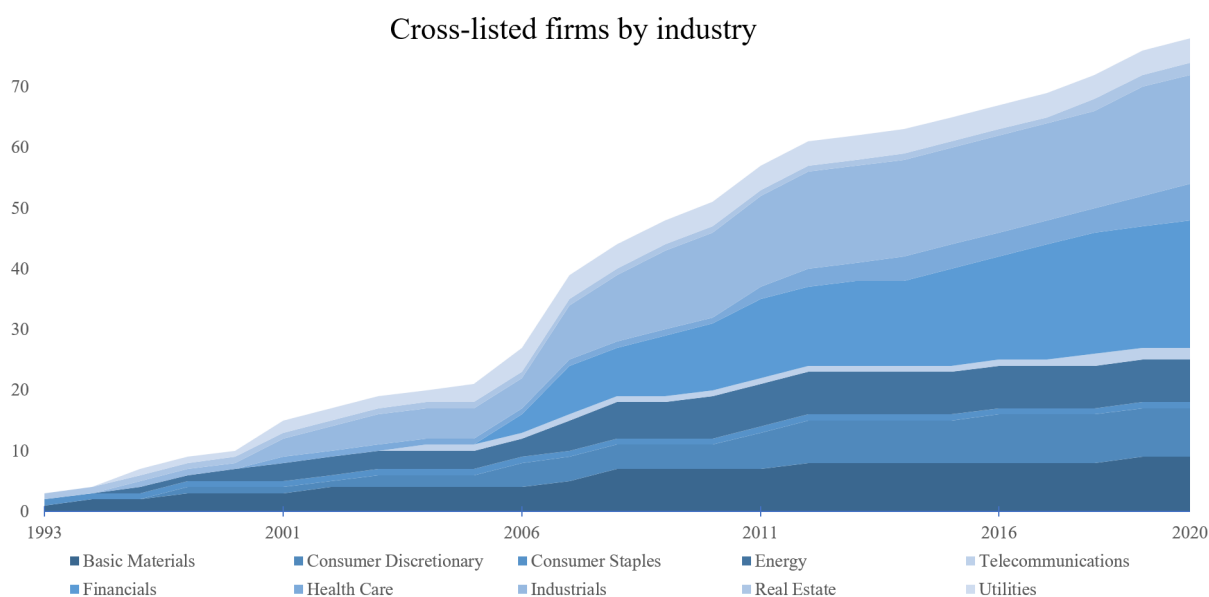


Figure 1: The cross-listing development by industry

## 4 Methodology

This study focuses on the impact of ESG performance and ESG reporting transparency on the AH-share premium. The first part of this section describes the variable construction, the second part presents the summary statistics and correlations between the variables of interest. The last part presents the proposed model and analysis.

### 4.1 Variable construction

The primary variable of interest is the AH-share premium, which indicates the relative pricing of A- and H-shares. The premium is calculated following the methodology of Zheng et al. (2018), which calculates the premium (discount) based on the price ratio of H-shares to A-shares:

$$Premium_{Hi,t} = \frac{P_{i,t}^H * Exchg_{R,t}}{P_{i,t}^A} - 1 \quad (1)$$

where  $Premium_{i,t}$  is the the premium for firm  $i$  at time  $t$ ,  $P_{i,t}^H$  is the H-share price for firm  $i$  at time  $t$ ,  $Exchg_{R,t}$  is the exchange rate from Hong Kong Dollars to Chinese Yuan Renminbi and  $P_{i,t}^A$  is the equivalent A-share price for firm  $i$  at time  $t$ . Eq. 1 gives the premium for H-shares if the premium is positive and the discount if the premium is negative. For simplicity, the term premium will be used henceforth to indicate either the premium or the discount.

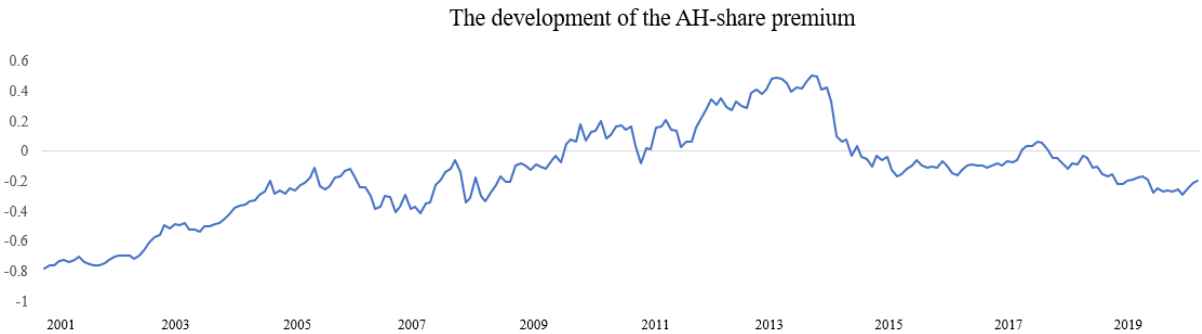


Figure 2: The AH-share premium

Figure 2 plots the average equal-weighted AH-share premium over the period 2001-2020. The figure indicates that the premium has been slowly diminishing over time and has relatively stabilized since 2015. At the start of the sample period from 2003 until 2008, the premium averaged around -46%. For a brief period from 2010 until 2014 the premium actually reversed, meaning that A-shares were cheaper than their H-share counterpart. However, since 2015, the price of A-shares has increased relative to H-shares and the premium has been stable around -11%. These changes seem to coincide with the altered

institutional investor policies by the Chinese government. Therefore, the institutional investor policies are included in the analysis.

After the AH-share premium, the most important variables of interest are ESG performance and ESG reporting transparency. The data is provided by Refinitiv, a leading data-supplier with one of the most comprehensive databases regarding global ESG scores. These scores are data-driven and not simply comprised of firm specific disclosures. Refinitiv has over 150 data analysts focused on collecting ESG data from CSR reports, company websites, annual reports, NGO websites, stock exchange filings and news sources. There are 450 ESG measures that are checked manually before computing the final ESG scores. Each measure is standardized to account for industry-specific factors and to guarantee that the score is comparable across industries.

The aggregate ESG score consists of three categories and covers Environmental (E), Social (S) and Governance (G) dimensions. Each primary layer has several supporting dimensions; the Environment score consists of the categories resource use, emissions and innovations; the Social score consists of the categories workforce, human rights, community and product responsibility; the Governance score consists of management, shareholders and corporate social responsibility strategy. The Appendix, section B gives an overview of the primary layers, the supporting layers and the corresponding themes. The final layer consists of over 500 data points used to calculate each of the scores. Refinitiv scores are not absolute scores, but reflect the relative performance of a firm to its sector. The data determines the industry specific benchmarks with regards to its Environmental and Social scoring, which ensures there is no bias in the given scores, while the country of incorporation sets the benchmark for the Governance score. The final ESG scores reflect a firm's ESG performance, commitment and effectiveness based on publicly-reported information (Refinitiv, 2021).

ESG reporting transparency is dependent on the percentage of the firm's activities covered in its Environmental and Social reporting. The scope is set by the reports of the company. If a firm is fully transparent and all extra financial reporting covers the firm's global activities, the scope is 100% and the firm is fully transparent.

The summary statistics of the ESG performance scores and the ESG reporting transparency scores of the 78 dual-listed firms are given in Table 2. The sample period is from 2001 until 2020. The mean aggregate ESG score 39.5; the mean Environment score is 39.24, the mean Governance score is 54.39 and the mean Social score is 31.51. On average, firms tend to score the highest on the Governance performance measure. The

average ESG reporting transparency score is 89.49. The ESG coverage of the variables increases over time, with an average of 69% for the ESG performance variables and an average of 38% for the ESG reporting transparency variable.

Table 2: ESG summary statistics

Variable	Maximum	Minimum	Mean	Coverage
ESG Score	82.05	3.38	39.50	69%
Environmental Score	90.81	0	39.24	69%
Social Score	89.6	0.28	31.51	69%
Governance Score	94.87	6.36	54.39	69%
ESG Reporting Transparency Score	100	1	89.49	38%

Next to the AH-share premium, the ESG performance scores and the ESG reporting transparency scores, other variables that have been identified in the literature to impact the AH-share premium are considered. This is to ensure that the variables do not capture other effects and measure only the impact under investigation.

An important difference between A- and H-shares is the currency in which the shares are being traded. H-shares are traded in Hong Kong Dollars and A-shares are traded Chinese Yuan Renminbi. The exchange rate between Hong Kong Dollars and Chinese Yuan Renminbi is time-varying in nature and could contribute to the AH-share premium (Zheng et al., 2018). Arquette et al. (2008) find that expected changes in the exchange rates already greatly influence the AH-share premium, by as much as 40% during 1998–2006. Hence, changes in the exchange rate are included in the analysis. The change in exchange rate is calculated as the monthly change in exchange rate, with January 2001 as the base year. Figure 3 displays the changes in exchange rate from 2001 until 2020. As can be seen, the change in exchange rate has been increasing in volatility over time.

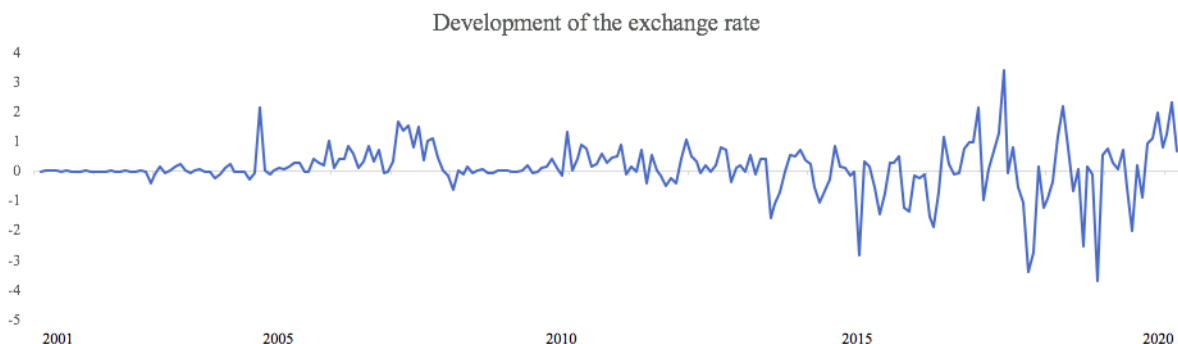


Figure 3: The exchange rate between Hong Kong Dollars and Chinese Yuan Renminbi

Another factor that sets A-shares apart from H-shares is stock liquidity. The overall



liquidity between the Hong Kong market and the Chinese domestic market is different and can differ substantially between stocks, which can impact the premium. Generally, investors prefer liquid stocks over illiquid stocks; investors are willing to pay a premium for liquidity or expect to be compensated for illiquidity. Zheng et al. (2018) find that individual stock liquidity, measured as the share turnover ratio between the A- and H-shares, has a significant impact on the H-share premium. This paper follows the methodology of Zheng et al. (2018) and measures individual stock liquidity as follows:

$$Liquidity_{i,t} = \frac{1}{D} \sum_{d=1}^{D_t} \frac{Volume_{i,d}}{Outstanding\ shares_{i,d}} \quad (2)$$

where  $Volume_{i,d}$  stands for the number of shares traded for firm  $i$  on day  $d$ .  $Outstanding\ shares_{i,d}$  is the number of outstanding shares for firm  $i$  on day  $d$ . The liquidity is calculated in the same manner for both markets. Estimating Eq. 2 has the advantage that it includes the number of shares traded as well as the number of shares outstanding, which is valuable given that the number of shares outstanding differs for the A- and H-market. The liquidity measure is added to the model as the A-share liquidity over the H-share liquidity.

Figure 4 displays the aggregate liquidity of both markets and the aggregate liquidity ratio. The figure clearly indicates that the A-share market is more liquid than the H-share market, which is logical given that the A-shares market cap is considerably larger than the H-share market cap. Especially, starting in the end of 2014, there is a strong increase in liquidity in the A-share market. This increase coincides with the launch of the Stock Connect Program, a program launched by the Chinese government which allows investors to trade in both Mainland China and Hong Kong. Therefore, the Stock Connect Program is also included in the analysis.

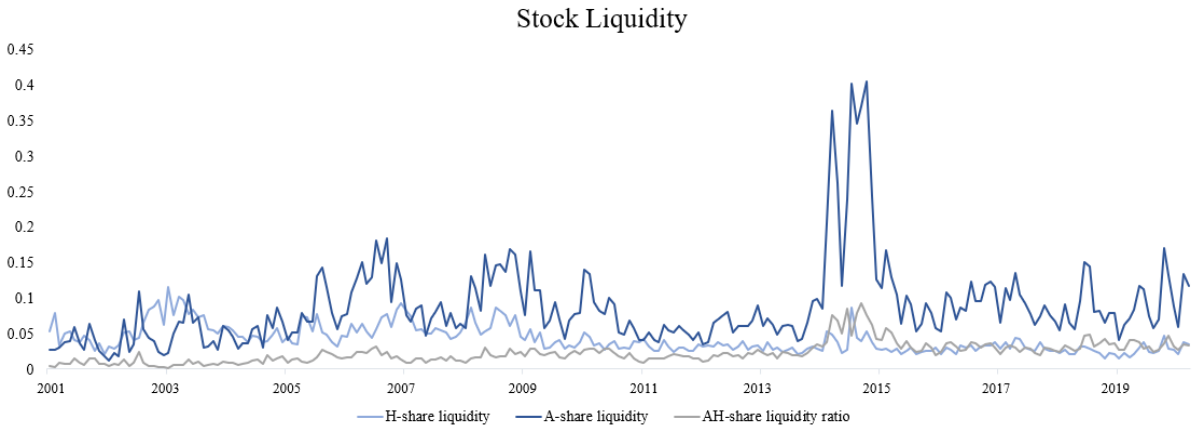


Figure 4: The liquidity of the AH-shares market

The AH-share premium could also be due to a difference in the availability of information. Several studies indicate that a price discrepancy between equivalent shares can arise due to information asymmetry (e.g. Brennan and Cao, 1997; Chan et al., 2008; Choe et al., 1999; Hau, 2001). Foreign investors tend to be at a disadvantage compared to local investors, as foreign investors face difficulty retrieving information due to linguistic and cultural disadvantages (Deng et al., 2021). With respect to the AH-share premium, this disadvantage could be even further enhanced due to China’s relatively weak investor protection (Deng et al., 2021; Chakravarty et al., 1998). K. Chan et al. (2008) find that their measure of information asymmetry accounts for more than 40% of the variation between Chinese A-shares and B-shares. As A-share and H-share investors face different conditions, and in order to assure that the ESG reporting transparency variable does not capture a reduction in information asymmetry, information asymmetry is added to the model. This paper measures information asymmetry following the methodology of Cui et al. (2018).

$$Information\ Asymmetry_{i,t} = \frac{\sigma_{t,i}^{EPS}}{\mu_{i,t}^{EPS}} \quad (3)$$

where  $\sigma_{t,i}^{EPS}$  stands for the standard deviation of the earnings per share 12 month forecast for firm  $i$  in time  $t$  and  $\mu_{i,t}^{EPS}$  stands for the mean forecast for firm  $i$  in time  $t$ . The measure is included similarly to the liquidity measure; as the ratio of the A-share information asymmetry measure over the H-share information asymmetry measure.

Further, a market performance measure is calculated. Dual-listed AH-shares comprise only a minority of the entire A- and H-share market, while the return on the remaining stocks could also be a factor that impacts the AH-share premium. The market performance measure reflects the market-wide performance of the A- and H-share market and is based on the returns of the Hong Kong Hang Seng Index (H-shares) and the Shanghai Stock Exchange A-share index. The ratio is calculated as the the return on the A-share market over the H-share market, meaning the Shanghai Stock Exchange A-share index over the Hong Kong Hang Seng Index.

The last factor considered is the market capitalization of the A- and H-shares. The H-share market is larger than the A-share market and most often, the market capitalization of H-shares is larger than A-shares. The relative market capitalization can impact the premium and is added to the model as the ratio between the A-share market capitalisation and the H-share market capitalisation. Similar to the other relative measure, this factor is added as the A-share size divided by the H-share size.

## 4.2 Summary statistics and correlations between variables

Table 3 presents the basic characteristics of the A- and H-shares between 2001 and 2020 of the 78 dual-listed firms. The average A-share price is more than 20% higher than the average H-share price. The average A-share market capitalization is nearly twice as large as the H-share market capitalization. This is line with the expectations, as A-shares are traded on a premium compared to H-shares and the number of A-shares exceeds the number of H-shares. The basic earnings per share do not differ between A- and H-shares, as the shares have an equivalent claim on cash flows. The number of shares outstanding includes both the A-shares and H-shares and represent the total number of shares outstanding.

Table 3: Characteristics

Variable	Maximum	Minimum	Mean
A-share price	317.35	0.51	11.77
H-share price	302.80	0.22	9.61
A-share market capitalization	2027775.00	454.73	120403.10
H-share market capitalization	2060375.00	124.10	56841.15
Basic earnings per share (H)	8.79	-2.15	0.63
Number of shares outstanding	356000000.00	130975.00	28400000.00

Table 4 presents the correlation between the variables. The AH-share premium is significantly correlated with all the variables in the model. There is an especially strong relationship between the premium and the exchange rate and the relative size of the firm. The premium is also correlated with the ESG performance measures. The three separate ESG measures are added rather than the combined ESG score, to determine the correlation between the separate ESG components. The Environmental score is positively correlated with the Social and Governance score, indicating that in improvement in environmental performance is correlated with an improvement of social performance and governance performance. Governance is also positively correlated with social performance, which means that all ESG performance measures are positively correlated with each other. Interestingly, ESG reporting transparency is negatively correlated with all ESG measures. This means a decrease in ESG performance is correlated with an increase in transparency.

Table 5 shows the results of the panel regression on the control variables and presents the sensitivity of the AH share premium to the industry, size, time and auditor dummy. The control variables are significant and explain a large proportion of the AH-share

Table 4: Correlation matrix2

Variable	AH-share premium	$\Delta$ Exchange Rate	A/H Market Return Ratio	A/H Share Size	A/H Liquidity Ratio
$\Delta$ Exchange Rate	0.539***				
A/H Market Return Ratio	0.042***	-0.062***			
A/H Share Size	-0.562***	-0.342***	-0.046***		
A/H Liquidity Ratio	0.039***	0.152***	-0.011	0.148***	
Information Asymmetry	0.023**	0.125***	0.012	-0.012	0.063
Environmental Score	-0.036***	-0.186***	0.003	0.042***	-0.072
Social Score	0.097***	-0.25	0.014	0.028*	0.028**
Governance Score	0.031***	-0.077***	0.01	0.107***	0.132***
ESG Reporting Transparency	-0.160***	-0.011	0.003	0.017	0.110***
	Information Asymmetry	Environmental Score	Social Score	Governance Score	
$\Delta$ Exchange Rate					
A/H Market Return Ratio					
A/H Share Size					
A/H Liquidity Ratio					
Information Asymmetry	0.044***				
Environmental Score	-0.011	0.672***			
Social Score	0.024*	0.268***	0.265***		
Governance Score	0.002	-0.058***	-0.210***	-0.120***	
ESG Reporting Transparency					

premium. The baseline industry in the sensitivity analysis is the Consumer Staples industry. The Utilities industry has the largest relative pricing difference, whereas the Financials industry has the smallest difference. The size of the firms is also significant and the positive coefficient indicates that larger firms have a smaller price differential, whereas smaller firms have a larger price differential. The impact of the regulatory regimes on the AH-share premium differs substantially; during the RQFII program, A-shares were priced considerably higher than H-shares, whereas during the Stock Connect program, A-shares were priced relatively lower compared to H-shares. Assuming that the A-shares are priced at a premium, the Stock Connect program is linked with a lower premium whereas the RQFII is linked with a higher premium. The Big 4 auditor dummy indicates that coverage by one of the Big 4 accounting firms decrease the premium and increases the relative price of H-shares compared to A-shares.

### 4.3 The model and analysis

The goal of this study is to determine if ESG performance and ESG reporting transparency affect the relative pricing of A- and H-shares. As mentioned before, the two main hypotheses are:

Table 5: Sensitivity of the AH-share premium

	Coefficient	t-statistic	P-value
<b>Intercept</b>	-0.4714	-9.93	0.000***
<b>Industry dummies</b>			
Financials	-0.111	-5.68	0.000***
ConsumerDiscretionary	-0.356	-17.9	0.000***
BasicMaterials	-0.334	-17.17	0.000***
Industrials	-0.221	-11.66	0.000***
Energy	-0.344	-17.11	0.000***
RealEstate	-0.089	-3.61	0.000***
Utilities	-0.407	-19.59	0.000***
HealthCare	-0.123	-5.56	0.000***
Telecommunications	-0.233	-9.11	0.000***
<b>Size dummies</b>			
Small firms	0.099	-16.01	
<b>Time Dummy</b>			
QFII	0.248	5.57	0.000***
QDII	0.535	12.12	0.000***
RQFII	0.975	22.14	0.000***
QFI	-0.049	-4.92	0.000***
Stock Connect Program	-0.404	-60.63	0.000***
<b>Auditor dummy</b>			
Big 4 coverage	0.132	18.37	0.000***
Adjusted R-squared	46.77%		

This table provides the sensitivity analysis of the AH-share premium on the dummy variables utilized in this study. The dependent variable is the AH-share premium and the dummies are regressed on the premium through a pooled regression. With respect to the industry dummies, the baseline industry is Consumer Staples.

**ESG Performance Hypothesis:** ESG performance increases the relative price of H-shares compared to A-shares and decreases the premium of A-shares relative to H-shares <sup>6</sup>.

**ESG Reporting Transparency Hypothesis:** ESG Reporting Transparency increases the relative price of H-shares compared to A-shares and decreases the premium of A-shares relative to H-shares <sup>7</sup>.

Both hypotheses are tested through a panel regression model and a fixed effects regression, estimating the impact of the ESG performance and ESG reporting transparency on the AH-share premium at the stock level. The fixed effects model is included to account for the time-invariant factors of the firms. The independent variables include the ESG performance scores, ESG reporting transparency, the relative individual stock liquidity, the change in exchange rate between Hong Kong Dollars and Chinese Yuan Renminbi,

<sup>6</sup>The hypotheses assume that A-shares are trading at a premium compared to H-shares. However, in the rare occasion that H-shares are trading at a premium compared to A-shares, the premium of H-shares increases compared to A-shares.

<sup>7</sup>See footnote 6.

the ratio between A- and H-shares' information asymmetry, the ratio between the A- H-shares' market return and the relative size of A- and H-shares. The full regression model is given below:

$$\begin{aligned}
Premium_{H,i,t} = & \beta_0 + B_i + \beta_1 \Delta Exchangerate_t + \beta_2 A/HMarketReturnRatio_t \\
& + \beta_3 A/HShareSize_{i,t} + \beta_4 A/HLiquidityRatio_{i,t} \\
& + \beta_5 InformationAsymmetry_{i,t} + \beta_6 ESGScore_{i,t} \\
& + \beta_7 EnvironmentalScore_{i,t} + \beta_8 SocialScore_{i,t} \\
& + \beta_9 GovernanceScore_{i,t} + \beta_{10} ESGTransparency_{i,t} \\
& + \beta_i IndustryDummies + \beta_i TimeDummies \\
& + \beta_i SizeDummies + \epsilon_{i,t}
\end{aligned} \tag{4}$$

where  $\Delta Exchangerate_t$  is the change in exchange rate between Hong Kong Dollars and Chinese Yuan Renminbi,  $A/HMarketReturnRatio_t$  is the ratio between the A- H-shares' market return,  $A/HShareSize_{i,t}$  is the relative size of A-shares and H-shares,  $A/HLiquidityRatio_{i,t}$  is the liquidity ratio and  $\beta_5 InformationAsymmetry_{i,t}$  is the relative information asymmetry between A- and H-shares. The ESG performance measure is added as  $ESGScore_{i,t}$ , the separate environmental performance is added as  $EnvironmentalScore_{i,t}$ , social performance as  $SocialScore_{i,t}$  and the governance performance as  $GovernanceScore_{i,t}$ . The variable accounting for ESG reporting transparency is added as  $ESGTransparency_{i,t}$ .

Lastly, several control variables are employed. Industry dummies are added to account for industry-specific effects. Time dummies are added to control for the varying institutional investor programs and the Stock connect program. To ensure that ESG reporting transparency does not capture general transparency, dummies regarding the firm's auditors are added. Zheng et al. (2018) find that being audited by one of the Big 4 auditors (EY, KPMG, PWC and Deloitte), increases information transparency and decreases the disparity between A- and H-shares. Hence, the dummies are based on whether or not the firm is being audited by one of the Big 4 auditors (EY, KPMG, PWC or Deloitte).

## 5 Results

The goal of this paper is to analyze the impact of ESG performance and ESG reporting transparency on the AH-share premium. In this section, the results of the regression analysis are described.

### 5.1 Regression analysis

Table 6 presents the results of the pooled regressions and Table 7 presents the results of the fixed effects regressions. The dependent variable is always the AH-share premium and the dummies employed depend on the model. Model (1) - (9) displays the pooled regressions and Model (10) - (18) displays the fixed effects regressions. A positive coefficient indicates that the variable increases the relative price of H-shares compared to A-shares. Assuming that A-shares are trading at a premium compared to H-shares, this would decrease the price discrepancy. However, given the construction of Eq. 1, this cannot be ascertained with certainty, as H-shares could also be trading at a premium compared to A-shares. A negative coefficient indicates that the variable decreases price of H-shares compared to A-shares. Assuming that A-shares are trading at a premium compared to H-shares, this would decrease the price discrepancy. However, as mentioned above, this cannot be directly ascertained.

The pooled regressions and fixed effects model first account for the aggregate effects of the change in exchange rate and the ratio of the return on the Hong Kong market and the Chinese domestic market. Second, the model includes the company-specific variables regarding size, liquidity and information asymmetry. Lastly, the model considers the variables of interest, namely ESG performance and ESG reporting transparency. ESG performance is added as an aggregate variable as well as in its three corresponding categories; Environmental performance, Social performance and Governance performance).

#### 5.1.1 Exchange rate

Model (1) indicates that the change in exchange rate explains a large proportion of the AH-share premium, as over 30% of the price discrepancy is explained by changes in the exchange rate. Time dummies are added to the model to account for the changes in the regulatory regime. The impact of changes in the exchange rate are persistent, as the variable is significant throughout the entire model. The positive coefficient indicates that an increase in the ratio between the Hong Kong Dollar (HKD) and Chinese Yuan Renminbi (RMB), which means that the RMB is appreciating against the HKD, lowers the

Table 6: Pooled regression results

	<i>Model (1)</i>	<i>Model (2)</i>	<i>Model (3)</i>	<i>Model (4)</i>	<i>Model (5)</i>	<i>VIF</i>
Constant	-2.778*** (-70.09)	-2.387*** (-23.84)	-2.093*** (-47.77)	-2.023*** (-44.14)	-2.097*** (-38.49)	
ΔExchange Rate	2.445*** (72.44)	1.718*** (26.35)	1.99*** (54.97)	1.926*** (50.64)	1.984*** (44.82)	1.26
A/H Market Return		0.398*** (8.06)	0.251*** (6.36)	0.266*** (6.32)	0.301*** (6.15)	1.21
A/H Share Size			-0.058*** (-59.52)	-0.059*** (-54.6)	-0.061*** (-43.28)	1.35
A/H Liquidity				0.001* (1.94)	0.003*** (4.22)	1.38
Information Asymmetry					0.008*** (5.15)	1.36
ESG performance						1.42
ESG Reporting Transparency						1.42
Environmental Performance						1.42
Social Performance						1.51
Governance Performance						1.52
Time dummies	Yes	Yes	Yes	Yes	Yes	
Industry dummies	No	No	Yes	Yes	Yes	
Size dummies	No	No	Yes	Yes	Yes	
Auditor dummies	No	No	No	No	Yes	
Adjusted R-square	0.3474	0.3567	0.5903	0.6146	0.5978	
	<i>Model (6)</i>	<i>Model (7)</i>	<i>Model (8)</i>	<i>Model (9)</i>		<i>VIF</i>
Constant	-1.663*** (-15.27)	-1.955*** (-18.38)	-1.807*** (-16.91)	-1.681*** (-15.52)		
ΔExchange Rate	1.879*** (22.2)	2.037*** (24.39)	1.966*** (23.65)	1.936*** (23.38)		1.26
A/H Market Return	0.233*** (3.31)	0.252*** (3.6)	0.261*** (3.77)	0.268*** (3.89)		1.21
A/H Share Size	-0.05*** (-26.42)	-0.048*** (-25.41)	-0.048*** (-25.79)	-0.05*** (-26.58)		1.35
A/H Liquidity	0.000 (-0.08)	0.001 (0.94)	0.001 (0.77)	0.000 (-0.07)		1.38
Information Asymmetry	0.005*** (3.23)	0.005** (2.49)	0.005*** (2.61)	0.004** (2.22)		1.36
ESG Performance	-0.002 (-5.14)					1.42
ESG Reporting Transparency	-0.001*** (-7.05)	-0.001*** (-6)	-0.001*** (-7.08)	-0.001*** (-8)		1.42
Environmental Performance		0.001*** (4.63)	0.002*** (7.89)	0.002*** (8.21)		1.42
Social Performance			-0.003*** (-8.05)	-0.002*** (-7.51)		1.51
Governance Performance				-0.001*** (-6.04)		1.52
Time dummies	Yes	Yes	Yes	Yes		
Industry dummies	Yes	Yes	Yes	Yes		
Size dummies	Yes	Yes	Yes	Yes		
Auditor dummies	Yes	Yes	Yes	Yes		
Adjusted R-square	0.5533	0.6396	0.647	0.651		



Table 7: Fixed effects regression results

	<i>Model (10)</i>	<i>Model (11)</i>	<i>Model (12)</i>	<i>Model (13)</i>	<i>Model (14)</i>
Constant	-2.611*** (-96.43)	-2.598*** (-93.17)	-1.459*** (-52.42)	-1.449*** (-48.94)	-1.354*** (-36.98)
Exchange Rate	2.301*** (15.74)	2.292*** (96.20)	1.536*** (69.00)	1.522*** (63.62)	1.465*** (49.60)
A/H Market Return		0.404*** (12.44)	0.213*** (7.89)	0.232*** (7.85)	0.242*** (7.09)
A/H Share Size			-0.073*** (-73.39)	-0.072*** (-67.96)	-0.077*** (-58.3)
A/H Liquidity				0.002*** (3.25)	0.002** (2.20)
Information asymmetry					0.003*** (2.63)
ESG Performance					
ESG Reporting Transparency					
Environmental Performance					
Social Performance					
Governance Performance					
Time dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No	No
Size dummies	Yes	Yes	Yes	Yes	Yes
Auditor dummies	No	No	No	No	No
Adjusted R-square	0.5045	0.5091	0.663	0.6688	0.6608
	<i>Model (15)</i>	<i>Model (16)</i>	<i>Model (17)</i>	<i>Model (18)</i>	
Constant	-0.606*** (-7.81)	-0.589*** (-7.98)	-0.594*** (-7.84)	-0.629*** (-8.12)	
Exchange Rate	1.142*** (20.28)	1.134*** (20.62)	1.137*** (20.33)	1.147*** (20.45)	
A/H Market Return	0.106** (2.74)	0.113*** (2.93)	0.112*** (2.92)	0.111** (2.87)	
A/H Share Size	-0.151*** (-49.41)	-0.152*** (-50.21)	-0.152*** (-50.18)	-0.151*** (-49.07)	
A/H Liquidity	0.003*** (3.1)	0.003*** (3.04)	0.003*** (3.04)	0.003*** (3.08)	
Information asymmetry	-0.001 (-0.94)	-0.001 (-1.03)	-0.001 (-1.04)	-0.001 (-0.99)	
ESG Performance	0.001*** (3.71)				
ESG Reporting Transparency	0.000 (-0.08)	0.000 (-0.36)	0.000 (-0.32)	0.000 (-0.22)	
Environmental Performance		0.001*** (4.81)	0.001*** (3.91)	0.001*** (3.68)	
Social Performance			0.000 (0.29)	0.000 (0.00)	
Governance Performance				-0.000** (-2.14)	
Time dummies	Yes	Yes	Yes	Yes	
Industry dummies	No	No	No	No	
Size dummies	Yes	Yes	Yes	Yes	
Auditor dummies	No	No	No	No	
Adjusted R-square	0.7737	0.7744	0.7744	0.7747	

AH-share premium. Hence, H-shares benefit from an appreciating RMB. Economically, this is logical since dual-listed firms are incorporated in mainland China and revenue is denominated in RMB. Consequently, if the RMB appreciates, revenue denoted in RMB becomes more valuable in comparison to revenue in HKD, leading to an increase in the demand for H-shares. Model (9) of Table 7 the fixed effects regression indicates the same results as Model (1); an appreciating RMB increases the relative value of H-shares compared to A-shares. In the fixed effects model, an even larger share of the premium can be explained by merely the exchange rate, as the model accounts for over 50% of the premium. These findings are in line with the findings of Zheng et al. (2018) and Arquette et al. (2008), who both find that the actual and the expected changes in the exchange rate greatly influence the AH-share premium.

### **5.1.2 Market return**

Model (2) includes both the ratio of the change in exchange rate and the ratio between the return on the Hong Kong market and the Chinese domestic market. The relative market performance is significant and has a positive coefficient, meaning that the variable decreases the AH-share premium. This indicates that an increase in the performance of the Chinese domestic stock market compared to the offshore market in Hong Kong is beneficial for H-shares. This implies that the H-share counterpart of shares listed on both exchanges increases in price relative to the A-shares, meaning that investors view dual-listed stocks as a source of diversification (Zheng et al., 2018). Model (11) of the fixed effects regression indicates the same results as the pooled regression. These findings are in line with the findings of Zheng et al. (2018), who also find that an improvement of the market performance of the Chinese domestic market increases the relative price of H-shares.

### **5.1.3 Share size**

Model (3) is expanded with the size measure. The size measure shows the relative size of the tradeable component of A-shares versus H-shares. The negative coefficient indicates that the larger the H-share size compared to the A-share size, the smaller the AH-share premium. This indicates that larger firms, with lower trading costs and generally lower risk, increase in H-share price relative to A-shares. Adding the industry and size dummies in combination with the ratio of share size explains a large part of the AH-share premium, as the adjusted R-squared is nearly 60% in the pooled regression model. Model (12) of the fixed effects model indicates the same result. Again, these findings are in line with the findings of Zheng et al. (2018), who find that larger firms have a smaller H-share

discount.

#### **5.1.4 Liquidity**

Model (4) and Model (13) present the impact of the liquidity factor. In the pooled regression model, the liquidity factor is only significant through Model (5) and (6); after adding the ESG performance measure and the ESG reporting transparency variable, the variable is insignificant. In the fixed effects model, the liquidity factor is significant throughout all models. The difference between the findings seems to suggest that unobserved heterogeneity is masking the effect of liquidity on the AH-share premium in the pooled regression model. The positive coefficient indicates that when A-share turnover increases relative to H-share turnover, the relative pricing of H-shares increases. This indicates that investors find H-shares more attractive if the A-share counterpart is increasing in liquidity. This is in line with expectations, as investors prefer liquid stocks over illiquid stocks. These findings differ with the findings of Zheng et al. (2018), who do not find a significant result throughout the fixed effects model.

#### **5.1.5 Information asymmetry**

Model (5) and Model (14) account for the information asymmetry measure. This measure is added to ensure that the ESG reporting transparency variable does not capture a difference in information asymmetry. Information asymmetry is significant throughout the pooled regression model, however, it does lower the R-squared of the model, raising questions about the effectiveness of the variable. The variable is not significant in the fixed effects regressions. This implies that the result of the factor is at least partly due to unobserved heterogeneity, as the results do not hold up in the fixed effects model.

#### **5.1.6 ESG performance**

Model (6) of the pooled regression model includes the aggregate ESG performance score and the results indicate that ESG performance has a significant effect on the AH-share premium; however, the effect is negative. This indicates that a higher ESG scores is linked with a higher relative price of A-shares compared to H-shares. This is contrary to the expected findings of the literature and could indicate that the A-share market prices ESG performance higher than the A-share market. However, the results of Model (15) of the fixed effects regression indicate a different effect, as Model (15) indicates that a higher ESG performance increases the relative price of H-shares, lowering the AH-share premium. The difference in outcome between the two models can be examined by determining the difference between the three separate ESG components.

The first sub-component is the Environmental performance. In both Model (6) of the pooled regression model and Model (15) of the fixed effects model, the sub-component Environmental performance has a positive significant coefficient. This indicates that Environmental performance significantly decreases the AH-share premium and that H-shares increase in price relative to A-shares. These findings are in line with the expectations based on the literature.

The second sub-component is the Social performance. Model (8) of the pooled regression model indicates that Social performance increases the AH-share premium, whereas Model (17) of the fixed effects model does not find a significant effect. This can be due to two main reasons; either the Social performance variable is too time-invariant for the fixed effects model or the impact of Social performance is not significant when accounting for company specific effects. Further examination of the data indicates that the Social performance variable changes over time and should be sufficient for the fixed effects model. Hence, the lack of finding an effect in the fixed effects model indicates that, at least in part, the effect is due to unobserved heterogeneity. After controlling for unobserved heterogeneity in the fixed effect model, the result of Model (8) does not longer hold up.

The third sub-component is the Governance performance. Model (9) of the pooled regression model and Model (18) of the fixed effects model represent the effects of the sub-component Governance performance. The effects are similar between the two models, as both coefficients are negative and significant. This indicates that Governance performance increases the AH-share premium and that the A-share market prices Governance performance higher than the H-share market. The effect of the sub-component Governance is not line line with the expectations of the literature, but might be explained by China's history regarding governance. China has not been known to be the front-runner regarding the sustainable governance of firms, which could explain why domestic Chinese investors price this component higher than the offshore investors.

The analysis of the sub-components indicate three different effects; Environmental performance decreases the premium, Governance performance increases the premium and Social performance does not have an undisputed effect on the premium. Hence, of only the Environmental measure and the Governance measure can it be said that these factors impact the AH-share premium. Consequently, adding the three sub-components to the model rather than only the ESG combined score, fairly enhances the accuracy of the model, as the adjusted R-squared increases from 55% to 65%. Overall, Model (9) and Model (18) have the highest R-squared and explain more than 65% and 77% percent of the variation in the AH-share premium, respectively.

### 5.1.7 ESG reporting transparency

The effects of the ESG reporting transparency variable are similar to the results of the Social performance variable; the variable is significant in the pooled regression model in Model (6) through Model (9), though insignificant in the fixed effects model in Model (15) through Model (18). The negative coefficient in the pooled regression model indicates that ESG reporting transparency increases the AH-share premium, meaning that the A-share market prices transparency higher than the A-share market. However, as this result does not hold up in the fixed effects model, this result is likely due to unobserved heterogeneity in the model.

## 5.2 Robustness check

The fixed effects model is employed next to the pooled regression model to account for time-invariant unobserved variables<sup>8</sup>. However, one concern of the fixed effects model is that certain key variables do not show much variation over the period of interest. Another concern is that certain dummy variables cannot be accounted for in a fixed effects model. Hence, a random effects model is included as a robustness check to check the validity of the results of the fixed effects model.

Table 8 shows the results of the random effects robustness check. The results of the random effects model are similar to the effects of the fixed effects regression. All coefficients indicate the same result; however, there is a slight difference in significance. This indicates the results of the fixed effects model are valid and are not driven by the lack of variation of key variables or the missing dummy variables.

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<sup>8</sup>This paper initially utilises a fixed effects model rather than a random effects model due to the outcome of the Hausman test. The Hausman test compares the random effects model to the fixed effects model by examining the correlation between the regressors and errors. The null-hypothesis assumes that the random effects model is the preferred model; the alternate hypothesis assumes that the fixed effects model is preferred. Based on the results of the Hausman test, the null-hypothesis is rejected and a fixed effects model is chosen

Table 8: Random effects regression results

	<i>Model (19)</i>	<i>Model (20)</i>	<i>Model (21)</i>	<i>Model (22)</i>	<i>Model (23)</i>
Constant	-2.847*** (-18.92)	-2.835*** (-18.75)	-1.663*** (-12.09)	-1.352*** (-7.13)	-1.261 (-6.34)
Exchange Rate	2.302*** (96.37)	2.292*** (96.14)	1.539*** (69.1)	1.524*** (63.74)	1.469 (49.76)
A/H Market Return		0.404*** (12.43)	0.214*** (7.91)	0.233*** (7.86)	0.243 (7.11)
A/H Share Size			-0.073*** (-73.38)	-0.072*** (-68.05)	-0.077*** (-58.36)
A/H Liquidity				0.002*** (3.24)	0.001 (2.16)
Information asymmetry					0.003 (2.41)
ESG Performance					
ESG Reporting Transparency					
Environmental Performance					
Social Performance					
Governance Performance					
Time dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	Yes
Size dummies	No	No	Yes	Yes	Yes
Auditor dummies	No	No	No	No	Yes
Adjusted R-square	0.5045	0.5091	0.663	0.6688	
	<i>Model (24)</i>	<i>Model (25)</i>	<i>Model (26)</i>	<i>Model (27)</i>	
Constant	-0.601*** (-2.89)	-0.592*** (-2.82)	-0.593*** (-2.86)	-0.634*** (-3.05)	
Exchange Rate	1.232*** (21.42)	1.22*** (21.69)	1.22*** (21.31)	1.232*** (21.47)	
A/H Market Return	0.123*** (3.09)	0.13*** (3.28)	0.131*** (3.30)	0.128*** (3.23)	
A/H Share Size	-0.136*** (-46.37)	-0.137*** (-47.22)	-0.136*** (-47.07)	-0.135*** (-46.01)	
A/H Liquidity	0.003*** (3.31)	0.003*** (3.24)	0.003*** (3.25)	0.003*** (3.3)	
Information asymmetry	-0.001 (-1.04)	-0.001 (-1.13)	-0.001 (-1.12)	-0.001 (-1.07)	
ESG Performance	0.001*** (-3.94)				
ESG Reporting Transparency	0.000 (-0.31)	0.000 (-0.59)	0.000 (-0.63)	0.000 (-0.49)	
Environmental Performance		0.001*** (4.89)	0.001*** (4.29)	0.001*** (4.00)	
Social Performance			(0.000)	(0.000)	
Governance Performance			(-0.27)	(-0.61)	
				-0.001*** (-2.61)	
Time dummies	Yes	Yes	Yes	Yes	
Industry dummies	Yes	Yes	Yes	Yes	
Size dummies	Yes	Yes	Yes	Yes	
Auditor dummies	Yes	Yes	Yes	Yes	
Adjusted R-square	0.7722	0.773	0.7729	0.7732	

## 6 Conclusion

This study set out to determine if ESG performance and ESG reporting transparency affect the relative pricing of A- and H-shares. Using a sample of 78 dual-listed shares from 2001 until 2020, the development of the AH-premium is examined in combination with a battery of independent and control variables.

The empirical results support the notion that ESG performance is priced higher by H-share investors than A-share investors. This means that the ESG Performance Hypothesis is confirmed; ESG performance increases the relative price of H-shares compared to A-shares and decreases the premium of A-shares relative to H-shares. However, these results should be seen in light of the findings; not all separate ESG components contribute to this effect. The environmental performance measure decreases the AH-share premium, Social performance does not have a significant effect and Governance performance increases the premium. Hence, the reason that ESG performance in its entirety decreases the premium is due to the fact that the effect of the Environmental performance measure significantly exceeds that of the Governance performance measure, leading to a decrease in the premium.

The second hypothesis, namely the ESG Reporting Transparency Hypothesis, cannot be confirmed. First, because ESG reporting transparency significantly increases the premium rather than decreases the premium in the pooled regression model. Second, because the variable is insignificant in the fixed effects model. Based on these results, the ESG reporting transparency variable either increases the premium or has no impact at all.

The results of the ESG Performance Hypothesis have several implications for investors and companies, as ESG performance impacts the AH-share premium. Companies and investors might be concerned with the AH-share premium, as the price disparity entails that the stock price of A- and H-shares is either overvalued or undervalued. If the trading barriers that sustain the premium are removed, the share prices might plummet, which is disadvantageous for both investors and companies. However, the impact of the ESG Performance Hypothesis should be seen in light of the findings, as not all separate components impact the AH-share premium similarly.

The first implication of the findings is that Environmental performance increases the relative pricing of H-shares compared to A-shares and decreases the premium, assuming that H-shares are at a discount. Companies might focus on improving their environmental performance as an effort to diminish the price disparity or to simply increase their share

price in the H-share market. The second implication regards Governance performance; improving governance increases the relative price of A-shares compared to H-shares and widens the premium, assuming that A-shares are trading at a premium. If companies are aiming to improve their corporate governance performance, they should keep into account that doing so might widen their share price discrepancy. The third implication regards investors; investors could also take the development of firms on these two measures into account. If firms are actively working on their Environmental performance, investors are better off buying H-shares than A-shares as H-shares will increase relatively more in value than A-shares. If the Governance performance of firms are improving, A-shares will increase relatively more than H-shares and investors might be better off buying A-shares. However, it should be noted that the impact of both the environmental and governance performance is rather small. Hence, ESG performance is not a major factor in increasing or widening the AH-share premium.

Also, an important note should be made about the findings of this study. ESG performance might be beneficial for shares in their entirety, however, the goal of this study is not to determine the impact of ESG performance improvement on stock prices. The goal is to determine how ESG performance affects the relative pricing of A- and H-shares. Therefore, it might be counter-intuitive that improving Governance performance widens the AH-share premium. However, it does not exclude that the share price of A- and H-shares increases due to improved performance; the results merely indicate that there is a difference between the value given to this improvement between Domestic Chinese investors and offshore investors.

The findings of this study complement the existing literature on the relative pricing of dual-listed A- and H- shares in several ways. First, this study extends the study of Zheng et al. (2018), by examining several of their proposed factors in a longer time period. Second, this study is the first to examine the impact of ESG performance on the AH-share premium.

As with most studies, this study is subject to several limitations. The first being that the result regarding ESG performance raises questions about the efficiency and effectiveness of considering ESG in its entirety rather than examining the separate components. The problem with adding ESG performance to the model and viewing ESG as a joint component, is that there is no distinction made between the sub-components. However, as is indicated by the results, certain investors are more concerned with the impact of certain sub-components than other components. Future studies could look into these components separately. The second limitation of this study regards the drawbacks of



the fixed effects model. The advantage of the fixed effects model is that it accounts for time-invariant heterogeneity; however, the model does not exclude time-variant heterogeneity. Therefore, it cannot be fully excluded that the results are due to unobserved heterogeneity. Also, the models do not exclude reverse causality. This study assumes that ESG performance impacts the relative pricing of A- and H-shares. However, a large price differential might push firms to improve their corporate governance. Future studies could employ a different model to exclude reverse causality. For instance, by measuring the exogenous influence of changes in governance or environmental policies through an event study or through a difference-in-difference model. The third limitation of this study regards the measurement and data availability of ESG performance. This study measures ESG performance as given by Refinitiv; however, the data is not extensive during the first years of the sample. Therefore, the results could be skewed due to a lack of data availability. Future studies could attempt to proxy for ESG by looking at other factors of which there is more data available.

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## A Dual-listed firms

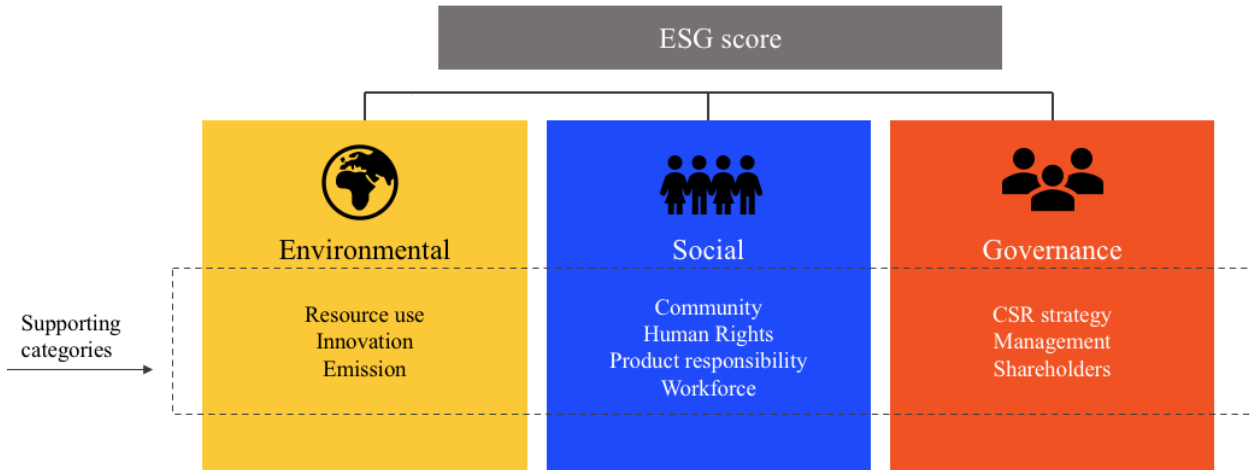
Table 9: Sample of the 78 dual-listed firms

Name	Industry	Name	Industry
AGRICULTURAL BANK OF CHINA	Financials	FLAT GLASS GROUP	Basic Materials
AIR CHINA	Consumer Discretionary	GF SECURITIES	Financials
ALUMINUM CORPORATION OF CHINA	Basic Materials	GREAT WALL MOTOR	Consumer Discretionary
ANGANG STEEL	Basic Materials	GUANGSHEN RAILWAY	Consumer Discretionary
ANHUI CONCH CEMENT	Industrials	GUANGZHOU AUTOMOBILE GP.	Consumer Discretionary
ANHUI EXPRESSWAY	Industrials	GUANGZHOU BAIYUNSHAN PHARM.HDG.	Health Care
BANK OF CHINA	Financials	HUADIAN POWER INTERNATIONAL	Utilities
BANK OF COMMS.	Financials	HUANENG POWER INTERNATIONAL	Utilities
BBMG	Industrials	HUATAI SECURITIES	Financials
BYD	Consumer Discretionary	INDUSTRIAL & COML.BK.OF CHINA	Financials
CENTRAL CHINA SECURITIES	Financials	JIANGSU EXPRESSWAY	Industrials
CHINA RAILWAY SIGNAL COMMUNICATION	Industrials	JIANGXI COPPER	Basic Materials
CHINA CITIC BANK	Financials	LIVZON PHARM.GROUP	Health Care
CHINA COAL ENERGY	Energy	MAANSHAN IRON & STL.	Basic Materials
CHINA CON.BANK	Financials	METALLURG.CORP.OF CHINA	Industrials
CHINA EASTERN AIRLINES	Consumer Discretionary	NEW CHINA LIFE INSURANCE	Financials
CHINA EVERBRIGHT BK.	Financials	PHARMARON BEIJING	Health Care
CHINA GALAXY SECURITIES	Financials	PING AN INSURANCE (GROUP) OF CHINA	Financials
CHINA INTERNATIONAL CAPITAL	Financials	RED STAR MACALLINE GROUP	Real Estate
CHINA INTL.MAR.CTRS. (GP.)	Industrials	SHAI.FOSUN PHARM.(GROUP)	Health Care
CHINA LIFE INSURANCE	Financials	SHANDONG CHENMING PAPER HOLDINGS	Basic Materials
CHINA MERCHANTS BANK	Financials	SHANGHAI ELECTRIC GP.	Industrials
CHINA MINSHENG BANKING	Financials	SHANGHAI JUNSHI BIOSCIENCES	Health Care
CHINA MOLYBDENUM	Basic Materials	SHANGHAI PHARM HDG.	Health Care
CHINA OILFIELD SVS.	Energy	SHENZHEN EXPRESSWAY	Industrials
CHINA PACIFIC INSURANCE (GROUP)	Financials	SICHUAN EXPRESSWAY	Industrials
CHINA PTL.& CHM.	Energy	SINOPEC OILFIELD SERVICE	Energy
CHINA RAILWAY GROUP	Industrials	SINOPEC SHANGHAI PETROCHEMICAL	Basic Materials
CHINA SECURITIES	Financials	SINOTRANS	Industrials
CHINA SHENHUA EN.	Energy	TIANJIN CAP.ENV.PROTC. GP.	Utilities
CHINA SOUTHERN AIRLINES	Consumer Discretionary	TSINGTAO BREWERY	Consumer Staples
CHINA VANKE	Real Estate	WEICHAI POWER	Industrials
CITIC SECURITIES	Financials	XINHUA WINSHARE PUBLISHING AND MEDIA	Consumer Discretionary
COSCO SHIPPING DEV.	Industrials	XINJIANG GOLDWIND SCTC.	Energy
COSCO SHIPPING HDG.	Industrials	YANZHOU COAL MINING	Energy
CRRC	Industrials	YANGTZE OPTC.FRE.& CABLE JOINT STOCK	Telecommunications
DATANG INTL.PWR.GNRTN.	Utilities	ZIJIN MINING GROUP	Basic Materials
DONGFANG ELECTRIC	Industrials	ZOOMLION HDY.SCTC.	Industrials
EVERBRIGHT SECURITIES	Financials	ZTE	Telecommunications

This table provides the 78 dual-listed firms and their corresponding industries.

## B ESG score dimensions and supporting categories

Figure 5: ESG components



This figure gives an overview of the ESG dimensions and the supporting categories.

*Source: Refinitiv*

## C Overview of the regulatory changes

Figure 6: Timeline of the investor programs

Date	Event
November 2002	The Qualified Foreign Institutional Investor (QFII) program was announced. The QFII program allowed foreign institutional investors to invest in mainland China. The program allocated investment quotas to certain institutional investors if they met requirements regarding years of operation, scale and certain qualifications.
April 2006	The Qualified Domestic Institutional Investor (QDII) program was announced. The QDII program allowed domestic institutional investors to invest in foreign financial markets. Similar to the QFII program, investment quotas were allocated and the investors had to meet a variety of requirements.
December 2011	The Renminbi Qualified Foreign Institutional Investor (RQFII) program was announced. This program allowed foreign institutional investors to invest in China's domestic bonds and equity market through offshore Renminbi accounts. Similar to the QFII and QDII program, investment quotas were allocated to certain investors. Eventually, the RQFII was also spread to asset managers and international banks.
April 2014	The Stock Connect Program was announced. The Shanghai - Hong Kong Stock Connect would allow institutional and non-institutional investors to trade on a centralized platform and buy and sell stocks that were listed on both exchanges. The program allowed investors to circumvent some of the stricter requirements of the other institutional investor programs, though trading was still restricted to certain investment quotas.
September 2020	The Qualified Foreign Investor (QFI) program, also called the R/QFII program, was announced. This program unifies its predecessors and further enhances trading in China. It expands the financial instruments investors can invest in and eases restrictions on trading.

This figure gives an overview of the changes in China's regulatory framework.