2011

The Persistence of Pricing Differentials in Dual-listed Companies in Hong Kong and China

Justin Spitzer
Claremont McKenna College

CLAREMONT MCKENNA COLLEGE

THE PERSISTENCE OF PRICING DIFFERENTIALS IN DUAL-LISTED COMPANIES IN HONG KONG AND CHINA

SUBMITTED TO

PROFESSOR LISA MEULBROEK

AND

DEAN GREGORY HESS

BY

JUSTIN SPITZER

FOR

SENIOR THESIS

FALL 2011

NOVEMBER 27, 2011

Table of Contents

Acknowledgements

I would like to thank Dr. Lisa Meulbroek for her guidance and direction throughout the thesis project. I would also like to express my gratitude to Professor Richard Burdekin for his advice concerning my thesis topic. Finally, I would like to thank my family whose encouragement and confidence in me have been invaluable.

Abstract

Over the past two decades a number of Chinese companies have issued shares on both the Hong Kong Stock Exchange and on one of the Chinese stock exchanges. The Hong Kong-listed H-shares of Chinese dual-listed companies have traded at a persistent discount rate relative to the China-listed A-shares. As these shares represent the same ownership rights and cash flows, the shares should theoretically trade at the same price. The price differential between H-shares and A-shares should decrease as international markets continue to converge. The paper analyzes the persistence of the discount rates and the effects of both market and investor sentiment on the price disparity between the two shares. The paper also examines whether certain sectors consistently trade at larger discount rates relative to others.

I. Introduction

Pricing differentials of dual-listed companies are an interesting market anomaly to study, involving firms which are available in two different exchanges at two different prices. The majority of dual-listed companies use a dual-listed structure to mitigate the potential tax consequences of a merger or to gain access to multiple capital markets. Currently, only a relatively small number of international companies are dual-listed, the most well-known of which are Royal Dutch Shell plc, Tata Motors Limited, and Rio Tinto Group. Historically, most of these companies are dual-listed on exchanges in the USA, the UK, Australia, and the Netherlands. This paper focuses on seven firms that are dual-listed in Hong Kong and China, examining the persistence of the price differentials between H-shares and A-shares from August 3, 2007 to November 7, 2011.

Dual-listed companies employ a unique corporate structure that enables the firm to list on more than one stock exchange while maintaining separate legal entities in each market. Typically, these dual-listings are cross-border in two different countries. Companies that employ this strategy have "Siamese-twin" company stocks that have unique trading behaviors that are not perfectly correlated. Twin stocks of a dual-listed company value the same cash flows and earnings and therefore should trade at the same price. Nevertheless, a price discount or premium has been found in almost all dual-listed companies. Past studies have attributed this price disparity variously to arbitrage, regulatory requirements, co-movements, market cycles, and macroeconomic movements.

However, there is no overarching model that explains the discount rates between one leg of a company and its "twin". Each market has distinct factors that may be more statistically significant in one relationship than another. For instance, market "noise" may have a greater effect on smaller and more recently dual-listed companies such as Mondi Group (South Africa/UK) as compared to Royal Dutch Shell (UK/Netherlands) because Mondi has only been dual-listed for four years, whereas Royal Dutch Shell has been dual-listed since 1907.

Dual-listed corporate structures have existed on the Chinese and Hong Kong stock exchanges since 1993, but there are still relatively few firms that are dual-listed in the two countries. Recently, there has been a significant increase in the number of companies taking advantage of this unique opportunity to avail themselves of international investment opportunities. Through an initial listing in both Hong Kong and China, these companies can gauge international interest within a focused investing market that will provide valuable insight into market perception of the value of the firm.

With the continued growth of the Chinese economy, international investors are looking for greater levels of access to investment opportunities in China. Currently, non-Chinese investors are limited to American Depositary Receipts (ADRs), H-shares traded in the Hong Kong Stock Exchange (SEHK), and B-shares traded in mainland China stock exchanges. A-shares are traded in mainland China and are only tradable by local Chinese investors. ADRs provide investors with an investment opportunity in the shares of foreign companies that are not directly available for purchase from the country in which the company is listed. ADRs for Chinese companies are denominated in US dollars and

entitle the owner to all dividends and capital gains, but does not grant ownership rights of the actual company. H-shares are available to any investor allowed to invest in the SEHK and are denominated in Hong Kong dollars. These shares are the "twin" stock with the A-share and are afforded the same ownership rights as A-shares. B-shares trade in the mainland China stock exchanges, but are denominated in foreign currencies. However, B-shares are thinly traded and do not play a significant role in the relationship between A-shares and other investment instruments. The Chinese government plans to combine B-shares and A-shares in the future to open Chinese equity markets to more international investors.

When dual-listing in China and Hong Kong, companies can choose to trade on the Hong Kong Stock Exchange and either the Shanghai Stock Exchange or the Shenzhen Stock Exchange. Some of the larger companies trading in both Hong Kong and Shanghai range from huge financial firms including China Life Insurance Company Ltd., China Merchants Bank Company Ltd., and the Industrial and Commercial Bank of China Ltd., to building materials firms such as the Anhui Conch Cement Company Ltd. and Jiangxi Copper Company Ltd. Historically, there has been a persistent price premium for A-shares relative to both H-shares and ADRs. In theory, the discount rates should be close, as both stocks are valuing the same underlying securities, but there is a considerable difference between the two. From 1998 to 2006, ADRs traded at discount rates ranging from -54.9% to 115.2% and H-shares traded at discount rates between -72.35% and 115%. The mean discount rate for ADRs was -17.08% and the mean discount rate for H-shares was -27.88%. (Arquette, Brown, and Burdekin 2008, p. 1920) The larger discount

rate for the Hong Kong H-shares relative to the ADRs is interesting as one would expect the Hong Kong market and the Chinese market to trade at a closer price due to the amount of political and economic integration between the two countries.

The primary objective of this study is to analyze the cause and persistence of discount rates for Hong Kong H-shares relative to China A-shares using econometric tools. A comparison of price movements and index movements will reveal some of the factors causing the price differentials. These differentials can initially be attributed to differences in reporting standards, but further analysis reveal a number of meaningful contributors. Some of the core factors identified by economists to be causing the price differentials are investor psychology/sentiment and a variety of "cultural factors", including the Chinese mistrust of domestic regulations, a casino mentality amongst inexperienced Chinese investors, caution by the international investment community, and a desire to participate in the expected appreciation of the Chinese currency.

Additional variables included in previous studies have included monetary appreciation and expansion, market concentration, and a relatively young market that needs more time to mature. There have been significant amounts of research performed on the topic of market segmentation and the discount rates of ADRs and Hong Kong H-shares relative to China A-shares, but the focal point of this study is the further exploration of the persistence of the discount rates solely between H-shares and A-shares even with the continued integration of the Hong Kong and Chinese economies.

Investor and market sentiment play critical roles in the explanation of the Hong Kong H-share discount rate relative to that of the China A-shares. These two measures can help illustrate how investors perceive a firm relative to the market. Figure 1 highlights the negative relationship between the average H-share discount rate and market sentiment (measured as the Shanghai Stock Exchange A-share Index P/E divided by the Hang Seng China Enterprises Index P/E). Investor sentiment is a critical contributor to the movements of discount rates. The quantification of investor sentiment is complex, but the use of the firm's relative P/E ratio in a country has been used as an effective proxy in past studies.

A secondary objective of this paper is to complete a sector-by-sector comparison of the discount rates for dual-listed companies in the Hong Kong and Shanghai stock exchanges; this analysis could reveal a pattern that would provide strategic insight for companies considering dual-listing. Burdekin and Yang (2011) use an econometric model to compare the share price discounts between dual-listed commercial banks in Hong Kong and China. Performing a similar comparison through a different lens could reveal larger discount rates in certain sectors than in others. Past studies have examined the volatility associated with each sector based on its business cycles, but an analysis of the magnitude of sector price differentials and corresponding movements between firms within the industry could indicate investor confidence in particular sectors.

Section II reviews relevant literature concerning the pricing differentials in dual-listed companies and more specifically, the nature and cause of Hong Kong H-share discount rates. Section III addresses data collection and the regression models tested in

this paper. Section IV presents the results and empirical analysis of these tests and a description of the sector-by-sector comparison of discount rates. Section V concludes the paper.

II.   Literature Review

Froot and Dabora (1998) wrote one of the first papers analyzing the cause of price differences and fluctuations from equilibrium price ratios in dual-listed companies. Traditional financial theory dictates that the location of a trade should have no affect on the intrinsic value of an asset, but their study suggests that price differentials could be a result of the separate shareholder bodies, currency movements, parent company expenditures, and investor heterogeneity resulting from taxes. They also assert that country-specific sentiments and market segmentation contribute to the price differentials.

Froot and Dabora (1998) use Royal Dutch Shell to demonstrate that there are clear price deviations between the shares traded in different countries. Royal Dutch shares were traded on the Amsterdam Exchange and Shell shares were traded on the London Stock Exchange. The companies merged on a 60-40 split, which should be represented by a Royal Dutch share being priced 1.5 times more than a Shell share. Froot and Dabora (1998) use regression models to establish that there were deviations from the equilibrium price ratio by as much as 35%. The study concludes that there are three possible explanations for the observed market segmentation (and the resulting price disparity between a pair of twin stocks). First, tax-induced investor heterogeneity may play a role by shifting holding patterns by investors when the Shell shares were cheap

relative to Royal Dutch shares. However, it alone cannot explain the whole movement because there are only a few cases where twin stocks have different withholding taxes. Second, market-wide segmentation coupled with market noise has a greater effect on locally-traded stocks than on foreign-traded stocks. The authors suggest that the irrational activity of traders leads to market noise shocks, causing a disproportionately large movement in the local twin stock relative to the foreign twin share. Third, institutional inefficiencies can have adverse effects resulting in co-movements of any pair of twin stocks. Froot and Dabora (1998) note that "by virtue of higher liquidity or inclusion in domestic-market indexes, one twin may be classified as a 'domestic' stock." This categorization results in an inherent bias towards one of the twin stocks and affects trading activity either positively or negatively, creating another source of co-movements. The study's final point is that arbitrage would occur if there were no market barriers; arbitrage would be prevalent as any investor would be able to finance their own arbitrage trading. However, the existence of market barriers (capital flow channels, government regulations, etc.) makes arbitrage an unrealistic explanation for twin stock movements.

Peng, Miao, and Chow (2007) focus on the potential for price convergence in dual-listed Shanghai A-shares and Hong Kong H-shares and the theoretical causes for convergence. They introduce two interesting hypotheses: 1) trading activities based on arbitrage will lead to future price convergence, and 2) information asymmetry coupled with shifting demands will cause continued price divergence. Froot and Dabora (1998) touched on the possibility of arbitrage causing price differentials in dual-listed companies but the effects of arbitrage on price convergence are challenging to quantify as there is no data that documents the exact amount of such trading.

Through a series of regressions and panel unit root tests, Peng, Miao, and Chow (2007) found statistically significant evidence that there is arbitrage in Hong Kong and Shanghai dual-listed companies. The Shanghai A-shares were valued at a 47 P/E ratio compared to their corresponding Hong Kong H-shares with a 27 P/E ratio. There was also a 90% difference in terms of price appreciation between the A-share and the H-share, which is correlated to the 24% to 14% volatility for the A-shares and B-shares, respectively. (Peng, Miao, and Chow 2007, p. 4) Their study argues that, as a result of heavily regulated foreign exchange flows in and out of China, capital often moves through unofficial channels. This trading strategy would benefit from the lack of perfect information in the market, but would be disrupted by market segmentation, as speculative investing would lead to increased volatility in both stocks.

Peng, Miao, and Chow's (2007) hypothesis that information asymmetry is a relevant factor when determining the cause of the H-share discount rate is a popular theory that is used in the papers by Chan (2011) and Fong, Wong, and Yong (2007). The latter study reviewed price differentials between H-shares and A-shares, along with potential causes such as market segmentation and inefficient capital allocation. Their study postulates that the price discrepancy can be explained by a combination of microeconomic and macroeconomic factors including market liquidity and conditions, share supply, risk levels, information asymmetry, the imbalance of the Chinese economy, and market structure and regulation. The resulting model is an amalgamation of several different studies designed to create a more accurate depiction of the cause of the price disparity between Shanghai A and Hong Kong H-shares. A particularly important discovery in the paper is that A-shares are more susceptible to movements as a result of

macroeconomic factors (such as the expansion and appreciation of the RMB supply), while these changes have no statistically significant effects on H-shares.

Chan (2011) examined the relationship between dual-listed Shanghai A-shares and Hong Kong H-shares with an array of econometric tools testing for co-integration and the direction of causality between the two types of shares. His study concludes that the movement in H-shares is determined by A-share trends, proving a causal relationship running from A-shares to H-shares but not vice versa. The study fails to identify factors behind this causal relationship but acknowledges that price convergence and volatility between the two stocks could be theoretical factors. Chan's (2011) results are slightly contradictory to Fong, Wong, and Yong's (2007) conclusions, as the latter assert that macroeconomic factors have a significant effect on the movements of Shanghai A-shares, but not on those of Hong Kong H-shares. If, however, China A-shares did have a causal relationship leading H-share movements, then there should be corresponding co-movements from the Hong Kong H-shares that would be statistically significant.

Miao and Peng (2007), two of the authors of an aforementioned study, observed considerably more volatility in A-shares than in H-shares, which could be an indication of a causal relationship. Their hypothesis contends that Fong, Wong, and Yong's (2007) conclusion that macroeconomic and monetary conditions are the cause of the volatility of A-shares and H-shares, is improbable. Miao and Peng (2007) claim that the proliferation of individual investors, market concentration, and an undeveloped trading mechanism are more likely to explain the differences in volatility. The supporting evidence for each

point is strong and could provide a more thorough explanation of the price disparity between dual-listed A-shares and H-shares.

Miao and Peng's (2007) paper uses comparable tradable investment holdings in the United States to demonstrate the disproportionately skewed investor structure. Chinese individual investors account for 69% of the holdings in the A-share market with only 4% in contracted savings. Individual investors in the USA, on the other hand, account for only 37% of the comparable tradable investment holdings and have an additional 38% in contracted savings. (Miao and Peng 2007, p. 6) This unusual investment structure is a result of a relatively young market in China with limited experience and a lack of quality institutional investors. The lack of investing experience coupled with the undeveloped trading mechanism increases the volatility of A-shares because there are few limits in place to prevent greater market volatility The trading system has a 10% movement limit designed to stop major price fluctuations as a result of volatility. However, this limit is rendered ineffective by the implementation of modern sophisticated trading strategies designed to automatically account for this limit in its valuation by determining the future volatility of the shares.

Another issue addressed in their paper is that market concentration in cyclical sectors has led to a lack of diversification and thereby increasing market volatility. Lack of diversification within an individual portfolio will lead to higher risk levels; on a market-wide scale, this could lead to increased movements due to investor noise as Froot and Dabora suggested. Miao and Peng (2007) support this argument by examining the difference of the market capitalization of the top ten stocks in the Shanghai Composite

Index compared to the S&P 500 Index: 45.8% and 19.2%, respectively. (Miao and Peng 2007, p. 8) The high stock concentration of the Shanghai Composite Index of the top ten stocks indicates that the Shanghai market is susceptible to higher volatility due to lack of diversification.

Arquette, Brown, and Burdekin (2008) broaden the scope of their study to examine the relationship of the discount rates for Hong Kong H-shares and US ADRs relative to their corresponding Shanghai A-shares. The study uses the expected change in exchange rates, market sentiment, company sentiment, and market capitalization and dividends in local currency as the variables in their model. The results of the regression of these models are intriguing. The authors found that close to 40% of the total variation in both the ADR and H-share discount can be attributed to the expected change in exchange rates. However, the addition of the market sentiment variable leads to a drop in the exchange rate expectations coefficient. The US Dollar to Renminbi (USD/RMB) exchange rate would have a significantly smaller effect on the Hong Kong H-share discount rate because neither investment vehicle is denominated in US dollars. Arquette, Brown, and Burdekin (2008) calculated this variable as the expected change in exchange rates expressed by the 12-month RMB non-deliverable forward contract rates. Market segmentation separates the US market and the Chinese market, so local investor sentiment should not transfer from one market to the other.

The company sentiment variable is economically and statistically significant for both the ADRs and H-shares models. The variable is representative of local investing sentiment towards a certain firm. It comes into play when investors in Shanghai, due to

higher local company sentiment, are willing to pay more for a particular firm's predicted earnings; if foreign investors do not act accordingly, the ADR discount will rise. The models include market capitalization, dividends, and company fixed effects, but there is no significant effect from the addition of these variables on the discount rates.

Burdekin and Redfern (2008) focus on the relationship between investor sentiment and savings deposits in China. To explore the effect of both market and investor sentiment on savings rates, they study the cause of different discount rates on ADRs, Hong Kong H-shares, and China A and B-shares. The model used is an extension of Arquette, Brown, and Burdekin's (2008) model as market sentiment, company sentiment, market capitalization, and the expected change in exchange rates are supplemented by the turnover ratio for each security and the growth rates of the Hang Seng Index (HSI), the S&P 500 index, and the Shanghai A and B indices (SHASHR and SHBSHR). The turnover ratio and the growth rates for the HSI and SHASHR indices were all significant at a 99% confidence level, indicating that both liquidity and market movements partially explain the discount rates of Hong Kong H-shares relative to China A-shares.

Burdekin and Redfern (2008) demonstrate that investor sentiment plays a critical role in the movement of savings rates, as higher investor sentiment will lead to lower savings deposit growth rates. An increase in investor sentiment in China would lead to both lower savings rates and a higher Hong Kong H-share discount rate. The study uses an investor sentiment survey from the People's Bank of China and the log of the relative P/E ratios to represent investor sentiment. (The People's Bank of China investor

sentiment survey was not included in this study as the survey is done quarterly and the limited number of observations do not fit with the weekly observations used for the other variables.)

Burdekin and Yang (2011) use a simplified model based on the paper by Arquette et al. consisting of a lagged discount variable, investor and market sentiment, the exchange rate change, and the average discount of other firms included in the sample. The study examines the share price disparity for China's state-owned commercial banks in China and in Hong Kong. As state-owned commercial banks make up 28.43% of the Shanghai A-Share market, they are important drivers of market sentiment for dual-listed companies. (Burdekin and Yang 2011, p. 20) The listings of the older, more established banks could also provide insight into the future performance and movements of Hong Kong H-shares and China A-shares for the Agricultural Bank of China, listed in both markets in July 2010. Their paper indicates that the H-shares of all the banks traded at a discount relative to the China A-shares, but the magnitude of the discount rate differed from one bank to the next. Burdekin and Yang (2011) note that investors are more willing to invest in state-owned commercial banks because they have government backing that provides a political and economic safeguard against poor performance.

In addition to the aforementioned contributors to price disparities between the China A-shares and Hong Kong H-shares, Li, Yan, and Greco (2006) test two separate hypotheses to determine the relationship of the two types of shares. The first hypothesis addresses the price discount of Hong Kong H-shares relative to China A-shares coupled with the exchange rate factor. The second hypothesis contends that the variation of the

price premiums between the two shares is an indication of the difference in the rates of return required by investors. This hypothesis is a variation of the investor sentiment hypotheses from previous studies. To test their hypothesis, Li, Yan, and Greco (2006) use multiple regressions of 13 firms dual-listed in both stock markets. They include the Hang Seng Price Index (HSI) and the Shanghai Composite Index (SHI) to account for market movements. The authors identify that the firm-specific price discounts of the dual-listed H-shares relative to their A-share counterparts correspond to the differences in the movements between the contemporaneous HSI and SHI. Included in the regression is both the spread between Hong Kong and mainland interest rates as well as the difference in the exchange rates between the two countries. These numbers are found by: 1) subtracting the Chinese monthly savings deposit rate from the Hong Kong rate, and 2) taking the time period's (weekly) exchange rate of Hong Kong Dollar to Renminbi (HKD/RMB) over the previous time period's rate and subtracting by one.

Li, Yan, and Greco (2006) conclude that the main cause of the price premiums on China A-shares compared to Hong Kong H-shares is the systematic risk premiums in the local markets. It is worth noting that the time period in their study occurred during the Asian financial crisis in 1997 and, though intriguing, it does not fully explain the continued price disparity. The limited time period suggests that there are additional factors that may be statistically significant in the explanation of the variations. Incorporating the authors' variables of the index premiums (HSI and SHI) and exchange rate spread into a new model will provide a better explanation for the existing price disparities that can be applied to a range of time periods, not just during periods of financial distress.

In summary, these studies use an array of different variables and econometric models to determine the reasons behind the price disparity of dual-listed Shanghai A-shares and Hong Kong H-shares. Information asymmetry, lack of diversification, macroeconomic movements, investor sentiment, and arbitrage are a few of the factors examined in the models above. Despite the numerous studies, there is no statistically perfect model. Each study approaches the relationship from a different perspective and selecting a model that combines the most statistically significant variables from previous studies will ideally result in a model that can explain the majority of variation in the discount rates.

III. Data Methodology and Description

All the data used in the study was collected from Bloomberg. The sample number of firms being used to test the hypotheses is limited due to the relative immaturity of the dual-listed company structure in these markets compared to other capital markets (e.g., Europe and Australia). The longest dual-listed firm, Tsingtao Brewery Co. Ltd., adopted the structure in July of 1993. There are currently 42 companies listed in the Hang Sang China Enterprises Index (HSCEI), an index of the top Chinese companies listed as H-shares in the Hong Kong Stock Exchange. Of these companies, 28 firms are dual-listed in both the Hong Kong and Shanghai exchanges. Further examination of sample firms leads to a list of 19 firms, as several have not been listed long enough to have a statistically significant pattern and the movements of the discount rates may result from the short listing period. Companies listed on more than two exchanges were also

excluded from the study. The third exchange could affect the movements of the Shanghai A-shares and the Hong Kong H-shares and would be unaccounted for by the regression. However, only seven out of these 19 firms had positive earnings through the study. As the sentiment variables are highly related to price-earnings ratios, the firms used were required to have positive earnings throughout the time period. Refer to Table 1 for a list of the seven firms included in the paper.

The time period studied spans from August 3, 2007 to November 7, 2011. Weekly observations were collected for share prices, P/E ratios, and P/B ratios for each firm. The data for the HKD/USD exchange rate, USD/RMB exchange rate, the Hang Seng Index, the Hang Seng China Enterprises Index, the Shanghai Composite Index, and the Shanghai A-Share Index were obtained from Bloomberg. Weekly observations were used, as opposed to monthly or daily, to capture full market movements that might not be apparent in monthly data or might fluctuate too much from one day to the next.

The calculation of the firms' discount rates is consistent with past studies:

H-Share Discount = [(Market Price of H-Share in HKD – (Market Price of A-share RMB/(RMB/HKD exchange rate)]/Market Price of H-Share in HKD

The first independent variable is the weekly change in the USD/RMB exchange rate to examine if this expected change effects the discount rates of H-shares relative to A-shares. Past studies which included ADRs found that the expected change in exchange rates proved to have a significant effect on the discount rate; this factor will therefore be included in this model. Burdekin and Redfern suggest that the inclusion of the variable explains the movement of the discount rate resulting from currency movements. In this

model, the current change in the exchange rate is used instead of the expected changes in the exchange rates as past studies conclude that there would be no change in the results.

The next two variables represent market and investor sentiment. Similar to past studies, the inclusion of investor sentiment should provide a significant explanation of the discount rates because the price differential can initially be attributed to the lack of information available to investors. On the assumption that investor and market sentiment can be accurately reflected by the comparison of firm and market price-earnings ratios, the variables provide a numerical value that can effectively describe the relationship between sentiment and the discount rates of Hong Kong H-shares relative to China A-shares. Burdekin and Redfern use a quarterly investor sentiment series created by the People's Bank of China to measure investor sentiment. Its efficacy is limited, however, as the series is only available on a quarterly basis. Using this measure could potentially include too many business cycles, causing the movements and discount rates to become less significant due to the spacing of the observations. It also cannot be used in this model because weekly observations are used instead of quarterly or monthly.

Arquette, Brown, and Burdekin (2008) use relative price-earnings ratios for the Shanghai A-share Total Stock Index and the Hang Seng (Hong Kong) China Enterprises Index as a proxy for investor sentiment. The use of these ratios as proxies is valid as a higher ratio in the Shanghai market relative to the Hong Kong market would result in the A-share trading at a premium relative to its corresponding H-share. The comparison of the market variables would therefore be an effective representation of market sentiment. P/E ratios are used by some economists as an investor sentiment indicator as it is a rough

estimation of how much investors are willing to pay per dollar (unit of currency) of earnings. Company sentiment can also be extrapolated from this relationship as a firm specific P/E ratio; compared to the market's relative P/E ratio, it would indicate local sentiment towards a particular security. For these variables to be accurate reflections of the relationship of Shanghai A-shares to Hong Kong H-shares, a similar set of firms must be used, resulting in the final list selected from the Hang Seng China Enterprises Index. See Table 1 for the list of firms used in the study.

The weekly growth rates of both the Hang Seng Index and the Shanghai Composite Index were included to demonstrate the effect of market movements on a specific security. Higher growth rates in one index than in the other indicate an increased willingness to invest in that market. Higher growth rates in the Hang Seng Index should signal a decrease in the H-share discount rate and increased growth rates in the Shanghai Composite Index should have a corresponding increase in the price differential between H-shares and A-shares. According to Li, Yan, and Greco's (2006) study, a significant percentage of the variation of the discounts attached to Chinese securities trading as H-shares in Hong Kong can be attributed to market (systematic) risk. Shanghai A-shares are affected only by the market risk premiums associated with mainland China, while H-shares are affected by the risk premiums of both markets. Incorporating the growth rates of the Hang Seng Index and the Shanghai Composite Index would demonstrate whether the securities' discount rates are affected by market movements.

Building on the concept of market sentiment and the effect of the growth in the individual markets on the price of the securities, the price-book ratio was included in the

study as a new variable to examine if either country consistently overvalues or undervalues firms. Li, Yan, and Greco (2006) indicate that a significant percentage of the variation of the discounts attached to Chinese securities trading as H-shares in Hong Kong can be attributed to market (systematic) risk. A market risk premium could lead to a general under or overvaluation of a security. The P/B ratio is frequently used as a rough estimate in the valuation of a company. A lower P/B ratio typically signals that a firm is undervalued relative to its share price, indicating a lack of investor confidence in the firm's future. The investor sentiment variable is a replication of past studies (See Arquette, Brown, and Burdekin, 2008, Burdekin and Redfern, 2008, and Burdekin and Yang, 2011), but the inclusion of P/B ratios is a new addition to the regression models.

Price-book ratios are frequently used by analysts as part of a company's valuation. The ratio itself is an imperfect estimation as the book value of a company can be manipulated, but the continued usage of the ratio is illustrative of its importance and value to investors. The market P/B and country specific P/B ratios are included to examine whether there is a relationship between the ratio and the Hong Kong H-share discount rate relative to China A-shares. Theoretically, the variables could be construed as crude proxies for investor confidence, but there is little to no past literature to support this theory.

During the study's time period, the H-Share discount rate for all the firms in the HSCEI Index was -18.65%. The highest premium found was 95.83% and the largest discount was -72.14% with a median discount rate of -26.12%. For the seven firms that were used in the study, the median discount rate was -18.75% with a mean of -18.42%.

The range in the sample firms was considerably smaller, ranging from a premium of 35.2% to a discount of -72.14%. There has been some convergence in terms of prices as there was a relatively steady movement towards the elimination of the discount rates from 2007 to 2010, but after 2010, the discount rates grew steadily to their current level of around -12.42%. The price divergence could be explained by the reluctance of foreign investors to take positions in H-shares as international market volatility has remained high in the aftermath of the global recession. Table 2 provides the summary statistics on the discount rates and variables.

The regression model for the Hong Kong H-Share discount rate relative to China A-shares is:

$$H\_Share\_discount_{it} = \alpha_0 + \beta_1\ Lagged\_Discount_t + \beta_1\ Exchange\_Rate\_Change_t +$$
$$\beta_2\ Growth\_of\_Hang\_Seng\_Index_t + \beta_3\ Growth\_of\_Shanghai\_Composite\_Index_t +$$
$$\beta_4\ Market\_Sentiment_{it} + \beta_5\ Company\_Sentiment\_HK_t + \beta_6\ Company\_Sentiment\_SH_t$$
$$+ \beta_7\ Market\_Price/Book\_Ratio + \beta_8\ HK\_Price/Book\_Ratio +$$
$$\beta_9\ SH\_Price/Book\_Ratio + \beta_{10}\ Time\_Trend_t + \varepsilon_t$$

The lagged discount rate is the lagged discount rate for the individual firm. The exchange rate change is the weekly exchange rate change over the time period. The growth rates of the Hang Seng Index and the Shanghai Composite Index were calculated by dividing the weekly price of the index over the previous week's price and subtracting one. The market sentiment variable is the Shanghai Stock Exchange A-Share Index P/E ratio over the Hang Seng China Enterprises Index P/E. The investor sentiment for Hong Kong is the firm's Hong Kong P/E divided by the Hang Seng China Enterprise Index P/E. The investor sentiment for Shanghai is calculated by the firm's Shanghai P/E over

the A-Share Index P/E. The market P/B ratio is the A-Share Index P/B over the HSCEI
P/B ratio. The Hong Kong P/B ratio is the firm's Hong Kong P/B over the HSCEI P/B.
The Shanghai P/B ratio is the firm's Shanghai P/B over the A-Share Index P/B. The time
trend is a cumulative time variable.

IV. Results and Empirical Analysis

H-Share Discount Rate:

There are higher levels of correlation between each firm's discount rates as is
evidenced in Table 3. Each correlation coefficient is positive and significant at the 99%
confidence level. The correlations are the greatest between firms with the same industry
classification.   The correlation coefficient between the Bank of China, China Life
Insurance, and China Merchant's Bank are all greater than 0.8355 signaling that the
discount rates of firms in similar sectors tend to move in corresponding cycles. The three
financial firms' discount rates vary greatly as both China Life Insurance and China
Merchant's Bank have positive mean discount rates (2.05% and 1.24%, respectively)
while the Bank of China has an average discount rate of -18.67%. The correlation matrix
also demonstrates that the change in the exchange rate is not significant for any of the
discount rates. The market sentiment variable correlation coefficient is negative for all
the firms, but only significant for China Shipping Development at the 99% confidence
level.

The regression results can be found in Table 4. The lagged discount rate is positive and statistically significant at the 99% level for all firms. The exchange rate change is only significant for China Merchant's Bank at the 90% confidence level, suggesting that there are no effects of the inclusion of this variable in the model. This finding is contrary to what previous studies (Arquette, Brown, and Burdekin, 2008, and Burdekin and Redfern, 2008) found as their models indicated that the expected change in exchange rates was significant at the 99% confidence level. Arquette, Brown, and Burdekin (2008) initially found that that the expected change in exchange rates explain more than 40% of the total variation in the H-Share discount rate. When they added the market sentiment variable, the coefficient was greatly decreased. The study cites the linkage between the markets as the cause for this drop. As international markets have continued to converge, the changes in exchange rates would become even less significant, supporting the findings from the regression. Not only would overall international market convergence explain the lowered significance of the variable, but the increasing interconnectivity between China's and Hong Kong's economy would lead to the RMB/USD exchange rate playing a smaller role in the H-Share discount rate.

The Hang Seng Index growth rate and Shanghai Composite Index growth rates remain insignificant for all the firms except China Life Insurance. For this company, both growth rates are significant at the 90% confidence level. This result is contradictory to traditional finance theory as one would expect increased market growth in Hong Kong to cause a decrease of the discount rates of H-shares relative to A-shares. On the other hand, an increase in Shanghai market growth should lead to discount rates getting larger. The Shanghai growth rate should therefore have a consistently negative coefficient for all

the firms and the Hang Seng growth rate should be positive, and on average the coefficients follow the expected trend. However, the sign for the coefficients for each firm differs, which is unexpected. A possible explanation for this unanticipated lack of significance and sign change is the increased confidence in the performance of these companies. If investors viewed the securities individually and only used dual-listed securities as comparables, the significance of the growth rates of the markets would be diminished as they would provide no insight into the specific nature and movements of Hong Kong H-shares and China A-shares.

The findings concerning the sentiment variables are similar to past studies. The market sentiment variable is negative for all the firms and is significant at the 99% confidence level for all the firms, except China Petroleum and Chemical Corporation. The negative coefficients signal that the discount rates grow as the Shanghai/Hong Kong P/E increases. The significance of the variable demonstrates that market sentiment not only is a critical component in the explanation of Hong Kong H-Share discount rates, but that the quantification of market sentiment using the quotient of the Shanghai's market P/E relative to Hong Kong's market P/E is an effective proxy for investor sentiment.

The firm's Hong Kong investor sentiment variable is measured as the first difference of the firm's Hong Kong P/E ratio over the Hang Seng China Enterprises Index P/E. The coefficient for the variable is negative and is significant at the 99% confidence level for three of the firms and at the 95% confidence level for two other firms. It is interesting to note that the coefficient is negative as one would expect that an increase in the Hong Kong P/E ratio would lead to a smaller discount rate. However, the

negative sign implies that an increase in the firm's Hong Kong relative P/E would in fact increase the discount rate. The firm's Shanghai investor sentiment variable is positive and significant at the 99% confidence variable for five of the firms. Similar to the Hong Kong sentiment variable, this finding differs from past studies that found the firm's Shanghai relative P/E ratio to have negative coefficients. The positive sign for the Shanghai investor sentiment signals that the H-Share discount rate decreases when Shanghai investors bid the firm's price above the market P/E.

The market P/B ratio is negative for all but one of the firms and is significant at the 95% confidence level for the Bank of China and at the 99% confidence level for China Merchant's Bank. It is interesting to note that the variable is significant for the two banks included in the sample. The relative insignificance of the variable as a whole implies that the market P/B ratio does not signal any substantial movement in the Hong Kong H-Share discount rate.

The firms' P/B ratios are a modification on past regression models. The firm's Hong Kong P/B ratio is significant at the 99% confidence level for five of the firms. The signs for the coefficients are not consistent across the firms as three are negative and four are positive. The Shanghai P/B ratio coefficient is significant at the 99% confidence level for six of the firms and the signs are opposite to that of the Hong Kong P/B coefficients. The positive coefficients signal that an increase in the firm's relative P/B ratio will lead to a corresponding decrease in the H-Share discount rate and the negative coefficients signal an increase in the H-Share discount rate when the P/B ratio increases. Generally an increase in a firm's P/B ratio indicates that a firm's return on equity should

be increasing as well. The inconsistency in signs could be a result of investor confidence in the individual firms as investors frequently use P/B ratios as a sign that a firm is under or overvalued.

There were several patterns that could be extrapolated from the original regression model which are useful for investors looking to take positions in Chinese dual-listed companies. The first two trends are based on the firm's investor sentiment variables. Essentially, an increase in the firm's China investor sentiment will lead to a decrease in the H-share discount rate and an increase in the firm's Hong Kong investor sentiment leads to an increase in the discount rate. Investors can use market forecasts to estimate the firms' future P/E ratios, thereby allowing them to adjust their investment strategies based on the expected price movements of each share. The price to book ratios offer a less consistent pattern as the P/B ratio for each firm only offers an estimate of the valuation of a firm relative to other firms within its sector. However, it can be noted that generally an increase in the firm's China P/B ratio increases the H-share discount rate and an increase in the firm's Hong Kong P/B ratio decreases the H-share discount rate. Investors can disregard the changes in exchange rates and the growth rates of the market indices because these variables had little significant effect on the discount rates.

A second control regression was included in the paper to examine whether the inclusion of the P/B ratios changed the overall fit of the regression model. The variables included in this regression were the lagged discount rates, growth rates of the two indices, the weekly change in exchange rates, the sentiment variables, and the time trend. The adjusted R-squared from the regression model without the P/B ratios were on average

0.0034 smaller. The minute change in the R-squared suggests that the P/B ratio does not play a critical role in the explanation of the discount rates of Hong Kong H-shares to China A-shares. Therefore, the quantification of investor confidence using P/B ratios is ineffective. A possible explanation for the lack of significance could be the book values of the firms in the sample are manipulated through share buybacks or changing cash reserves making the ratio an inaccurate representation of the firm. If return on equity was included for each firm, the variable might have been more significant due to the positive correlating relationship that return on equity is generally thought to have with the price to book ratio. Table 5 provides the results of the new regression model excluding the P/B ratios.

Sector-by-Sector Comparison:

Based on the high correlation coefficient between the financial firms, there should be high levels of correlation between firms in the same sector. Hong Kong H-shares of a particular sector may trade at a larger discount rate than other sectors. Table 6 provides the list of firms included in the correlation matrix, their summary statistics, and corresponding sector classifications. Table 7 shows the correlation matrix for the discount rates for a larger sample of firms from the HSCEI Index.

All discount rates are correlated at the 99% confidence level, but the variation in the correlation coefficients between the firms is wide. Financial firms have the highest correlation coefficients. These firms also trade on average at a relatively small discount rate of -8.37% indicating that government involvement does in fact attract international investors and thereby decreases the discount rate. As Burdekin and Yang (2011)

concluded, foreign investors are more willing to invest in state-owned banks as they believe that the possibility of government intervention will provide the investment with greater investor protection. Firms in the consumer goods sector have high levels of correlation between each other, but the discount rates differ hugely as Tsingtao Brewery H-shares trade at a -14.73% discount rate while Dongfeng Motor Group H-shares trade at a 43.79% premium.

The values of the correlation coefficients between sectors differ as well. There is a high level of correlation between firms in the consumer goods sector and among financial firms. Firms in the energy sector have the lowest correlation coefficients among the firms and generally have low correlation levels relative to the correlation levels of other sectors. It appears that firms in the services, utilities, energy, and materials sectors trade at the largest discount rates. These sectors are capital intensive and are often subject to stringent government regulation.

Investors can identify sectors that move together due to high correlation coefficients. The positive value of all the correlation coefficients indicates that as one discount rate increases or decreases, the other discount rates will follow the same pattern. Financial firms and certain sectors may have more transparency due to their market position or the degree of government involvement with the firm. If investors are more experienced with certain sectors, they will be able to use the correlation coefficient to estimate the magnitude of an increase or decrease in the discount rate.

V. Conclusion

As international markets continue to converge, the price differentials between Hong Kong H-shares and China A-shares should theoretically decrease. However, the persistence of H-share discount rates relative to the A-shares indicates that the increased linkage, both politically and financially, between the Hong Kong and Chinese economies are not causing the expected price convergence.

Investor sentiment towards a firm in Hong Kong and China played a significant role in the continued price disparity between the two shares. Higher investor sentiment towards a firm in China leads to a corresponding decrease in the discount rates whereas an increase in the Hong Kong firm's investor sentiment leads to an increase in the discount rate. This differed from past studies which found higher Chinese investor sentiment toward a firm typically leads to an increase in the discount rate. However, the change from positive to negative coefficients for each variable could result from foreign investors investing based on Chinese investor patterns. Information asymmetry coupled with the mimicking strategy of foreign investors would result in arbitrage opportunities within the market.

The Chinese government has indicated that it intends to eventually allow foreign investors greater access to their stock exchanges as well as to allow Chinese investors greater access to the Hong Kong stock exchange. The contradictory pattern in investor sentiment could be a result of investors taking into account this eventual access to take advantage of this theoretical arbitrage opportunity.

The H-share discount rates of dual-listed firms are all positively correlated and are significant at the 99% confidence level. The differing degrees of correlation indicate that some sectors move closely, while others are more loosely correlated. Sectors that have high correlation coefficients between each other can benefit investors who can extrapolate the movements of one sector into a prediction of another sector. These predictions can then be used to identify investment opportunities in firms within the correlated sectors.

The persistence of the Hong Kong H-share discount rates relative to the China A-shares suggests that there is a difference in perception of the value of the shares. Historical patterns demonstrate that the prices between H-shares and A-shares have shown some patterns of convergence. Despite continued international market convergence, however, Hong Kong H-share discount rates will continue until there is symmetry between Chinese and foreign investors. Market opportunities thus exist for investors identifying sector and sentiment patterns.

References

Arquette, Gregory C., William O. Brown Jr., and Richard C.K. Burdekin, 2008, US ADR and Hong Kong H-share discounts of Shanghai-listed firms, *Journal of Banking & Finance* 32, 1916-1927.

Bailey Warren, 1994, Risk and return on China's new stock markets: Some preliminary evidence, *Pacific-Basin Finance Journal* 2, 243-260.

Burdekin, Richard C.K., and Yang (Amanda) Yang, 2011, Cross-Market Trading in China's Large State-Owned Commercial Banks, 2006-2011, Unpublished Working paper, Claremont McKenna College.

Chan, Michael Mau-Hung, 2011, The Causal Relationship between Dual-Listed A-shares and H-shares in China: An Error Correction Model, *Journal of Applied Economics and Business Research* 1, 53-63.

Fong, Tom, Alfred Wong, and Ivy Yong, 2007, Share Price Disparity in Chinese Stock Markets, Working paper, Hong Kong Monetary Authority.

Froot, Kenneth and Emil Dabora, 1998, How are stock prices affected by the location of trade?, Working paper, National Bureau of Economic Research.

Fung, Hung-Gay, and Kevin H. Zhang, 2002, *Financial Markets and Foreign Direct Investment in Greater China*, (M.E. Sharpe, Inc., Armonk, NY).

Li, Yuming, Daying Yan, and Joe Greco, 2006, Market segmentation and price differentials between A shares and H shares in the Chinese stock markets, *Journal of Multinational Financial Management* 16, 232-248.

Miao, Hui, and Wensheng Peng, 2007, Why A-share market volatility is high?, *Chinese Economic Issues* 4/07, 1-13.

Peng, Wensheng, Hui Miao, and Nathan Chow, 2007, Price convergence between dual-listed A and H shares, *Chinese Economic Issues* 6/07, 1-14.

Poon, Winnie P.H. and Hung-Gay Fung, 2000, Red chips or H shares: which China-backed securities process information the fastest?, *Journal of Multinational Financial Management* 10, 315-343.

Redfern, Luke, 2008, Stock Market Sentiment in China: The Impact on Time Deposits and Share Prices, unpublished senior thesis, Claremont McKenna College.

Wang, Steven Shuye, and Li Jiang, 2004, Location of trade, ownership restrictions, and market illiquidity: Examining Chinese A- and H-shares, *Journal of Banking & Finance* 28, 1273-1297.

Table 1: Firms Included in Sample

SSE Symbol (A-Share)	SEHK Symbol (H-Share)	Listing Name	Company Name	SEHK Initial Listing Date	SSE Initial Listing Date	Industry Classification
600585	914.HK	Anhui Conch	Anhui Conch Cement Co	October 21, 1997	February 7, 2002	Properties & Construction
601988	3988.HK	Bank of China	Bank of China Ltd.	June 1, 2006	July 5, 2006	Financials
601628	2628.HK	China Life	China Life Insurance	December 18, 2003	January 9, 2007	Financials
600026	1138.HK	China Ship Dev	China Shipping Development	November 11, 1994	May 23, 2002	Services
600036	3968.HK	CM Bank	China Merchants Bank	September 22, 2006	April 9, 2002	Financials
600362	0358.HK	Jiangxi Copper	Jiangxi Copper Company	June 12, 1997	January 11, 2002	Materials
600028	0386.HK	Sinopec Corp	China Petroleum & Chemical Corporation	October 19, 2000	August 8, 2001	Energy

Table 2: Summary Statistics for the Firm H-Share Discount Rates and Variables

	Observations	Mean	Standard Dev.	Minimum	Maximum
Average H-Share Discount	218	-18.42%	12.73%	-45.69%	3.78%
Discount Rates					
Anhui Conch Cement Co.	218	5.63%	13.07%	-29.83%	34.22%
Bank of China Ltd.	218	-18.67%	18.25%	-52.16%	19.45%
China Life Insurance	218	2.05%	18.36%	-43.31%	30.38%
China Shipping Development	218	-24.05%	15.12%	-50.58%	9.91%
China Merchant's Bank	218	1.24%	19.03%	-34.46%	35.20%
Jiangxi Copper Company	218	-54.48%	9.40%	-72.14%	-33.20%
China Petroleum & Chemical Corporation	218	-40.63%	13.63%	-63.15%	-10.33%
Market Sentiment (Shanghai/Hong Kong P/E Ratio)	218	0.02%	5.08%	-17.47%	19.62%
Exchange Rate Change (RMB/USD)	218	0.08%	0.22%	-0.53%	0.83%
Hang Seng Index Growth Rate	218	0.29%	4.28%	-20.80%	12.43%
Shanghai Composite Index Growth Rate	218	-0.16%	4.24%	-13.84%	14.96%
Market P/B Ratio (Shanghai Index/Hong Kong Index P/B)	218	0.0008	0.0748	-0.2191	0.3170
Price/Earnings Ratios					
Anhui Conch Cement Hong Kong P/E	218	-0.1096	1.1296	-3.8462	5.3327
Anhui Conch Cement Shanghai P/E	218	-0.0629	0.7024	-2.6747	3.6223
Bank of China Ltd. Hong Kong P/E	218	0.0009	0.0293	-0.1208	0.1622
Bank of China Ltd. Shanghai P/E	218	0.0001	0.0212	-0.0952	0.1088
China Life Insurance Hong Kong P/E	218	-0.0096	0.1169	-1.3570	0.2251
China Life Insurance Shanghai P/E	218	-0.0062	0.0908	-1.1174	0.1616
China Shipping Development Hong Kong P/E	218	-0.0030	0.1200	-1.3681	0.3730
China Shipping Development Shanghai P/E	218	-0.0033	0.0815	-0.9449	0.2183
China Merchant's Bank Hong Kong P/E	218	-0.0047	0.1538	-2.0174	0.4650
China Merchant's Bank Shanghai P/E	218	-0.0029	0.0933	-1.1399	0.4150
Jiangxi Copper Company Hong Kong P/E	218	-0.0050	0.0499	-0.4777	0.1762
Jiangxi Copper Company Shanghai P/E	218	-0.0061	0.0719	-0.5406	0.1447
China Petroleum & Chemical Corporation Hong Kong P/E	218	-0.0042	0.0445	-0.5229	0.1305
China Petroleum & Chemical Corporation Shanghai P/E	218	-0.0032	0.0452	-0.4921	0.1316
Price/Book Ratios					
Anhui Conch Cement Hong Kong P/B	218	0.0325	0.3374	-1.7035	1.0862
Anhui Conch Cement Shanghai P/B	218	0.0210	0.2294	-1.1849	0.6981
Bank of China Ltd. Hong Kong P/B	218	-0.0327	0.3374	-1.0862	1.7035
Bank of China Ltd. Shanghai P/B	218	0.0002	0.0275	-0.0979	0.1231
China Life Insurance Hong Kong P/B	218	0.0063	0.1240	-0.3042	1.5642
China Life Insurance Shanghai P/B	218	-0.0035	0.0982	-1.1234	0.3116
China Shipping Development Hong Kong P/B	218	0.0101	0.1414	-0.3312	1.3198
China Shipping Development Shanghai P/B	218	-0.0028	0.1070	-1.0791	0.3100
China Merchant's Bank Hong Kong P/B	218	0.0085	0.0953	-0.1755	1.0803
China Merchant's Bank Shanghai P/B	218	-0.0018	0.0924	-0.9666	0.3163
Jiangxi Copper Company Hong Kong P/B	218	-0.0018	0.1655	-0.4577	1.6541
Jiangxi Copper Company Shanghai P/B	218	-0.0198	0.2515	-1.5970	0.5205
China Petroleum & Chemical Corporation Hong Kong P/B	218	0.0095	0.1673	-0.1017	2.4196
China Petroleum & Chemical Corporation Shanghai P/B	218	-0.0019	0.0499	-0.3251	0.2002

*All data points are weekly observations collected from August 3, 2007 to November 7, 2011.

Table 3: Correlation Matrix for Firm Discount Rates and Market Variables

	Anhui Conch Discount	Bank of China Discount	China Life Discount	China Ship Dev Discount	CM Bank Discount	Jiangxi Copper Discount	Sinopec Corp Discount	Exchange Rate	Market P/E
Anhui Conch Discount	1								
Bank of China Discount	0.4813*** (0.0000)	1							
China Life Discount	0.6864*** (0.0000)	0.8355*** (0.0000)	1						
China Ship Dev Discount	0.5808*** (0.0000)	0.5542*** (0.0000)	0.6163*** (0.0000)	1					
CM Bank Discount	0.5871*** (0.0000)	0.9213*** (0.0000)	0.8652*** (0.0000)	0.6322*** (0.0000)	1				
Jiangxi Copper Discount	0.5309*** (0.0000)	0.6293*** (0.0000)	0.5385*** (0.0000)	0.5329*** (0.0000)	0.6550*** (0.0000)	1			
Sinopec Corp Discount	0.4684*** (0.0000)	0.6300*** (0.0000)	0.5484*** (0.0000)	0.2991*** (0.0000)	0.6753*** (0.0000)	0.7426*** (0.0000)	1		
Exchange Rate	-0.0601 (0.3776)	-0.0738 (0.2779)	-0.1638** (0.0155)	-0.0522 (0.4428)	-0.0602 (0.3763)	0.0656 (0.3350)	0.0137 (0.8404)	1	
Market P/E	-0.1115 (0.1008)	-0.0828 (0.2235)	-0.0885 (0.1929)	-0.1940*** (0.0040)	-0.0902 (0.1847)	-0.1168* (0.0852)	-0.0588 (0.3878)	-0.1681** (0.0129)	1

P-values (probability that the correlation is significant from 0) are in parentheses, and ***, **, and * denote significance at the 99%, 95%, and 90% confidence levels, respectively.

Table 4: OLS Regression Results for the Firm's H-Share Discounts Including the Price/Book Ratios

Dependent Variable

	Anhui Conch	Bank of China	China Life	China Ship Dev	CM Bank	Jiangxi Copper	Sinopec Corp
Lagged Own Discount	0.9843***	0.9999***	0.9941***	0.9918***	0.9788***	0.9858***	0.9567***
	(0.0153)	(0.0058)	(0.0080)	(0.0075)	(0.0134)	(0.0085)	(0.0281)
Exchange Rate Change	-0.7906	0.4637	-0.6786	-0.2574	-1.4046*	0.6439**	-0.8116
	(0.8070)	(0.3164)	(0.4220)	(0.5207)	(0.7420)	(0.3259)	(1.1799)
HSI Growth Rate	-0.0023	0.0124	0.934*	-0.0189	0.0566	-0.0505	-0.2092
	(0.1079)	(0.0436)	(0.0558)	(0.0715)	(0.0986)	(0.0441)	(0.1588)
Shanghai Composite Growth	-0.0554	0.0394	-0.0777*	-0.0219	-0.0714	0.0110	-0.3762
	(0.0778)	(0.0318)	(0.0407)	(0.0532)	(0.0708)	(0.0325)	(0.1173)
Market P/E	-0.9566***	-0.5164***	-0.8577***	-0.7186***	-0.7631***	-0.4543***	-0.1743
	(0.0844)	(0.0494)	(0.0456)	(0.0551)	(0.0764)	(0.0335)	(0.1256)
Firm's Hong Kong P/E	-0.0183**	-0.8099***	-0.7499***	-0.1600	-0.2111***	-0.2247**	-0.4486
	(0.0085)	(0.0494)	(0.0418)	(0.1021)	(0.0437)	(0.0896)	(0.4245)
Firm's Shanghai P/E	0.0379***	1.0490***	1.0846***	0.3808***	0.0794	0.2611***	0.2336
	(0.0125)	(0.0425)	(0.0631)	(0.1109)	(0.0618)	(0.0527)	(0.3271)
Market P/B	-0.0132	-0.0176587**	-0.0054	0.0056	-0.0550***	-0.0027	0.0091
	(0.0223)	(0.0088)	(0.0115)	(0.0145)	(0.0206)	(0.0090)	(0.0323)
Firm's Hong Kong P/B	0.1342***	0.0001	0.2336****	-0.3256***	-0.5826***	-0.1234***	0.2841
	(0.0276)	(0.0020)	(0.0409)	(0.0698)	(0.0426)	(0.0274)	(0.3163)
Firm's Shanghai P/B	-0.1631***	-0.3823***	-0.2567***	0.2237***	0.3979***	0.0438***	0.3015
	(0.0373)	(0.0680)	(0.0453)	(0.0688)	(0.0465)	(0.0139)	(0.2085)
Time	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)
Constant	0.0006	0.0015	0.0020	-0.0012	-0.0047	-0.0099	-0.0254
	(0.0035)	(0.0029)	(0.0025)	(0.0032)	(0.0047)	(0.0052)	(0.0174)
Adjusted R-squared	0.9669	0.9973	0.9953	0.9893	0.9863	0.9896	0.9346

Robust standard errors are in parantheses, and ***, **, and * denote signficance at the 99%, 95%, and 90% confidence levels, respectively.

Table 5: OLS Regression Results for the Firm's H-Share Discount Rates Without the Price/Book Variables

	Anhui Conch	Bank of China	China Life	China Ship Dev	CM Bank	Jiangxi Copper	Sinopec Corp
				Dependent Variable			
Lagged Own Discount	0.9833***	0.9972***	0.9918***	0.9898***	0.9614***	0.9836***	0.9330***
	(0.0159)	(0.0062)	(0.0085)	(0.0079)	(0.0185)	(0.0088)	(0.0284)
Exchange Rate Change	-0.2576	0.4786	-0.9403**	-0.2143	-0.8813	0.7740**	-0.5634
	(0.8340)	(0.3394)	(0.4480)	(0.5420)	(1.0214)	(0.3358)	(1.2030)
HSI Growth Rate	-0.0954	0.0067	0.1375**	-0.0356	0.1451	-0.0591	-0.1952
	(0.1108)	(0.0466)	(0.0592)	(0.0741)	(0.1361)	(0.0451)	(0.1622)
Shanghai Composite Growth	0.0098	0.0141	-0.1159***	0.0061	-0.1137	0.0219	-0.3536***
	(0.0801)	(0.0334)	(0.0431)	(0.0553)	(0.0977)	(0.0336)	(0.1201)
Market P/E	-1.0355***	-0.7084***	-0.8186***	-0.7526***	-0.7317***	-0.4695***	-0.1685
	(0.0867)	(0.0376)	(0.0480)	(0.0570)	(0.1059)	(0.0345)	(0.1278)
Firm's Hong Kong P/E	-0.0583***	-1.0425***	0.5201***	-0.6289***	-0.2486***	-0.6136***	-0.2001*
	(0.0022)	(0.0306)	(0.0163)	(0.0188)	(0.0358)	(0.0237)	(0.1102)
Firm's Shanghai P/E	0.0912***	1.1558***	0.7510***	0.7536***	0.5241***	0.4240***	0.6182***
	(0.0034)	(0.0415)	(0.0250)	(0.0300)	(0.0490)	(0.0148)	(0.0956)
Time	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Constant	0.0018	0.0006	0.0007	-0.0002	-0.0079	-0.0108	-0.0401**
	(0.0037)	(0.0000)	(0.0027)	(0.0033)	(0.0065)	(0.0057)	(0.0175)
Adjusted R-squared	0.9634	0.9969	0.9946	0.9883	0.9736	0.9887	0.9303

Robust standard errors are in parantheses, and ***, **, and * denote signficance at the 99%, 95%, and 90% confidence levels, respectively.

Table 6: Select Firms Included in HSCEI Sector-by-Sector Correlation Matrix

HK Symbol	SSE Symbol	Listing Name	Company	Sector Classification	Mean Discount Rate	Standard Dev.	Maximum	Minimum
0489.HK	600006	Dongfeng Group	Dongfeng Motor Group	Consumer Goods	43.79%	73.68%	195.83%	-54.54%
0168.HK	600600	Tsingtao Brew	Tsingtao Brewery Co	Consumer Goods	-14.30%	15.23%	10.07%	-45.19%
0386.HK	600028	Sinopec Corp	China Petroleum & Chemical Corporation	Energy	-40.63%	13.63%	-10.33%	-63.15%
1171.HK	600188	Yanzhou Coal	Yanzhou Coal Mining Company	Energy	-36.05%	12.01%	-10.59%	-65.99%
3988.HK	601988	Bank of China	Bank of China Ltd.	Financials	-18.67%	18.25%	19.45%	-52.16%
3328.HK	601328	Bank Comm	Bank of Communications	Financials	-4.43%	18.44%	31.13%	-40.67%
2628.HK	601628	China Life	China Life Insurance	Financials	2.05%	18.36%	30.38%	-43.31%
0998.HK	601998	CITIC Bank	China Citic Bank Corporation	Financials	-28.78%	13.27%	-8.37%	-57.77%
3968.HK	600036	CM Bank	China Merchants Bank	Financials	1.24%	19.03%	35.20%	-34.46%
1398.HK	601398	ICBC	Industrial and Commercial Bank of China	Financials	-1.62%	17.13%	29.93%	-40.47%
2600.HK	601600	Chalco	Aluminum Corporation of China	Materials	-49.18%	8.38%	-30.18%	-70.46%
0358.HK	600362	Jiangxi Copper	Jiangxi Copper Company	Materials	-54.48%	9.40%	-33.20%	-72.13%
914.HK	600585	Anhui Conch	Anhui Conch Cement Co	Properties & Construction	5.63%	13.07%	34.22%	-29.83%
0753.HK	601111	Air China	Air China Limited	Services	-48.02%	11.16%	-22.31%	-70.01%
1919.HK	601919	China Cosco	China Cosco Holdings	Services	-37.21%	12.37%	-15.78%	-63.93%
1138.HK	600026	China Ship Dev	China Shipping Development	Services	-24.05%	15.12%	9.92%	-50.58%
0902.HK	600011	Huaneng Power	Huaneng Power International	Utilities	-39.35%	6.39%	-15.86%	-54.21%

Industry classification is based on the categorization by the Hong Kong stock exchange.

Sector Comparison	Mean Discount Rate	Standard Dev.	Maximum	Minimum
Consumer Goods	14.74%	41.33%	195.83%	-54.54%
Energy	-38.34%	1.15%	-10.33%	-65.99%
Financials	-8.37%	2.12%	35.20%	-57.77%
Materials	-51.83%	0.72%	-30.18%	-72.13%
Properties & Construction	5.63%	13.07%	34.22%	-29.83%
Services	-36.43%	2.03%	9.92%	-70.01%
Utilities	-39.35%	6.39%	-15.86%	-54.21%

Table 7: Correlation Matrix for Select Firms in the Hang Seng China Enterprises Index

	Air China	Anhui Conch	Bank of China	Bank Comm	Chalco	China Cosco	China Life	China Ship Dev	CITIC Bank	CM Bank	Dongfeng Group	Huaneng Power	ICBC	Jiangxi Copper	Sinopec Corp	Tsingtao Brewery	Yanzhou Coal
Air China	1																
Anhui Conch	0.6332*** (0.0000)	1															
Bank of China	0.782*** (0.0000)	0.4813*** (0.0000)	1														
Bank Comm	0.7115*** (0.0000)	0.665*** (0.0000)	0.8801*** (0.0000)	1													
Chalco	0.4454*** (0.0000)	0.4961*** (0.0000)	0.6541*** (0.0000)	0.7031*** (0.0000)	1												
China Cosco	0.3424*** (0.0000)	0.3509*** (0.0000)	0.5637*** (0.0000)	0.6098*** (0.0000)	0.7566*** (0.0000)	1											
China Life	0.7465*** (0.0000)	0.6864*** (0.0000)	0.8355*** (0.0000)	0.8532*** (0.0000)	0.6756*** (0.0000)	0.4369*** (0.0000)	1										
China Ship Dev	0.4501*** (0.0000)	0.5808*** (0.0000)	0.5542*** (0.0000)	0.7017*** (0.0000)	0.702*** (0.0000)	0.8321*** (0.0000)	0.6163*** (0.0000)	1									
CITIC Bank	0.7108*** (0.0000)	0.5811*** (0.0000)	0.8885*** (0.0000)	0.8269*** (0.0000)	0.6994*** (0.0000)	0.5563*** (0.0000)	0.833*** (0.0000)	0.5398*** (0.0000)	1								
CM Bank	0.8302*** (0.0000)	0.5871*** (0.0000)	0.9213*** (0.0000)	0.9095*** (0.0000)	0.6327*** (0.0000)	0.5547*** (0.0000)	0.8652*** (0.0000)	0.6322*** (0.0000)	0.8101*** (0.0000)	1							
Dongfeng Group	0.8349*** (0.0000)	0.4220*** (0.0000)	0.8027*** (0.0000)	0.6679*** (0.0000)	0.3395*** (0.0000)	0.2046*** (0.0024)	0.7131*** (0.0000)	0.2249*** (0.0008)	0.7376*** (0.0000)	0.8035*** (0.0000)	1						
Huaneng Power	0.4360*** (0.0000)	0.5887*** (0.0000)	0.4297*** (0.0000)	0.5723*** (0.0000)	0.5006*** (0.0000)	0.4530*** (0.0000)	0.4306*** (0.0000)	0.4784*** (0.0000)	0.4914*** (0.0000)	0.4518*** (0.0000)	0.2940*** (0.0000)	1					
ICBC	0.7686*** (0.0000)	0.6059*** (0.0000)	0.9368*** (0.0000)	0.9010*** (0.0000)	0.7322*** (0.0000)	0.5709*** (0.0000)	0.9169*** (0.0000)	0.6452*** (0.0000)	0.8757*** (0.0000)	0.9259*** (0.0000)	0.7219*** (0.0000)	0.4497*** (0.0000)	1				
Jiangxi Copper	0.6007*** (0.0000)	0.5309*** (0.0000)	0.6293*** (0.0000)	0.7612*** (0.0000)	0.5881*** (0.0000)	0.5750*** (0.0000)	0.5385*** (0.0000)	0.5329*** (0.0000)	0.6667*** (0.0000)	0.6550*** (0.0000)	0.5546*** (0.0000)	0.6202*** (0.0000)	0.6038*** (0.0000)	1			
Sinopec Corp	0.6405*** (0.0000)	0.4684*** (0.0000)	0.6300*** (0.0000)	0.6915*** (0.0000)	0.2815*** (0.0003)	0.2441*** (0.0003)	0.5484*** (0.0000)	0.2991*** (0.0000)	0.5672*** (0.0000)	0.6753*** (0.0000)	0.7619*** (0.0000)	0.5052*** (0.0000)	0.5638*** (0.0000)	0.7426*** (0.0000)	1		
Tsingtao Brewery	0.8275*** (0.0000)	0.3940*** (0.0000)	0.7926*** (0.0000)	0.6449*** (0.0000)	0.4008*** (0.0000)	0.2624*** (0.0001)	0.7228*** (0.0000)	0.3045*** (0.0000)	0.6880*** (0.0000)	0.7886*** (0.0000)	0.8783*** (0.0000)	0.1856*** (0.0060)	0.7448*** (0.0000)	0.4966*** (0.0000)	0.5874*** (0.0000)	1	
Yanzhou Coal	0.5906*** (0.0000)	0.3390*** (0.0000)	0.6007*** (0.0000)	0.6014*** (0.0000)	0.5562*** (0.0000)	0.7193*** (0.0000)	0.4543*** (0.0000)	0.6516*** (0.0000)	0.4729*** (0.0000)	0.6966*** (0.0000)	0.4402*** (0.0000)	0.3807*** (0.0000)	0.5850*** (0.0000)	0.5935*** (0.0000)	0.3673*** (0.0000)	0.5072*** (0.0000)	1

P-values (probability that the correlation is significant from 0) are in parentheses, and ***, **, and * denote significance at the 99%, 95%, and 90% confidence levels, respectively.
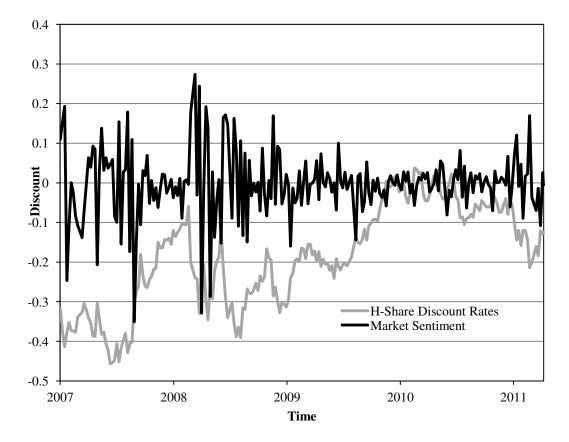
Figure 1: H-Share Mean Discount Rate and Market Sentiment