Analysis of price differences between A and H shares

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Abstract: The price difference between the A share trading in China and the H share trading in Hong Kong of the same company has been presented for a long time. Studying the differences could be useful in understanding dissimilarity between the two markets. This paper is devoted to analyze certain company specific and market factors that may influence the premium between A & H share. An appropriate factor model is built based on a sample from 63 listed companies in both markets from January 2014 to June 2017. Our factors are useful to explain premium variations; in addition to typical market and company specific factors, it is found that premium level is significantly related to the industry sector in general. These are important factors to improve on the fitting in the regression analysis. Meanwhile, it is observed that premiums of many shares are becoming narrower in recent years, which might pave the way to convergence after the recent link between the China and Hong Kong stock exchange.

Keywords: AH premium, factor model, stock market segmentation

JEL codes: C38, G14

1. Introduction

Listed companies in China can issue shares in domestic exchange markets for local investors (A share), for foreign capital (B share) and listing via overseas (e.g. H share, N share, S share and L share). Over the past decade, many companies in China listed overseas for capital raising, such as issuing H-shares in the Hong Kong stock exchange. When capital market in China relaxes its control to the international capital, price differences of dual-listed companies between A and H share have drawn lots of attention.

The research on price differences between segmented markets can trace from the 1980s. Errunza and Losq (1985) studied the stock market segmentation when foreign investors can simultaneously trade in domestic and foreign stock exchanges. However,

there is a potential for different prices between two markets, and this phenomenon was explained by Bailey et al. (1994) and Domowitz et al. (1997) where prices of foreign shares are higher than that of domestic shares in the empirical studies, which including stock markets in Thailand, Switzerland, Norway and Singapore. Referring to the Chinese dual-listed companies, Eun (2001) proposed a hypothesis about differential risk, the domestic investors have less chance to invest in overseas to diversify risk, which is domain to explain the Chinese discount puzzle. Later, Fernald and Rogers (2002) found that exchange rate relates to the variations of the A & H premium. In addition, Liu (2004) concluded that information asymmetry is one of the key factors to influence the pricing of the Chinese dual-listed companies. Furthermore, Han (2006) found that factors contributing to soft segmentation in A and H stock markets are market-specific risk, liquidity and the expectation of investors.

This paper aims at studying the A & H premium in a more systematic and comprehensive way about possible influential company specific and market factors from the literature. We found that most of the factors are significant in explaining the premium for A & H share markets, and better result can be obtained by consolidating factors proposed in the literature and selecting the useful factors. In addition to typical market and company specific factors, it is found that premium level is significantly related to the industry sector in general. These are important factors to improve on the fitting in the regression analysis.

The rest of the paper is organized as follows. Section 2 describes the model and possible factors. Then, section 3 provides the analysis about model fitting results. Lastly, section 4 summarizes the conclusions and discussions.

2. Model and Variables

Suitable model is chosen from the panel data that we expect to affect the A & H share premium. All the data in this study are collected from Bloomberg, starting from January 2014 to June 2017. Excluding certain non-trading days, there are 827 data points can be collected in the sample. However, records with incomplete information was removed, and there are altogether 49,268 observations by the 63 stock pairs as the final sample in regression analysis. Table 1 provides a summary for each factor, and they are discussed in the following sub-sections.

2.1 Model

Factor model is used to analyze different phenomena about dual-listed companies in A-H share markets. We can express the factor model by the formula as follows,

$$Y_{i,t} = b_1 + \sum_{k=2}^{n+1} b_k f_{k,i,t} + \varepsilon_{i,t} .$$

Where i stands for the company, t is the t-th observation in the time series, b_k represents the coefficient of the k-th factor, and $f_{k,i,t}$ is the k-th factor at time t for company i.

2.2 The explained variable

The explained variable is the price difference in A & H share of the same company, which is denoted as $Y_{i,t}$ for the premium rate of A-share relative to H-share, and it is defined as

$$Y_{i,t} = \ln(P_{i,t}^{A}) - \ln(P_{i,t}^{H} * ER_t);$$

where i (i=1,2...63) denotes the i-th company and t (t=1,2,...,827) denotes the t-th observation. $P_{i,t}^{A}$ and $P_{i,t}^{H}$ are closing price of A- and H-shares at time t for company i. H-share prices are converted into RMB based on the daily exchange rate.

2.3 Independent variables

Market segmentation may impact on the A-H premium by varieties of factors. With reference to the literature on the market segmentation research, we will analyze 11 potential factors and 9 dummy variables by the industry sectors of the stock pairs. For some factors that might not be observed directly, proxy indicators will be applied.

Table 1. Summary of variables

	Variable	**Symbol**	**Explanation**
Dependent Variable	A-H premium rate	$Y_{i,t}$	Price premium for the A-H stock pairs in term of RMB.
Independent Variables	Trading Liquidity	$TUR_{i,t}$	Ratio of the turnover amount in term of RMB for the A and H stock pairs.
		$V_{i,t}$	Ratio of the trading volume for the A and H stock pairs.
	Elasticity of demand difference	$TS_{i,t}$	Ratio of the number of issued shares for A and H-share respectively.
	Differential risk attitudes	$VOL_{i,t}$	Ratio of the 90-day price volatility for the A-H stock pairs

	Information asymmetry (Company Size)	$CAP_{i,t}$	Natural logarithm of the total market capitalization for the company.
	Book-to-market ratio	$BM_{i,t}$	Book to market ratio for A share of the company.
	Market condition	$MA_{i,t}$	Beta of the A-share in comparison to CSI300 Index
		$MH_{i,t}$	Beta of the H-share in comparison to HSI Index
Control Variables	Exchange rate	ER_t	Daily spot exchange rate for HKD to RMB
	Premium rate of ETFs in the market	DA_t	Daily average of the trading premium percentage for available ETFs listed in China.
		DH_t	Daily average of the trading premium percentage for available ETFs listed in Hong Kong.
	Industry sectors	$D_{1,t}$	Dummy variable to represent the corresponding stock in energy sector.
		$D_{2,t}$	Dummy variable to represent the corresponding stock in industrials sector.
		$D_{3,t}$	Dummy variable to represent the corresponding stock in consumer goods sector.
		$D_{4,t}$	Dummy variable to represent the corresponding stock in utilities sector.
		$D_{5,t}$	Dummy variable to represent the corresponding stock in materials sector.
		$D_{6,t}$	Dummy variable to represent the corresponding stock in properties & construction sector.
		$D_{7,t}$	Dummy variable to represent the corresponding stock in consumer services sector.
		$D_{8,t}$	Dummy variable to represent the corresponding stock in financials sector.
		$D_{9,t}$	Dummy variable to represent the corresponding stock in information technology sector.

2.2.1 Trading liquidity

The trading liquidity in different markets are often found to be one of the main

reasons to explain the price divergence (Silber, 1991, Amihud, 2002). If liquidity is weaker, transaction cost becomes higher due to potential larger bid-ask spread (Zhiwu and Xiong, 2001). In fact, a stock is considered to be active in the market whenever there is a higher turnover or volume. Therefore, we choose two indicators to measure liquidity, namely the ratio of A and H share turnovers and the ratio of trading volume, as proxies of the liquidity. The factor $TUR_{i,t} = \frac{T_{i,t}^{A}}{T_{i,t}^{H}}$ is the ratio of turnover, where $T_{i,t}^{A}$, $T_{i,t}^{H}$ are the turnover of the dual-listed company, and the factor $V_{i,t} = \frac{V_{i,t}^{A}}{V_{i,t}^{H}}$ represents the ratio of trading volume, with $V_{i,t}^{A}, V_{i,t}^{H}$ being the trading volume for A & H share respectively.

2.2.2 Elasticity of demand difference

Demands by investors from different markets on the same company may lead to differentiation in prices. If demand growth rate is greater than the volatility of its prices, it can be explained by demand elasticity (Stulz and Wasserfallen, 1995). We use the number of issued shares as the indicator in the analysis. The factor is $TS_{i,t} = \frac{TS^{A}{}_{i,t}}{TS^{H}{}_{i,t}}$, where $TS^{A}{}_{i,t}$ and $TS^{H}{}_{i,t}$ are the numbers of issued shares of dual-companies for A-share and H-share, respectively. Generally, if the issued share quantities are large, trading activities may be more active and stable.

2.2.3 Differential risk attitudes

Different investors have heterogeneous view in investment styles and levels of risk aversion (Fama and French, 1993); for example, domestic investors are more likely to invest for short-term benefit according to Sun and Tong (2000), and this may lead to the price difference between two markets. Nerveless, the development of the A stock market is slower than that of H share market, the later is more mature with professional investors internationally, this may provide more stable market with efficiency in pricing. Here, we choose the ratio of volatility as an indicator to measure

risk attitude differences with the factor $VOL_{i,t} = \frac{VOL^A_{i,t}}{VOL^H_{i,t}}$.

2.2.4 Information asymmetry (Company Size)

In the market, the larger companies attract more attention with supports of more financial data and research reports being published. It seems to be the case that the larger the company becomes; the higher stock price may grow in the market with richer capital. The total capital of the company is useful to measure the scale of company operations (Fama and French, 1995). In the analysis, logarithm of the total market capitalization of the company ($CAP_{i,t}$) is employed to indicate the information asymmetry.

2.2.5 Book-to-market ratio

Fama and French (1995) concluded that book-to-market ratio is one of the factors that influence the behavior of stock price under rational pricing; moreover, Zheng et. al. (2011) included this factor in analyzing the premium gap between A & B stocks in the China market. Thus, we also include this factor in consideration to study the premium gap between A & H shares.

2.2.6 Market conditions

According to CAPM model, the segmentation of the markets has been exploited by some traders with an effect of exacerbating market condition. Meanwhile, the different locations of transaction can influence on the stock price movements due to the systemic risk. We calculate sensitivity about the return of A-share on CSI300 Index and H-share on Hang Seng Index respectively. CSI300 and HSI index are comprehensive refection about the overall condition of Chinese stock market and Hong Kong stock market respectively. We can define them as follows:

$$MA_{i,t} = \frac{Cov(R_{CSI300,t}, R^A_{i,t})}{VAR(R_{CSI300,t})}$$

$$MH_{i,t} = \frac{Cov(R_{HSI,t}, R_{i,t}^{H})}{VAR(R_{HSI,t})}$$

where $MA_{i,t}$ is a measure of the risk arising from exposure to CSI300 index movement for A-share, $R_{CSI300,t}$ represents the return of CSI300 index at time t, and $R_{i,t}^{A}$ is the return of the *i*th company in A-share market at time t; similarly for $MH_{i,t}$.

2.2.7 Exchange rate

The volatility of exchange rate can lead to differential price for dual-list companies. H shares are trading with Hong Kong dollars which is pegged against the U.S. dollars, but the dividends are denominated in RMB. The pricing mechanism may need to account for this fact and investors will require a reasonable risk spreads to cater for potential exchange rate risk. Fernald and Rogers (2002) demonstrated the volatility of the exchange rate can influence on the H- share market. As a result, this is clearly a potential factor to cause the price differences.

2.2.8 Premium rate of ETFs in the market

Investor sentiment regards as important factor on asset pricing, but there is no direct indicator easily available to measure investor sentiment, trading discount of the funds based on their current market price can be a proxy of investor sentiment in Zheng et. al. (2011), and shows that A share market is more likely to be overpriced when investment sentiment is positive. Therefore, we included the average premium rate of the ETFs available in China and Hong Kong markets to proxy the investment sentiment to the two markets.

2.2.9 Industry sector

In the dataset, we found that premium is quite different over industry sector. Figure 1 displays the premium level by industry sector; where energy, industrials, and materials sectors have premium which are higher than the overall level; while,

average premium levels in financials and information technology sectors are much lower than the overall. Therefore, we include some dummy variables to represent the potential difference in average premium over different industry sectors.

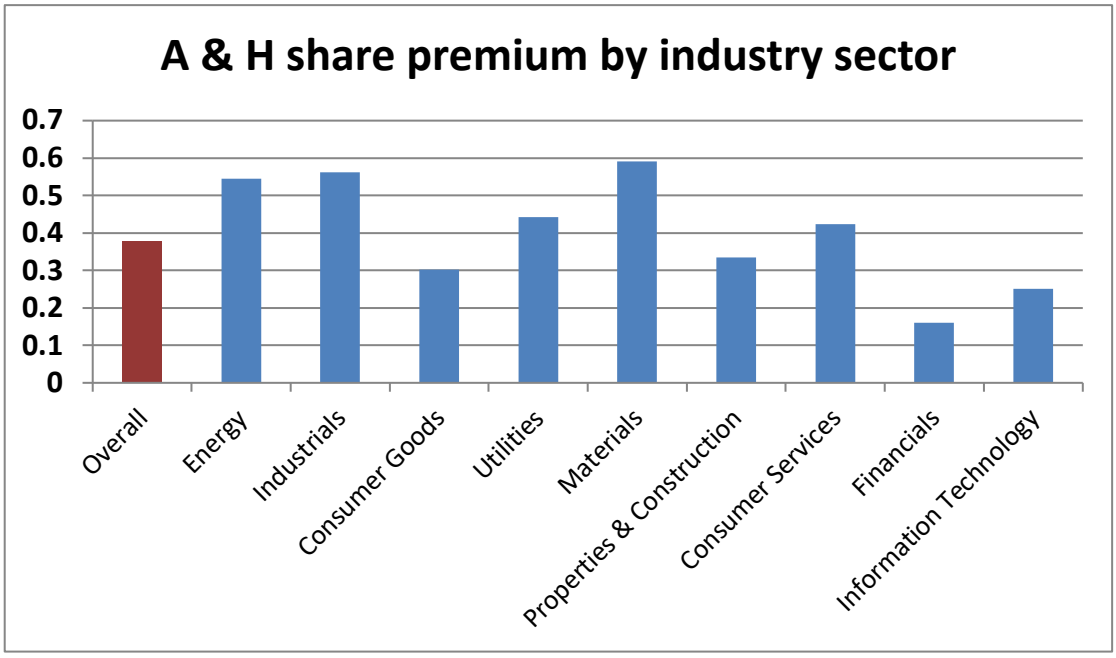

Figure 1. Summary of A & H share premium by industry sector

3. Result and Analysis

3.1 Descriptive statistics

In this section, stepwise regression was performed to generate a model with suitable variables to explain the changes in A & H share premium over the sample. Factors in the model should not be highly correlated with each other, VIF and factor correlation matrix were deployed to ensure the compliance. Table 2 includes a summary of the descriptive statistics for our sample.

Table 2. Descriptive statistics for the overall sample

	Mean value	Standard deviation	Maximum value	Minimum value
A-H premium rate	0.3781	0.3450	1.6556	-0.5311
Trading Liquidity - Turnover	8.8720	13.6140	514.7874	0.00604
Trading Liquidity - Trading volume	5.7419	8.3008	265.6223	0.00453
Elasticity of demand difference	3.3636	1.8203	9.5663	0.0399

Differential risk attitudes	1.0340	0.3472	2.9013	0.3576
Information asymmetry (Company Size)	11.5855	1.1278	14.7525	9.1382
Book-to-market ratio	1.7474	1.0235	19.2454	0.4176
Market condition - A share	1.0547	0.4493	9.8403	-27.4141
Market condition - H share	1.1655	0.5253	4.7432	-2.7192
Exchange rate	0.8302	0.0351	0.8978	0.7788
Premium rate of ETFs in China market (%)	-0.2390	0.5500	2.7371	-5.1584
Premium rate of ETFs in Hong Kong market (%)	-0.8628	0.4194	0.1506	-2.5976

In average, A share prices tend to show premium over the H shares, even some pairs show discount in A share stocks. Ratios in liquidity, demand elasticity and risk attitudes are greater than 1; thus, A shares in China market seem to provide better channel for local investors in trading purpose. Market condition in both markets shows similar condition, and their ETFs trade with discount in both China and Hong Kong market in general; however, Hong Kong market shows more discount compared to China market in our sample, this may indicate that higher investment sentiment in China market.

3.2 Regression results

The regression was run to build a model with significant factors on the A and H share price gaps. The resulting model has 18 variables and adjusted R^2 is 55.21%; where the final model is shown as below, and Table 3 provides the details of the model.

$$Y_{i,t} = b_1 + b_2 TUR_{i,t} + b_3 V_{i,t} + b_4 TS_{i,t} + b_5 CAP_{i,t} + b_6 BM_{i,t}$$
$$+ b_7 MA_{i,t} + b_8 MH_{i,t} + b_9 ER_t + b_{10} DA_t + b_{11} DH_t$$
$$+ b_{12} D_{1,t} + b_{13} D_{2,t} + b_{14} D_{3,t} + b_{15} D_{4,t} + b_{16} D_{6,t} + b_{17} D_{7,t} + b_{18} D_{8,t} + b_{19} D_{9,t} + \varepsilon_{i,t}$$
$$i = 1, 2, ..., 63; t = 1, 2, ..., 827$$

Table 3. Summary of Regression Model

Adjusted R^2:		**55.21%**		
F-statistic:		**3374 (>99% significant)**		
VIF:		**4.30**		
#	**Variable (Coefficient)**	**Coefficient Estimate**	**Coefficient Standard Error**	**Coefficient t-value**
1	Intercept	-0.7919	0.03560	-22.25
2	Trading Liquidity - Turnover	0.0025	0.00009	29.05
3	Elasticity of demand difference	-0.0136	0.00062	-21.89
4	Differential risk attitudes	0.2484	0.00370	67.23
5	Information asymmetry (Company Size)	-0.0681	0.00149	-45.68
6	Book-to-market ratio	0.1053	0.00124	85.09
7	Market condition - A share to CSI300	-0.0435	0.00276	-15.76
8	Market condition - H share to HSI	0.1008	0.00228	44.29
9	Exchange rate	1.7640	0.03970	44.44
10	Premium rate of ETFs in the China market	0.0211	0.00197	10.71
11	Premium rate of ETFs in the Hong Kong market	-0.1687	0.00333	-50.71
12	Industry variable - Energy sector	0.0917	0.00487	18.84
13	Industry variable - Industrials sector	-0.0429	0.00427	-10.06
14	Industry variable - Consumer goods sector	-0.3472	0.00466	-74.53
15	Industry variable - Utilities sector	-0.0152	0.00581	-2.61
16	Industry variable - Properties & Construction sector	-0.1619	0.00481	-33.66
17	Industry variable - Consumer services sector	-0.1059	0.00531	-19.94
18	Industry variable - Financials sector	-0.2449	0.00488	-50.21
19	Industry variable - Information technology sector	-0.3099	0.00930	-33.31

The regression result indicates that all variables are significance at more than 99% level, and it explains the model with R^2 over 55%. For the independent variables selected, it is expected for positive coefficient in turnover ratio, since higher premium in the market with relatively higher liquidity in A share market. There is multi-colinearity problem when both turnover and volume are selected; thus, only turnover is used for liquidity measure. Then, negative coefficient in elasticity of demand difference stands for market price tends to be lower relatively when there are more shares issued in one market. In information asymmetry (company size), negative coefficient should be in accordance to the stated reason, since large companies attract

more attention with more research and data support, which may reduce the premium gap. In addition, higher book-to-market ratio seems to be more favorable information to A share investors with positive coefficient in the model, and thus enlarge the premium gap relative to the H share stock. Finally, risk attitudes difference and volatility in exchange rate as control variable are factors that influence on the A & H premium positively, and this validates the original hypothesis in explaining the price gap. A share market tends to be favorable in volatile market when compared to H share market, and this lead to widen premium expected when A share show higher volatility relative to H share.

According to the final model, 8 out of 9 variables in industry sector are selected, and they improve the model by 14% in R^2. Energy sector has positive coefficient in the dummy variable, which significantly shows that A shares in this sector should enjoy higher premium; however, other selected sectors show negative values in the coefficients. Next, positive coefficient for the market condition in H share, and negative relationship in A share are revealed in the model. This implies that diversification benefit is reduced when shares have positive relations to the market condition, and leads to lower share price according to the model. It is because investors may require higher return to compensate for reduced diversification benefit, and thus affect the price gap between A & H shares. Investment sentiment is also selected in the model, coefficient in Hong Kong market shows negative value; while, China market has positive value. This implies that A & H share price may subject to the investment sentiment from their trading market accordingly and affect the premium level between A & H share.

4. Conclusions

In this paper, we have studied the factors from the literature in explaining premium variations between the A & H shares using regression analysis, and our factors are useful to explain premium variations. In addition to typical market and company specific factors, it is found that premium level is significantly related to the industry sector in general. These are important factors to improve on the fitting.

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