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Financial information relevance with stock return and return disparity study: case for China A-H dual-listed companies

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Abstract

The relationship between stock return and company financials information as a key component of investment decision making has its highly practical implications for equity market investors. This paper narrows down the scope to examine how this relationship looks like for dual-listing companies in China's developing capital market, more specifically between return or return disparity and two price ratios, earnings to price and book value to price ratio. A series of fixed-effect models are applied on a panel data set of A and H dual-listing companies to test three main hypotheses developed on this issue. It was found that price ratios BV/P explain A and H current share returns with a negative responding effect, trailing E/P ratios cannot always explain the current period return especially under normal market conditions but forward E/P are more useful. Return positively responds to E/P ratios when significant relationship holds. A shares generally demonstrate higher value-relevance with price ratios than H shares do, and the relevance sensitivities with price ratios are higher too. BV/P ratio (both trailing and forward) is useful in return prediction and more so for A shares than H shares. AH share return disparity can be predicted from the gap between A and H share BV/P ratios, the wider the gap the bigger the disparity will be. Generally speaking, A (H) return or AH return disparity predictability is undermined during period with strong market disturbance like financial crisis, indicating the limitations of such predictability.

Key words: market segmentation, value relevance, AH dual-listing, return disparity

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1. Introduction

Information functions as the core of capital market in the sense that all sides of market participants make decisions based on their accessible information sets. As one of the major sources of information in public equity market, company financial reporting lies in the center of company performance relevant information set and is the basis of most investors' analysis and decision-making process. 'Fundamental analysis' is how people usually refer to of this kind of analysis based on how companies perform in their business. It is especially critical to long-term stock investors who have much heavier reliance on analyzing 'fundamentals' among other factors than short-term investors to implement investment strategies.

At the same time, multiples including price to earnings (P/E) or price to book (P/BV) are two most popular metrics used in assisting the 'fundamental' based investment decision-making. However, the usefulness of these metrics relies on whether and to what extent they have implications on stock returns. Therefore studies on the value relevance of company financial indicators or multiples to stock price or returns become potentially interesting from an investor perspective. Since 1990s, a considerable amount of academic research has been carried out to address this topic through studying both developed and developing markets, the latter of which has attracted lots of academic attentions in recent decades because the emerging markets seems to demonstrate significant different characteristics compared to developed financial markets. Key researches from various angles addressing this topic, which will be reviewed in more detail in later section, provide some meaningful insights although empirical findings are mixed due to different research design or sample differences. This paper tries to provide most recent empirical evidence based on findings in Chinese capital market.

The purpose of this paper is to explore the implication of price ratios (inverses of price multiples) in investment decisions through looking at the value relevance issues

as well as return predictability from price ratios given segmented Chinese stock markets. Focus of the study is specifically devoted to a group of dual-listed Chinese companies in mainland stock markets (Shanghai and Shenzhen Stock Exchange) and Hong Kong stock market (Hong Kong Stock Exchange) not only because these three markets provide the most liquid market places for both international and domestic investors in China, but also comparing dual-listings in Chinese mainland and Hong Kong stock markets were less researched previously for no clear reason. On a practical side, findings from this study should contribute to providing a reference point for developing potential trading strategies on dual-listings within (between) the mainland and Hong Kong stock markets. The dual-listing companies of interest in this paper issue both A and H share, which respectively represents mainland Chinese company listing in Shanghai/Shenzhen stock exchange and in Hong Kong stock exchange. Hong Kong is recognized as a semi-foreign market for mainland China investors due to the different regulatory system applied there, although efforts on integrating both markets have been made since 1997 when Hong Kong returned to China as a Special Administrative Region. The dual-listing companies in A and H market have dual financial reporting system to follow, and capital assets do not flow completely freely between the two capital markets. These segmentations provide a unique and interesting ground for this research. More specifically, the paper investigates Chinese dual-listing return and return disparity in association with two financial accounting ratios, namely E/P and BV/P under the condition of segmented Chinese share market. The latest data are used to gain the most recent evidence.

The paper commences with the background of this study, including introductions of Chinese stock market especially A and H share markets, followed by a sub-section introducing Chinese accounting and auditing system. Section 3 reviews previous research on Chinese market segmentation and AH share premium, together with a summary of studies on stock value relevance as well as return predictability based on price ratios. Assumptions and hypotheses of this paper are derived accordingly in Section 4. Section 5 and 6 describes data and research methodology respectively,

followed by Section 7 reporting empirical findings and discussion of the results. Conclusion, limitations and possible future research are presented in the last two sections. References are listed in the end and followed by the appendix where additional graphs, tables are found.

2. Background

2.1 China stock market

Chinese stock market has been segmented ever since 1991 when the first stock exchange opened in Shanghai. Along with its gradual development path was the opening of new market sections, regulation and deregulations, state-initiated capital market reforms, as well as various financial production innovations. All these direct toward a long term vision of a more open and internationalized financial market in China.

Currently there are four major types of shares in Chinese corporations, namely government shares, legal entity shares, employee shares[1] and traded shares which further comprise of A-shares, B-shares and H-shares that are issued and traded in China territory. Differences among these shares mainly lie in the ownership restrictions as well as stock trading rules. A share as the mainland share, are issued by mainland China incorporated companies and denominated in Chinese Yuan (CNY). Mainland individual[2] and institutional investors can invest in A shares freely through Shanghai or Shenzhen stock exchange. H share are issued by mainland China incorporated companies that trade in Hong Kong dollars (HKD) in Hong Kong stock exchange, together with other Hong Kong listings. B shares are mainland

[1] Employee shares are those shares offered to managers or employees by Chinese listed companies; these shares can only be tradable after filing for permission with the Chinese Securities Regulatory Committee (CSRC).
[2] individual investors residing in Hong Kong, Macau or Taiwanan are not allowed to invest in A share directly.

incorporated company issues traded in US dollars (USD) in Shanghai or HKD in Shenzhen stock exchange. Initially B shares were only allowed to be traded by foreign investors (including those from Hong Kong, Macau or Taiwan) since 1992 when the B market was established, but from 19 Feb 2001 on, domestic mainland investors can also trade B shares in USD. The major differences among A, B and H shares are summarized in Table 2-1. These differences such as ownership restrictions creates another layer of segmentation on top of the capital flow control barrier the central government set between mainland China stock market as a semi-open domestic market and Hong Kong stock market as a semi-foreign and international market.

Table 2-1. Comparison of major type of shares in Chinese stock markets

	Exchange	**Investor**	**Currency**	**Settlement**
A share	Shanghai Stock Exchange (SSE) Shenzhen Stock Exchange (SZSE)	Domestic individual investor (mainland China citizens), institutional investors including QFII	CNY	T+1
B share	Shanghai Stock Exchange (SSE) Shenzhen Stock Exchange (SZSE)	Foreign and domestic (opened to domestic individuals since Feb 2002) individual or institutional investors	USD HKD	T+3
H share	Hong Kong Stock Exchange (HKSE)	All investors in HKSE, except for China mainland individual investors, who can only indirectly invest through mainland QDII	HKD	T+0 T+2

HKSE		**SSE**		**SZSE**	
No. of listed companies	Market cap	No. of listed companies	Market cap	No. of listed companies	Market cap
1,426 (no. of H shares: 163)	2,751,672	905	2,905,570	1246	1,336,394

Note: market cap in USD, all numbers are those as of 31 Mar 2011.
Source: Hong Kong stock exchange, China Securities Regulatory Commission

The direction of Chinese capital market reform points towards a more integrated and open market in the long run, and the Chinese government has carried out a series of

important barrier-releasing actions including 'Reform of Non-tradable Shares' in A share market that aims to release the trading restrictions on government shares and legal entity shares. Removal of certain restrictions laid between markets, for example, improving A and B share market integration by allowing mainland China investors buying B shares directly, and setting up QFII[3] and QDII[4] that are allowed to invest cross border with quota allocated by China authorities have been examples of Chinese capital market liberalization too.

Because of the deregulations, B share market has become a more integrated market with A share market since 2001. H share trading adopted a similar easing policy in Aug 2007 to allow domestic individual investor buying Hong Kong listed shares (including H shares) directly through a program called 'Hong Kong Stock Express' (also called 'through-train' program), however the program test-run plan was suspended only three months after the new policy was published by State Administration of Foreign Exchange (SAFE), mainly due to the concern of over-releasing of China's capital account. Cautious but progressive efforts were being made after that to further strengthen the integration of Hong Kong and mainland China capital markets, but so far there are still significant investment barriers between the two and Chinese mainland investors can only directly invest in Hong Kong listed shares through certain institutional investors authorized as qualified domestic institutional investors (QDII).[5]

Mainland Chinese companies have significant presence in Hong Kong stock market. (see Table 2-2) As of March 2011, there are 163 H shares, 103 red chip stocks (companies incorporated outside China and listed in Hong Kong), and 334 Non-H share mainland private enterprises, totaling 57.2% of market capitalization and 65%

[3] Qualified foreign institutional investors.
[4] Qualified domestic institutional investors.
[5] Direct investment by individuals can be done with opening an account with a Hong Kong based brokerage firms which have limited presence in mainland, and the transaction cash inflow and outflow to/from mainland China is subjected to China's capital account control with capped amount per annum. Therefore this 'direct' investment channel has not being influential in the market so far.

of equity turnover in Hong Kong stock exchange. (66 of the 163 H shares have dual-listing in mainland's two A share markets, called AH companies. These AH companies, after applying for certain selection criteria, reduce to a total number of 26 companies which comprise the selected sample of this paper.

Table 2-2. Mainland Chinese enterprises in Hong Kong Stock Exchange

Mainland Enterprises (Main Board and GEM)	
No. of H shares	163
No. of Red chips Stocks[6]	103
No. of NHMPE	334
Market capitalisation (% of market total)	57.20%
Turnover value (% of equity turnover)	65.00%

Note: 1) GEM= Growth Enterprises Market (board)

2) NHMPE = Non-H Share Mainland Private Enterprises.

3) March 2011, Month-end figures

Source: Hong Kong Stock Exchange

2.2 China accounting and auditing practices for A and H shares

Companies that issue A and H shares at the same time are required to comply with different financial reporting systems, under which listed companies prepare financial reports under People's Republic of China Generally Accepted Accounting Principles (PRC GAAP (sometimes interchangeable with ABSE[7]) that are audited by local certified accounting & auditing firms, while H share companies prepare reports under and the International Financial Reporting Standards (IFRS)[8] or Hong Kong GAAP that are audited by international auditors. For companies that dual-list on both A and H markets, they have to file financial reports under both systems (or make reconciliations based on one system to generate the other report) until December 2010,

[6] Hong Kong listing of oversea-registered Mainland China companies.

[7] Tthe Accounting System for Business Enterprises (ASBE) was introduced in 2001 for A- and A&B-share firms.

[8] Incorporated mainly from formerly-known name of International Accounting Standards (IAS). International Financial Reporting Standards (IFRS) is used from 2001 when IASB (International Accounting Standard Board) took over from the IASC (International Accounting Standards Committee) the responsibility for setting International Accounting Standards.

when Hong Kong Stock Exchange announced accepting H share companies reporting under Chinese GAAP as a way of reducing company compliance costs.

Table 2-3. Comparison of accounting and auditing practices in Chinese stock markets

Share	Accounting standard	Auditors
A-shares	PRC GAAP	Local auditing firms
B-shares	IFRS	International auditing firms
H-shares	IFRS/HK GAAP	International auditing firms
AB-shares	PRC GAAP & IFRS dual reporting	Local CPA & international auditing firms
AH-shares	PRC GAAP & IFRS/HK GAAP dual reporting	Local CPA & international auditing firms

Differences between Hong Kong GAAP and IFRS are minimal since 2005 except for a few minor ones (Deloitte 2005), when great efforts were made to integrate Hong Kong GAAP and IFRS. Differences between PRC GAAP and IFRS are bigger than that between Hong Kong GAAP and IFRS, therefore in many cases, key company financials such as earnings or net assets appear differently in the same financial reports under two sets of accounting rules. The latest (Dec 2010) approved one system reporting/auditing regulation by HKSE removed the policy barrier of financial reporting gap now existing among AH companies, and it is expected that in the long run more AH companies will only adopt PRC GAAP to cut their compliance costs. However in the short term this policy will not change current practice for majority of AH companies mainly due to their concern on whether international investors can adapt well to the PRC GAAP reporting instead of IFRS reporting. As of 18 April 2011, only about 10% of the small and medium-sized AH companies shifted towards sole PRC GAAP reporting, big companies took a wait-and-see strategy and mostly had concern on investors negatively interpret them shifting to one accounting system only immediately[9].

[9] Sina.com.hk news, http://finance.sina.com.cn/stock/hkstock/hkstocknews/20110418/08099706108.shtml, accessed on Apr 20, 2011

3. Theoretical background

3.1 Chinese stock market segmentation and A-H share premium disparity

There has been considerable amount of literature on how market segmentation affects share price premium for multi-listings. Empirical studies on this issue usually find that countries where ownership restrictions on stocks exist, the foreign shares trade at a price premium over the domestic counterpart shares. Countries of such example include Finland (Hietala, 1989), Thailand (Bailey and Jagtiani, 1994), Switzerland (Stulz and Wasserfallen, 1995), and Mexico (Domowitz et al., 1997). However the case for China is reversed in a way that Chinese foreign shares (B or H shares) trade at price discount over domestic counterpart shares (Bailey, 1994; Su, 1997; and Fernald and Rogers, 1998). Reasons for Chinese foreign share price discounts are investigated through research that tests four types of hypotheses: Differential risk hypothesis, which assumes that foreign investors require lower risk premium than domestic investors on an unrestricted stock (Hietala 1989); Differential demand hypothesis, which assumes different stock demand elasticity facing different investor groups; liquidity hypothesis which is based on stocks traded with varied liquidity level, and information asymmetry hypothesis addressing premium caused by information gap.

Most literature test these hypotheses based on empirical studies on A and B share market, but just a few recent studies provide more evidence on A and H share comparative studies. Although finding out reasons for the H share price discount is not the purpose of this paper, prior research that does look for explaining this reversed phenomenon helps with interpreting results of this study. On what makes A and H share markets segmented, Wang and Jiang (2004) and Li et al. (2006) argue that not only stock ownership but also listing and trading locations manifests segmentation between the A and H share markets. Hing-Wah Lee (2009) reinvestigates liquidity

hypothesis and finds out that China A-shares on average provide better market liquidity than their Hong Kong H-share counterparts do.

3.2 Value relevance of company financials

The effect of different accounting systems along with China's segmented share markets has been researched in the past decade, most of which make efforts to address the issue of value relevance of accounting information in China as one of the emerging markets. following the description by Francis and Schipper (1999), in this paper value relevance is defined as "the ability of accounting numbers to summarize the information underlying the stock prices, thus the value relevance is indicated by a statistical association between financial information and prices or returns''. To investigate the value relevance relationship, previous academic studies mainly apply two types of models, price model and return model that used share price or return as dependant variables on a series of independent financial variables respectively. Typical price models applied usually include independent variables such as earnings and book value of equity, e.g Collins et al. (1997), Bao et al. (1999) and Chen et al. (2001). A return model, first developed by Easton and Harris (1991), is most widely applied to explore linear relationship between stock returns and two independent variables - earnings per share and change of earnings per share over previous period. Evidence in China stock market was found to support A share value relevance of earnings reported under PRC GAAP includes studies by Haw et al. (1999) on their return model built on entire population A-share during 1994 and 1997, and Chen et al. (2001) with both price and return model tested on a sample of A share companies during 1990 and 1997, who verifies value relevance of financial reporting disclosure in China and it varies on different market. Companies that only have A-share listings were found to be more value-relevant than companies with both A and B share listings. And the results are consistent for both price and return models. Further researches that examine A, B share markets at the same time also find that A-share listing companies have higher value-relevance than B-share listings in China and the

value-relevance seem to increase over time between 1993 and 1996 for both types of companies with price model applied (Bao and Chow, 1999). Other researches report opposite findings with longer time series. For instance, with similar model specification Samia and Zhou (2004) study on AB dual-listed companies from 1994-2000 and obtained evidence that the accounting information in the B-share market is more value-relevant. The relevance level for A-share companies increased and peaked in 2006, while for B-share companies there had no significant change over time. Liu and Liu (2007) update the research with the same price model but provided multi-faceted insights on the value relevance issue in the Chinese stock market with more comprehensive analysis on data from 1999 to 2003. They find that value-relevance between accounting information and stock price are different for all A, B and H shares, and that B and H share markets have higher value-relevance than A share market. Certain company characteristics such as percentage of total tradable shares does not make a difference in value relevance cross-sectionally but investors tend to rely more on earnings than book value of equity in valuation process for companies with higher percentage of total tradable shares. Another interesting result found by them is that during bearish market situation, investors may perceive information on historical resources (reflected by book value of equity) than current performances (reflected in earnings).

3.3 Asset pricing theories and return predictability based on factors

The earliest and most well-known model to explain stock return difference was the Capital Asset Pricing Model (CAPM) built on the Markowitz paradigm, by assuming that expected return of any risky assets linearly depend on its co-movement with the market portfolio. The market return premium is a common risk factor that drives asset pricing.

However after the development of CAPM model in 1960s, there were some cross-sectional studies on stock returns showing contradicting results against what

CAPM model predicted, supported by large sample tests with the help of a few well-developed databases such as *Compustat*. Additional factors, though not necessarily being common risk factors were found to explain stock return differences such as earnings/price, firm size, long-term return reversals, book-to-market equity, leverage and momentum. Fama and French (1992) synthesized empirical findings of some of these factors (size, leverage, book-to-market equity and beta) in a single model, based on which they further established Fama and French (1993) three-factor model. The three-factor model finds results supporting two additional factors besides excess return specified in CAPM model, namely SMB - based on investment strategies of long in small-cap stocks and short in large-cap stocks, and HML – based on long in high book-to-market equity stock (value stocks) and short in low book-to-market stocks (growth stocks). And the three-factor regression reported significant coefficients on all three factors and improved R-square than a CAPM model.

These researches, based mainly on US data exploring new pricing factors, disclose potential relationship between stock returns and certain characteristics, such as earnings to price or book to price ratios. Whether the relationship also stands for markets outside the US is a question to be tested. More especially, whether and how the relationship holds for companies with certain natures such as dual-listing in segmented markets remains to be seen. This paper tries to provide some empirical findings on this question, with its models built not to serve the purpose of finding out common risk factors that drive asset returns, but rather to investigate whether company characteristics like E/P and BV/P ratios can explain or predict returns and return disparity between dual-listings.

4. Hypothesis & Assumptions

As summarized in section 3.1, considerable literature had studied on finding out explanations for the price or return disparity; however this paper tries to take the price/return disparity as given and examine how financial accounting information (valuation ratios E/P and BV/P) of AH dual-listed companies can be used for interpreting A and H share returns separately and jointly as AH return premium/discount. I also believe that existing significant price or return disparity among segmented stock markets indicate potential arbitrage opportunities once an arbitrage mechanism becomes available. However the arbitrage mechanism is still lacking mainly due to Chinese Yuan and foreign currency flow control, capital market segmentation and regulatory concerns. Therefore discussing strategy implementation in practice with these potential arbitrage opportunities is not yet viable; instead, several hypotheses can be interesting to be tested. Before outlining these hypotheses, several assumptions are made first in this section.

4.1 Assumptions

Assumption (1). H share investors utilize financial accounting information under IFRS and A share investors utilizes that under PRC GAAP.

Although AH dual-listed companies had financial statement reports under both PRC GAAP and IFRS therefore information under both systems are accessible to all investors, it is assumed that international investors mainly use company financial reports under IFRS and domestic investors use that under PRC GAAP for the purpose of convenience and comparability with international and other A-listing domestic peers. Concerns of most AH companies on shifting to a single-system reporting stopped them to do so, and this indirectly reflected the assumption that reporting under IFRS or HKGAAP is heavily relied on by international investors on H share

markets. While in A-share markets, domestic investors heavily rely on PRC GAAP reporting. This situation is not likely to change swiftly and the convergence of all accounting stands sees only in the longer term.

Assumption (2). China stock market is a weak-form-efficient market, certain public information such as company financial accounting information can be used in future price prediction.

This paper takes the assumption of Chinese stock market being a weak-form-efficient market which follows the findings of previous empirical studies such as Sun, Zhang, & Zhou (1997); and Chen, Chen, & Su (2001). And it further assumes that information such as financial reporting is useful for investment decisions and can be taken advantage of to predict future stock return, following Francis & Schipper, (1999).

Four additional assumptions are made especially in relation to the raise of key hypotheses of this research.

Assumption (3). High E/P ratio indicates low earning growth expectations and possibility of value stocks.

Multiple P/E (price to earnings) can be interpreted as how much price an investor is willing to pay per dollar of earnings. A high P/E multiple indicates investors' expectation of high earning growth in the future for the concerning company because otherwise the marking is over-paying for the company. Therefore a high E/P ratio, the inverse of P/E multiple, reflects investors' expectations of low earning growth because every dollar an investor pays for the stock is backed up by more dollars of earnings. These stocks may represent value stocks that are 'good buy' because one can probably pay lower market price for company with good profitability.

Assumption (4). High BV/P indicates low net asset valuations and possibility of value stocks.

Multiple P/BV (price to book value equity) can be interpreted as how much price an investor is willing to pay per dollar of tangible net asset of a company. A high P/BV multiple indicates high market expectation of cash flow that the company assets can generate in the future in the concerning company (yet again high future growth). Therefore a high BV/P ratio, the inverse of P/BV reflects low market expectation and valuation of the company net assets. But similar to high E/P ratio stocks, these high BV/P stocks can also imply 'good buy' because one can probably pay lower market price for the same value of net assets.

Assumption (5). At least one of both, trailing E/P and BV/P or forward E/P and BV/P ratios are useful.

There are usually two types of price multiples (or ratios) used in practice, trailing or forward. Trailing E/P (BV/P) is defined as earnings (or book value of equity) between time $T-1$ and T (for book value it is the T year end value that is used) divided by stock price at time T, i.e. historical earnings (book value) and current stock price are used in the trailing ratio. Forward E/P (BV/P) is defined as expected earnings (or book value of equity) between time T and $T+1$ (for book value it is the expected $T+1$ year end value that is used) divided by stock price at time T, i.e. (projected) future earnings (book value) and current stock price are used in the forward ratio. Although it may be argued that only forward price ratio should be the concerning one because current price should already contain information about past financial information. However, it should be also noted here that in practice, company financial release usually comes some time after the reporting period end. Therefore, trailing ratios though literally means historical performance over current price, the current price does not contain such historical information until the information is disclosed some time after the current time spot. Forward ratios, are forward-looking ratios that contains information (expectations) stretching even further away into the future.

Assumption (6). Exceptional market conditions such as financial crisis may have an influence on stock value relevance or return predictability.

Recalling that Liu and Liu (2007) find that during bearish market situation, investors may perceive information on historical resources (reflected by book value of equity) than current performances (reflected in earnings). Taking into similar distortions that may be caused by exceptional market conditions, it is therefore reasonable to assume that the recent financial crisis may lead to different findings on A and H share value relevance or return predictability.

4.2 Hypotheses

Based on assumptions outlined in section 4.1, hypotheses are made and will be tested in later sections.

Hypothesis 1. Trailing and (or) forward price ratios E/P and BV/P under PRC GAAP (IFRS) can explain A (H) share current period returns.

Current period returns defined as periodic return from the past one period (arithmetically denoted as $\frac{P_t - P_{t-1}}{P_{t-1}}$).

Hypothesis 2. Trailing and (or) forward price ratios E/P and BV/P under PRC GAAP (IFRS) can predict A (H) share next period returns.

Next period returns defined as periodic return in the following one period (arithmetically denoted as $\frac{P_{t+1} - P_t}{P_t}$).

Hypothesis 3. Difference between price ratios under PRC GAAP and under IFRS can partially explain AH share return disparity in the current or the next one period.

Next period AH return disparity is defined as differences of A and H share periodic return in the following one period (arithmetically denoted as $\frac{P_{t+1}^{A}-P_{t}^{A}}{P_{t}^{A}}-\frac{P_{t+1}^{H}-P_{t}^{H}}{P_{t}^{H}}$).

5. Data

5.1 Data collection

To test the hypotheses developed in section 4.2, an initial sample of 66 AH dual-listed companies are selected, which represents the full body of listing AH shares as of now March 2011. Semi-annual A and H share price between end of June 2002 and end of June 2010 are collected then used to calculate 6-month returns for both A and H share. Company half-year financials earnings per share (EPS) and book value per share (BPS) are collected for period 2002 first half (2002 S1) to 2010 first half (2010 S1), which are used to derive corresponding E/P and BV/P ratios.

5.2 Sample selection

Certain criteria are applied to the initial data collections to get the final sample data, for technical purposes. These criteria include:

1. Financial sector companies (banks and insurance companies) are excluded due to the same reason Liu and Liu (2007) mention in their research that certain financial attributes may distort financial information of total sample where non-financial companies are majority.
2. Same length of data points over time and entities are needed for a highly balanced panel dataset and a consistent comparison, but missing data points exist in the initial list of 66 AH companies as all companies do not have same listing time in A shares and H shares. The AH companies that have more than 4 periods of data missing on any of the variables are excluded as well.

Filtering on these two criteria left a sample of 26 AH companies with A and H share prices (returns) respectively with 6-month earnings per share (EPS) and book value of equity per share (BPS) over the period of June 2002 to June 2010 (17 periods). Total number of observations is 442 in the panel data with few single data point missing for certain companies in certain years but this will have minimal impact to the sample data effectiveness. An example of how variables are defined is summarized as in Table 5-1 where company financials are those of the current period. Next period financials are picked in the same way except for that the applying period is the following 6-months after current period.

Table 5-1. Summary of example variable list for period 2002 S1 and S2

	2002 S1 (first year half)		**2002 S2 (second year half)**	
A/H share price/return	Price: A/H share price as of 30 June 2002	Return: A/H share 6-month simple return over the period of 31 Dec 2001 to 30 June 2002	Price: A/H share price as of 31 Dec 2002	Return: A/H share 6-month simple return over the period of 30 June 2002 to 31 Dec 2002
(current period) A/H share EPS	A share EPS: Earnings per share (January to June) of the company under PRC GAAP	H share EPS:Earnings per share (January to June) of the company under IFRS or HKGAAP	A share EPS: Earnings per share (June to December) of the company under PRC GAAP	H share EPS: Earnings per share (June to December)of the company under IFRS or HKGAAP
(current period) A/H share BPS	A share BPS: Book value of equity per share (January to June) of the company under PRC GAAP	H share BPS: Book value of equity per share (January to June) of the company under IFRS or HKGAAP	A share BPS: Book value of equity per share (June to December) of the company under PRC GAAP	H share BPS: Book value of equity per share (June to December)of the company under IFRS or HKGAAP

In addition, the sample is looked at separately with (without) period taking into account the global financial crisis (start time taken as June 2008) period:

Pre-crisis sample: June 2002 to June 2008

Full sample: June 2002 to June 2010

Pre-crisis sample is used for a comparative group with the full sample which includes the commencement of 2008 financial crisis to see whether and how much the empirical results are influenced by the crisis. The number of periods since June 2008 is too few to be used for making any meaningful statistical inference in this study therefore the post-crisis period is not researched separately as a sub-sample but only included in the full period sample.

5.3 Descriptive statistics

Summary of pooled panel data sample statistics are made for both A and H share (company financials) in full period and pre-crisis sample. A shares in full period on average give 6-month return of 10.7% (annualized return 21.4%), slightly higher than the average of 10.4% 6-month return in pre-crisis period only. This is opposite to the H share performance where pre-crisis 6-month return of 17.2% (annualized return 34.4%) is higher than the 16.8% (annualized 33.6%) in full period. Stock return standard deviations among A share stocks is slightly lower than that of H share stocks, indicating that among the 26 sample companies, their A share listings on average show are less volatile than the H share counterparts including during crisis period. This is probably contributable to the more stringent capital flow control into and out of A share market than Hong Kong stock market as a international free harbor. In general, the impact brought about by the financial crisis on Chinese stock market is not so drastic, this partly reflects in the small return and volatility difference observed in pre-crisis and full period performance among the sample AH companies.

On price ratios E/P and BV/P, due to the dual-reporting and listing system applied, average E/P manifests differently for the same AH company. Observed full period average E/P ratio is 0.1 percentage point lower than that under IFRS, and average BV/P shows much bigger difference which is 59.5 percentage points lower for A shares. Pre-crisis period statistic manifests a similar pattern but financials are higher

than in full period.

The descriptive statistics of all variables used are summarized in Table 5-2 below. Graphs of AH share return and price ratios for each company and on overage of the full period are provided in the Appendix.

Table 5-2. Statistical summary of variables

A share					
Full period					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
areturn	442	0.107	0.478	-0.692	2.922
aep	439	0.013	0.091	-1.531	0.202
abp	436	0.458	0.305	-0.652	1.739
Pre-crisis period					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
areturn	338	0.104	0.470	-0.692	2.922
aep	335	0.016	0.092	-1.531	0.202
abp	332	0.474	0.296	-0.526	1.476
H share					
Full period					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
hreturn	442	0.168	0.500	-0.677	2.557
hep	442	0.014	0.244	-3.552	0.348
hbp	442	1.053	0.901	-2.612	6.588
Pre-crisis period					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
hreturn	338	0.172	0.493	-0.677	2.557
hep	338	0.026	0.212	-3.552	0.348
hbp	338	1.109	0.871	-1.196	5.071

In terms of correlations among all variables, First of all, A and H share 6-month returns across pooled samples report a high positive correlation of 0.738 in full period sample, which is slightly higher than the 0.705 correlation in pre-crisis sample. E/P ratios of A and H shares are more similar than their BV/P ratios, with high E/P correlation of 0.935 versus BV/P correlation 0.624 in full period sample. This

correlation difference further widens in pre-crisis sample, implying that the crisis seems to have caused unparallel disturbance on A and H shares. Correlation coefficients between share returns and price ratios indicate negative relationship between BV/P and corresponding A and H share return, being -0.291 and -0.230 respectively, in the full period sample. While this negative correlation becomes slightly less negative in pre-crisis sample only. The full correlation table is given below in Table 5-3, for both pre-crisis and full period sample.

Table 5-3. Variable correlations with significance value

A and H variable correlation table						
Full period (obs=433)						
	areturn	hreturn	aep	abp	hep	hbp
areturn	1					
hreturn	0.7384* 0	1				
aep	0.0414 -0.3868	0.0795 -0.0963	1			
abp	-0.2910* 0	-0.1744* 0.0003	0.2960* 0	1		
hep	0.0495 0.2988	0.0807 0.0902	0.9349* 0	0.2439* 0	1	
hbp	-0.2830* 0	-0.2305* 0	0.1325* 0.0054	0.6238* 0	0.1712* 0.0003	1
Pre-crisis period (obs=329)						
	areturn	hreturn	aep	abp	hep	hbp
areturn	1					
hreturn	0.7047* 0	1				
aep	0.0326 0.5522	0.0694 0.2049	1			
abp	-0.2808* 0	-0.1099* 0.0454	0.2871* 0	1		
hep	0.0234 0.6682	0.0491 0.3681	0.9518* 0	0.2209* 0	1	
hbp	-0.3367* 0	-0.2447* 0	0.0986 0.0716	0.5769* 0	0.1326* 0.0147	1

Note: (1) p-value is given below each correlation coefficient.

*(2) *significance at 95% confidence level*

6. **Methodology**

To test the hypotheses developed in section 4.2, panel data analysis is carried out to due to its several advantages. Preference of panel analysis over OLS pooled regression (also called 'dirty pooled') is because a pooled regression model assumes that all data points can be compared, whether across time or units. By doing so, just one single intercept estimation rather than different intercepts for each unit and (or) time point is given. What makes a simple pooled regression problematic is also that when setting up specific independent variables (control variables), there can always be concerns about omission of crucial variables which lead to estimation bias. But it turns out that by using certain panel analysis technique, it is possible to control for all possible characteristics – as long as they are time-invariant, of the individuals without estimating them.

Considering the limitations of pooled regression models applied on panel data set. three panel models are intended to be constructed by taking both time and cross-sectional dimensions into account, to explore relationships between current period return and current price ratios (hypothesis 1), next period return and current price ratios (hypothesis 2) as well as return disparity and price ratios gaps (hypothesis 3).

6.1 Choice of panel data model

According to Cheng Hsiao (2006), "panel data have several advantages over cross-sectional or time-series data by blending the inter-individual differences and intra-individual dynamics. The advantages include more accurate inference of model parameters (Hsiao, Mountain and Ho-Illman, 1995), greater capacity for capturing

complexities, and simplifying computation and statistical inference in certain cases." There are two major types of panel data regressions, fixed-effects (FE) model and random-effects (RE) model, depending on whether 'unobserved heterogeneity' in the panel sample is assumed as random variables or fixed parameters. FE and RE specification has its own advantages and limitations, for instance FE specification can allow individual and/or time specific effects to be correlated with explanatory variables but does not allow estimation of time-invariant coefficients while RE specification allow estimation of time-invariant variable's impact by imposing a 'conditional density assumption' (Hsiao, 2006).

The choice of FE or RE model in this paper is made with the help of a statistic developed by Hausman (1978) which can be tested under chi-square distribution assumption. Null hypothesis under the Hausman test is that difference in coefficients under FE and RE specification are not systematic, and rejection of the null needs the constructed statistic which follows chi-square distribution is significantly different from zero. STATA command 'hausman' is used to implement the Hausman test on the sample panel regressions to decide whether FE or RE model should be used in this study. For all panel datasets used, test results identify the suitability of FE specification rather than RE specification therefore FE regressions are used in all three models specified for parameter estimation.

By taking on a fixed-effect panel analysis approach, the methodology automatically assumes that the 'unobserved heterogeneity' that might simultaneously affect the LHS and RHS of the regression are time-invariant. This can be seen from a simplest fixed-effect regression specification:

$$y_{it} = \alpha + \beta_1 x_{it} + v_i + u_{it}$$

Where the x variables are time-varying by construction, v_i denotes the unit specific effects (fixed-effects when v_i is fixed and random-effect when it is random) of the data, u_{it} is the error term, β_1 is the parameter to be estimated. *STATA* software provides a set of commands ('xtreg' is used in this paper) to estimate FX model

parameters.

6.2 Current period return model

A current period return model is developed to test the first hypothesis:

Hypothesis 1. Trailing and (or) forward price ratios E/P and BV/P under PRC GAAP (IFRS) can explain A (H) share current period returns.

The current period return model includes two sub-models for comparison using trailing or forward ratio.

Trailing price ratio sub-model is specified as:

$$r_{i,t}^{A} = \alpha_A + \beta_1^A \frac{E_{i,t}^{A}}{P_{i,t}^{A}} + \beta_2^A \frac{BV_{i,t}^{A}}{P_{i,t}^{A}} + v_i + u_{i,t} \quad (1)$$

$$r_{i,t}^{H} = \alpha_H + \beta_1^A \frac{E_{i,t}^{H}}{P_{i,t}^{H}} + \beta_2^H \frac{BV_{i,t}^{H}}{P_{i,t}^{H}} + v_i + u_{i,t} \quad (2)$$

Forward price ratio sub-model is specified as:

$$r_{i,t}^{A} = \alpha_A + \beta_1^A \frac{E_{i,t+1}^{A}}{P_{i,t}^{A}} + \beta_2^A \frac{BV_{i,t+1}^{A}}{P_{i,t}^{A}} + v_i + u_{i,t} \quad (3)$$

$$r_{i,t}^{H} = \alpha_H + \beta_1^A \frac{E_{i,t+1}^{H}}{P_{i,t}^{H}} + \beta_2^H \frac{BV_{i,t+1}^{H}}{P_{i,t}^{H}} + v_i + u_{i,t} \quad (4)$$

$r_{i,t}^{A}$: semi-annual return of A share for company *i* at time *t.*

$r_{i,t}^{H}$: semi-annual return of H share for company *i* at time *t.*

$\frac{E_{i,t}^{A}}{P_{i,t}^{A}}$ (or $\frac{E_{i,t+1}^{A}}{P_{i,t}^{A}}$): 6-month trailing (or forward) earning price ratio for company *i* A-share at time *t.* Same notation for company H-share where H script is used.

$\frac{BV_{i,t}^{A}}{P_{i,t}^{A}}$ (or $\frac{BV_{i,t+1}^{A}}{P_{i,t}^{A}}$): 6-month trailing (or forward) book value price ratio for company *i*

A-share at time *t*. The same notation for company H-share where H script is used.

v_i: time-invariant unobserved factor for company i.

$u_{i,t}$: error term.

t: discrete time variable with semi-annual frequency.

i: AH company *i*.

6.3 Return prediction model

A next-period return model (return prediction model) is developed to test the second hypothesis:

Hypothesis 2. Trailing and (or) forward price ratios E/P and BV/P under PRC GAAP (IFRS) can predict A (H) share next period returns.

Similarly with the current return model, return prediction model also includes two sub-models for comparison using trailing or forward ratio.

The trailing price ratio sub-model is specified as:

$$r^{A}_{i,t+1} = \alpha_A + \beta^{A}_{1}\frac{E^{A}_{i,t}}{P^{A}_{i,t}} + \beta^{A}_{2}\frac{BV^{A}_{i,t}}{P^{A}_{i,t}} + v_i + u_{i,t} \quad (5)$$

$$r^{H}_{i,t+1} = \alpha_H + \beta^{A}_{1}\frac{E^{H}_{i,t}}{P^{H}_{i,t}} + \beta^{H}_{2}\frac{BV^{H}_{i,t}}{P^{H}_{i,t}} + v_i + u_{i,t} \quad (6)$$

The forward price ratio sub-model is specified as:

$$r^{A}_{i,t+1} = \alpha_A + \beta^{A}_{1}\frac{E^{A}_{i,t+1}}{P^{A}_{i,t}} + \beta^{A}_{2}\frac{BV^{A}_{i,t+1}}{P^{A}_{i,t}} + v_i + u_{i,t} \quad (7)$$

$$r^{H}_{i,t+1} = \alpha_H + \beta^{A}_{1}\frac{E^{H}_{i,t+1}}{P^{H}_{i,t}} + \beta^{H}_{2}\frac{BV^{H}_{i,t+1}}{P^{H}_{i,t}} + v_i + u_{i,t} \quad (8)$$

$r^{A}_{i,t+1}$: (expected) semi-annual return of A share for company *i* at time *t+1*.

$r^{H}_{i,t+1}$: (expected) semi-annual return of H share for company *i* at time *t+1*.

$\frac{E^A_{i,t}}{P^A_{i,t}}$ (or $\frac{E^A_{i,t+1}}{P^A_{i,t}}$): 6-month trailing (or forward) earning price ratio for company *i* A-share at time *t.* Same notation for company H-share where H script is used.

$\frac{BV^A_{i,t}}{P^A_{i,t}}$ (or $\frac{BV^A_{i,t+1}}{P^A_{i,t}}$): 6-month trailing (or forward) book value price ratio for company *i* A-share at time *t.* The same notation for company H-share where H script is used.

v_i: time-invariant unobserved factor for company i.

$u_{i,t}$*:* error term

t: discrete time variable with semi-annual frequency

i: AH company

6.4 Return disparity model

AH return disparity model is developed to test the third hypothesis:

Hypothesis 3. Difference between price ratios under PRC GAAP and under IFRS can partially explain AH share return disparity in the current or the next one period.

The return disparity model is constructed to encompass both current period and next period, each with both trailing and forward price ratios used. Specifications are as below:

Current period return disparity sub-model:

$$r^A_{i,t} - r^H_{i,t} = \alpha_t + \beta_1\left(\frac{E^A_{i,t}}{P^A_{i,t}} - \frac{E^H_{i,t}}{P^H_{i,t}}\right) + \beta_2\left(\frac{B^A_{i,t}}{P^A_{i,t}} - \frac{B^H_{i,t}}{P^H_{i,t}}\right) + v_i + u_{i,t} \quad (9)$$

$$r^A_{i,t} - r^H_{i,t} = \alpha_t + \beta_1\left(\frac{E^A_{i,t+1}}{P^A_{i,t}} - \frac{E^H_{i,t+1}}{P^H_{i,t}}\right) + \beta_2\left(\frac{B^A_{i,t+1}}{P^A_{i,t}} - \frac{B^H_{i,t+1}}{P^H_{i,t}}\right) + v_i + u_{i,t} \quad (10)$$

Next period return disparity sub-model:

$$r^A_{i,t+1} - r^H_{i,t+1} = \alpha_t + \beta_1\left(\frac{E^A_{i,t}}{P^A_{i,t}} - \frac{E^H_{i,t}}{P^H_{i,t}}\right) + \beta_2\left(\frac{B^A_{i,t}}{P^A_{i,t}} - \frac{B^H_{i,t}}{P^H_{i,t}}\right) + v_i + u_{i,t} \quad (11)$$

$$r^A_{i,t+1} - r^H_{i,t+1} = \alpha_t + \beta_1\left(\frac{E^A_{i,t+1}}{P^A_{i,t}} - \frac{E^H_{i,t+1}}{P^H_{i,t}}\right) + \beta_2\left(\frac{B^A_{i,t+1}}{P^A_{i,t}} - \frac{B^H_{i,t+1}}{P^H_{i,t}}\right) + v_i + u_{i,t} \quad (12)$$

In all above models (1)-(12), fixed-effect regressions are run respectively for parameter estimation. However, note that the estimation of v_i which representing unobserved heterogeneity will not be given according to fixed-effect (within regression, realized by *STATA* command 'xtreg'.) method. But the FE regression remedies the problem of unobserved heterogeneity in pooled OLS regression and should give more accurate parameter estimation on betas. Results from these FE regressions will be given in section 7, the results from pooled regressions are also provided but in the appendix just for reference. The same regressions are also run separately for two samples (1) full period 2002 S1 to 2010 S1 (2) pre-crisis period 2002 S1 to 2008 S1, in order to detect whether estimations change with the inclusion of financial crisis period data.

7. Empirical results

7.1 Current return model

Recapping that current return model is to test hypothesis 1, through running fixed-effect regression (1)-(4), where (1) (2) use trailing price ratios and (3) (4) use forward price ratios on the RHS.

$$r_{i,t}^{A} = \alpha_A + \beta_1^A \frac{E_{i,t}^{A}}{P_{i,t}^{A}} + \beta_2^A \frac{BV_{i,t}^{A}}{P_{i,t}^{A}} + v_i + u_{i,t} \quad (1)$$

$$r_{i,t}^{H} = \alpha_H + \beta_1^A \frac{E_{i,t}^{H}}{P_{i,t}^{H}} + \beta_2^H \frac{BV_{i,t}^{H}}{P_{i,t}^{H}} + v_i + u_{i,t} \quad (2)$$

$$r_{i,t}^{A} = \alpha_A + \beta_1^A \frac{E_{i,t+1}^{A}}{P_{i,t}^{A}} + \beta_2^A \frac{BV_{i,t+1}^{A}}{P_{i,t}^{A}} + v_i + u_{i,t} \quad (3)$$

$$r_{i,t}^{H} = \alpha_H + \beta_1^A \frac{E_{i,t+1}^{H}}{P_{i,t}^{H}} + \beta_2^H \frac{BV_{i,t+1}^{H}}{P_{i,t}^{H}} + v_i + u_{i,t} \quad (4)$$

The key empirical results are summarized in Table 7-1 below, followed by discussions.

Table 7-1. Current return model empirical results

(1) and (2) - Current model (with trailing price ratios)							
Full sample				**Pre-crisis sample**			
A share	**(FE model)**			**A share**	**(FE model)**		
	R-sq: within = 0.1721				*R-sq: within = 0.1668*		
	coef	std.error	P		coef	std.error	p
aep	0.666*	0.259	0.010	aep	0.444	0.294	0.132
abp	-0.881*	0.096	0.000	abp	-0.863*	0.111	0.000
_con	0.507	0.049	0.000	_con	0.512	0.058	0.000
H share	**(FE model)**			**H share**	**(FE model)**		
	R-sq: within = 0.0861				*R-sq: within = 0.0918*		
	coef	std.error	P		coef	std.error	p
aep	0.235*	0.101	0.020	aep	0.095	0.130	0.466
abp	-0.191*	0.031	0.000	abp	-0.202*	0.036	0.000
_con	0.366	0.040	0.000	_con	0.393	0.047	0.000

(3) and (4) - Current model (with forward price ratios)							
Full sample				**Pre-crisis sample**			
A share	**(FE model)**			**A share**	**(FE model)**		
	R-sq: within = 0.1798				*R-sq: within =0.1667*		
	coef	std.error	p		coef	std.error	p
aepfw	1.164*	0.283	0.000	aepfw	1.207*	0.289	0.000
abpfw	-0.897*	0.101	0.000	abpfw	-0.833*	0.112	0.000
_cons	0.538	0.052	0.000	_cons	0.494	0.059	0.000
H share	**(FE model)**			**H share**	**(FE model)**		
	R-sq: within = 0.1048				*R-sq: within = 0.1107*		
	coef	std.error	p		coef	std.error	p
hepfw	0.412*	0.123	0.001	hepfw	0.418*	0.122	0.001
hbpfw	-0.204*	0.033	0.000	hbpfw	-0.204*	0.036	0.000
_cons	0.396	0.043	0.000	_cons	0.389	0.047	0.000

*Note: *significance at 95% confidence level*

Pre-crisis sample (2002 S1 to 2008 S1) results are looked at first since this excludes the possible disturbing factor due to the extreme market situation. In general the trailing E/P ratios turn out to be insignificant in relation to current period share returns for pre-crisis sample, but with abnormal market situation like crisis, the significance becomes positive. When forward ratios are used, E/P ratios always turn positively significant for both A and H shares and in both sample periods. This confirms Chinese

share value relevance with company E/P ratios, which is in line with previous return-model studies on (Haw et al., 1999 and Chen et al., 2001). And the positive relationship supports the idea of value stock (with higher E/P ratios) realizing higher returns.

BV/P ratios hold to be statistically significant and negatively relevant to both A and H share returns in all cases. The negative coefficient of BV/P on share return does not support the general intuition of value stocks (with high BV/P ratio) realizing higher returns. Instead, AH companies with lower BV/P ratios (growth stocks) realize higher current period returns, probably due to certain uncovered special traits with AH dual-listing companies. As previous value relevance literatures include book value (not book value to price ratio) only in price models, not in return models where only E/P and/or change of E/P ratios are included. Therefore result findings on BV/P in this paper are not directly comparable to previous findings on BV in relation to share price. However, the finding of a negative relationship between BV/P ratios and share current returns among dual-listed AH companies provide a new piece of evidence in this area.

Then by examining results from full sample period which includes crisis period, it was found that the relationship keeps consistent with that under pre-crisis period, except for that trailing E/P ratios become significant in the full sample – same as the in forward ratio regression. This may indicate that with crisis period covered, current period returns factor in more considerations of the most recent company financial performance through E/P ratios.

Comparing A share and H share on value-relevance with price ratios, A shares in the sample demonstrate higher current period return value-relevance with price ratios on average with higher R squares (-within) than H shares do. This is opposite to the findings of Liu and Liu (2007) which verifies higher value-relevance in B and H shares than in A shares using older data (1999-2003), implying possible changes on value-relevance in China over time. Recapping the assumption (1) and (2) made in

section 4.1 to interpret my finding on A and H share relevance from a market efficiency point of view, it partially reflects a more efficient H market than A share market because H share investors cannot use AH company price ratios as much as A share investors can do to select potentially better return performers.

In addition, current period return sensitivities with price ratios are both higher for A shares than for H shares. For instance in full period sample, 1% higher trailing E/P ratios for an average A share see its current 6-month period return being 0.67% higher, but with the same change applying to H shares, the H share 6-month period return would only be 0.24% higher.

7.2 Return prediction model

The return prediction model is built to test hypothesis 2, through running fixed-effect regression (5)-(8), where (5) (6) use trailing price ratios and (7) (8) use forward price ratios on the RHS.

$$r^{A}_{i,t+1} = \alpha_A + \beta^{A}_{1}\frac{E^{A}_{i,t}}{P^{A}_{i,t}} + \beta^{A}_{2}\frac{BV^{A}_{i,t}}{P^{A}_{i,t}} + v_i + u_{i,t} \quad (5)$$

$$r^{H}_{i,t+1} = \alpha_H + \beta^{A}_{1}\frac{E^{H}_{i,t}}{P^{H}_{i,t}} + \beta^{H}_{2}\frac{BV^{H}_{i,t}}{P^{H}_{i,t}} + v_i + u_{i,t} \quad (6)$$

$$r^{A}_{i,t+1} = \alpha_A + \beta^{A}_{1}\frac{E^{A}_{i,t+1}}{P^{A}_{i,t}} + \beta^{A}_{2}\frac{BV^{A}_{i,t+1}}{P^{A}_{i,t}} + v_i + u_{i,t} \quad (7)$$

$$r^{H}_{i,t+1} = \alpha_H + \beta^{A}_{1}\frac{E^{H}_{i,t+1}}{P^{H}_{i,t}} + \beta^{H}_{2}\frac{BV^{H}_{i,t+1}}{P^{H}_{i,t}} + v_i + u_{i,t} \quad (8)$$

The key empirical results are summarized in Table 7-2 below, followed by discussions.

Table 7-2. Return prediction model empirical results

(5) and (6) - Prediction model (with trailing price ratios)

Full sample

A share	**(FE model)**		
	R-sq: within = 0.0508		
	coef	std.error	p
aep	-0.400	0.277	0.150
abp	0.477*	0.103	0.000
_con	-0.106	0.052	0.043

H share	**(FE model)**		
	R-sq: within = 0.0378		
	coef	std.error	p
aep	-0.134	0.102	0.189
abp	0.165*	0.032	0.000
_con	-0.004	0.041	0.913

Pre-crisis sample

A share	**(FE model)**		
	R-sq: within = 0.0378		
	coef	std.error	p
aep	-0.158	0.326	0.629
abp	0.425*	0.124	0.001
_con	-0.118	0.064	0.066

H share	**(FE model)**		
	R-sq: within = 0.0564		
	coef	std.error	p
aep	0.029	0.139	0.833
abp	0.164*	0.039	0.000
_con	-0.037	0.051	0.461

(7) and (8) - Prediction model (with forward price ratios)

Full sample

A share	**(FE model)**		
	R-sq: within = 0.0706		
	coef	std.error	p
aepfw	0.367	0.306	0.231
abpfw	0.531*	0.110	0.000
_cons	-0.139	0.056	0.014

H share	**(FE model)**		
	R-sq: within = 0.0816		
	coef	std.error	p
hepfw	0.223	0.125	0.076
hbpfw	0.177*	0.033	0.000
_cons	-0.020	0.044	0.645

Pre-crisis sample

A share	**(FE model)**		
	R-sq: within = 0.0581		
	coef	std.error	p
aepfw	0.372	0.318	0.242
abpfw	0.453*	0.123	0.000
_cons	-0.142	0.064	0.029

H share	**(FE model)**		
	R-sq: within = 0.0774		
	coef	std.error	p
hepfw	0.201	0.130	0.123
hbpfw	0.170*	0.038	0.000
_cons	-0.050	0.050	0.315

*Note: *significance at 95% confidence level*

Empirical results on return prediction model are consistent in all cases, including for A or H shares, with trailing or forward price ratios as independent variables, and during both pre-crisis and full time period. It was found that BV/P ratios are positively and significantly related to next 6-month period returns, supporting value-stock strategy in future return prediction. E/P ratios are not significant thus not useful in predicting AH share next period returns.

A share next period returns on average demonstrate higher sensitivity on BV/P ratios than H shares do. Taking full period sample with trailing price ratios for example, 1% higher BV/P of an average A share expects 0.48% higher next 6-month returns, while an average H share with 1% higher BV/P only sees 0.17% higher next 6-month returns. Overall sensitivities observed from pre-crisis sample are slightly higher than from full period sample, meaning that using BV/P ratio to gain from AH return disparity becomes less useful when strong market disturbance exists.

The concept of value-relevance does not fully apply here when interpreting R-square (within), because the definition on value-relevance involves "the ability of accounting numbers to summarize the information underlying the stock prices" but it does not involve return prediction from accounting numbers (here transformed as E/P and BV/P ratios). Therefore R-square results here cannot lead to any conclusion of 'value-relevance' in return disparity model but simply is a measure of FE model fitness.

7.3 Return disparity model

The return disparity model is built to test hypothesis 3, through running fixed-effect regression (9)-(12), where (9) (10) use the gap of trailing price ratios and (11) (12) use that of forward price ratios on the RHS.

$$r^{A}_{i,t} - r^{H}_{i,t} = \alpha_t + \beta_1 \left(\frac{E^{A}_{i,t}}{P^{A}_{i,t}} - \frac{E^{H}_{i,t}}{P^{H}_{i,t}}\right) + \beta_2 \left(\frac{B^{A}_{i,t}}{P^{A}_{i,t}} - \frac{B^{H}_{i,t}}{P^{H}_{i,t}}\right) + v_i + u_{i,t} \quad (9)$$

$$r^{A}_{i,t} - r^{H}_{i,t} = \alpha_t + \beta_1 \left(\frac{E^{A}_{i,t+1}}{P^{A}_{i,t}} - \frac{E^{H}_{i,t+1}}{P^{H}_{i,t}}\right) + \beta_2 \left(\frac{B^{A}_{i,t+1}}{P^{A}_{i,t}} - \frac{B^{H}_{i,t+1}}{P^{H}_{i,t}}\right) + v_i + u_{i,t} \quad (10)$$

$$r^{A}_{i,t+1} - r^{H}_{i,t+1} = \alpha_t + \beta_1 \left(\frac{E^{A}_{i,t}}{P^{A}_{i,t}} - \frac{E^{H}_{i,t}}{P^{H}_{i,t}}\right) + \beta_2 \left(\frac{B^{A}_{i,t}}{P^{A}_{i,t}} - \frac{B^{H}_{i,t}}{P^{H}_{i,t}}\right) + v_i + u_{i,t} \quad (11)$$

$$r^{A}_{i,t+1} - r^{H}_{i,t+1} = \alpha_t + \beta_1 \left(\frac{E^{A}_{i,t+1}}{P^{A}_{i,t}} - \frac{E^{H}_{i,t+1}}{P^{H}_{i,t}}\right) + \beta_2 \left(\frac{B^{A}_{i,t+1}}{P^{A}_{i,t}} - \frac{B^{H}_{i,t+1}}{P^{H}_{i,t}}\right) + v_i + u_{i,t} \quad (12)$$

The key empirical results are summarized in Table 7-3 below, followed by discussions.

Table 7-3. Return disparity model empirical results

(9) - Current model (with trailing price ratios)							
Full sample				**Pre-crisis sample**			
(FE)				**(FE)**			
A-H return				*A-H return*			
	R-sq: within = 0.0014				R-sq: within = 0.0027		
	coef	std.error	p		coef	std.error	p
a_hep	0.058	0.112	0.604	a_hep	-0.016	0.173	0.928
a_hbp	0.013	0.028	0.644	a_hbp	0.030	0.033	0.365
_cons	-0.053	0.024	0.029	_cons	-0.048	0.030	0.108
(10) - Current model (with forward price ratios)							
Full sample				**Pre-crisis sample**			
(FE)				**(FE)**			
A-H return				*A-H return*			
	R-sq: within = 0.0004				R-sq: within = 0.0015		
	coef	std.error	p		coef	std.error	p
a_hepfw	0.041	0.145	0.776	a_hepfw	-0.047	0.159	0.769
a_hbpfw	0.006	0.027	0.812	a_hbpfw	0.022	0.033	0.515
_cons	-0.054	0.023	0.020	_cons	-0.052	0.030	0.082
(11) - Prediction model (with trailing price ratios)							
Full sample				**Pre-crisis sample**			
(FE)				**(FE)**			
A-H return				*A-H return*			
	R-sq: within = 0.1239				R-sq: within = 0.1877		
	coef	std.error	p		coef	std.error	p
a_hep	-0.055	0.105	0.602	a_hep	0.020	0.157	0.899
a_hbp	0.195*	0.026	0.000	a_hbp	0.251*	0.030	0.000
_cons	0.055	0.022	0.015	_cons	0.095	0.027	0.001
Prediction model (with forward price ratios)							
Full sample				**Pre-crisis sample**			
(FE)				**(FE)**			
A-H return				*A-H return*			
	R-sq: within = 0.1385				R-sq: within = 0.2008		
	coef	std.error	p		coef	std.error	p
a_hepfw	0.118	0.135	0.380	a_hepfw	0.053	0.144	0.714
a_hbpfw	0.197*	0.025	0.000	a_hbpfw	0.253*	0.030	0.000
_cons	0.055	0.022	0.012	_cons	0.096	0.027	0.000

*Note: *significance at 95% confidence level*

Results show that the gap of price ratios E/P and BV/P, whether trailing or forward, cannot explain current AH return disparity. However trailing or forward BV/P ratio gap on average is positively and significantly related to expected next 6-month AH return disparity – the higher BV/P ratio gap is, the higher the AH return disparity will be. The results hold true for both full sample and pre-crisis sample, meaning that the crisis period has no significant impact on using gap of price ratios to explain AH share return disparity.

On average, the sensitivities of AH return disparity on are higher in pre-crisis period than in full period sample, which implies that using BV/P price ratio gap to take advantage of AH return disparity for higher future period return is less useful during period with strong market disturbance like financial crisis. Higher R-square in pre-crisis period sample also reflects this implication.

8. Conclusion

To address a question of high practical value for long term investors in China, this paper examined a group of 26 AH dual-listed companies in China during the period of June 2002-June 2010, to explore how two widely used price ratios relate to respective share returns given Chinese stock market segmentation.

Firstly an introduction of Chinese stock market and differently applied financial reporting rules in segmented markets were given, followed by a review on relevant theories and previous researches, including market segmentation and dual-listed stock price/return disparity, value relevance of price ratios and stock return explanation based on these. Three hypotheses are raised and tested through a series of fixed-effect models. The hypotheses are (1) Trailing and (or) forward price ratios E/P and BV/P

under PRC GAAP (IFRS) can explain A (H) share current period returns; (2)Trailing and (or) forward price ratios E/P and BV/P under PRC GAAP (IFRS) can predict A (H) share next period returns; and (3) difference between price ratios under PRC GAAP and under IFRS can partially explain AH share return disparity in the next one period.

Two types of price ratios (trailing and forward) are used in all models specified. And comparisons are made through seeking whether empirical findings change due to financial crisis influences. Main findings concluded from the results include that (1) price ratios BV/P explain A and H share current period returns (return from the past 6 months) with a negative responding effect, trailing E/P ratios cannot always explain the current period return especially under normal market conditions but forward E/P are more useful. Return positively responds to E/P ratios when significant relationship holds. A shares in the sample demonstrate higher current period return value-relevance with price ratios on average than H shares do, and the relevance sensitivities with price ratios are higher for A shares than for H shares. These partially reflect a more efficient H market than A share market because H share investors cannot use AH company price ratios as much as A share investors can do. (2) When it comes to (expected) next period return, BV/P ratio (both trailing and forward) is useful in return prediction and more so for A shares than H shares due to similar reason mentioned above in (1). (3) AH share return disparity can be predicted from the gap between A and H share BV/P ratios, the wider the gap the bigger the disparity will be. Generally speaking, A (H) return or AH return disparity predictability is undermined during period with strong market disturbance like financial crisis, indicating the limitations of such predictability.

9. Limitation and future research

This paper found some interesting empirical results that support current period return explanation, prediction of next period return and AH return disparity based on price

ratios, which practically could be utilized to develop investment trading strategies. However, the validity of the results and viability of the derived trading strategy can be subjected to some limitations, and to release these limitations could be extended future research.

(1) Investment barrier and transaction costs

Any theoretical trading strategy is only valid to the extent that no frictions such as investment barriers, transaction costs (bid-ask spread, broker commissions etc), currency conversion risks and so on. Implementation of the strategy therefore is subject to rules of restrictions in trading and deregulations of Chinese capital market in reality. Also as implied in these empirical result findings, price ratios in relevance with expected share return and return disparities may be interpreted as possible arbitrage opportunities, however an existing arbitrage opportunity is not always immediately realizable due to market forces and availability of arbitraging capital. For Chinese capital market, it is also not always viable due to a lacking arbitrage mechanism between A and H share market. Once the mechanism becomes available as China continues to open mainland capital market to international investors and integrate it more closely with Hong Kong capital market, the research carried out in this paper can be re-investigated again with above mentioned friction factors being taken into account.

(2) Model specification

All models are constructed based on fixed-effect specification which are believed to have certain advantages over time-series, cross-sectional regression or pooled panel regression.

All specified models include only two price ratios as independent variable, there could potentially be other variables that explain A or H share returns (or disparity), such as expected growth of earnings per share, or stock liquidity measurement. The AH return disparity could also be due to risk factor associated with the price ratios

(E/P and BV/P), meaning that the premium could be a compensation paid for a riskier asset. In addition, seeking common risk factor is not the purpose of this paper but can be very interesting to explore in future research on dual-listing companies.

(3) Small sample bias

The sample selected come from a relatively small range of individual companies over a relatively short period (9 years of semi-annual information). What holds true for these samples might not necessarily hold true or persist for outside-samples. But these cannot be tested yet due to insufficient outside-sample companies and too-short post crisis period. Further research can re-investigate the hypotheses in this paper when there are sufficient time series observations. A wider coverage of individual sample companies would also help to undercover important factors when more AH companies become available.

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Appendix

1. Plot on 26 sample companies on return, E/P and B/P during 2002 S1 to 2010 S1

Figure 1. 26 Sample company A shares 6-month returns during June 2002 and June 2010

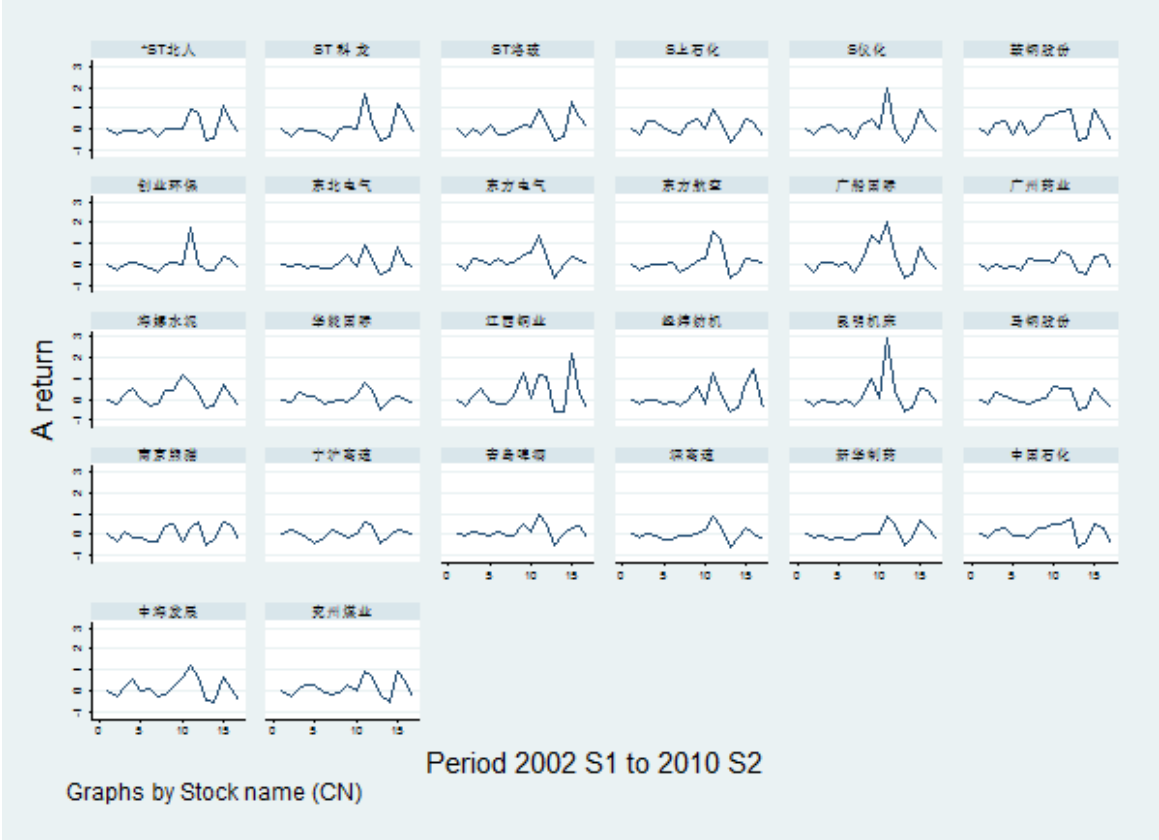


Figure 2. 26 Sample company A shares 6-month trailing E/P ratio during June 2002 and June 2010

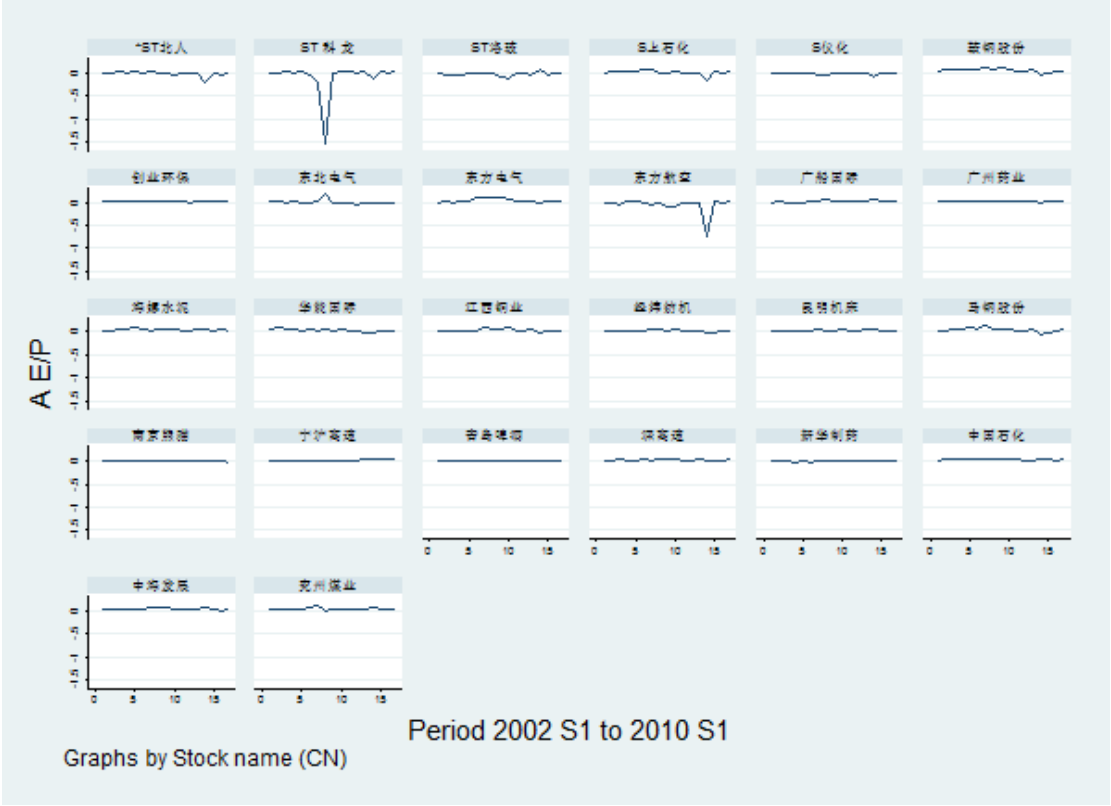


Figure 3. 26 Sample company A shares 6-month forward E/P ratio during June 2002 and June 2010

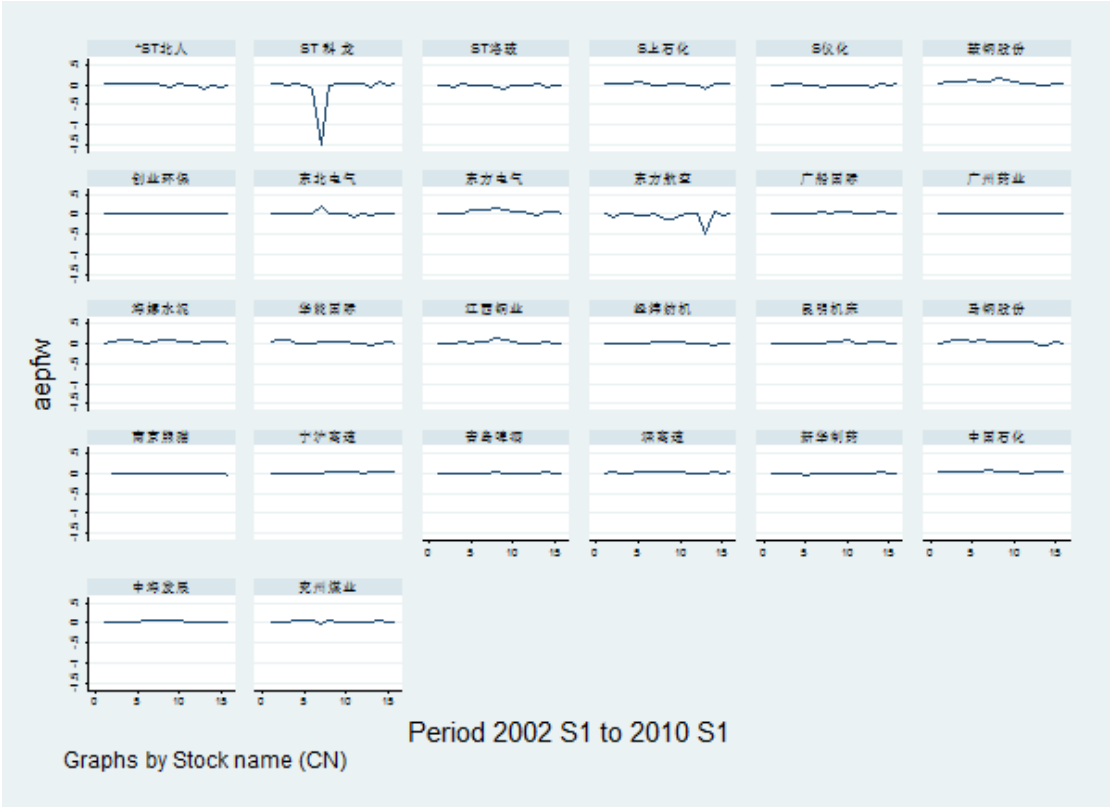


Figure 4. 26 Sample company A shares 6-month trailing BV/P ratio during June 2002 and June 2010

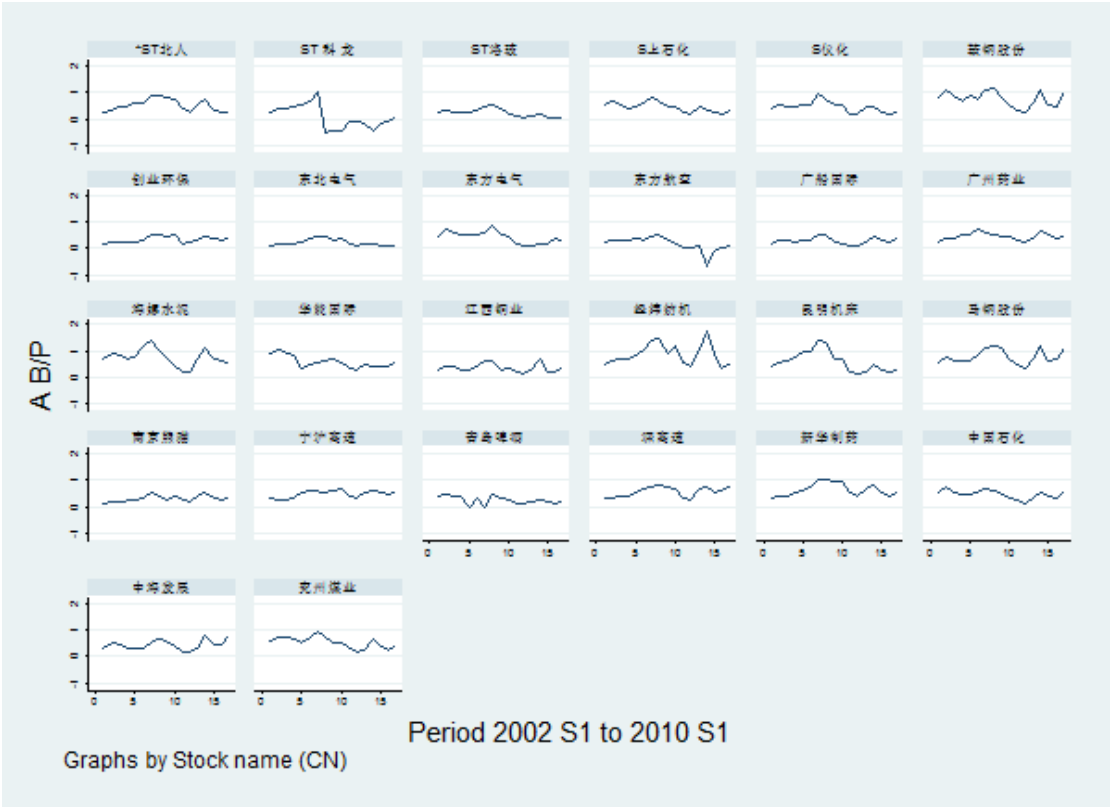


Figure 5. 26 Sample company A shares 6-month trailing BV/P ratio during June 2002 and June 2010

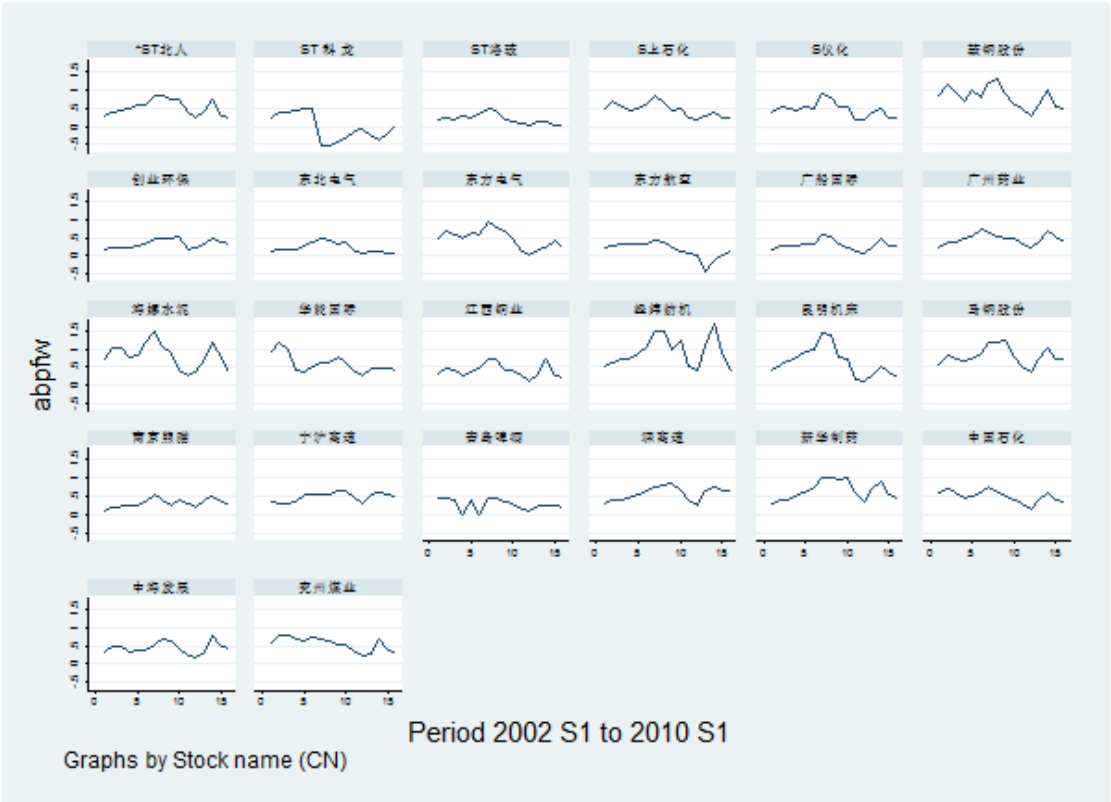


Figure 6. Average A shares 6-month returns of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

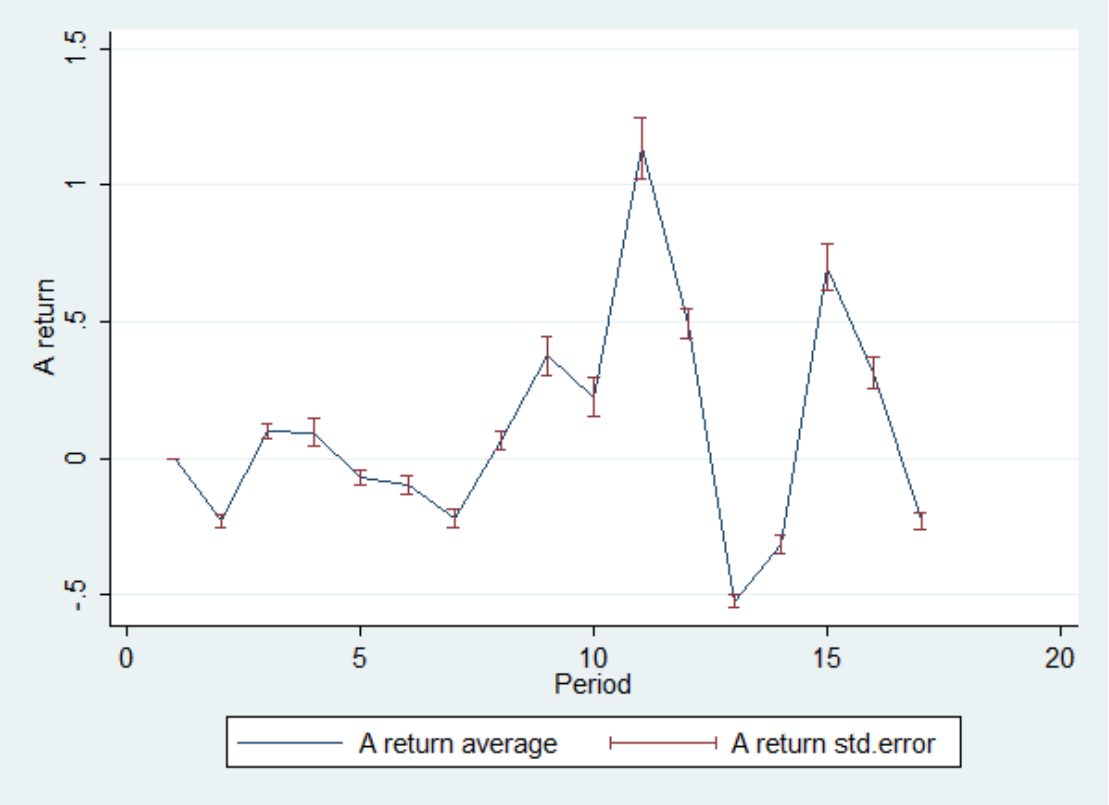


Figure 7. Average A shares 6-month trailing E/P ratio of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

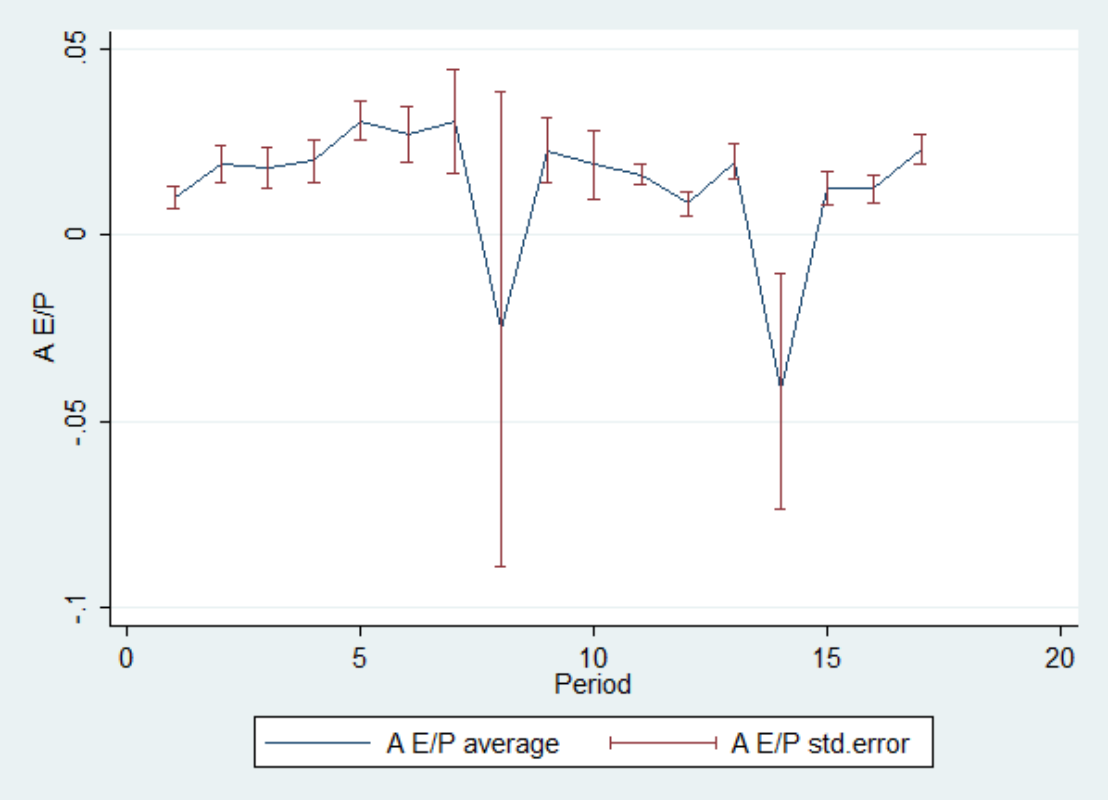


Figure 8. Average A shares 6-month forward E/P ratio of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

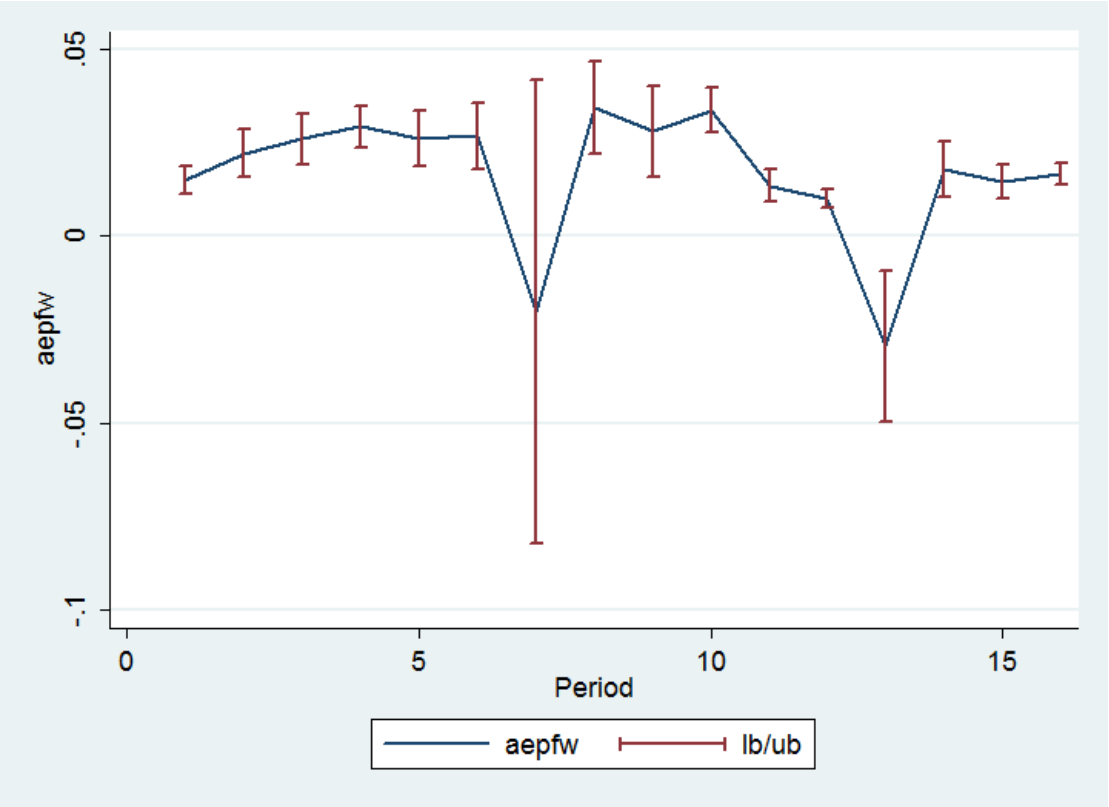


Figure 9. Average A shares 6-month trailing BV/P ratio of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

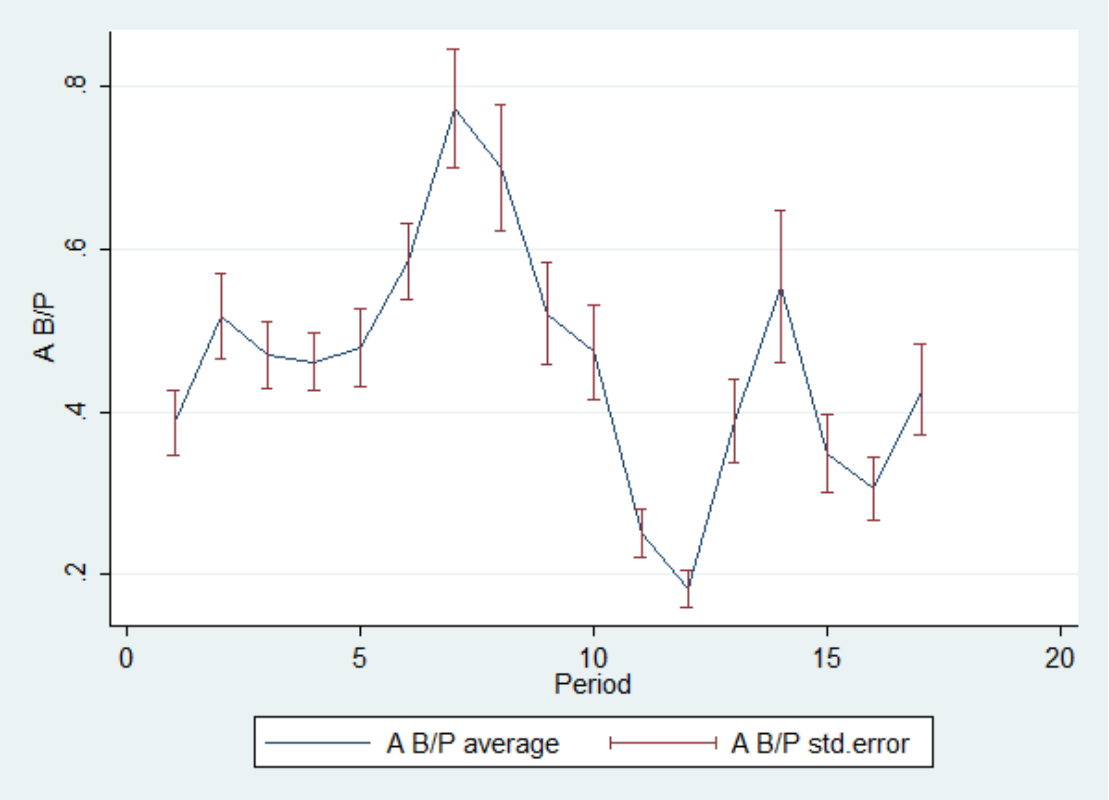


Figure 10. Average A shares 6-month forward BV/P ratio of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

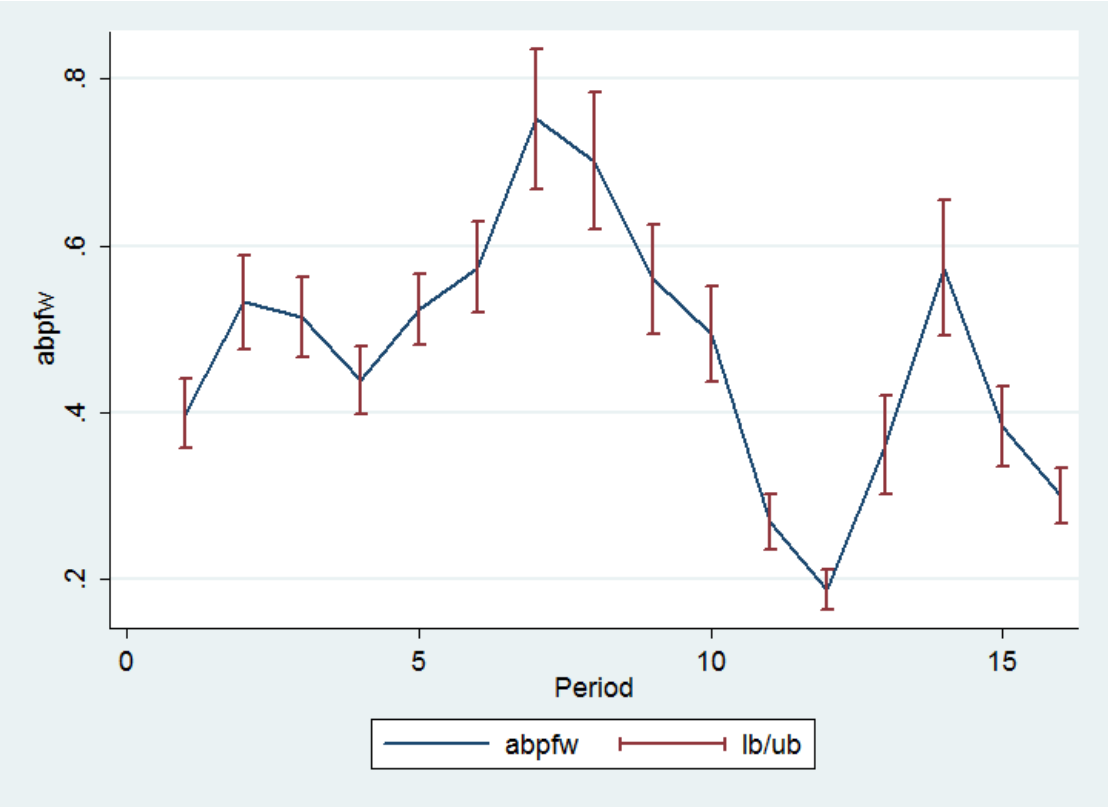


Figure 11. 26 Sample company H shares 6-month returns during June 2002 and June 2010

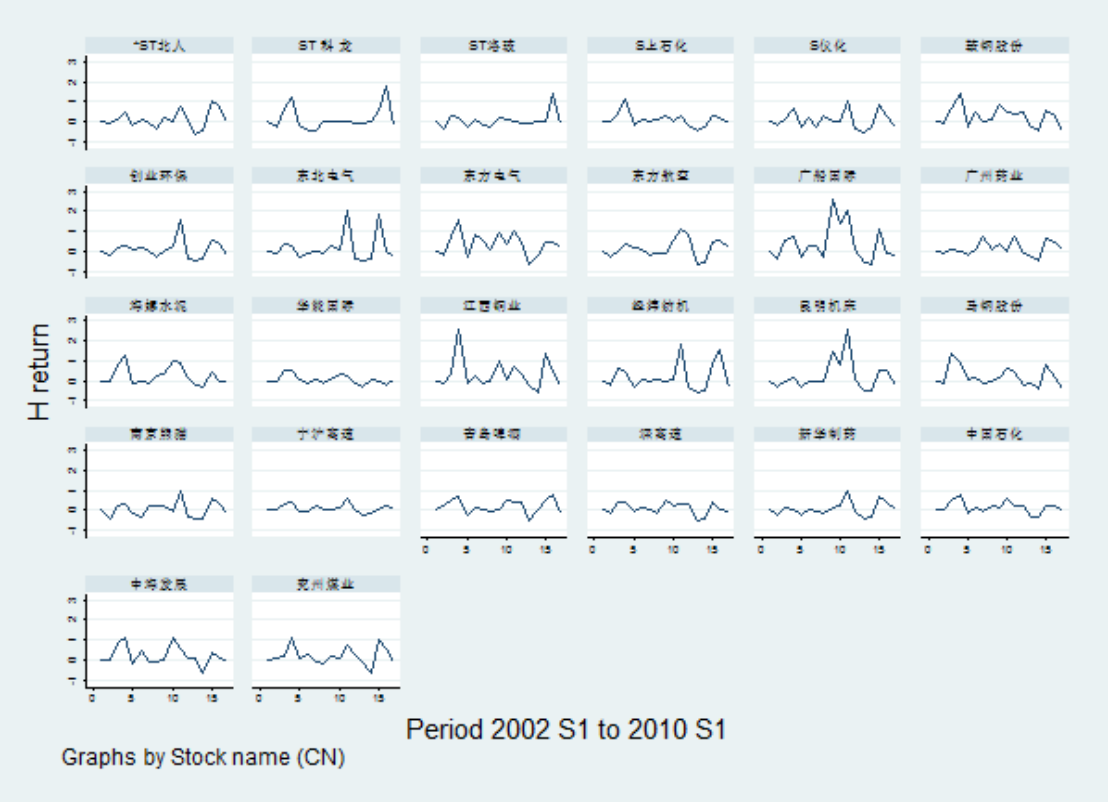


Figure 12. 26 Sample company H shares 6-month trailing E/P ratio during June 2002 and June 2010

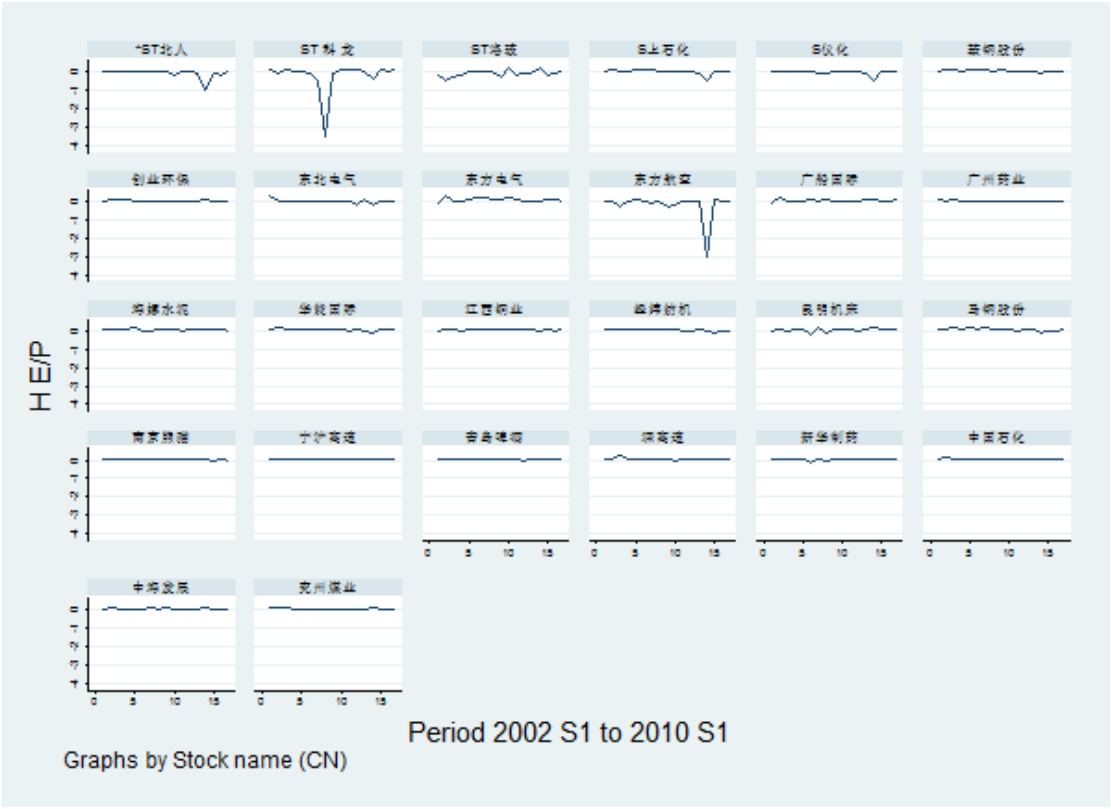


Figure 13. 26 Sample company H shares 6-month trailing E/P ratio during June 2002 and June 2010

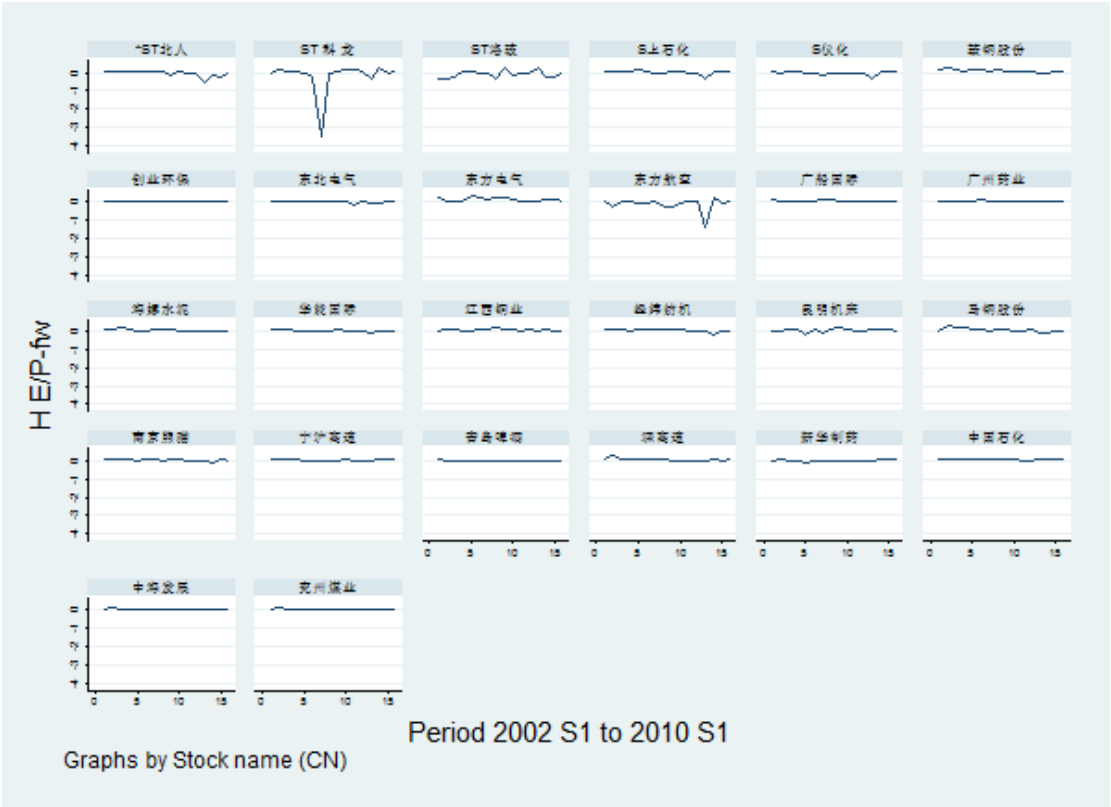


Figure 14. 26 Sample company H shares 6-month trailing BV/P ratio during June 2002 and June 2010

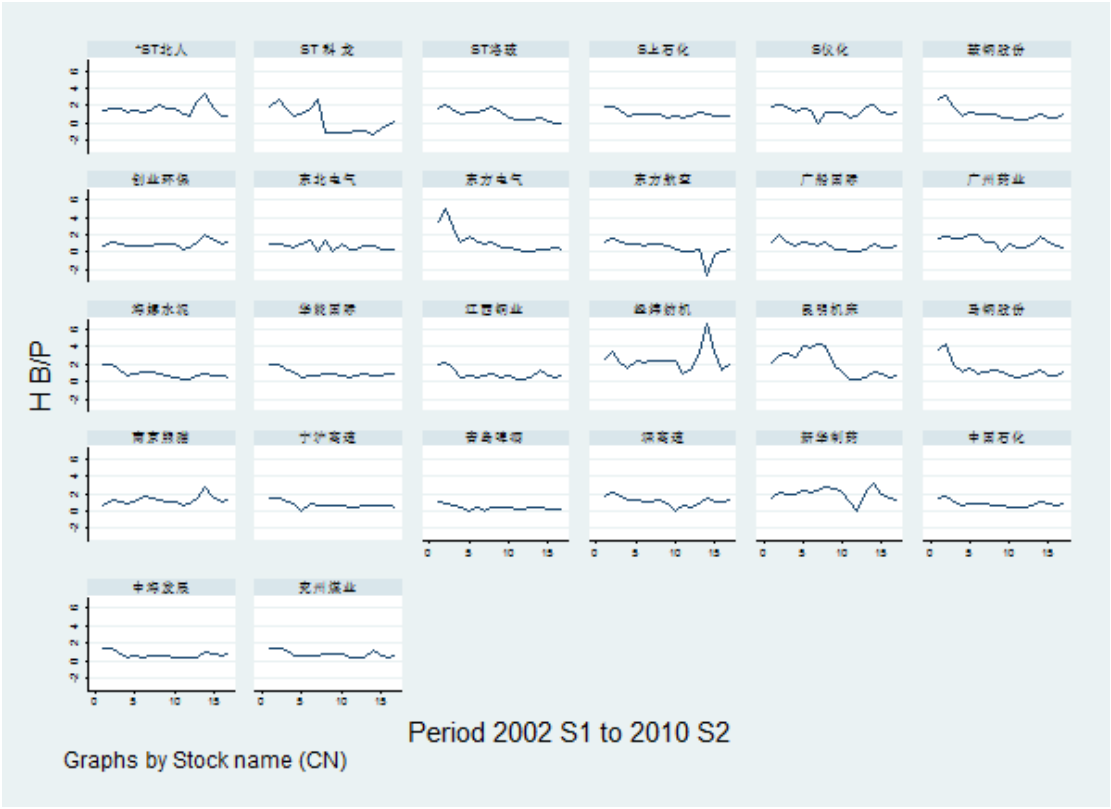


Figure 15. 26 Sample company H shares 6-month forward BV/P ratio during June 2002 and June 2010

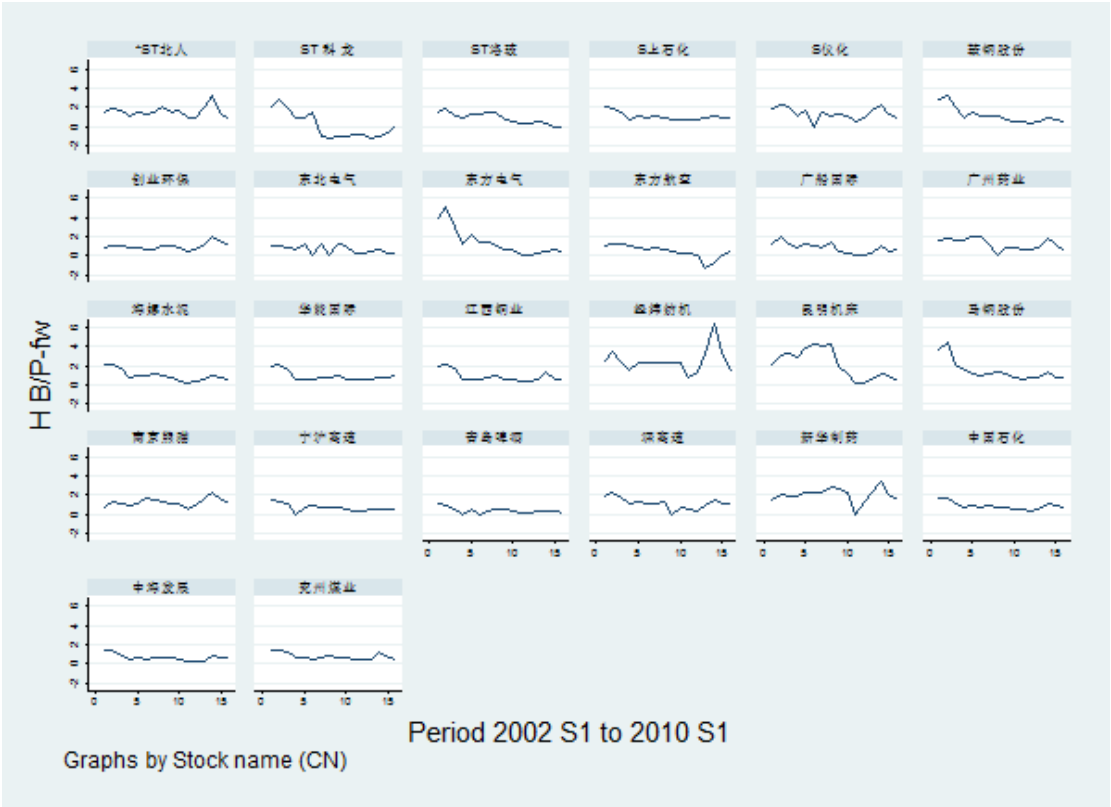


Figure 16. Average H shares 6-month returns of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

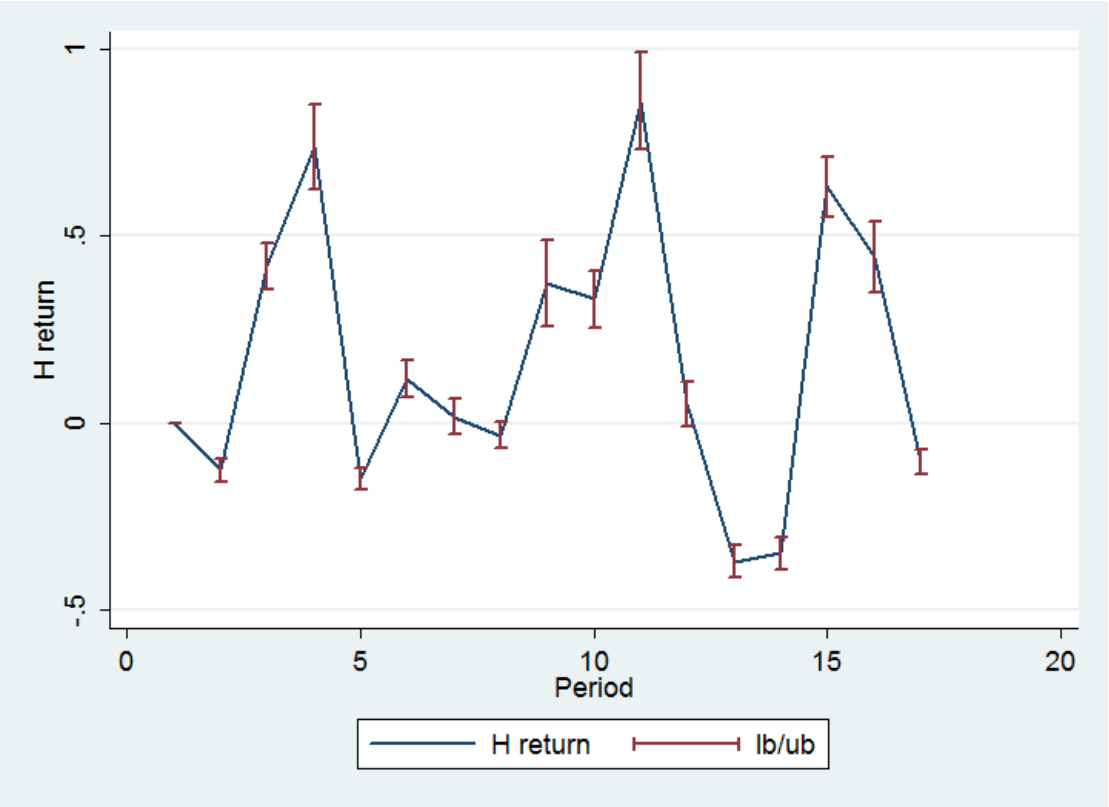


Figure 17. Average H shares 6-month trailing E/P of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

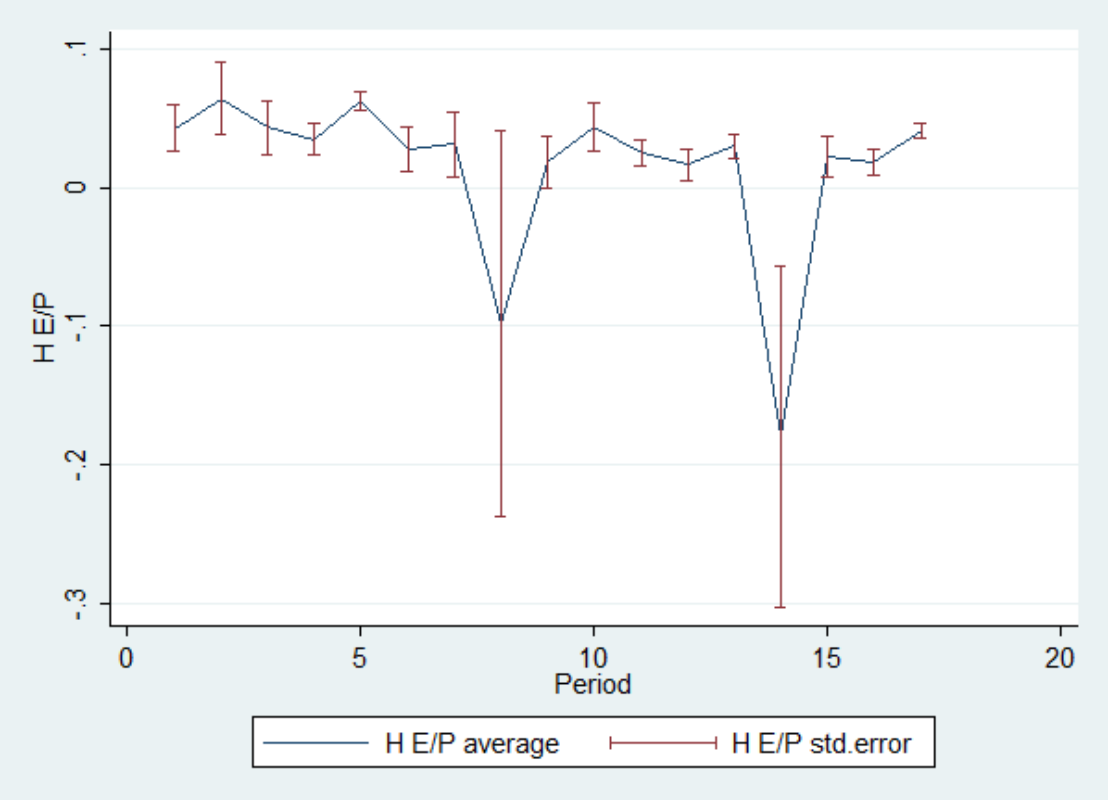


Figure 18. Average H shares 6-month forward E/P of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

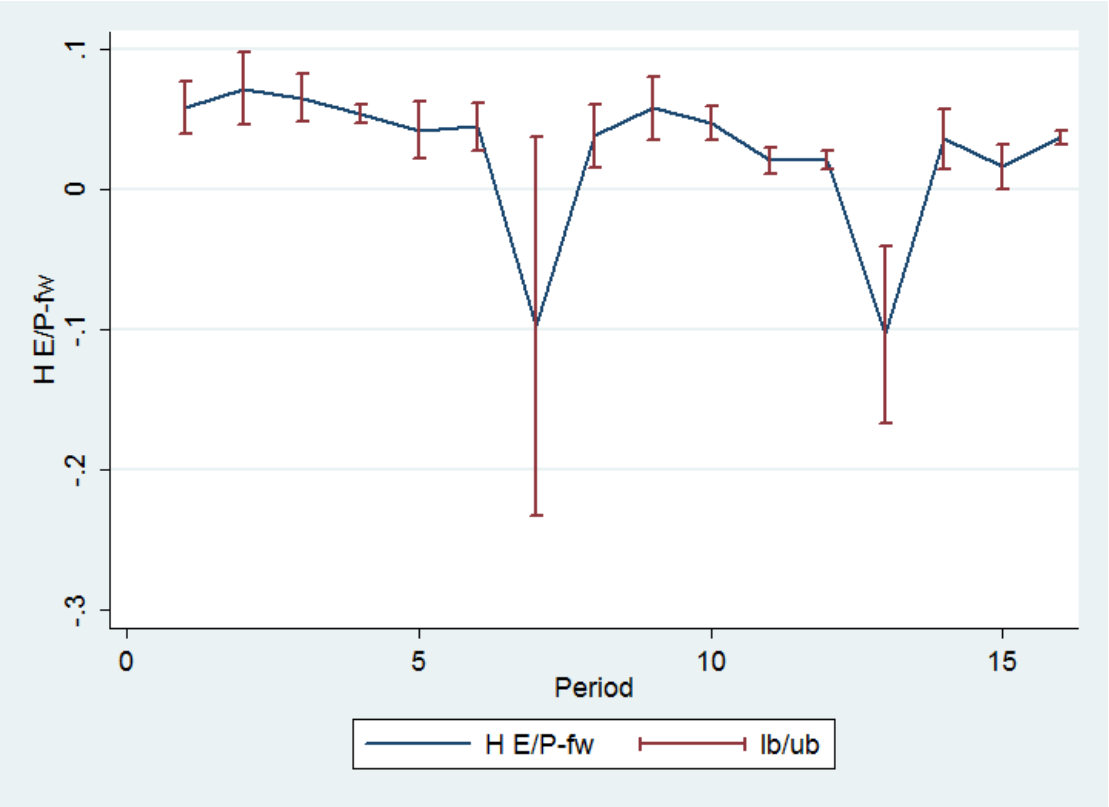


Figure 19. Average H shares 6-month trailing BV/P of 26 sample companies during June 2002 and June 2010 (period 1 to 17)

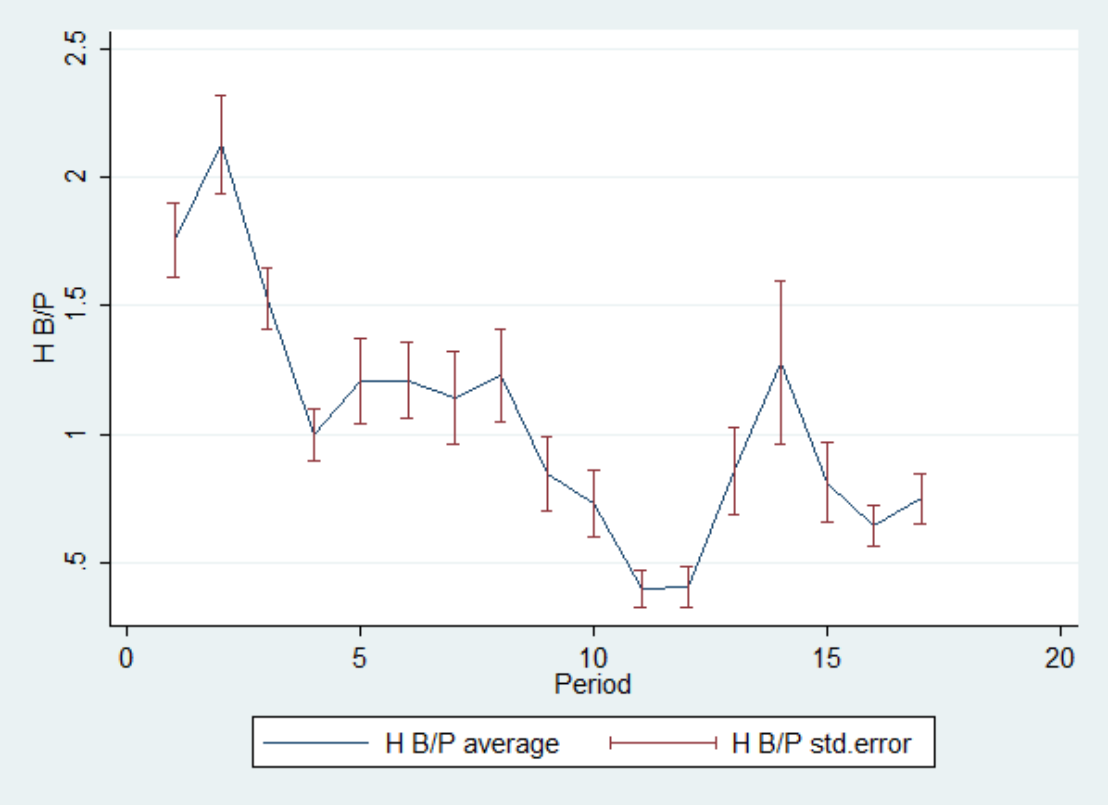
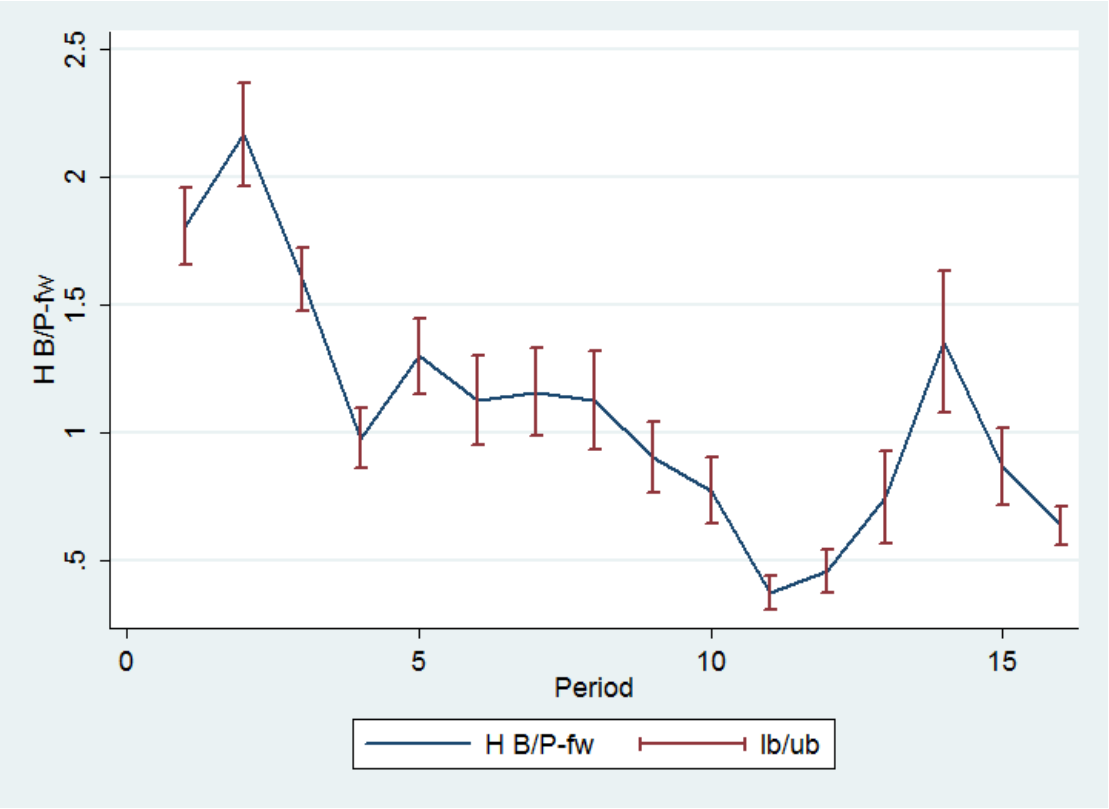


Figure 20. Average H shares 6-month forward BV/P of 26 sample companies during June 2002 and June 2010 (period 1 to 17)



2. Empirical results from pooled regression

Pooled regressions do not take into account any fixed effects, therefore model (1)-(12) are the same but only without v_i term.

(1) and (2) - Current model (with trailing price ratios)							
Full sample				**Pre-crisis sample**			
A share	**(Pooled)**			**A share**	**(Pooled)**		
	R-squared	=	*0.1047*		*R-squared*	=	*0.0958*
	coef	std.error	p		coef	std.error	p
aep	0.742	0.257	0.004	aep	0.635	0.213	0.003
abp	-0.529	0.077	0.000	abp	-0.514	0.095	0.000
_con	0.344	0.049	0.000	_con	0.342	0.062	0.000
H share	**(Pooled)**			**H share**	**(Pooled)**		
	R-squared	=	*0.0680*		*R-squared*	=	*0.0666*
	coef	std.error	p		coef	std.error	p
aep	0.254	0.080	0.002	aep	0.193	0.055	0.001
abp	-0.140	0.023	0.000	abp	-0.145	0.027	0.000
_con	0.311	0.039	0.000	_con	0.327	0.048	0.000

(3) and (4) - Prediction model (with trailing price ratios)

Full sample

A share (Pooled)

R-squared = 0.0295

	coef	std.error	p
aep	-0.333	0.188	0.077
abp	0.283	0.089	0.002
_con	-0.017	0.048	0.722

H share (Pooled)

R-squared = 0.0357

	coef	std.error	p
aep	-0.085	0.079	0.285
abp	0.106	0.029	0.000
_con	0.057	0.036	0.115

Pre-crisis sample

A share (Pooled)

R-squared = 0.0253

	coef	std.error	p
aep	-0.019	0.220	0.932
abp	0.264	0.105	0.012
_con	-0.044	0.060	0.460

H share (Pooled)

R-squared = 0.0351

	coef	std.error	p
aep	0.117	0.128	0.362
abp	0.103	0.033	0.002
_con	0.028	0.042	0.509

(5) and (6) - Current model (with forward price ratios)

Full sample

A share (pooled)

R-sq: within = 0.1088

	coef	std.error	p
aepfw	1.236	0.398	0.002
abpfw	-0.506	0.082	0.000
_cons	0.352	0.052	0.000

H share (pooled)

R-sq: within = 0.0832

	coef	std.error	p
hepfw	0.451	0.139	0.001
hbpfw	-0.142	0.024	0.000
_cons	0.328	0.041	0.000

Pre-crisis sample

A share (pooled)

R-sq: within = 0.1073

	coef	std.error	p
aepfw	1.280	0.461	0.006
abpfw	-0.479	0.093	0.000
_cons	0.321	0.060	0.000

H share (pooled)

R-sq: within = 0.0930

	coef	std.error	p
hepfw	0.493	0.168	0.004
hbpfw	-0.143	0.026	0.000
_cons	0.320	0.047	0.000

(7) and (8) - Prediction model (with forward price ratios)

Full sample

A share (pooled)

R-sq: within = 0.0409

	coef	std.error	p
aepfw	0.381	0.384	0.321
abpfw	0.267	0.091	0.004
_cons	-0.015	0.050	0.770

H share (pooled)

R-sq: within = 0.0560

	coef	std.error	p
hepfw	0.255	0.189	0.179
hbpfw	0.109	0.029	0.000
_cons	0.053	0.038	0.164

Pre-crisis sample

A share (pooled)

R-sq: within = 0.0429

	coef	std.error	p
aepfw	0.460	0.457	0.315
abpfw	0.242	0.100	0.016
_cons	-0.041	0.057	0.469

H share (pooled)

R-sq: within = 0.0606

	coef	std.error	p
hepfw	0.279	0.217	0.200
hbpfw	0.106	0.032	0.001
_cons	0.019	0.040	0.630

(9) - Current model (with trailing price ratios)

Full sample

(pooled)

A-H return

R-squared = 0.0016

	coef	std.error	p
a_hep	0.051	0.051	0.095
a_hbp	0.019	0.019	0.890
_cons	0.025	0.025	0.018

Pre-crisis sample

(pooled)

A-H return

R-squared = 0.0020

	coef	std.error	p
a_hep	0.054	0.077	0.483
a_hbp	0.019	0.024	0.428
_cons	-0.055	0.031	0.077

(10) - Current model (with forward price ratios)

Full sample

(pooled)

A-H return

R-squared = 0.0009

	coef	std.error	p
a_hepfw	0.084	0.089	0.344
a_hbpfw	0.000	0.018	0.999
_cons	-0.058	0.024	0.015

Pre-crisis sample

(pooled)

A-H return

R-squared = 0.0013

	coef	std.error	p
a_hepfw	0.041	0.078	0.598
a_hbpfw	0.014	0.023	0.538
_cons	-0.056	0.030	0.065

(11) - Prediction model (with trailing price ratios)							
Full sample				**Pre-crisis sample**			
(pooled)				**(pooled)**			
A-H return				*A-H return*			
	R-squared	= 0.0800			R-squared	= 0.1292	
	coef	std.error	p		coef	std.error	p
a_hep	-0.012	0.111	0.914	a_hep	0.083	0.121	0.494
a_hbp	0.134	0.026	0.000	a_hbp	0.178	0.029	0.000
_cons	0.019	0.023	0.412	_cons	0.049	0.026	0.064

(12) - Prediction model (with forward price ratios)							
Full sample				**Pre-crisis sample**			
(pooled)				**(pooled)**			
A-H return				*A-H return*			
	R-squared	= 0.0974			R-squared	= 0.1429	
	coef	std.error	p		coef	std.error	p
a_hepfw	0.156	0.148	0.292	a_hepfw	0.125	0.147	0.393
a_hbpfw	0.140	0.025	0.000	a_hbpfw	0.180	0.028	0.000
_cons	0.022	0.022	0.308	_cons	0.050	0.026	0.055