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Equity Valuation in Mainland China and Hong Kong: The Chinese A-H Share Premium*

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Abstract

This paper studies the links between fundamental value and market price of the companies listed in both mainland A-share and Hong Kong H-share markets. As the valuation model has been inadequately applied in the literature, this study theoretically clarifies that the dividends discount model (DDM) and it derivatives are suitable for firms, but not for general consumers and investors, to evaluate equity fundamental values. Thus, using DDM and its derivatives to determine the market price of equity, which has been done in many other studies, is problematic. This paper also empirically studies how accounting data determines fundamental values of equities using a pooled-data vector autoregressive method. It indicates that although fundamental value can be a benchmark for investors to price equity, prices of equity may deviate from fundamental values substantially for a long time due to differences in preference and the extent of risk aversion between A-shares and H-shares. Correlation between equity price and its fundamental value for H-shares is larger than the correlation for A-shares. This paper also explains why there has been a big price gaps between A-shares and H-shares with exactly the same yields rights. The estimates of fundamental value for each company help investors make rational investment decisions. It suggests that, in the long run, healthy development of Chinese securities markets will depend on the progress of privatisation and marketisation of the Chinese economy. Measures such as the Qualified Foreign Institutional Investors (QFII) and Qualified Domestic Institutional Investors (QDII) programmes should be adopted to improve the efficiency of financial resources utilisation in mainland China, despite the short-run pressure that may put on A-share markets.

Keywords: A-H share premium, China, Hong Kong
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1. Introduction

There are two types of securities trading in mainland China: A-share for local investors and B-share, initially for foreign investors. The B-shares were opened to domestic individual investors in 2001. In addition, H-share stocks have been traded in Hong Kong since 1993. The Hong Kong securities market has been the biggest source of foreign funds for China and has also been boosted by the great number of H-shares and red chips (Chang, 2000). By the end of 2003, there were over 70 H-share companies listed on the Hong Kong Stock Exchange, 29 of which also offered A-share stocks at the same time.

Despite their identical rights in sharing earnings, the price of A-shares was 113% higher than the corresponding H-shares on average according to the closing trading price on Dec 31, 2003 (cf. Table 1). The IPO price premium in mainland China during the period 1997 to 2003 was about 118%, which was perhaps the highest in the world (cf. Table 2). This indicates that a big bubble may have existed in the A-share market since the very beginning. Although there is a literature on the macroeconomic relationship of mainland China and Hong Kong (Ma et al., 1998) and their financial markets (Li et al., 1999), little research has been done on explaining the puzzle of the price discrepancies between A-shares and H-shares.

With the expanding of the A-share market, relaxing of the government control over stock listing, implementing the Qualified Foreign Institutional Investors (QFII) programme, and the expected forthcoming Qualified Domestic Institutional Investors (QDII) programme, A-shares have been experiencing a declining process. For example, Shanghai stock price index fell from 2,245 points on June 15 in 2001 to 1,189 points on January 21 in 2004, down over 50%.

Some A-share stocks have been priced closer to the corresponding H-shares, and there has been no indication that this trend will stop in the near future. The high price premium between A-shares and H-shares also indicates that price discovery mechanisms in the two markets are different. Perhaps Hong Kong as a mature stock market is more efficient than that of mainland China in valuating share equity. Then the questions are: what are the factors fundamentally and institutionally behind this phenomenon and what are the implications to the development of the Mainland capital market?

In some valuation studies of equity on mature capital markets, the efficient market hypothesis (EMH) and the Modigliani-Miller (1958) dividend irrelevancy theorem are taken for granted. Equity price is assumed to be equal to or to fluctuate randomly around its fundamental value. This leads some economists to ignore the fundamental value itself, and turn their attention to the empirical studies on the correlations between price and fundamental factors and the model selection that helps estimate stock value or price more accurately.

As a result, the residual income valuation model (RIV) has been found to perform well relative to the dividends discount model (DDM) and discounted cash flow (DCF) by some people (e.g., Bernard, 1995; Penman and Sougiannis, 1998; Courteau et al. 2003). In contrast, other researchers find a very weak linkage between value variations and accounting information. For example, Myers (1999) argued that Feltham and Ohlson's (1995) model that studied the equity price with accounting information provided estimates no better than the book-value estimates.

However, EMH is not a universally accepted hypothesis. For example, it is difficult to explain by fundamentals why the NASAQ index rose by 86% in 1999 and the stock price of Amazon increased more than 2,300 times from listing in 1997 to the end of 1998. At that time, there was a popular viewpoint that traditional economics was clasping because it could not explain these phenomena. However, good times did not last long; the NASDAQ fell from 5,046 on March 9 to 3,319 on April 14 in 2000. Currently it is below 2,000. Similar problems also existed in the mainland A-share market. The Shanghai composite index fell from 2,200 in June 2001 to about 1,100 in May 2005, although the accounting information showed that the performances of companies were improving.

The above facts show that it is problematic that studies on the mainland China stock market are based on linear information and no-arbitrage assumptions. Without the no-arbitrage assumption, market value might not converge to its fundamental value even in the long run. A study by Chang (2000) on the effectiveness of Hong Kong-listed H-shares and red-chips in cross-hedging Shanghai-listed B-shares showed to some extent the impropriety of the no-arbitrage assumption.

Zhao (2003a, b) noticed the deficiency of the no-arbitrage assumption and the impropriety of RIV in pricing equity and turned his attention to measuring the size of the bubble in stock prices after relaxing those unrealistic assumptions. Through a market price/equity determination model, he gave a good explanation of the deviation of market price from the fundamental value in the Chinese mainland A-share market. Additionally, Li et al. (1999) investigated lead-lag relations between A-shares and H-shares based on the belief that A-share traders in mainland China may not receive market-wide information to the same extent as H-share traders in Hong Kong. A theoretical analysis of the stock market and foreign direct investment was presented by Ma (2001a).

Instead of focusing on the study of fundamentals that are important in determining the value of shares, many researchers have examined some transitional factors such as asymmetric information (Chakravarty et al., 1998; Chen et al., 2001; Yeh et al., 2002; Wang and Jiang, 2004), illiquidity and transaction costs of trading (Chen et al., 2001; Wang and Jiang, 2004), difficulty for arbitrage due to market segmentation (Chakravarty et al., 1998; Chen et al., 2001; Fernald and Rogers, 2002; Yeh et al. 2002), and differential risks of volatility, exchange rate, and political factors (Chen et al., 2001; Fernald and Rogers, 2002; Zhang and Zhao, 2003).

The higher IPO price premium in the Shanghai and Shenzhen stock exchanges and the price gaps between Chinese A-shares and H-shares also remind us that at least one of the A-share and H-share markets produce bubbles. DDM and its derivative RIV and DCF models do not seem to adequately explain such a large short time price premium. And there are problems with applying the efficient market hypothesis and the dividends policy irrelevance theorem to mainland markets. Furthermore, individual firm's fundamental value and its comparison with A-H share prices have not been estimated in previous studies.

Hence, the aim of this paper is to estimate fundamental values of stocks. This study tries to link the stock pricing mechanism to economic fundamentals, investors' behaviour, as well as institutional environments. Economic fundamentals are those variables that appear in firms' financial statements that determine the fundamental value of stock. Fundamental value as a performance indicator has little

relationship to investors' behaviour in the secondary market, but it could be the foundation for market price, which is the outcome of the game played between investors and therefore relates to the investor's behaviour. Furthermore, this study is also concerned with how the institutional environment influences investors' behaviour, especially in the Chinese mainland, which is experiencing drastic institutional changes.

The remainder of this paper is organised as follows. In Section 2 we present the theory and preconditions for the DDM and discuss the testability of DDM. Unlike some existing studies that ignore the preconditions of the model, we find that DDM can only be utilised in certain circumstances, otherwise it may lead to a wrong conclusion. In the model selection process, we choose the residual-income valuation (RIV) model as a substitute for DDM to estimate equity value. In Section 3, we discuss the methodology for estimation of fundamental values and meanings of estimated variables, and then present the estimation results. Since fundamental value analysis cannot fully explain the observed phenomenon, further interpretation resorting to the behaviour of market entities and institutional surroundings will be presented in this section. Finally, we provide main findings and policy implications in Section 4.

2. Origins of DDM and its testability

Many valuation models, such as the residual income valuation (RIV) model and the discount cash flow (DCF) model, are based on an extensively recognised valuation theory called the dividend discount model (DDM), first presented by Williams (1938). According to DDM, the fundamental value of a firm should equal the present value of expected future dividends, as shown in follow equation:

$$p_t = \sum_{\tau=1}^{\infty} (1+r)^{-\tau} E_t(d_{t+\tau}) \tag{1}$$

where

p_t: fundamental value of share equity of a company at the end of time t,[1]
d_t: dividends received at the end of period t,
r : risk-free discount rate,[2]
E_t: expectation operator based on the information set at the end of time t.

DDM has been viewed to be non-controversial in many recently published academic papers that discuss the performance of valuation models and has been used widely in equity valuation (Frankel and Lee, 1998). Since DDM is accepted without doubt, RIV and DFC, the derivatives of DDM, are also accepted (Lundholm and O'Keefe, 2000). Generally when the equity value estimation is not equal to its market price, researchers usually attributed this inaccuracy more to something outside than to the model itself. Thus, the only problem left to those economists who believe in DDM is how to judge its ability to forecast share price.

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1 If the market is perfect, according to the MM theorem (Modigliani and Miller, 1958), market price of equity should be equal to its intrinsic value. Otherwise, market price does not necessarily equal its intrinsic value.

2 The original model presented by Ohlson (1995) viewed firms as risk neutral and r in DDM as the risk-free rate. Unfortunately many subsequent researchers give inappropriate explanation to this variable, and use DDM unconditionally in many cases.

For example, to evaluate the usefulness of the RIV approach, Penman and Sougiannis (1998) and Francis et al. (2000) compared the accuracies of valuation of the RIV, DDM and DCF models and concluded that the RIV performs better than DDM and DCF. In practice, differences of estimation accuracy existed among the three models, which are attributed to inevitable truncation of the formulas and the limitation of the length of the existing data series. Few researchers have been attributing estimation error to the wrong specifications of models. After examining carefully the condition from which the DDM is deduced, we find that the DDM depends on a number of strong preconditions and hence cannot be applied arbitrarily.

2.1 Ways to derive DDM

There are a number of ways to derive the dividend discount model (DDM). One of them is in accordance with the definition of return on assets, as shown in formula (2) below:

$$r_{t+1} = \frac{E_t(p_{t+1}) + E_t(d_{t+1}) - p_t}{p_t} \quad . \tag{2}$$

Through a series of iterative procedures, the price of assets at time *t* can be expressed as

$$p_t = \frac{E_t(p_{t+1}) + E(d_{t+1})}{1 + r_{t+1}} = \sum_{\tau=1}^{\infty} \frac{E_t(d_{t+\tau})}{\prod_{i=1}^{\tau}(1 + r_{t+i})} \, . \tag{3}$$

Assuming $r_{t+1} = r$, the price of assets at time *t* can be expressed as

$$p_t = \sum_{\tau=1}^{\infty} (1+r)^{-\tau} E_t(d_{t+\tau}) \, . \tag{4}$$

This is the standard form of DDM.

The constant discount rate "*r*" in (4) represents the expected future return on the assets, not the cost of the assets (capital). Only in a perfect competitive market could the return on capital be equal to its cost. The price of assets here is defined as the sum of discounted future dividends, not relating to any economic theories.

The second way to obtain DDM is within the framework of the neoclassical consumer assets pricing model, in which the consumer is risk neutral. For example, assuming the utility maximisation problem faced by a consumer is

$$\max \sum_{s=t}^{\infty} \beta^{s-t} E_t u(C_s) \tag{5}$$

$$\text{s.t. } C_s + G_s + B_{s+1} - B_s + x_{s+1}V_s - x_s V_{s-1} = rB_s + d_s x_s + x_s(V_s - V_{s-1}) + w_s L \tag{6}$$

where

s = 1,2,3,…,t,…;

C_s : consumption at time s,

G_s: government expenditure at time s,

B_s: money invested in risk free assets,

V_s: price of equity at time s,

L: the number of employment,

x_s : quantity of shares held by households at time s,

d_s: dividends at time s,

r : return on risk-free assets or opportunity cost of risk assets,

w_s: labour wage rate at time t,

β : subjective discount rate of future utility of consumption,

E_s : expectation operator based on the information set at the end of time t.

Formula (5) denotes the utility function of a representative consumer who pursues utility maximisation, (6) is the budget constraint faced by the consumer, which means the total revenue of the consumer (denoted by the right-hand-side term) are sums of interest from risk free assets, dividends, income from the changes in stock price, and the wage of labour. On the other hand, it is consumed in the forms of consumption, government expenditure, buying additional risk free assets and stocks.

To solve the problem of (5) and (6), we get the first order conditions:

$$u'(C_s) = \beta(1+r)E_t u'(C_{s+1}), \tag{7}$$

$$V_s u'(C_s) = \beta E_t (V_{s+1} + d_{s+1}) u'(C_{s+1}). \tag{8}$$

Assuming that the consumer is risk neutral, namely, $u'(C_s) = c$, where c is a constant, then we have

$$1 = \beta(1+r), \tag{9}$$

$$V_s = \beta E_t (V_{s+1} + d_{s+1}). \tag{10}$$

From (9) and (10), we obtain

$$V_s = \frac{E_t(V_{s+1} + d_{s+1})}{1+r}. \tag{11}$$

Through a series of iterative procedures, we again obtain the DDM in (1).

The third way to derive DDM is to keep the risk-aversion condition constant in the utility function, and to assume that there is no uncertainty for future events. This means that the values of all future variables are fully anticipated: expected value of variables equals their actual value. Thus, under the assumption of perfect foresight, the expectation operator could be deleted and (7) and (8) will become

$$u'(C_s) = \beta(1+r)u'(C_{s+1}), \tag{12}$$

$$V_s u'(C_s) = \beta(V_{s+1} + d_{s+1})u'(C_{s+1}), \tag{13}$$

Therefore, we have

$$V_s = \frac{V_{s+1} + d_{s+1}}{1+r}, \tag{14}$$

and hence

$$V_t = \sum_{\tau=1}^{\infty}(1+r)^{-\tau} d_{t+\tau}. \tag{15}$$

This is a special case of expectations about future return and cost. The only difference between equations (15) and (1) is that there is no expectation operator “E” in (15).

From the above analysis, different forms of DDM have different implications, because they are separately deduced from specific assumptions. The first form [equation (4)] assumes return on equity to be equal to capital cost. It is correct only if the market is perfectly competitive, in which case all investments get the same return. In fact, under the circumstances in which the market is not perfectly competitive, information is asymmetric and future events are uncertain, this view is clearly not persuasive. The second form [equation (11)] is deduced under the assumption of risk neutrality. This assumption is evidently not consistent wit people’s common sense and intuition since traditional theory regards investors as risk-averse. In the third form (15), although the assumption of risk-aversion is maintained, the assumption that future events are certain is clearly not realistic. More generally recognised assumptions should contain both uncertainty and risk aversion.

Using general forms of equation (12) and (13), we obtain (16):

$$V_s(1+r)E_s\left[u'(C_{s+1})\right] = E_t\left[(V_{s+1} + d_{s+1})u'(C_{s+1})\right]. \tag{16}$$

According to the law of expectation operation we have

$$E_t\left[(V_{s+1}+d_{s+1})u^{'}(C_{s+1})\right]=E_t(V_{s+1}+d_{s+1})E_t(u^{'}(C_{s+1}))+Cov(V_{s+1}+d_{s+1},u^{'}(C_{s+1}))\,. \quad (17)$$

Replacing right-hand term of (16) with (17), and then making some simple derivations, we have:

$$V_t=\sum_{\tau=1}^{\infty}\frac{E_t(d_{t+\tau})}{(1+r)^{\tau}}+\sum_{\tau=1}^{\infty}\frac{Cov\left(V_{t+\tau}+d_{t+s},u^{'}(C_{t+\tau})\right)\Big/E_t[u^{'}(C_{t+\tau}]}{(1+r)^{\tau}} \quad (18)$$

As stated above, if the consumer is risk neutral, or marginal utility with respect to consumption is constant or independent of $V_{t+\tau}+d_{t+\tau}$, then

$$Cov\left(V_{t+\tau}+d_{t+s},u^{'}(C_{t+\tau})\right)\Big/E_t(u^{'}(C_{t+\tau})=0\,,$$

Otherwise, the covariance may not equal to zero, that is, $Cov\left(V_{t+\tau}+d_{t+s},u^{'}(C_{t+\tau})\right)\Big/E_t(u^{'}(C_{t+\tau})\neq 0.$ In this case, the second term of right-hand side of equation (18) should not be ignored. However, most studies ignore this correlation term, resulting in the model misspecification. According to (18), there must be a deviation of estimated price from the fundamental value based on DDM if $Cov\left(V_{t+\tau}+d_{t+s},u^{'}(C_{t+\tau})\right)\Big/E_t(u^{'}(C_{t+\tau})\neq 0.$ Even if investors are all rational, estimation errors will appear when using DDM to estimate the price of equity. Thus, at least part of the deviation is caused by model itself rather than limitation of data or truncation.

2.2 Residual Income Valuation Model (RIV)

The residual income valuation model (RIV) is an accounting-based valuation model equating a firm's value to the sum of book value and the present-value of expected future residual income. It first appeared in Preinreich (1938), and then Edwards and Bell (1961), and was revitalised by Ohlson (1995) and Feltham and Ohlson (1995). Specifically, RIV can be expressed as

$$V_t=b_t+\sum_{\tau=1}^{\infty}\frac{E_t(x^a_{t+\tau})}{(1+r)^{\tau}}=b_{\mathrm{t}}+\sum_{\tau=1}^{\infty}\frac{E_t(x_{t+\tau}-rb_{t+\tau-1})}{(1+r)^{\tau}}, \quad (19)$$

where,

b_t denotes book-value of equity at time *t*,

x_t denotes return on equity at time *t*,

$x^a_t=x_t-rb_{t-1}$ denotes residual income on equity or abnormal return on equity.

Since RIV is introduced in an accounting system that satisfies a clean surplus relation (CSR)

$$b_t=b_{t-1}+x_t-d_t, \quad (20)$$

and the book value of equity grows at a rate less than r when time is long enough, which guarantees (21) to be satisfied:

$$\lim_{\tau\to\infty}\frac{E_t(b_{t+\tau})}{(1+r)^{\tau}}=0\,. \tag{21}$$

Since RIV is equivalent to the DDM model given the CSR condition, RIV also needs preconditions. Thus, the viewpoint that RIV does not require any assumption about the discount rate (Bernard, 1995) might be a misunderstanding of the model. It also contradicts the original works by Ohlson (1995) and Feltham and Ohlson (1995), which develops RIV in a world of risk-free rates.

Another equivalence of DDM is the discounted free cash flow (DCF) model. It is widely used in practice and is often introduced in textbooks. The relation between dividends and cash flow can be expressed as $C_{t+\tau}-I_{t+\tau}=d_{t+\tau}-F_{t+\tau}$, for all time τ, where C denotes cash flow from operations, F is cash flow from non-equity financing activities, I denotes cash investment, and d is dividends net of equity as before. Let FA_t, denote the present-value of future cash flows with respect to non-equity financing activities. The equity value can be expressed with DCF:

$$V_t=FA_t+\sum_{\tau=1}^{\infty}\frac{E_t(C_{t+\tau}-I_{t+\tau})}{(1+r)^{\tau}}=FA_t+\sum_{\tau=1}^{\infty}\frac{E(FC_{t+\tau})}{(1+r)^{\tau}} \tag{22}$$

where $FC_{t+\tau}=C_{t+\tau}-I_{t+\tau}$ is called “free cash flow” at time $t+\tau$ and FA_t usually denotes net debt to reflect net borrowing.

2.3 The testability of DDM and its derivatives

It is surprising that although the dividend discount model (DDM) is accepted so widely, little effort has been made to provide formal tests on whether the stock price equals its DDM-based fundamental value. Rather, the researchers turn their attention to compare which of the three models performs best in equity valuation.

For example, Bernard (1995) and Penman and Sougiannis (1998) found that the RIV performs well relative to DDM and FCF (free cash flow) in terms of value estimates. Frankel and Lee (1998) concluded that the residual income valuation model accounts for more than 70% of the cross-sectional price variation. Using firm level regressions, Hand and Landsman (1999) obtained R^2 in excess of 80% and predicated “the role in setting prices of information outside key aggregate accounting data in current financial statements may be more limited than previously thought.” In contrast, traditional approaches used in accounting research found a very weak linkage between value changes and accounting information.

There are a number of possible reasons why no test on DDM has been presented so far. Firstly, as is stated by Lo and Lys (2000), it is impossible to specify the appropriate benchmark for testing RIV or DDM. Secondly, according to our theoretical analysis, fundamental value and stock price are formed in different mechanisms (see formula (18)); the former is computed from accounting data and the latter, besides using accounting data, also depends on uncertainty and secondary market investors’ preference.

Thirdly, from a statistical angle, hypothesis testing is a process that uses actual data and a well-behaved statistics to judge with probability whether a null hypothesis is correct. If fundamental value is equal to price according to DDM, we have:

$$p_t = \sum_{\tau=1}^{T} \frac{E_t(d_{t+\tau})}{(1+r)^{\tau}} + \frac{1}{(1+r)^{T}} E_t(p_{t+T+1}) . \tag{23}$$

Rewriting (23), we obtain:

$$E_t\left[p_t - \sum_{\tau=1}^{T} \frac{d_{t+\tau}}{(1+r)^{\tau}} - \frac{1}{(1+r)^{T}} p_{T+1} \right] = 0 . \tag{24}$$

Let

$$\xi_t = p_t - \sum_{\tau=1}^{T} \frac{d_{t+\tau}}{(1+r)^{\tau}} - \frac{1}{(1+r)^{T}} p_{T+1} . \tag{25}$$

From (25), testing (24) is equivalent to testing whether the random variable ξ_t is distributed with mean zero $E_t\xi_t = 0$, However, the discount rate in formula (25) is not observable. There has been an on-going controversy over how to choose the discount rate and no agreement has been reached.

Fourthly, one can see from the stock market that the stock price can change considerably within a short time period, but dividends and capital cost can't. In addition, bubble-testing research has shown that the stock price can deviate from its fundamental value systematically for a long time as happened in the US stock market (Froot and Obstfeld, 1991; Ma and Kanas, 2004) and in the mainland A-share market (Xu, Yu and Wang, 2000). Thus, we think that at least for mainland companies it is not suitable to assume that stock price equals its fundamental value computed according to DDM or RIV. Perhaps this is why no researchers have presented a formal test on DDM and they instead turn to study correlations between price and accounting data.

2.4 Examinations of CSR and revisions to RIV

The residual income valuation (RIV) model relies on the clean surplus relation (CSR) condition and the accuracy of CSR is the premise of the accuracy of RIV. However, it was found that there is substantial violation of CSR under GAAP (Lo and Lys, 2000). Once CSR is violated, a compensation for the CSR violation is needed. Thus the examination of CSR is needed before using RIV. In reality, an alternative measure y_t of income that doesn't satisfy with CSR may be used to estimate the value of share equity.

Substituting y_t for x_t in CSR $b_t = b_{t-1} + x_t - d_t$, the so-called dirty surplus relation $b_t \neq b_{t-1} + y_t - d_t$ appears. Assuming $z_t = x_t - y_t$ or $x_t = y_t + z_t$, the dirty surplus extension allows us to rewrite RIV as

$$V_t = b_t + \sum_{\tau=1}^{\infty} R^{-\tau} E_t(y^a_{t+\tau}) + \sum_{\tau=1}^{\infty} R^{-\tau} E_t(z_{t+\tau}) \tag{26}$$

Lo and Lys (2000) indicate that omitting z_t in (26) creates two problems when using abnormal dirty surplus earnings y_t. First, as long as the correlation between y_t^a and z_t is less than unity, the omission of z_t from RIV will bias the regression R^2 downwards. Second, as long as the correlation between either of the two included variables y_t^a or b_t and the omitted variable z_t is not zero, the omission will bias the coefficients of the included variables. Thus, before using RIV, CSR should be tested first. If the dirty surplus relationship is applicable, RIV should be adjusted.

3. RIV-Based Fundamental Value Estimates and Its Relations with Price

Although the dividend discount model (DDM) and residual income valuation (RIV) model are equivalent in theory, the accuracies of the estimates of fundamental values and their correlations with accounting data are different. Bernard (1995) reports that the RIV forecasts substantially outperform DDM forecasts. Penmann and Sougiannis (1998) make a comparison between DDM, FCF (free cash flow) and RIV and conclude that the RIV consistently outperforms the DDM and FCF in terms of signed prediction errors. Francis et al. (2000) also report that RIV outperforms the others. Actually this phenomenon can be directly explained in theory. Since RIV and DDM can be rewritten with terminal value as:

$$\text{RIV:}\quad V_t = b_t + \sum_{\tau=1}^{T} \frac{(ROE_{t+\tau} - r) \times b_{t+\tau-1}}{(1+r)^{\tau}} + \frac{1}{(1+r)^{T}}(V_T - b_T), \tag{27}$$

$$\text{DDM:}\quad V_t = \sum_{\tau=1}^{T} \frac{d_{t+\tau-1}}{(1+r)^{\tau}} + \frac{1}{(1+r)^{T}} V_T. \tag{28}$$

If the equity value exists, two residual expressions in (27) and (28) will approach zero:

$$\lim_{T\to\infty} \frac{1}{(1+r)^{T}}(V_T - b_T) = 0$$

and

$$\lim_{T\to\infty} \frac{1}{(1+r)^{T}} V_T = 0.$$

Truncating RIV at the time horizon T, we get the value estimate by RIV,

$$\hat{V}_t = b_t + \sum_{\tau=1}^{T} \frac{(ROE_{t+\tau} - r) \times b_{t+\tau-1}}{(1+r)^{\tau}} \tag{29}$$

and the estimation error in terms of the residual term

$$\frac{1}{(1+r)^{T}}(V_T - b_T). \tag{30}$$

For the same reason, the value estimate by DDM will be

$$\hat{V}_t = b_t + \sum_{\tau=1}^{T} \frac{d_{t+\tau-1}}{(1+r)^{\tau}} \tag{31}$$

and the estimated error in terms of the residual term

$$\frac{1}{(1+r)^{T}}(V_T), \tag{32}$$

Thus, as long as the time period is long enough, the value estimates in (29) and (31) will approach their true value with any specified accuracy.

Dividing the error terms (30) by (32), we have

$$\left| \frac{\frac{1}{(1+r)^{T}}(V_T - b_T)}{\frac{1}{(1+r)^{T}}(V_T)} \right| = \left| \frac{V_T - b_T}{V_T} \right| = \left| 1 - \frac{b_T}{V_T} \right| < 1.$$

Thus, we can conclude that for a conservative accounting statement, the error term in RIV is smaller than that in DDM in estimating equity value. Perhaps this is one of the reasons that RIV performs well and why we choose RIV to estimate fundamental value.

RIV is expressed in terms of an infinite time series, but for practical purposes, the explicit forecast period must be finite. Thus, the estimate of fundamental value for a firm based on residual income includes estimates of a terminal value and time horizon. Within the horizon, the terms are expressed in the explicit forecasting period. Beyond the horizon, the post-horizon values are expressed as the perpetuity of final-period abnormal earnings t+T (Frankel and Lee, 1998), so the fundamental value estimate is

$$\hat{V}_t = b_t + \sum_{\tau=1}^{T} \frac{(ROE_{t+\tau} - r) \times b_{t+\tau-1}}{(1+r)^{\tau}} + \frac{(ROE_{t+T} - r) \times b_{t+T-1}}{(1+r)^{T} r}. \tag{33}$$

Another way to estimate fundamental value is presented by Bernard (1995), which expresses the fundamental value estimate as

$$\hat{V}_t = b_t + \frac{(1+r)^{T}}{(1+r)^{T} - 1} \sum_{\tau=1}^{T} \frac{(ROE_{t+\tau} - r) \times b_{t+\tau-1}}{(1+r)^{\tau}}. \tag{34}$$

It is easy to demonstrate that so long as the time horizon is long enough, $\hat{V}_t$ in (34) will approach $\hat{V}_t$, or $\hat{V}_t \to V_t$ as $T \to \infty$.

When using formula (33) to estimate equity value, we need to rule out the scale effect so that values between different firms can be compared. Dividing each term in (33) by b_t, we have

$$V/B = \frac{V_t}{b_t} = 1 + \sum_{\tau=1}^{T} \frac{(ROE_{t+\tau} - r) \times (b_{t+\tau-1}/b_t)}{(1+r)^{\tau}} + \frac{(ROE_{t+T+1} - r) \times (b_{t+T}/b_t)}{(1+r)^{T} r} \tag{35}$$

There are four variables to be forecasted in (35), namely, the book value b_t, return on equity ROE_t, capital cost r, and time horizon T. we explain below the four variables to be estimated one by one.

3.1 Cost of equity

There is little consensus on what the discount rate should be. In the original model presented by Ohlson (1995), capital cost r is viewed as the risk-free rate. Feltham and Ohlson (1995) again stress, “The equivalence of the risk-free interest rate in NIR (net interest relations) and PVR (present value relations) is central to our analysis because Modigliani/Miller (MM) concepts will apply. — The valuation of operating activities does not depend on the extent to which the firm distributes financial assets as dividends.” For the firms in the United States, the capital cost should reasonably be about 6%, which amounts to the interest rate of 30-year government bonds. However, many researchers ignored the precondition of the dividend discount model (DDM) or its derived forms and misused DDM in many situations.

For example, Schröder (2004) uses DDM to forecast equity premium and substitutes shareholder’s expected rate of return on risky assets for the cost of capital. This viewpoint is evidently problematic when the market is imperfectly competitive and liquidity of investment is irreversible.

Bernard (1995) also misunderstands RIV when he advocates that RIV “does not require any assumptions about the discount rate, that is, even though it is developed in a world of risk-free discount rates, one can substitute the cost of risky equity capital, so long as one is willing to accept the assumptions underlying the use of the same risky discount rate” in expression (19). Though he admits that the value estimates can differ across parties with different expectations, the models used in the estimation are the same. He doesn’t recognise that investors’ valuation models also vary with risky assets and investors’ preferences, that is, the model with different preconditions will have different forms and meanings as stated in our Section 2.

In empirical studies, a similar problem also appears in the capital asset pricing model (CAPM) that was used by Lee, et al. (1999) who estimate a mean discount rate of 12.13% over the sample period. Of course, here we perhaps don’t want to address the reasonability of CAPM in forecasting the cost of risky capital, but we need to make it clear that CAPM is developed in the framework of risk-aversion, which is different from the conditions that the DDM and RIV develop. By this token, a simple combination of DDM and CAPM is problematic.

The discussion above shows that different investors face a different cost of capital. In other words, the cost of capital is investor-specific. The capital cost links investor preference to risk that cannot be observed directly. Therefore what we observed and estimated are not the capital costs of individual investors, but are the market average costs. However, three things are observed equally with respect to

each investor. They are (1) fundamental value of firms which is objective existence, (2) the price of equity in the stock market that can be observed by every investor, and (3) the risk-free rate which can be viewed to be the long-term rate of government bonds and also provides investors with identical benchmarks.

While the fundamental value and trading price of stocks are formed through different mechanisms and can be estimated with different models, we need to make clear the implications that the variables in the models have for different kinds of investors. According to our analysis in Section 2, fundamental value is a concept linking the earnings, cost, as well as other things in the balance sheet. It is an objective existence with no relations to the preferences of secondary market investors. From the angle of firms, dividends are produced in the production process and are determined by the production itself, and have no links to investors' risk preference. The cost of equity is an investor-specific variable, and can vary across firms, consumers, as well as time.

We admit that different kind of investors could choose the assets to invest at will and view their earnings as opportunity costs. For example, assuming a firm raised $1 million from the initial public offering, it can invest the money to produce goods A with expected rate of return r_A and expected dividends $D_{A,t}$ and risk σ_A, or to produce goods B with expected rate of rate of return r_B and expected dividends $D_{B,t}$ and risk σ_B, or to buy long-term government bonds with risk-free interest rate 6%. If an investor invests to produce goods A, he loses two potential investment opportunities: r_B or 6%; if an investor invests to produce goods B, he loses two potential investment opportunities: r_A and 6%. For the same reason, if an investor buys long-term government bonds, he also loses two potential investment opportunities: r_A and r_B.

However, if all the markets are in equilibrium, an investor will be indifferent to which of the three assets to invest, since the three assets are perfect substitutes although their returns, 6%, r_A or r_B, are different. This is because, in equilibrium, the risk-adjusted returns across three assets are identical at 6%. The fundamental value of a firm should be estimated by substituting the discount rate in the dividend discount model (DDM) by this 6% risk-free long-term rate. It would be wrong to apply the other two rates, r_A or r_B, to the DDM or the RIV. This is because both r_A and r_B include a risk premium. To make this important issue clear, let us investigate the implications of the fundamental value.

Firstly, the fundamental value is a firm-related concept. Thus the cost of capital is the cost faced by a firm instead of other investors and consumers. As an investment body listing on the stock exchange, a firm raises capital from different sporadic individuals or institutions and invests them as a whole in goods production. Once the capital investment is made in the production process, it cannot be withdrawn from the firm. This means that the opportunity cost for a firm basically appears before the investment decision is made, after the decision there is little opportunity cost for the firm.

However, individual investors who hold the stock of the firm can cash them by going to the stock exchange. Transactions in the stock exchange do not change the firm's investment project, and firms do not expect to get a return from the stock exchange. The only way for firms to get back the investment and residual earnings is to produce and sell more products. This shows that there is a very big difference between investments by firms and the investments in financial instruments by investors of secondary

markets: firms invest in real goods production; once the investment is accomplished it cannot be withdrawn to invest for other purposes. A firm's investment is long-term in the form of fixed capital, and is thus basically irreversible. As for secondary market investors, their money is invested in financial instruments, this kind of investment is short-term and has relatively high liquidity and easy to cash out.

Secondly, the characteristic of long-term and low liquidity of firm investment distinguishes the capital cost faced by the firm from the capital cost faced by secondary market investors. Since the investment by the firm is irreversible and the dividends are collected on a yearly basis, the investment should be viewed as a long-term decision.[1] Accordingly, the cost of capital faced by the firm should be viewed as the long-term risk-free rate. Long term risk-free may be the only rate that can be accepted as a benchmark by all investors and is easy to forecast. Therefore, when estimating fundamental value by DDM and RIV, "assumption of a constant rate across firms and time is the best we can do." (Beaver, 1999).

While firms are considered to be an investment body with infinite horizon and risk- free rate is recognized as the cost of capital, the best substitute for cost of capital we think is the rate of long-term government bonds. In mainland China, the 28-year Treasury bond is the longest that has ever issued, whose yearly interest rate to maturity is 5.35%. However, Hong Kong has no such a long-term Treasury bond issued correspondingly. Hence we have to utilize US long-term Treasury bonds interest rate as risk-free rate faced by Hong Kong investors, because Hong Kong's currency is pegged to the US dollar and is fully convertible. The 30-year long Treasury bond interest rate to maturity in US is 6.05%. The difference of long-term interest rate to maturity between mainland and Hong Kong is mainly attributed to the separation of market and inconvertibility of the Chinese currency renminbi.

3.2 Forecasting of Future ROEs and Book-Value

Forecasting the future return on equities (ROEs) is one of the most important and difficult tasks in valuating stock. There have been a number of methods used to forecast them. A few are mentioned here including (1) equating of all future ROEs to the currently observed one $ROE_t^e = ROE_{t-1}$, (2) using the earning forecasts by analysts (Abarbanell and Bernard, 2000), (3) estimating the ROEs together with other variables through a constructed vector autoregressive (VAR) model (Feltham and Ohlson, 1995), and (4) computing the book-value by clean surplus relation (CSR) (Myers, 1999).

Unlike most other researchers who focus their interest on the correlation of stock price and accounting data, our focus is on how to estimate the fundamental value using accounting data. However, since many firms in mainland China either don't distribute dividends or distribute them arbitrarily, the dividend payout ratios are not easy to forecast. To avoid this difficulty of estimating payout ratios, we directly estimate the ROEs and the growth of book-value (b_{t+1}/b_t) using a panel data VAR model. The method

[1] Actually dividends as part of revenue are obtained as a whole by the firm first and then are allocated to stockholders, so stockholders are also concerned with the firm's decision.

allows us to simultaneously estimate ROE and book-value. The VAR equations that will be estimated are:

$$\begin{pmatrix} GB_t \\ ROE_t \end{pmatrix} = \begin{pmatrix} c_1 \\ c_2 \end{pmatrix} + \sum_i \begin{pmatrix} a_{1i} & b_{1i} \\ a_{2i} & b_{2i} \end{pmatrix} \begin{pmatrix} GB_{t-i} \\ ROE_{t-i} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix}$$

3.3 Forecasting horizons and terminal value

The forecast of the horizons and terminal value estimate is related to the behaviour of ROEs. In theory, if the fundamental value based on residual income valuation (RIV) exists, the finite series should approach the fundamental value in any accuracy as long as T is set long enough. In practice, it is not easy to select the time horizon. Penman (1991) forms portfolios of firms based on the level of ROEs during 1969-1985 and finds that abnormal ROEs appear to revert to an average return that is close to the long[-run stock returns, and most of the reversion appears to be completed by eight years. Halsey (2001) thinks that a benchmark of five to ten years for the forecast horizon appears to be justified by average market forces.

Considering their "ability to forecast future ROEs diminishes quickly over time, and forecasting errors are compounded in longer expansions," Frankel and Lee (1998) use a short horizon earnings forecast of up to three years to valuate equity. Bernard (1995) adopts a horizon as short as four years. In the case of Chinese mainland listing companies, it is difficult to specify how long it takes for the ROEs to converge given the short history of stock markets. But we can apply international experience and specify the horizon $T = 10$. Once the time horizon is fixed, the terminal value will be decided by (35).

3.4 Empirical Results and Interpretations

In our empirical study, 29 companies that issue both A-shares in mainland China and H-shares in Hong Kong are selected. Since the stock markets in mainland China have only a 12-year history and most of the listing companies were listed after 1996, the accounting data investigated in the paper are yearly data from 1998-2003. Such a short period of accounting data is not sufficient to accurately forecast their future trend using the company's data alone.

To overcome this difficulty, we classify those companies into different types of industries. Each company investigated belongs to one of them. Companies are put together according to their industrial type to form a panel. For each type of industry, we run on a pooled data VAR model to estimate the return on equity (ROE) and the growth of book value ($GB_t = b_t / b_{t-1}$) after controlling the fixed effect. This method helps us to resolve the estimation problem due to the short sample and can help improve the forecasts for the ROE trend and the growth of book-value.

When we examine whether the clean surplus relation (CSR) is satisfied with the data of 29 companies, we find that the CSR is frequently violated. There are many reasons for the violation. The most important one may be that many companies increase their book-value following reorganisation, merger and acquisition, or seasoned equity offerings. To apply the residual-income valuation (RIV) model, we have to adjust accounting data and make them satisfy the CSR. As a result, 7 companies that clearly violated

CSR and were difficult to adjust were eliminated, and 22 companies (see Table 1) that satisfied CSR were left for further discussion.

In Table 1, we list the equity per share, closing trading price for stock exchanges for both A-shares and H-shares and the price premium of A-shares over H-shares. The closing trading prices for all A-share companies are higher than their H-share counterparts on Dec 31, the last trading day in 2003, except the Tsingdao Beer Co. (青岛啤酒 code 600600). The price premium of A-shares over H-shares is as low as -4.99% for Tsingdao Beer, and as high as 298.66 % for Nanjing Xiongmao (南京熊猫 600775).

Table 3 presents the ROE forecasts and movements for each company investigated between 2003 and 2014. It shows that all variables are stationary process. Most of them converge to their average ROEs after 6 years. The only exceptions are Tsingdao Beer and Zhonghai Fazhan (中海发展 600026); the former converges much more slowly than the others and the latter seems converge and fluctuate up and down regularly.

The fundamental values of these 22 companies issuing both A-shares and H-shares that are operating in mainland China are determined by the earnings, costs and lifetime horizons faced by A-share companies. The risk-free rate faced by mainland companies is recognised to be 5.35%, the expected rate of return on 28-year period national debt. After discounting the expected future earnings by 5.35% according to RIV, we get the fundamental value estimates (Table 4). Table 4 shows that the price of A-shares for most of companies is higher than its fundamental value; only Angang Xinza (鞍钢新轧 000898) and Hailuo Shuini (海螺水泥 600585) are undervalued.

The magnitude of overvaluation is between -13% and 709% and the median is 51%. In contrast to overvaluation of the companies in A-share markets, more companies were undervalued in H-share markets. There are many reasons for the overvaluation of A-shares and the price differences between the mainland and Hong Kong. Among them are the differences of institutional framework, investor's preference to risk, and behaviour and categories of investors. However, from the perspective of fundamental value determination, only the difference in opportunity costs that investors face in the two markets could account for the pricing differences. As stated above, in mainland China, the risk-free interest rate faced by investors is represented by 5.35%, the 28-year Treasury-bond rate.

Given that Hong Kong is an international finance centre with world-wide investment opportunities, the risk-free interest rate they face is represented by 6.05%, the 30-year US Treasury-bond interest rate. This indicates that Hong Kong investors and mainland investors may give different fundamental valuations to the mainland companies. Table 4 lists the fundamental value estimates at a discount rate of 6.05%. Comparing the price of H-shares with their fundamental value, we find that four H-shares are priced 30% lower than their fundamental value estimates, six are priced 30% higher than the fundamental value estimates; another 12 companies are valued at a reasonable scope from -26% to 19%. The prices of the big sized blue-chips in the H-share market are much closer to their fundamental value estimates.

It seems that the valuation mechanism is much more efficient in H-share markets than in A-share market. The average premium of the A-share price over its fundamental value is 122%; the average premium of the H-share price over its fundamental value is only 18.8%. The median premium is 51% in the A-share

market compared with -5% in the H-share market. The variation of the premium in terms of variance is 3.45 in A-share markets, which is much higher than 0.44 in H-share markets. The correlation coefficient of A-share prices with their fundamental values is 0.93 compared with 0.85 in H-share markets.

At least part of the price difference between A-shares and H-shares can be attributed to the difference in fundamental valuation. Among the factors that affect fundamental values in Hong Kong and mainland China, only capital costs are different in the two markets. Comparing the fundamental value of the mainland with that of Hong Kong, we find that the fundamental value in the mainland is on average estimated at 16.6% higher than that in Hong Kong. Perhaps we can say 16.6% of the price premium of A-shares over H-shares is caused by fundamental value estimates. *Ceteris paribus*, once mainland China carries out the QDII programme, namely, the Hong Kong stock market opens to qualified domestic institutional investors from the mainland, the fundamental valuation mechanism in the mainland and Hong Kong will certainly converge. This will lead to the A-share prices going down and H-share prices going up.

Although the difference in capital cost can explain partly why investors in Hong Kong and mainland China evaluate the same company differently, it can't explain all the difference in prices between the two markets. Besides the capital costs, many other factors also account for the price differences.

Firstly, there are systematic shortages in the supply of equities in mainland stock markets. Chinese security supervision and management institutions are empowered to control the scale of the stock issue, leading to the demand for stocks being larger than the supply. Under this circumstance, the prices of stocks are extremely distorted; the price differences between the two markets have existed ever since the set-up of Chinese stock markets. Generally the P/E ratio for A-shares is much higher than that of H-shares. To issue stocks successfully, some companies deliberately overestimated their future earning ability, which misled investors and caused excessive demand.

Secondly, as is well known, people's motives to buy stocks can be classified into investment motive and speculative motive. Investment motive leads people to buy stocks based on fundamental value and speculative motive leads people to buy stocks based on short-term price changes. This indicates that not all investors buy shares purely according to their fundamental values. Some of them buy shares just for the purpose of speculation. When speculative motive dominates stock markets, even though issued stocks have no long-term investment value, their price could be driven to too high a level. In the early stage of the development of the mainland stock market, since investors faced a very limited supply of stocks, speculative demand for stocks was strong enough to support the overpriced stock markets. Both a high IPO premium and the gap between market price and fundamental value show that speculative demand is considerably strong.

Thirdly, the great price premium also originates from the estimate of the performance of the listing companies. If we investigate the categories of mainland investors, we find that mainland investors in the security markets can be classified into two classes. One class belongs to institutional investors, such as security companies and security investment funds. The other class belongs to individual investors.

Institutional investors, especially the big ones, in the mainland are basically funded and organised by state-owned enterprises (SOEs), stated-owned banks (SOBs) and other government institutions. They are directly or indirectly owned or controlled by the state. The government restricts and often does not allow private institutions to set up security companies or investment banks. Because of unclear ownership of state-owned institutions and lack of a proper management and supervisory system, these intuitional investors suffered a disease similar to the ordinary state-owned enterprises, that is a so-called soft-budget constraint.

Under the soft-budget constraint, although the assets of these financial institutions are owned in the name of the state, they are actually controlled by managers and are served for the managers, who are called insiders. The significant characteristic of insiders' control is the asymmetric distribution of earnings and losses. When institutional investors make earnings, the earnings are controlled and shared by insiders, but the owners of assets enjoy very little benefit from earnings. When the financial institutions make losses, the state as the owner of the assets bears most of the losses. Insiders do not take the responsibility and there is no mechanism to punish those who incurred losses.

As a result of the soft-budget constraint, managers of institutional investors actually were encouraged to run as much risk as they could to earn for themselves and at the same time took no responsibility for the failure of their investment. Once this type of investor dominates the stock markets, the stocks price must be driven to a very high level, leading to bubbles.

At the present mainland markets, individual investors are the major participants in the market in terms of the number of investors, although the intuitional investors are the dominant force in terms of the amount of investment. Unlike Hong Kong investors who face a global capital market and can more easily find better substitute financial instruments, mainland investors live in a closed and depressed financial market and have fewer financial instruments to choose from. This leads individual investors in mainland China to face even lower opportunity costs than that of Hong Kong. Lower opportunity costs combined with herding behaviour induced by institutional investors also create conditions for the self-realisation bubbles.

Fourthly, unrealistically optimistic expectations for the performance of listing companies also contributed to the high price premium. It is well-known that the economy of mainland China has maintained a 9% annual growth rate. Many investors don't have a deep understanding of the mechanism of the Chinese economy and mistakenly believe that they can share the benefits of the fast growth by accession into the capital market. However, it is well known that most of the mainland listing companies were reorganised from SOEs. The capital markets are positioned as tools for the SOEs to avoid bankruptcy. The stock market is set up to strengthen the control power of the state-owned economy over the whole economy.

Based on this, the government strenuously stresses the financing function of the capital market instead of its allocation function for financial resources. This leads the scarce resources to be allocated to less efficient SOEs. At the starting period, to keep the absolute control of the state over the listing companies, about 70% of shares were owned by the state, which promised not to trade on stock exchanges. Although these companies have been changed from pure SOEs to stock companies, they are still controlled by the government. As a matter of fact, the behaviour of these companies has no difference from the former SOEs but to control money. Because of the strong intervention from local governments,

listing companies have to pursue what governments like instead of the pure profit maximisation goal.

For example, besides profits they also pay attention to the market share and value-added so as to meet the government demand for higher GDP growth which was usually regarded as an indicator to evaluate the performance of local government officials for their promotions. As a result, enterprises with multiple objectives have excessive demand for investment and labour, and tend to produce more output than those with the single objective of profit maximisation (Ma et al., 2003; Li and Ma, 1996; Kanamori and Zhao, 2004).

However, enterprises with multiple objectives may be less competitive compared with those with a pure profit maximisation objective, since the former earn smaller profits. Even worse, since the marginal productivity of capital is less than its cost, profits tend to be negative, and enterprises may be unable to repay their loans to the banks (Zhao, Ma et al., 2002; Kanamori and Zhao, 2004). This results in a weakening of the foundation for the existence of the enterprise, and the creation of non-performing loans in the banking sector. Only time will finally make investors come back to rationality, once the performance of listing SOEs is unable to support such a high stock price. In the long run, stock price will have to converge to the fundamental value and the bubble will burst.

4. Conclusions and Implications

Through investigating the valuation models of DDM (dividends discount model), RIV (residual income valuation) and DCF (discounted cash flow) in theory and in practice, we find that the RIV model performs better than DDM and DCF model in evaluating the fundamental value of A-share stocks. Combining the truncated RIV with pooled data analysis, we obtain fundamental value estimates for 22 A-share and H-share companies from the perspectives of both firms in mainland China and investors in Hong Kong respectively, since they have different opportunity costs.

According to our estimation, about 16.6% the price difference between A-shares and H-shares can be explained by the capital cost difference. Hence 16.6% of the price difference between the two types of stocks should be acceptable based on fundamental value analysis. The paper also shows that correlation between equity price and its corresponding fundamental value for H-shares is larger than the correlation for A-shares. This indicates the H-share market is much more efficient than the A-share market in pricing equity. It also shows that the exceptional IPO price premium and huge price difference in the two stock markets cannot be fully explained by the capital cost alone, however.

Compared with the mature market in Hong Kong, there are lots of institutional deficiencies in mainland markets, such as the IPO pricing system, the government control of the scale of the stock issuing, and partition of equity rights. Under an imperfect market system, government behaviour, investors' behaviour, and firms' behaviour are all distorted and the distortion is getting more and more serious. In a closed market, when supervisory institutions and listing companies do not disclose key information publicly, their problems will accumulate and eventually will lead to the creation of a bubble that could exist for a long time.

However, with the opening up of the stock market to the outside world, the bubble cannot last forever. The Shanghai composite index falling from its highest point 2,200 in June 2001 to 1,100 points in May 2005 has shown that the reversion of stock price to fundamental value is underway. The integration process will speed up if the merging of A-shares with B-shares and H-shares as well as the implementation of the Qualified Domestic Institutional Investors (QDII) programme both take place. This integration will inevitably lead the H-share price to go down and A-share price to go up in the short run. It perhaps is something bad for A-share market investors but is good for H-share market investors. However, in the long run A-share market investors also may benefit from the opening up, because they can buy stocks at a much cheaper price than before and it prevents those companies from raising money without payback to investors.

All the problems existing in current mainland stock markets are rooted in incomplete market reform (Ma, 2001b). Since the market system has not been fully established, market participants in the mainland are not profit maximisation entities, leading to resources being used inefficiently. To promote financial efficiency and to make the market more attractive to investors, China needs to continue to reform her economic system, and push forward QFII and QDII, which have a great impact on the behaviour of government and investors and institutional reform as well.

As for the government sector, it should accelerate institutional reform, and create a good environment for Chinese capital market (Sun and Ma, 2003), and integrate mainland stock markets with that of Hong Kong and abroad. The government should try its best to resolve the equity rights partition problem, rebuild the pricing mechanism, improve the supervisory measures, and strengthen information disclosing to prevent companies from giving false information to mislead investors. The government also should take every measure to protect small and middle investors and to punish severely those individuals and companies who infringe on the interests of shareholders. Furthermore, government should reject the wrong idea that emphasises only the financing function and neglects the investment function of the stock market. Finally, the government should give up their power to price equity and leave it to the market.

Investors should be educated to fully recognise the risk that they face in the mainland capital market is even higher than in a mature market. They should establish a concept of fundamental value-based investment and pay more attention to the long-term investment value of a stock to limit speculative behaviour. When investing in the mainland market, investors should consider not only market risk but also institutional risk caused by institutional reform. They should be responsible for their wrong decisions instead of only complaining about the government sector.

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Table 1. Closing Trading Price and Price Premium of A-shares and B-shares
(Date: Dec 31, 2003)

Name in Chinese	Code of Companies	Equity Per Share	A-share Price	H-share Price	A-H share Premium
经纬纺机	000666	4.045	5.950	2.953	101%
新华制药	000756	3.090	5.730	1.969	191%
鞍钢新轧	000898	3.021	5.530	4.469	24%
科龙电器	000921	2.831	6.680	3.565	87%
华能国际	600011	5.771	17.550	14.312	23%
中海发展	600026	2.144	8.600	6.119	41%
中国石化	600028	1.879	4.950	3.698	34%
兖州煤业	600188	3.841	10.880	8.353	30%
广州药业	600332	2.996	6.610	2.064	220%
江西铜业	600362	1.971	7.780	4.549	71%
宁沪高速	600377	2.891	10.910	4.389	149%
深高速	600548	2.730	7.710	2.953	161%
海螺水泥	600585	3.650	11.430	10.641	7%
青岛啤酒	600600	3.315	9.200	9.683	-5%
广船国际	600685	1.368	5.770	1.947	196%
上海石化	600688	2.154	5.860	3.671	60%
南京熊猫	600775	1.724	8.060	2.022	299%
交大科技	600806	2.130	6.050	1.820	232%
马钢股份	600808	2.318	4.700	2.740	72%
仪征化纤	600871	2.281	5.270	2.086	153%
创业环保	600874	1.518	7.290	2.421	201%
东方电机	600875	2.109	9.100	3.937	131%

Table 2. IPO Price Premiums in Different Markets of the World

Region Name	Period	Premium	Region Name	Period	Premium
Israel	1993-1994	4.50%	France	1983-1992	4.20%
Turkey	1990-1995	13.60%	Canada	1971-1992	5.40%
Hong Kong	1980-1996	15.90%	United States	1980-2000	6.30%
Chile	1982-1990	16.30%	Austria	1964-1996	6.50%
Singapore	1973-1992	31.40%	Netherlands	1982-1991	7.20%
Mexico	1987-1990	33.00%	Denmark	1989-1997	7.70%
India	1992-1993	35.30%	Finland	1984-1992	9.60%
Taiwan	1971-1990	45.00%	Belgium	1984-1990	10.10%
Thailand	1988-1989	58.10%	Germany	1978-1992	10.90%
Korea	1980-1990	78.10%	Australia	1976-1989	11.90%
Brazil	1979-1990	78.50%	United Kingdom	1959-1990	12.00%
Malaysia	1980-1991	80.30%	Norway	1984-1996	12.50%
China	1997-2003	118.00%	Japan	1970-1996	24.00%

Table 3. ROEs Forecasts for 22 Companies from 2004 to 2014 in Mainland China

Code	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
000666	6.61	5.781	5.473	5.319	5.246	5.211	5.194	5.186	5.183	5.181	5.180	5.179
000756	2.98	3.690	4.098	4.346	4.496	4.586	4.641	4.673	4.693	4.705	4.713	4.717
000898	16.01	10.020	8.706	8.433	8.372	8.359	8.356	8.356	8.356	8.356	8.356	8.356
000921	7.2	7.673	7.830	7.877	7.892	7.897	7.899	7.899	7.899	7.899	7.899	7.899
600011	15.69	13.361	12.521	12.177	12.040	11.986	11.964	11.955	11.951	11.950	11.950	11.949
600026	13.77	13.139	14.993	13.816	15.060	14.013	14.981	14.121	14.897	14.201	14.827	14.265
600028	11.667	10.766	11.035	10.795	10.897	10.827	10.862	10.841	10.852	10.845	10.849	10.847
600188	10.03	11.139	10.675	10.865	10.787	10.819	10.806	10.811	10.809	10.810	10.810	10.810
600332	5.75	5.755	5.726	5.710	5.700	5.694	5.690	5.688	5.687	5.686	5.686	5.685
600362	9.62	9.881	9.976	9.983	9.985	9.985	9.985	9.985	9.985	9.985	9.985	9.985
600377	6.53	7.561	8.034	8.263	8.374	8.428	8.454	8.466	8.472	8.475	8.476	8.477
600548	14.31	11.833	10.570	9.961	9.667	9.524	9.455	9.422	9.406	9.398	9.394	9.392
600585	16.13	15.957	14.939	14.300	13.861	13.562	13.358	13.219	13.124	13.060	13.016	12.986
600600	7.22	6.974	8.156	9.124	9.953	10.662	11.268	11.786	12.229	12.608	12.932	13.209
600685	6.36	5.258	4.832	4.607	4.500	4.447	4.422	4.409	4.403	4.400	4.399	4.398
600688	8.935	6.897	6.758	6.786	6.783	6.783	6.783	6.783	6.783	6.783	6.783	6.783
600775	8.71	11.641	12.020	12.100	12.113	12.115	12.116	12.116	12.116	12.116	12.116	12.116
600806	2.89	2.619	2.420	2.330	2.287	2.266	2.256	2.251	2.249	2.248	2.248	2.247
600808	18.67	10.746	8.259	7.453	7.199	7.118	7.092	7.083	7.081	7.080	7.080	7.080
600871	2.63	3.523	3.842	3.941	3.971	3.981	3.984	3.985	3.985	3.985	3.985	3.985
600874	13.71	12.850	12.439	12.350	12.320	12.312	12.310	12.310	12.309	12.309	12.309	12.309
600875	3.49	3.918	4.053	4.098	4.112	4.117	4.119	4.119	4.119	4.119	4.119	4.119

Table 4. Estimates of Fundamental Values under Different Capital Cost Assumptions

Code	Company Name	EPS	A_P	H_P	A_H %	A_F	H_F	AF_HF %
000666	经纬纺机	4.045	5.950	2.953	101.50%	3.954	3.449	14.63%
000756	新华制药	3.090	5.730	1.969	191.07%	2.592	2.264	14.52%
000898	鞍钢新轧	3.021	5.530	4.469	23.74%	5.854	4.939	18.54%
000921	科龙电器	2.831	6.680	3.565	87.39%	4.802	4.078	17.75%
600011	华能国际	5.771	17.550	14.312	22.62%	17.396	14.880	16.91%
600026	中海发展	2.144	8.600	6.119	40.56%	8.019	6.889	16.40%
600028	中国石化	1.879	4.950	3.698	33.87%	4.326	3.751	15.31%
600188	兖州煤业	3.841	10.880	8.353	30.25%	10.526	8.928	17.90%
600332	广州药业	2.996	6.610	2.064	220.20%	3.228	2.788	15.77%
600362	江西铜业	1.971	7.780	4.549	71.03%	4.465	3.822	16.81%
600377	宁沪高速	2.891	10.910	4.389	148.55%	5.172	4.423	16.94%
600548	深高速	2.730	7.710	2.953	161.10%	5.095	4.484	13.61%
600585	海螺水泥	3.650	11.430	10.641	7.41%	13.104	11.221	16.78%
600600	青岛啤酒	3.315	9.200	9.683	-4.99%	7.585	6.537	16.03%
600685	广船国际	1.368	5.770	1.947	196.31%	1.093	0.934	17.01%
600688	上海石化	2.154	5.860	3.671	59.62%	2.928	2.502	17.04%
600775	南京熊猫	1.724	8.060	2.022	298.66%	5.390	4.590	17.43%
600806	交大科技	2.130	6.050	1.820	232.49%	0.748	0.640	16.85%
600808	马钢股份	2.318	4.700	2.740	71.53%	3.851	3.175	21.30%
600871	仪征化纤	2.281	5.270	2.086	152.68%	1.610	1.394	15.47%
600874	创业环保	1.518	7.290	2.421	201.14%	4.279	3.696	15.79%
600875	东方电机	2.109	9.100	3.937	131.13%	1.528	1.312	16.51%

Notes: where
EPS: equity per share
A_P: closing price of A-shares on Dec 31, 2003
H_P: closing price of A-shares on Dec 31, 2003
A_H %: percentage of closing price of A-shares over H-shares on Dec 31, 2003
A_F: fundamental value estimate at capital cost 5.35%
H_F: fundamental value estimate at capital cost 6.05%
AF_HF %: percentage of A_F over H_F.

Figure 1. IPO price premium in different markets

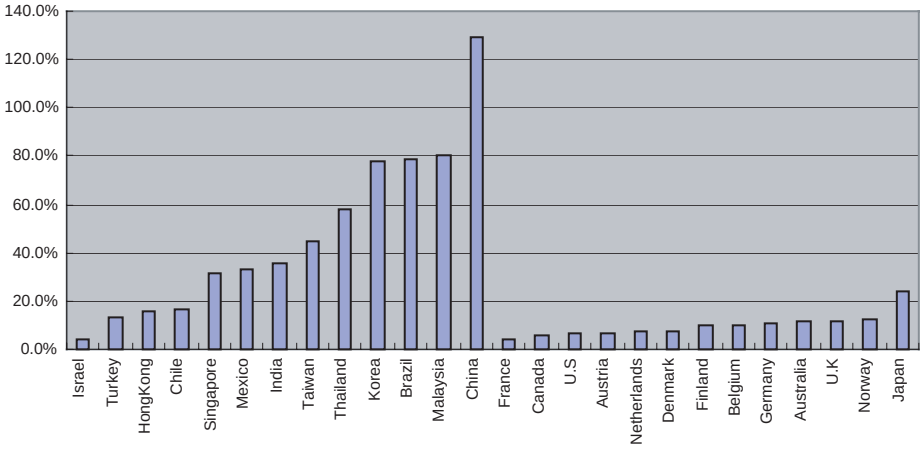

Figure 2. Percentage of Price of A-share over Fundamental Value Estimates

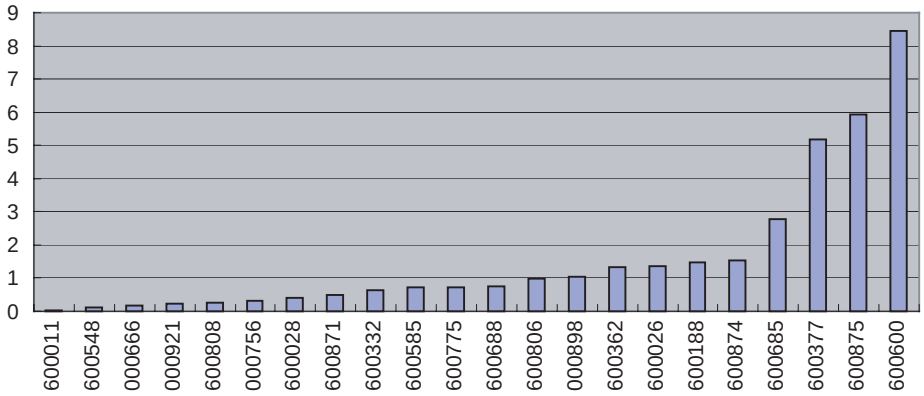

Figure 3. Percentage of Price of H-share over Fundamental Value Estimates