

## The Book-to-Market Anomaly in the Chinese Stock Markets<sup>\*</sup>

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This paper examines the existence of value premium in the Chinese stock markets and empirically provides its explanation. Our results suggest that the value premium does exist in the Chinese markets, and investor sophistication is significant in explaining its existence. In particular, there is supporting evidence that the value premium could be driven by individual investors, whereas stocks that are mostly held by institutional investors are value-premium free. We briefly discuss the implications of our findings.

Keywords: Book-to-Market Anomaly, Chinese Stock Markets, Empirical Asset Pricing, Value Premium, Investor Sophistication  
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## I. INTRODUCTION

The book-to-market effect (otherwise known as the “value premium” effect) is an empirical regularity that stocks with high book-to-market (BM) ratios (low market prices relative to the book values of equity) earn higher average (risk-adjusted) returns than stocks with low BM ratios. Many previous asset pricing studies suggest that the existence of value premium can be explained from either the perspective of risk or the influence of mispricing factors.<sup>1</sup> Findings from these asset pricing studies extensively rely on datasets from the U.S. stock market which not only has a large pool of global institutional investors but also is considered a relatively efficient market.

Previous studies such as Fama and French (1998 and 2012) and Asness, Moskowitz and Pedersen (2013) have also confirmed the existence of value premium in international financial markets. However, value premium could exist in various markets with different explanations. For example, risk-based explanation has built on the efficient market hypotheses. Those explanation may fit in the U.S. market, but not in other less developed and less efficient markets such as the Chinese market. Drew, Naughton, and Veeraraghavan (2003) and Euna and Huang (2007) have shown that the value premium exists in Chinese markets. However, they have not provided its explanation.

Unlike previous studies, this study goes further by providing the explanation for the existence of value premium in Chinese markets. We notice that the Chinese stock market is a natural candidate for testing whether individual investors drive value premium with the following reasons. First, the mainland Chinese stock markets are often perceived as “casinos driven by fast money flows in and out of stocks with little regard for their underlying value” (Wall Street Journal, August 22 2001). In addition, the segmentation of the markets and the predominance of individual investors in these markets make the Chinese stock market a natural candidate for testing whether individual investors drive value premium.

Our results confirm that, like Drew et al. (2003) and Eun and Huang (2007), the value premium does exist in the Chinese markets for the period from 1994 to 2010. Moreover, there is a significantly negative relationship between institutional

<sup>1</sup> For details on the risk-based explanation, please refer to Fama and French (1995); for details on the mispricing-based explanation, please refer to Ali et al. (2003).

ownership of stocks and value premium. This is apparently consistent with findings of Phalippou (2007, 2008) that value premium is related to trading activities of individual investors, not institutional investors in the U.S. market.

Our findings with the Chinese firms contribute to empirical asset pricing literature by providing international supporting evidence that the value premium could be driven by individual investors, whereas stocks that are mostly held by institutional investors are value-premium free.

The rest of the paper is organized as follows. Section 2 reviews the literature regarding the value premium, the characteristics of the Chinese stock markets and develops several testable hypotheses. Section 3 then discusses the datasets and explains the empirical methodology. The empirical results are analyzed in detail in Section 4. Finally, this paper concludes by discussing the implications of our results for policy regulators, the role of institutional investors, and the overall market efficiency in China.

## II. THE VALUE PREMIUM AND CHINESE STOCK MARKET

### *1. The Value Premium and Its Explanation*

The economic interpretation of the value premium is a much debated issue, with current explanations falling into two broad categories. One explanation suggests that the value premium is compensation for risk that is not captured by the capital asset pricing model (Fama and French, 1995, 1996, 1998; Lindaas and Simlai, 2014). In particular, Fama and French suggest that the value premium is apparently related to the degree of “relative distress” in the economy. When the economy weakens, investors demand a higher risk premium on firms with distress characteristics. Since distressed stocks perform poorly just when the investor least wants to hold a poorly performing stock, value stocks must offer a higher average return to compensate for the additional systematic risk.

However, evidence against this explanation has been suggested by several researchers (Dichev, 1998; Griffin and Lemmon, 2002; Arshanapalli et al., 2006; Campbell et al., 2008) and it shows that the risk-based explanation cannot completely account for the existence of the value premium. In particular, Campbell et al. (2008) note that financially distressed firms apparently deliver abnormally lower returns than others, implying that distress risk may not be systematic. Arshanapalli et al. (2006) also conclude that value premium does not behave like a risk factor.

Evidence against the risk-based explanation has prompted an alternative approach to explain the existence of the value premium based on the behavior of investors (Lakonishok et al., 1994; Ali et al., 2003; Phalippou, 2007 and 2008). As suggested by Lakonishok et al. (1994), the value premium can arise from a behavioral or “irrational” perspective due to systematic mispricing. In particular, investors are predisposed towards investments in firms with high current or expected future levels of profits, regardless of the stock price, so they overvalue growth stocks. The opposite applies for value stocks. As a result, growth (value) stocks become overvalued (undervalued). Ali et al. (2003) builds on this idea of mispricing by showing evidence that systematic bias in mispricing is not arbitrated away as arbitrage is costly and any systematic mispricing is not quickly and completely traded away in situations where arbitrage costs exceed arbitrage benefits. Furthermore, risk due to the volatility of arbitrage returns (“arbitrage risk”) deters arbitrage activity and is likely to be an important reason for the existence of the value premium effect. In general, they conclude that the value premium is higher for stocks with higher expected stock volatility (proxy for arbitrage risk), higher transaction costs, and lower ownership by sophisticated investors.

Other related studies (La Porta et al., 1997; Skinner and Sloan, 2002) also corroborate the finding that market participants naively extrapolate earnings and persistently overvalue (undervalue) future earnings for growth (value) stocks. This systematic bias in expectations generates the value premium and it may not be eliminated quickly through arbitrage. As argued by Shleifer and Vishny (1997), arbitrage can be difficult due to prohibitive transactions costs. Furthermore, they predict that higher volatility of stocks will deter arbitrage activities, which makes it even more difficult to eliminate systematic mispricing.

More recently, Phalippou (2007, 2008) shows the relationship between institutional ownership and value premium. He argues that if the value premium arises due to mispricing and limited arbitrage, then the value premium should be concentrated in stocks that are both held by relatively less sophisticated individual investors and expensive to arbitrage. In contrast, institutional investors should be somewhat less prone to judgment biases than individual investors. As such, if the percentage of institutional ownership were a proxy for investor sophistication, the value premium would be significant in stocks with low institutional ownership.

## 2. *The Chinese Stock Markets and Hypotheses Development*

Fama and French (1998, 2012) and other recent studies have confirmed that value premium is an international phenomena. However, each individual market's characteristics have not been fully explored in finding the explanation for its existence. In particular, Chinese markets have several unique characteristics that cannot be found in other markets, which creates a testing ground for examining value premium.

First, short-selling in the mainland Chinese stock markets was disallowed until 2010 (Chang et al., 2014).<sup>2</sup> Moreover, stock trading in China is subject to a “one-day lock-up” regulation: when buyers purchase some equity shares, they cannot sell their stocks on the same day; they must wait until the next trading day to sell (Bian, Su and Wang, 2015). These institutional features create barriers and high transaction costs for conducting arbitrage trading. The unique features of the Chinese stock markets suggest that arbitrage risk is quite significant for market participants. Ali et al. (2003) postulate that, as arbitrage is costly and systematic mispricing is not quickly and completely traded away in situations where arbitrage costs exceed arbitrage benefits, value premium can persist to create disparity between value and growth stocks. Furthermore, risk due to the volatility of arbitrage returns (“arbitrage risk”) deters arbitrage activity. Arbitrage resources are concentrated in the hands of a relatively few specialized and poorly diversified traders. These arbitrageurs are risk averse and are concerned about the idiosyncratic risk in their portfolios. To specialized arbitrageurs, idiosyncratic volatility of the stocks in their portfolio is of greater concern than systematic volatility. Idiosyncratic volatility cannot be hedged and since arbitrageurs are not well-diversified, idiosyncratic volatility adds to total portfolio volatility without a corresponding increase in expected returns. Value premium is higher for stocks with higher expected stock volatility (proxy for arbitrage risk). As such, we propose the following hypothesis:

*Hypothesis I: High arbitrage risk is one of significant explanatory factors for the existence of value premium in Chinese stock markets.*

<sup>2</sup> According to Chang et al. (2014), the China Securities Regulatory Commission (CSRC) did not allow short selling in the Chinese stock markets. The pilot program for short-selling was only launched in 2010 and subsequently implemented as routine practice after 2011.

Moreover, as noted in the media, the mainland Chinese stock markets are often perceived as “casinos driven by fast money flows in and out of stocks with little regard for their underlying value” (Wall Street Journal, August 22 2001). The former head of the Development Research Council in the State Council of People’s Republic of China Jinglian Wu also observes that the Chinese stock market is “worse than a casino” (Green, 2004). Literature on the profile of investors in the Chinese stock markets has further suggested that speculation is rampant in the markets, in part due to dominance of inexperienced and unsophisticated individual investors who are concerned primarily with short-term trading profits (Eun and Huang, 2007; Ng and Wu, 2006 and 2007; Mei et al., 2009). Furthermore, Chen et al. (2007) suggest that Chinese investors are subject to several behavioral biases, including overconfidence.

Apart from the dominance of individual investors, the current segmented market structure can test the significance of investor sophistication from several angles. In particular, the stock exchanges themselves, located in Shanghai and Shenzhen, are segmented into A- and B-share classes. A- and B-shares are similar in the sense that they have the same voting rights and earn the same dividends. Prior to 2001, A-shares were dominated by domestic participants (mostly individual investors) while the B-shares were meant for foreign institutional investors. However, after 2001, the domestic individual investors were allowed to invest in B stocks and a Qualified Foreign Institutional Investor (QFII) program allowing certain foreign institutions to invest in A-shares was established in 2002. Nonetheless, differences between the stock classes still exist. As noted by Tan, Chiang, Mason and Nelling (2008), the A-share markets are dominated by domestic individual investors who typically lack knowledge and investing experience, while the B-markets are dominated by more sophisticated foreign institutional investors. The dominance of individual investors and the separation of domestic/foreign investors’ participation for the same stock suggest that less sophisticated investors may drive value premium in Chinese markets. Thus, as in Phalippou (2007, 2008), value premium is higher for stocks with low percentage of institutional investors. Our second hypothesis is the following.

*Hypothesis II: Investor sophistication is one of significant explanatory factors for the existence of value premium in Chinese stock markets.*

### III. DATA AND METHODOLOGY

#### *1. Data*

Our data sample includes A-shares and B-shares in the Shanghai Stock Exchange from CSMAR (China Stock Market Trading Database). Stocks should have price, market values, book-value items as well as return data for the subsequent three-year period available. The BM ratio is calculated as total share holders' equity plus deferred tax assets last December (the end of the fiscal year) divided by market value in June. We drop stocks with negative book values and also exclude stocks with the highest 0.5% and lowest 1% BM values. Extreme observations with 400% monthly returns are also omitted. To minimize potential bias from penny stocks, stock returns are set to missing when their closing prices are less than 3 Yuan (about 50 US cents) in the previous month. We also exclude observations with top/bottom 0.5% stock returns. CSMAR data is available from 1991, but our sample period begins from January 1994 due to few observation for the period from 1991-1993. The currency for all the data items is the Chinese Yuan (CNY). We use the three-month deposit rate in China as the risk-free rate. Buy-and-hold returns are measured over one-, two-, and three-year holding periods beginning in July of year  $t$ .

The datasets for shares held by institutional investors are obtained from the RESSET Financial Research Database (RESSET/DB). This database provides the percentage of shares held by various kinds of institutional investors, including funds, securities corporations, financial products, QFII, insurance companies, social security funds, enterprises annuities, finance companies, and so on. Moreover, the database includes the percentage of shares held by the top 10 largest shareholders. To merge the CSMAR and RESSET/DB databases, we make use of the individual stock codes and the years. There are 8,880 (101,118) observations in the combined firm-year (month) dataset from 1994 to 2010<sup>3</sup>. We use both annual (at the end of June) and monthly frequency samples for our analysis.

#### *2. Methodology*

Our methodology is based on Ali et al. (2003) and Phalippou (2007, 2008). One part of the analysis will make use of the technique of sorting portfolios. First, we

<sup>3</sup> Our sample period ends in 2010 year due to the availability of the RESSET/DB.

sort the firms according to their book-to-market ratios and compute the return differences between the top and bottom quintiles.

The other part of the analysis will involve a set of predictive regressions to examine whether coefficients of book-to-market ratio are significantly positive in different samples based on levels of arbitrage risk and investor sophistication. Specifically, we measure them in the following manners.

*Expected idiosyncratic volatility (Ivolatility):* Ivolatility is a proxy for measuring the impact of arbitrage risk on the mispricing of stocks (Schleifer and Vishny, 1997; Ali *et al.*, 2003). As noted by Schleifer and Vishny (1997), there is a link between idiosyncratic volatility, arbitrage risk and mispricing. Although arbitrage trades can correct mispricing in theory, these trades may not always be executed in practice due to the presence of arbitrage risk. Schleifer and Vishny (1997) argue that these trades are mostly conducted by a few poorly diversified and specialized arbitrageurs, who are typically risk-averse and only hold on to a limited range of stocks in their arbitrage portfolios. As a result of their risk-aversion, the arbitrageurs pay particular attention to the idiosyncratic volatility of their portfolios and an increase in the idiosyncratic volatility of their stocks will reduce their incentives to conduct arbitrage activities. Mispricing of stocks can occur as a result of arbitrage risk and stock idiosyncratic volatility is a good proxy for measuring the extent of arbitrage risk. To compute idiosyncratic volatility, we regress the daily returns on a value-weighted market index over a one-year period immediately preceding the holding period and compute the variance of the residual term (Ali *et al.*, 2003).

*Top 10:* Ali *et al.* (2003) suggest that if markets have sophisticated investors (such as institutional investors) actively involved in trading for reasons other than arbitrage, stocks may not be mispriced. Phalippou (2007, 2008) also suggest that the proportion of institutional investors is inversely related to the degree of mispricing. To proxy for institutional ownership of stocks, we use the datasets on the top ten owners of the stocks in RESSET/DB, mainly because of the investor characteristics in the Chinese stock markets. According to Green (2003), both formal and informal institutional investors exist in the Chinese stock markets. The former group includes securities companies, investment funds and insurance funds, whereas the latter includes some large institutional investors who report themselves as individual investors when they purchase stocks. In particular, Green (2003) suggests that these informal institutional investors account for



about half the total market capitalization in the Chinese stock markets. Moreover, the datasets in RESSET/DB suggest that institutional investors are the largest shareholders of the stocks. Thus, we employ “top 10 unrestricted stock holders’ holding percentage to unrestricted shares” as a proxy for institutional ownership to take into account the existence of formal and informal institutional investors.<sup>4</sup>

Our predictive regressions are provided below:

$$SRET_{i,t} = b_0 + b_2 BM_{i,t} + b_1 Beta_{i,t} + Firm\ Variables_{i,t} + e_{i,t} \quad (1)$$

where  $SRET_{i,t}$  indicates stock returns of firm  $i$  at period  $t$ . In all our regressions, we use the one-month buy-and-hold returns minus the average returns of the portfolios for the size deciles. We also use unadjusted stock returns,  $RET_{i,t}$ , for the same predictive regression analysis.

In the predictive regressions, firm variables are beta, firm size, leverage ratio, and trading volume that are used to explain firm characteristics. To control for the influence of systematic risk of the stocks, we compute the beta. For further details on beta, refer to Ali et al. (2003). Size is the log of market capitalization ratio of previous month and the leverage ratio is the book value of total liabilities to the book value of total assets. Volume is the log value of trading volume. These variables are widely employed in empirical asset pricing literature in predicting firm level expected stock returns.

<Table 1> shows summary statistics of variables. The mean of SRET is close to zero, Size and Volume indicate the log value of market capitalization and the log value of trading volume. Beta, Ivolatility and Top 10 begins from 2000 year due to data availability.

<sup>4</sup> We have also used percentages of the shares held by various institutional investors and the results are largely consistent with what we report in this paper. The details are available from the authors upon request.

Table 1. Summary Statistics

Variable	Obs.	Mean	Std.Dev.	Min	Max
SRET	101,118	0.00	0.10	-0.47	0.88
BM	101,118	0.37	0.24	0.03	2.71
Size	101,118	14.86	1.03	12.19	20.73
Beta	78,818	1.00	0.26	0.34	1.88
Ivolatility	82,860	0.32	0.15	0.08	0.79
Top10	62,271	0.34	0.58	0.01	7.12
Leverage	101,118	0.47	0.18	0.00	1.00
Volume	101,118	19.62	1.60	11.75	25.60

## IV. ESTIMATION RESULTS

### *1. Value Premium in Chinese Stock Market*

In this section, we examine whether the value premium exists in the Chinese stock markets before testing Hypotheses I and II. The existence of value premium can be shown by forming BM-based portfolios and comparing return differences among the highest BM and the lowest BM portfolios. In Table 2, we confirm positive and significant average return differences using A-shares in our sample period, from January 1994 to December 2010. For each year, stocks are sorted based on the value of BM, calculated as book value at fiscal year-end (December) of year  $t-1$  divided by market value of equity at the end of June of year  $t$ . Then, five quintile portfolios, from Q1 (the lowest BM portfolio) to Q5 (the highest BM portfolio) are formed. For each portfolio, monthly time series averages of variables are calculated. The variables are BM, market value of equity in millions at the end of each month (ME), and size-adjusted returns with one-year, two-year, and three-year buy-and-hold periods (SRet1y, SRet2y, and SRet3y, respectively). SRet1y, SRet2y, and SRet3y are defined as raw buy-and-hold returns less size-decile returns. To avoid size-bias (small stocks), we examine size-adjusted returns. In this analysis, Q5-Q1 size-adjusted returns are 4.4%, 7.2%, and 10.9%, over one-, two-, and three-year holding periods, which are similar to Ali et al. (2003)'s

U.S. results. Ali et al. (2003) suggest that BM has the ability to predict returns.<sup>5</sup> Thus, in Table 2, we confirm that the value premium exists in Chinese stock markets before testing Hypothesis I and II.

Table 2. Characteristics of the Book-to-Market (BM) Quintiles Portfolios over the 1994-2010 period

Variable	All firms	Q1	Q2	Q3	Q4	Q5	Q5-Q1	
		(Low)				(High)	Diff	t-statistic
BM	0.370	0.156	0.251	0.331	0.426	0.642	0.486	12.517 ***
SRet1y	-0.018	-0.053	-0.027	0.004	-0.015	-0.009	0.044	2.187 **
SRet2y	-0.031	-0.087	-0.053	-0.011	-0.021	-0.016	0.072	2.442 **
SRet3y	-0.031	-0.108	-0.047	-0.051	-0.016	0.001	0.109	2.747 ***
Num. of obs.	101,118	20,339	20,418	20,314	20,257	19,790		

Note: Q5-Q1 is the average return differences from Q5 to Q1. The t-stat shows the statistical significance of Q5-Q1 and is reported with the Newey and West (1987) t-statistics with 11 months lag to avoid serial correlation. \*\*\*, \*\*, and \* indicate significance at better than 1%, 5%, and 10% levels, respectively. Num. of obs. is the total number of observations.

## 2. Predictive Regressions

In this section, we examine Hypothesis I and II using predictive regressions as explained in equation (1)<sup>6</sup>. Since our data sample is essentially stock-month observations, the regressions should account for firm cross-correlation. Thus, we implement the Fama and MacBeth (1973) two-step procedure. In the first step, for each month, a cross-sectional regression across A shares is performed.<sup>7</sup> Then,

<sup>5</sup> We also observe positive and significant average return differences using different sample period: 1994-2001 and 2002-2010. We find similar results using firm-year observations with 1 year lag of Newey-West (1987) t-statistics. In fact, we proceed all of our analyses using both monthly and yearly frequency samples and find similar results in two different frequency samples. These results are available from the authors upon request.

<sup>6</sup> The analysis period is from 2004 to 2010. RESSET database has missing observations problem from 2001 to 2004. Thus, we only report the results with the period from 2004 to 2010. We also ran the same regression specifications with the period from 2001 and find similar results.

<sup>7</sup> B shares are excluded in the regressions as there will be a double-count issue especially after 2002.

coefficients are collected from each month. In the second step, we regress the collected coefficients on one to test whether the average of these coefficients are significant. The reported final estimates are the coefficient and standard errors of one variable. We also account for the correlation of errors across time by calculating Newey-West (1987) standard errors with 11 months lag. Table 3 reports the regression results from equation (1).

Table 3. Predictive Regressions using Size adjusted returns

Dependent variable: Size adjusted returns with one-month buy-and-hold period								
Samples	All		Ivolatility groups			Top 10 groups		
	All	All	Low	Low	Low	Low	Middle	High
<i>BM</i>	0.010** (0.005)	0.012*** (0.004)	0.011* (0.006)	0.011* (0.006)	0.011* (0.006)	0.019*** (0.005)	0.006 (0.005)	0.006 (0.006)
<i>Beta</i>	0.013 (0.010)	0.007 (0.010)	0.011 (0.012)	0.011 (0.012)	0.011 (0.012)	0.031* (0.017)	0.017 (0.016)	0.015 (0.016)
<i>Size</i>		-0.013*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.011*** (0.001)	-0.027*** (0.003)	-0.017*** (0.002)	-0.010*** (0.002)
<i>Leverage</i>		-0.003 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.003 (0.004)	0.005 (0.006)	-0.002 (0.006)
<i>Volume</i>		0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.000*** (0.000)
<i>Constant</i>	-0.016 (0.010)	0.168*** (0.024)	0.143*** (0.021)	0.143*** (0.021)	0.143*** (0.021)	0.333*** (0.041)	0.205*** (0.027)	0.126*** (0.024)
Obs.	78,818	78,817	20,682	20,682	20,682	13,341	21,109	18,275
R <sup>2</sup>	0.052	0.103	0.147	0.147	0.147	0.157	0.102	0.118

Note: \*\*\*, \*\*, and \* indicate significance at better than the 1%, 5%, and 10% levels, respectively.

The dependent variable is size adjusted returns with a one-month buy-and-hold period. The first two columns are predictive regression results with all observations. The coefficient of *BM* in the second column shows positive sign and statistical significance at 1% level. This indicates that returns are higher in high *BM* stocks, suggesting value premium effects.

*Ivolatility* is a proxy for inverse of expected idiosyncratic volatility and higher values of *Ivolatility* imply that expected idiosyncratic volatility increases. The second set of Table 3 show results when we separate samples into Low/Middle/High *Ivolatility* groups. Low/Middle/High *Ivolatility* are groups with lower 30%/middle 40%/higher 30% of *Ivolatility* variable, respectively. The coefficients of BM across three groups are significantly positive, implying that there is no difference in the value premium effects across different level of arbitrage risk in Chinese markets. Hypothesis I has not been confirmed from Table 3 results.

*Top10* is a proxy for institutional ownership and lower values of *Top10* imply lower percentage of institutional investors, thus, more chances of mispricing by investors. The last set of Table 3 shows results when we separate samples into Low/Middle/High Top 10 groups. Low/Middle/High Top 10 are groups with lower 30%/middle 40%/higher 30% of Top 10 variable, respectively. In last set, the coefficient of BM in only Low Top 10 group is positively significant at 1% level, suggesting that the BM anomaly only exists in low institutional investors. Thus, Hypothesis II has clearly been confirmed in this predictive regressions.

Table 4 shows predictive regression results using unadjusted returns. We find that unadjusted returns also show similar results to those in Table 3.

Table 4. Predictive Regressions using Unadjusted returns

Dependent variable: Unadjusted returns with one-month buy-and-hold period								
Samples	All		Ivolatility groups			Top 10 groups		
	All	All	Low	Middle	High	Low	Middle	High
<i>BM</i>	0.012** (0.005)	0.014*** (0.004)	0.012** (0.006)	0.010* (0.006)	0.011** (0.005)	0.020*** (0.005)	0.007 (0.005)	0.007 (0.006)
<i>Beta</i>	0.011 (0.011)	0.007 (0.010)	0.011 (0.013)	0.007 (0.011)	0.008 (0.012)	0.033* (0.017)	0.018 (0.017)	0.015 (0.016)
<i>Size</i>		-0.016*** (0.003)	-0.013*** (0.002)	-0.014*** (0.003)	-0.018*** (0.002)	-0.032*** (0.005)	-0.021*** (0.003)	-0.014*** (0.002)
<i>Leverage</i>		-0.002 (0.003)	-0.001 (0.003)	-0.002 (0.003)	-0.005 (0.004)	-0.002 (0.004)	0.004 (0.005)	-0.002 (0.006)

<i>Volume</i>	0.000***	0.000***	0.000***	0.000***	0.000**	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
<i>Constant</i>	0.005	0.231***	0.184***	0.207***	0.250***	0.439***	0.302***
	(0.007)	(0.048)	(0.035)	(0.043)	(0.043)	(0.075)	(0.045)
Obs.	78,818	78,817	20,682	27,679	20,296	13,341	21,109
R <sup>2</sup>	0.056	0.141	0.189	0.149	0.148	0.184	0.132
						0.156	

Note: \*\*\*, \*\*, and \* indicate significance at better than the 1%, 5%, and 10% levels, respectively.

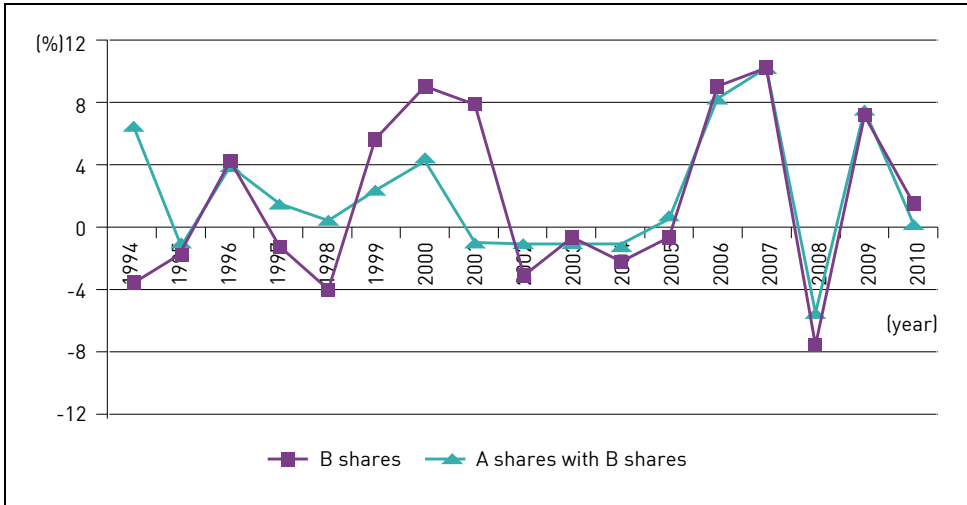
### 3. Robustness Tests: Domestic Investors versus Foreign Investors

In the predictive regressions, we find that the investor sophistication explains the book-to-market anomaly in the Chinese markets. However, the investor sophistication results are only based on the percentage of top 10 investors. We take the percentage as institutional ownership. However, one might argue that the proxy needs to be investigated more. Thus, we carefully examine Hypotheses II using other investor groups in this section. In this section, we compare returns of A shares and B shares of the same firms. Our reasoning is the following.

Due to the predominance of domestic individual (foreign institutional) investors in the A-shares (B-shares) market before the introduction of the QFII program, the firms in the A-shares market should display significant value premium, whereas the same shares listed on B-shares should not.

Figure 1 shows the trend of average returns for A shares and B shares of firms to which both domestic investors and QFII have access. Before 2002, both B shares and A shares (with B shares included) exhibit different patterns. During this period, investor groups are different for our sample firms. QFII were only allowed to buy B shares of firms and there were approximately 40 firms with B shares. After 2002, QFII can buy A shares as well and average returns become similar. Thus, Figure 1 apparently suggests that different investor groups may be driving the different returns for the same firm. One possibility is that one of the groups tends to commit mispricing errors.

Figure 1. Trend of Average Returns for A shares and B shares



Note: The reported lines are equal-weighted for monthly value-weighted average of returns over a year. B shares indicate the average returns of reported B shares in the Shanghai stock exchange; A shares with B shares indicate the average returns of A shares of firms which also have B-shares in the Shanghai stock exchange.

Table 5 shows average return differences of the highest quintile (Q5) BM-based portfolio and the lowest quintile portfolio of three samples. The comparison using three samples provides empirical evidence for Hypotheses II that either foreign or domestic investors are related to the existence of value premium. The Q5-Q1 columns provide values of average return differences (Diff) based on BM sorting and the Newey-West (1987) t-statistics (t-stat) with 11 months. The column (1) Q5-Q1 is calculated with the sample of B shares during the period, from Jan. 1994 to Dec. 2001. The column (2) Q5-Q1 is with the sample of A shares issued by firms which also issue B shares during the period, from Jan. 1994 to Dec. 2001. The last column, (3) Q5-Q1, is with the sample of A shares issued by firms which also issue B shares during the period, from Jan. 2002 to Dec. 2010. The yearly frequency results also show similar results.

Table 5. High minus Low portfolio: A shares and B shares

Period	Before 2002 (1994-2001)				After 2002 (2002-2010)	
Sample	B shares		A shares of firms with B shares			
Variable	(1) Q5-Q1		(2) Q5-Q1		(3) Q5-Q1	
	Diff	t-stat	Diff	t-stat	Diff	t-stat
BM	0.469	10.265 ***	0.459	8.404 ***	0.727	9.547 ***
SRet1y	0.048	1.909 *	0.074	1.821 *	0.075	2.341 **
SRet2y	0.040	0.386	0.140	3.907 ***	0.177	5.835 ***
SRet3y	0.060	0.720	0.199	4.180 ***	0.261	2.366 **
Num. of obs.	3,475		3,536		3,656	

Note: The sample frequency is monthly. SRet1y, SRet2y, and SRet3y are size-adjusted returns as explained in Table 1. \*\*\*, \*\*, and \* indicate significance at better than the 1%, 5%, and 10% levels, respectively. Num. of obs. is the total number of observations.

In (1) Q5-Q1 column, SRet1y and SRet2y show insignificant return differences. However, in (2) Q5-Q1 column, the results using A shares of firms with B shares show positive and significant value premium for size-adjusted returns over two-, and three-year buy-and-hold periods. For (1) Q5-Q1 and (2) Q5-Q1, those results are based on the same firms sample as well as the same data sample period. The only differences are groups of stocks: A share which only domestic investors have access to and B shares which only foreign investors have access to. For the same firms but different group of stocks, the BM effect is observed differently. It implies that different investor groups provide different BM effects. In (3) Q5-Q1 column, the significance levels for SRet2y and SRet3y have become weaker. The BM effects have become weaker since the participation of QFII in the A shares market. This finding implies that mispricing and overreaction of domestic investors may have generated the value premium in Chinese stock markets.

## V. DISCUSSION AND CONCLUSION

Our results indicate that investor sophistication is significantly related to the existence of the book-to-market effect in the Chinese stock market. Our findings contribute to empirical asset pricing literature by supporting mispricing based explanation for the existence of value premium using Chinese stock markets database.

Moreover, our findings have policy implications, as well. As noted by Lakonishok et al. (1994) and Ali et al. (2003), the inability to arbitrage away persistent mispricing



is the main reason for the existence of the book-to-market effect. The Chinese government should contribute to develop policies that are consistent with reducing persistent mispricing and enhancing overall market efficiency. The significant relationship between investor sophistication (or institutional ownership) and the book-to-market effect highlights the potentially beneficial impact of encouraging growth of sophisticated investors and having foreign institutional investors in the Chinese stock markets.

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