Speculative Trading and Stock Prices: An Analysis of Chinese A-B Share Premia*

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Abstract

China's stock markets, with stringent short-sales constraints, dominance of inexperienced individual investors, a small asset float and heavy share turnover (500% per year despite a high transaction cost), provide a unique opportunity to study non-fundamental components in stock prices. In particular, several dozen Chinese firms offered two classes of shares: class A, which could only be held by domestic investors, and class B, which could only be traded by foreigners. Despite their identical rights, A-share prices were on average 420% higher than the corresponding B shares. By exploring several different model specifications, we find that the turnover rate of A shares is able to explain a large portion of the cross-sectional variation in A-B share premium. Our further analysis of the relationship between asset float and share turnover shows that trading in A-share markets is more likely to be driven by speculation than by liquidity factors. Our results are robust after controlling for the effects of liquidity, discount rates, and differential risk and demand curves by local and foreign investors.

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1 Introduction

Chinese stock markets provide a unique opportunity to investigate determinants of stock prices. During the period 1993-2000, there were several dozen firms that offered two classes of shares, class A and class B, with identical rights. Until 2001, domestic investors could only buy A shares while foreign investors could only hold B shares. Despite their identical payoffs, class A shares traded on average for 420% more than the corresponding B shares. In addition, A shares turned over at a much higher rate - 500% versus 100% per year for B shares. The striking price difference and heavy share turnover, despite the high round trip transaction cost of 1.4%, are often attributed to speculative bubbles by commentators. Several papers, e.g., Bailey, Chung, and Kang (1999), and Sun and Tong (2000), had conjectured speculative trading as a possible explanation to the puzzling behavior of the A-B share premia in China's stock markets, but without providing an empirical analysis that is motivated from an explicit economic mechanism.

In this paper, we examine the claim that speculative behavior is a partial explanation for the A-B share premia. The identical payoff structure of A and B shares makes it possible to control for stock price fundamentals. The relatively large sample allows a formal statistical analysis of a (potential) non-fundamental component in stock prices. The large panel also permits us to control for cross-sectional differences in risk and liquidity, as well as the time variation of interest rates and risk premium.

Our empirical analysis is based on recent theoretical developments on speculative bubbles. The argument that speculative motive of investors is an important determinant of stock prices goes far back to Keynes' *General Theory.* In the recent literature, Harrison and Kreps (1978) demonstrate that asset prices may incorporate a speculative component when investors have heterogeneous beliefs about the fundamental value of a stock and short sales are costly, since the ownership of a share of the stock provides an opportunity to profit from other investors' over-valuation. More recently, Scheinkman and Xiong (2003) use overconfidence, the belief by investors that their opinions are more precise than they actually are, to derive an explicit dynamics for heterogeneous beliefs among investors and a resulting speculative component for stock prices in a continuous-time equilibrium model with risk-neutral investors. Their model shows that there should be a positive cross-sectional association between the volume of speculative trading and the size of the non-fundamental component. Our empirical analysis is specifically built on this cross-sectional relationship. Furthermore, Hong, Scheinkman, and Xiong (2003) show that when investors have limited risk-bearing capacity, investors' speculative motives amplify the effect of asset float (the amount of tradable shares) on stock prices. In particular, they show that share turnover generated by speculative motive decreases with asset float, which is the opposite of the predictions from theories that justify trading from liquidity reasons. This difference allows us to distinguish speculative trading from liquidity based trading.

Chinese stock markets are well suited for analyzing the effects of speculative trading on stock prices for several reasons. First, not only short-sales of stocks and derivative securities are illegal, but also equity issuance and buy-backs by firms, a common practice that firms use to "arbitrage" the miss-valuation of their own stocks, are severely constrained by the restrictive rules imposed by Chinese government. Second, Chinese stock markets were only recently re-opened in early 1990s after being closed for nearly half a century. The markets are still in development with only limited participation of institutions, and most domestic investors are individuals who are new to stock trading and are likely to be subject to behavioral biases, including overconfidence. Third, only 30% of shares in Chinese stock markets are floating, much less than in other markets. The small amount of asset float makes it particularly easy for speculative trading to generate large price effect. These market conditions suggest that speculative trading could have an important effect, and that it would be more likely to cause A-share prices to depart from fundamentals than B-share prices.

Our analysis emphasizes the cross sectional correlation between the A-B share premia and the turnover rates. We show that the A-share turnover is able to explain, on average, 20% of the monthly cross sectional variation of the A-B share premia in the period of 1994 - 2000. On the other hand, the effect of B-share turnover on the A-B premia is insignificant. We have also incorporated the market capitalizations and various risk measures of A shares and B shares in our analysis to control for other mechanism such as potentially different risks in A and B-shares returns and differential demand curves by domestic and foreign investors. The importance of A-share turnover in explaining A-B share premium is not substantially affected by these controls.

One might argue that the effect of A-share turnover on the A-B share premia might be due to the cross-sectional difference in liquidity of A shares. However, the prevalence of individual investors and the high turnover rate in A-share markets make it hard to justify the importance of liquidity. Nevertheless, we control for the effect of liquidity using the proportion of no-price-change days in a month for each share.[1] This control actually increases our point estimate of the effect of A-share turnover on the A-B share premia. In addition, the effect of the portion of no-price-change days in A-shares is insignificant, while the effect of the portion of no-price-change days in B-shares is significant. These results suggest that the effect of A-share turnover on A-B share premium is not due to a liquidity effect. They also point out that liquidity could have played a role in B-share markets.

To further determine whether trading in A-share and B-share markets is driven by speculation or liquidity reasons, we examine the cross-sectional correlation between share turnover and asset float for both A shares and B shares. We find a negative and significant association between share turnover and asset float in A-share markets in the period of 1994-2000, while a positive and significant relationship in B-share markets. As we argue in Section 3, the speculative trading theory implies a negative correlation between turnover and float. However, to attribute the A-share premium variation to differences in liquidity, one has to postulate that, *coeteris paribus*, shares with higher float are less liquid!

To control for discount rate effects, we estimate several panel regressions of A-B share premium on A-share and B-share turnovers with different specifications of time and firm effects. We find that a model with random firm effects and a time effect is not rejected by the data. In this model, a one standard deviation change in turnover of the A share of a firm adds 22 percentage points to the A-B share premium. In addition, the variations in the time effect coefficients is well explained ($R^2 = 85\%$) by a linear combination of

[1] This variable has been found to be an effective measure of market liquidity in U.S. stock markets and several emerging markets by Lesmond, Ogden, and Trzcinka (1999) and Bekaert, Harvey, and Lundblad (2003).

Chinese and world interest rates and China's political risk premium as measured in the dollar denominated Chinese sovereign bond spread.

After February 2001, Chinese residents could purchase B shares using foreign currency. This rule change caused a great reduction in A-B share premia. Interestingly, while A-share markets had little reaction after the rule change, B-share prices and turnover rates went up dramatically, indicating that speculation by domestic investors also became an important factor in B-share markets.

Our study contributes to the growing debate on whether asset prices can be affected by investor psychology or other non-fundamental factors. While the classic asset pricing models typically state that stock prices are determined by firm fundamentals, i.e., the future stream of dividends and the discount factors that apply, this view has been especially challenged by the rise and fall of Internet stocks in the late 1990s.[2] Many observers have suggested that the speculative trading induced by the heterogeneous beliefs among investors about the fundamental value of these stocks has played an important role in the price dynamics of these Internet stocks. However, it is difficult to use the Internet stock prices to examine such a view because it is difficult to measure the fundamental value of a stock. The pairs of A and B shares in China's stock markets provide a unique and natural setup to control for asset fundamentals, and our results support the view that speculative motive of investors can be an important determinant of stock prices.

Our analysis adds to the earlier studies that use the relative pricing between securities with identical or similar fundamentals to analyze the effects of investor sentiments on asset prices. For example, Lee, Shleifer and Thaler (1991) study the discounts of closed funds relative to their net asset values, and Froot and Dabora (1999) examine three examples of twin shares, including Royal Dutch and Shell, that are traded in different markets across the world. While these studies find evidence that asset prices are affected by investor sentiments and location of trade, it is difficult to disentangle the interaction between individual investors and arbitrageurs and other institutional complications in these markets. China's stock markets provide a relatively simple environment, given

[2]For example, several recent studies, *e.g.* Mitchell, Pulvino and Stafford (2002), Lamont and Thaler (2003), and Ofek and Richardson (2003), show that in some extreme carve-out examples the value of a firm can be less than its subsidiary.

the strictly enforced restrictions on short-sales, segmentation of A and B shares, underdevelopment of investment institutions, and lack of derivatives markets. These market conditions allow us to specifically identify speculative trading by individual investors as an important determinant of stock prices.

Our study also contributes to the market segmentation literature in international finance. Previous studies, such as Eun and Janakiramana (1986), Hietala (1989), Bailey and Jagtiani (1994), and Stulz and Wasserfallen (1995) have used capital controls, information asymmetries, corporate governance, liquidity, as well as price discrimination to explain the price difference between foreign and domestic shares. Our analysis indicates that speculative trading could also provide a mechanism to generate this price difference.

The rest of the paper is organized as follows. Section 2 provides a brief review of related studies on the prices of China's A and B shares. Section 3 describes a theory of speculative trading and its implication on stock prices, based on heterogeneous beliefs and short-sales constraints. In Section 4, we describe some basic facts of the Chinese stock markets. In Section 5, we analyze the A-B share premium and other variables related to speculative trading. Section 6 provides panel regressions to examine the relationship between A-B share premium and share turnover. Section 7 discusses the changes that occurred after the relaxation of trading restrictions in B-share markets. Section 8 concludes the paper with some further discussion of the challenge created by speculative prices on the development of stock markets.

2 Related Studies

Various arguments have been proposed in the international finance literature to explain the difference in prices between different classes of shares, including differential discount rates and risk factors, differential demand curves, asymmetry of information, and liquidity effect[3]. These arguments have been applied to understand the A-B share premium after it was documented by Bailey (1994). In this section, we briefly review these arguments.

Fernald and Rogers (2002) and Eun, Janakiramanan and Lee (2002) propose that

[3]The possibility of differential tax effect is ruled out since there is no tax on dividends nor on capital gains for both A and B shares.

the A-B share premium may be caused by the difference in discount factors for the A and B shares, since Chinese local investors and foreign investors face different investment opportunity sets and have different risk exposure. The difference in discount factors may come from difference in risk-free rates or from difference in risk premium.

Domestic investors and foreign investors may also have different demand elasticities for a company's shares, as suggested by Stulz and Wasserfallen (1995). Sun and Tong (2000) adopt this argument to explain the price discount of B-shares relative to A-shares. The differential demand curves are potentially related to the information asymmetry between local investors and foreign investors. Chakravarty, Sarkar, and Wu (1998) emphasize that foreigners need to bear more risks in B shares relative to local investors in A shares due to language barriers and different accounting standards. However, the empirical evidence seems to be mixed on whether local or foreign investors are more informed. Chui and Kwok (1998) and Chen, Lee and Rui (2001) find evidence that B-share returns lead A-share returns by examining the cross-autocorrelation between them, while Chan, Menkveld and Yang (2003) show evidence supporting better informed domestic investors.

We take into account these arguments by incorporating the prevailing interest rates in China and abroad, the political risk of China, the market risk and firm specific risk of both A and B shares, and the market capitalization of both A and B shares in our analysis. We confirm the importance of these effects, but show that the effect of speculative trading on A-B share premia is not affected by these controls.

Chen, Lee and Rui (2001), and Chen and Xiong (2002) argued that liquidity may explain part of the Chinese A-B share price difference. As we mentioned above, we use the proportion of no-price-change days as a proxy for liquidity and found that it does not change the effect of A-share turnover on the premium. Furthermore our results concerning the effect of asset float on turnover provide supporting evidence that trading in A-shares is more likely to be driven by speculation than by liquidity reasons.

Karolyi and Li (2003) and Chan, Menkveld and Yang (2003) also analyze the effects of the opening B shares to domestic investors in 2001 on the price difference between A and B shares. Karolyi and Li find that strong reactions are concentrated in small capitalization stocks and those with substantial past-return momentum and are unrelated to firm risk and liquidity attributes. Chan, Menkveld and Yang find that the change in price is partially caused by the reduction in the information asymmetry between foreign and domestic investors.

3 Theory on Speculative Trading and Asset Prices

A long tradition in economics and finance, going back at least to Keynes (1931) and Williams (1938), stresses the role of speculative behavior on asset prices. Recent references include Harrison and Kreps (1978), Morris (1996), Scheinkman and Xiong (2003), and Hong, Scheinkman and Xiong (2003). These papers show that when investors have heterogeneous beliefs about the value of a stock and short sales are costly, the ownership of a share of the stock provides a resale option to profit from other investors' over-valuation. The resale option thus contributes a speculative component to stock prices, in addition to the fundamental value that is determined by the expected future cashflow discounted by a risk adjusted discount rate. In this section, we briefly discuss the implications of these models on speculative trading and asset prices.

Standard asset pricing models usually assume that investors have homogenous beliefs about the economy, and focus on the risk premium that investors would demand for bearing risk. In reality, investors often differ in their beliefs about asset fundamentals, for example, fund managers and financial analysts sometimes offer dramatically different views in newspapers and TVs about the future perspectives of the economy or certain sectors. The fluctuation in the relative beliefs among investors naturally leads to trading, which has been considered by some researchers, such as Harris and Raviv (1993) and Odean (1998), as an important mechanism in understanding trading in financial markets. Heterogeneous beliefs can be generated at least from two possible sources: heterogeneous prior beliefs or psychological biases in investors' information processing. Morris (1996) argues that the common prior assumption, which has been widely used in game theory and asset pricing models, is not motivated from any economic principle, but it is rather a simplifying tool to model agents' beliefs. Therefore, it is legitimate to relax this assumption, provided that a plausible mechanism is used to parameterize the difference in beliefs.[4]

Investor overconfidence provides a convenient way to generate heterogeneous beliefs among investors. Overconfidence is a widely observed behavioral bias in psychological studies. Hirshleifer (2001) and Barberis and Thaler (2003) review the related psychological evidence and discuss implications of overconfidence to financial markets. Overconfidence can lead investors to differ in their information processing, i.e., some investors might choose to overweigh a subset of available information in analyzing asset fundamentals, while other investors might overweigh another set, therefore generating heterogeneous beliefs. The difference in investors' beliefs will fluctuate more if investors are more overconfident and differ more in their information processing, or if there is more fundamental uncertainty which would leave more room for beliefs to differ.

When short-sales of assets are costly, heterogeneous beliefs can create a speculative motive for investors. An asset owner expects not only to collect future cash flows from the asset, but also to profit from other investors' over-optimism in the future by selling the share at a price higher than he thinks it is worth. Thus, the price of an asset can be decomposed in two components: the fundamental valuation of the asset owner if forced to hold the asset forever and collect all the future cashflows, and a speculative component generated by the asset owner's option to sell the share for a speculative profit. Scheinkman and Xiong (2003) offer a continuous-time model with overconfident and risk neutral investors to analyze the contribution of the resale option to asset prices and the optimal selling strategy of asset owners. They show that the resale option, analogous to standard financial options with the difference in investors' beliefs as the underlying asset, is valuable to the asset owner even if other investors' beliefs are currently lower. In particular, the valuation of the resale option depends crucially on the volatility of the difference in beliefs, which increases with investor overconfidence and the fundamental volatility of the asset. As the difference in investors' beliefs become more volatile, the resale option becomes more valuable, and at the same time investors trade more frequently with each other. Hence we would predict that when investors have heterogeneous beliefs

[4]It is important to note that private information cannot generate heterogeneous beliefs that lead rational investors with identical prior beliefs to speculate against each other. See Milgrom and Stokey (1982), Tirole (1982), and Diamond and Verrecchia (1987).

about asset fundamental and short-sales are constrained the following hypothesis would hold:

Hypothesis I: *There is a positive relationship between the speculative component in asset prices and the turnover of shares.*

We will use the pairs of A- and B-shares in China's stock markets to study the speculative component in prices, and especially to examine its relation with turnover of shares, as highlighted in Hypothesis I. Interestingly, Cochrane (2002) also pointed out the existence of a positive cross-sectional correlation between the market/book ratio of US stocks and their turnover rates during the Internet bubble period of 1996-2000. However, he does not provide a formal analysis of this empirical regularity.

Hong, Scheinkman and Xiong (2003) analyze the effects of asset float, i.e., the number of shares that are available for trading in the market, on the resale option and speculative trading. When investors are risk averse, a larger asset float means that it takes a greater divergence in opinion in the future for an asset owner to resell the shares for a speculative profit, which implies that the resale option is less valuable today. Indeed, Hong, Scheinkman and Xiong show that, as the asset float increases, the "strike price" of the resale option increases. As a result, the resale option becomes less valuable, and the share turnover rate becomes smaller since asset owners are less likely to exercise their resale option. Since the effect of asset float on the resale option derives from the the strike price, it is highly non-linear, and especially dramatic when the float is small. The theory in Hong, Scheinkman and Xiong (2003) has the following implication:

Hypothesis II: *The speculative component and the turnover of shares decrease with asset float. The speculative component is especially sensitive to changes in asset float when float is small.*

Another factor in studying the relation between asset prices and share turnover is liquidity. Investors often need to trade assets for portfolio rebalancing or other liquidity reasons, and assets differ in transaction cost and the level of difficulty in matching buyers with sellers. Duffie, Garleanu and Pedersen (2003), Vayanos and Wang (2003) and Weill (2003) provide theoretical models to analyze the effects of liquidity on asset prices and trading volume, based on a search process between buyers and sellers. It is intuitive that liquid assets tend to have higher prices and larger turnover rates. These models also predict that share turnover is positively related to asset float when investors trade for liquidity reasons, distinct from the prediction in Hypothesis II. The basic argument is that when asset float becomes larger, it is easier for a seller to match with a buyer. Hence a liquidity story implies:

Hypothesis III: *The turnover rate of shares increases with asset float.*

The opposite predictions in Hypotheses II and III on the effect of asset float on share turnover allow us to separate trading driven by speculation from trading driven by liquidity reasons.

4 The Chinese Stock Market

4.1 Institutions

China made a dramatic transition from a planned economy to a market economy, starting in 1978. In 1990, stock exchanges were established in Shanghai and Shenzhen. These stock exchanges listed shares of partially privatized state owned enterprises. Market growth was spectacular - by 2001 each exchange listed more than 500 companies and the total market cap of Chinese stocks exceeded US$500 billion. The number of shareholders increased 160 times, from 400,000 in 1991 to more than 64 million in 2001.

Like other emerging markets, China displayed remarkable booms and busts. Figure 1 illustrates the behavior of the Shanghai A share and B share indices. Beginning in 1991, the Shanghai index went from 100 to 250 in less than a year and then reached 1200 by the first quarter of 1992. By mid-1992, multiples of 50 to 100 times earnings became the norm on the Shanghai Stock Exchange and some "hot" issues fetched even higher multiples.[5] Starting in June 1992, the Shanghai stock market dropped by more than 60 percent in a period of five months. Within a few days of hitting bottom, the bull market returned. In just three months, the overall market index rose from 400 to a new height

[5]As an example, Happy Flying, a consumer electronics company, sold for over 1,000 times its previous year's earnings at one point. Apparently investors believed that the earnings of Happy Flying would rise astronomically as a result of equipping 1.2 billion consumers with TVs and VCRs, and quickly bring the price-earnings ratio to a more reasonable level. When the market fell, Happy Flying not only led the way but also crashed more spectacularly than any other stock, dropping from 13.10 Yuan to 2.60 Yuan. See Malkiel and Mei (1997) for more details.

of 1600. However, by the mid 1994 the index was back to 400. In the second half of the decade the market generally trended up, but as it can be seen from the figure, there were numerous episodes in which the index lost several hundred points in a short period. For example, during the 1993-2001 period, there were 20 "mini-crashes" when the Shanghai market Index lost more than 10% in a month, but only 8 similar episodes in the Nasdaq.

In addition to high volatility, the Chinese stock market had very high turnover. From 1991 to 2001, class A shares turned over on average at an annual rate of 500%, which is even higher than the 365% turnover of DotCom firms in their heyday, and more than five times the turnover rate of the typical NYSE stock.[6]

The heavy turnover rate of A shares is puzzling from the perspective of standard rational expectations models of asset trading, especially given the high transactions cost in Chinese stock markets. During most 1990s, each side of a trade on the Shanghai Stock Exchange had to pay a 0.4% commission fee to the broker and a 0.3% stamp tax to the government.[7] Thus, a trade would incur a total fee of 1.4% of the proceeds, in addition to other costs such as the price impact of trades. A turnover rate of 500% a year implies that 7% of the A-share market capitalization was paid as direct trading fees each year. This number is hard to justify from the usual hedging or portfolio rebalancing arguments.[8]

There are several features of the Chinese market during this period that make the model in Section 3 above particularly applicable.

Chinese residents face a very stringent "short-sale" constraint. Chinese investors' accounts are kept centrally at the stock exchanges, and it is illegal to sell short. An exchange's computer always check an investor's position before it executes a trade. This trading system makes it very difficult for financial institutions to lend stocks to their clients for short selling purposes. Moreover, there are no futures or option markets on

[6]Ofek and Richardson (2001).

[7]See the official website of Shanghai Stock Exchange: http://www.sse.com.cn.

[8]The trading activity in the Chinese markets is much heavier than the neighboring markets. For example, the average turnover rates in 1994 and 1995 for Indonesia, Japan, and Korea are 23%, 24%, and 125%, respectively, according to Morgan Stanley International Portfolio Desk, IFC Stock Market Factbook (1996) and Dow Jones Research. The direct transaction costs per round-trip trade for Indonesia, Japan, and Korea are 1.6%, 0.7%, and 1.3%, respectively, comparable to China.

stocks in China.[9]

Normally, when equity prices exceed their fundamental values, companies will increase the supply of equities to arbitrage the difference. Baker and Wurgler (2002) present strong evidence of market timing by U.S. firms, showing that firms tend to issue equity when their market value is high. This automatic market correction mechanism is impaired in China because of the tight government control over IPOs and seasoned equity offerings (SEOs). Chinese companies need government approval to sell their equity. The process is highly political and companies often have to wait years for issuing shares. Strict quotas, which generally bind, stop many qualifying companies from taking advantage of favorable market conditions to sell their shares. Similarly, when equity prices falls below their fundamental values, companies are also prevented from share buy-backs due to restrictive Chinese corporate law.[10]

The Chinese stock market only resumed its operation in early 1990s after being shut down for nearly half a century. At the moment, it is dominated by individual investors. Investment institutions such as mutual funds and pension funds are still in an early stage of development. According to a recent report of the World Bank "at the end of 1999, of the 30 percent of tradable shares, individuals held 25 percent and institutions held 5 percent" (Tenev, Zhang, and Brefort (2002), page 77). Feng and Seasholes (2003) summarize the demographic information of a sample of 90,478 actively investing individuals in China, and find that these individuals are much younger, and would have less investing/trading experience in comparison with a typical individual investor in U.S. Psychological experiments indicate that overconfidence is more pronounced in the face of more difficult tasks.[11] Therefore, it seems a reasonable working hypothesis to assume

[9]The government banned bond futures market in 1994 because of a price manipulation scandal and has also put the development of equity derivatives markets on hold. So far, no equity derivatives have be legally traded in China due to a lack of government approval.

[10]It is worth noting that, while Chinese firms had almost no control over its IPO or SEO process, the Chinese government does tend to issue more shares in a booming market. However, the issuance is often based on a long waiting list whose order seems to be more related to politics than to relative valuations in the market place. As a result, while the new issues approved by the government may take advantage of overall market conditions, they are not meant to address relative mis-valuations in the marketplace. As late as 2002, a World Bank Report states "...future decisions about which companies will access the market and when and where they will do so *will* be based on market principles." (Tenev, Zhang, and Brefort (2002), page 111, the emphasis is ours.)

[11]See Lichtenstein, Fischhoff, and Phillips (1982).

that Chinese investors were more likely to display overconfidence, especially relative to the foreign institutional investors who invest in the Chinese B-share markets. Given the presence of strict short-sales constraints and less experienced individual investors, the mechanism described in Section 3 seems well suited for Chinese A-share markets, and we proceed to test its implications.

The float (tradable shares) in Chinese stock markets is small. Since the government is still in the process of gradually privatizing state owned enterprises, it has a dominant ownership in most public companies. Chinese companies have four major types of shares, state shares, legal person shares, A shares and B shares.[12] The state shares and legal person shares, each contributing to about one third of all shares, are not tradable and are usually owned directly by the central and local governments or indirectly through domestic institutions, most of which are partially owned by the government. As we argue in Section 3 the small amount of float makes it easy for speculative trading among overconfident investors to generate a large price effect.

4.2 A-B Share Premium

Several dozen Chinese companies issued two classes of common shares with identical voting and dividend rights. They are also listed on the same exchanges, either on the Shanghai or Shenzhen stock exchanges. Class A shares were restricted to domestic residents. Class B shares were confined to foreigners before February 2001 when domestic residents were allowed to purchase B shares using foreign currency. Even after the rule change, capital controls continue to serve as a restriction for Chinese residents to acquire B shares. In the period 1993-2001, 75 companies had both class A and class B shares.

Our sample covers prices and other characteristics for all firms that listed both A and B shares from 1993-2001. To provide some general description of speculative behavior in the Chinese market, we also collected data for the much larger set of all companies that listed A shares, though typically not B shares, during the period of 1997-2001. The data include daily closing prices, monthly returns (with dividend reinvested), annual dividends

[12] See Sun and Tong (2003) for a detailed account of these shares.

and earnings per share, turnover, and the number of floating A shares.[13] Our sample period of 1993 to 2001 covers the market slump from 1993-1995, a major bull market in 1996-1997 and a tech stock boom from 1999-2001 that coincides with the tech bubble in the U.S. There is also the important regime change in February 2001, when the Chinese government changed the regulations on B-shares, allowing domestic investors to legally own and trade them if they have foreign currency.

Table 1 provides some summary statistics. Since our sample period overlaps with the U.S. tech bubble, we split our sample into two groups: High tech firms and the rest (called low-tech). We classify firms that belong to the information technology, biotech, telecom, and computers sectors as high-tech companies.[14] For A shares, we find that the high-tech firms are generally larger in market capitalization, have higher prices, and tend to trade more heavily. Monthly turnover was 43% for the high-tech firms and 39% for the low-tech firm, which are equivalent to annual rates of 516% and 468% respectively. However, the difference in behavior between Chinese high-tech and low-tech firms is much smaller than in the case of U.S. Internet stocks (See Ofek and Richardson (2003).) For this reason we will not differentiate between the two types of firms in what follows.

Table 2 provides some simple comparison between A and B shares. The comparison is based on matching A and B shares of the same companies in the sample. While there were about 1250 firms on the two exchanges, only 75 firms issued both A and B shares. It is worth noting that the issuance of both shares are usually not determined by the firm, but by central government policies. A shares were also more actively traded than B shares. The average turnover of A shares was four times that of B shares during the sample period. There was also more cross-sectional variation of turnover in A shares than in B shares. The average cross-sectional variation of monthly turnover in A shares was 18.5% compared to 5.3% for B shares. Figure 3 plots both the time series of the average and cross-sectional variation of the monthly turnover rates of both A and B shares. In

[13]The data are obtained from Shenzhen GTA Information Technology Inc., which has recently reached an cooperative agreement with Wharton Research Data Service (WRDS) to incorporate GTA research databases on China's security markets into the WRDS. We have also confirmed part of our data from GTA with the data that we received from another source, Boshi Fund Management Company.

[14]We classified G (info tech including telecom and computer), C5, C51, C5110, C5115 (electronics), C85, C8501, C8599 (biotech, pharmaceutics), L20, L2001, L2005, L2099 (information services) as high tech, and all others as low tech.

addition, we provide summary information on the proportion of no-price-change days, a measure of market liquidity which we will discuss in greater detail in Section 5.2.

Table 2 also provides some simple statistics on the A-share price premium over the corresponding B share. On average, A shares fetched a 421.8% premium over B shares, even though they were entitled to exactly the same legal rights and claim to dividends.[15] The presence of such a large domestic share premium is quite different from many emerging and developed markets where domestic shares generally sell at a discount. Hietala (1989), Bailey and Jagtiani (1994), Bailey, Chung, and Kang (1999) and Stulz and Wasserfallen (1993) have all found a price discount for domestic shares in Finland, Indonesia, Malaysia, the Philippines, Singapore, Switzerland, and Thailand.[16] These authors have used liquidity factors, supply and demand factors to explain the discount. Some have even argued for a role for speculation without however conducting an empirical analysis.

Figure 2 presents a graphic plot of the equally weighted average A shares premium over time. The premium rose from 300% in April 1993 to about 800% in March 1999 and then fell to 100% at the end of 2001. The relaxation of restrictions on purchase of B shares by domestic investors in February 2001 did not eliminate all premia and it remained at a level around 80%, since domestic Chinese investors have limited access to the necessary foreign currency.[17] Figure 2 also provides the number of firms used in our study of A-B premia. This number changes over time because of listings and de-listings, and grows from less than 10 to over 70 in the sample period.

In addition to their large magnitude, the A-B share premia also vary dramatically

[15]Since B shares were traded in dollars and A shares in Yuans, the difference depends on the exchange rate. We used the official rate of the Bank of China. A black market rate would lower the average premium, but would not affect the cross sectional results that we emphasize.

[16]Typically in these countries a class of restricted shares are offered to local investors only, and another class of unrestricted shares are offered to both local and foreign investors. The restricted local shares usually sell at a discount. However, both China's A and B shares are restricted shares especially before the B shares were opened to local investors in 2001. Even after 2001, Chinese capital controls still imposed restrictions on the ownership of B shares by residents. Thus, the finding of restricted shares traded at a discount relative to unrestricted shares in other countries may not be directly comparable with the China's A-B share premia.

[17]Until a few years ago, China's currency control was quite strict. The only sources of foreign currency for domestic investors are remittance from overseas or the black market. To open a B-share account, domestic investors need to bring copies of foreign passports to show that the account is actually intended for foreigners. Recently, the government has somewhat relaxed its currency control, allowing people to exchange limited amount of foreign currency for overseas travel. It is also possible to exchange large amount of foreign currency in Hong Kong.

across firms. The average (over time) cross-sectional standard deviation of the premia is 167%. This compares with a (time-series) standard deviation of the average monthly premium of 193% during the same period. Hence cross sectional variation is of the same magnitude as the time series variation of the premium. Figure 4 plots the cross-sectional standard deviation of price premia over time. It fluctuates from 50% to over 400%. In the empirical analysis that follows, we focus on explaining this cross-sectional variation of the premia.

5 Empirical Analysis

One of the main hurdles to examining speculative components in stock prices is that deviations from fundamental value are unobservable. The presence of the two classes of shares of Chinese stocks with identical voting and dividend rights and a substantial price difference suggests the possibility of a non-fundamental component in the price of the more expensive class. Of course, some of this premium could result from other factors such as discount rates, risk premia, and market liquidity. In this section, we analyze the cross-sectional association between the A-B share premium, share turnover rate, and asset float based on the theory introduced in Section 3. We will also control for the cross-sectional effects generated by firms' risk, liquidity, and market capitalization. In the next section, we will use a panel regression method to control for the effect of time-varying discount rate and political risk.

5.1 Speculative Trading and Cross-sectional Variation of A-B Share Premia

Could the existence of a speculative component help explain the large variation of premia on A shares? In this section, we propose a regression analysis to test this view. According to the theory described in Section 3, the A-share price of a firm (the i-th firm), P_i^A, can be decomposed as the sum of two components, a fundamental component and a speculative component. The fundamental component is the current expected value of discounted future dividends adjusted for risk premium and we assume, in analogy to Gordon's Growth Formula, that it can be written as $\frac{E_i}{R_{it}^A - g_i}$, where E_i is the expectation of current (unobservable) earnings, g_i its growth rate and R_{it}^A the discount rate that applies.

$$R_{it}^{A} = r_{China,t} + \mu_i^{A}$$

where $r_{China,t}$ is the domestic interest rate available to Chinese investors and μ_i^A is the risk premium which could be determined by the firm's market risk or idiosyncratic risk. The speculative component S_{it}^A is determined by the volatility of the difference in beliefs among the Chinese investors about the firm's fundamental value and by the float of the A-shares, among other variables. That is, the firm's A-share price is

$$P_{it}^{A} = \frac{E_i}{R_{it}^{A} - g_i} + S_{it}^{A}.$$

Similarly, the B-share price of the firm, which is traded by foreign investors, can be specified as

$$P_{it}^{B} = \frac{E_i}{R_{it}^{B} - g_i} + S_{it}^{B},$$

where S_{it}^B is the speculative component in the B-share market. This speculative component in B-shares is positive when foreign investors are also overconfident and have heterogeneous beliefs about the fundamental value of the firm. In this case, S_{it}^B depends on the volatility of he difference in beliefs among the foreign investors, and on the float of B-shares. The discount rate R_{it}^B is given by

$$R_{it}^{B} = r_{World,t} + \beta_i^{B}\mu_{World} + \lambda_p,$$

with $r_{World,t}$ as the world interest rate, β_i^B as the beta of the firm's B share, μ_{World} as the world market premium and λ_p as the sovereign risk premium associated with China.

For simplicity, we will assume first that the B-share price provides a reasonable measure of the fundamental component of the firm value, that is $S_{it}^B = 0$. Later we will treat the case when $S_{it}^B > 0$. Thus, a firm's A and B share premium can be expressed as

$$\rho_{it} = \frac{P_{it}^{A} - P_{it}^{B}}{P_{it}^{B}} = \frac{R_{it}^{B} - g_i}{R_{it}^{A} - g_i} + \frac{S_{it}^{A}}{P_{it}^{B}} - 1. \tag{1}$$

If we ignore the difference in the discount rates for A and B shares, then $\rho_{it} \propto \frac{S_{it}^A}{P_{it}^B}$. We start with this simplification, although we will bring back later the term involving the difference in discount rates.

Hypothesis 1 in Section 3 claims that, as the volatility of the difference in beliefs of the domestic investors who trade a firm's A shares changes, the speculative component S_{it}^A and the turnover rate of A shares co-move together,[18] thus predicting a positive association between the A-B share premium and the A-share turnover rate.

To examine this correlation, we run the following cross-sectional regression of A-B premia on turnover rates:[19]

$$\rho_{it} = c_{0t} + c_{1t}\tau_{it}^A + c_{2t}\tau_{it}^B, \tag{2}$$

where $\tau_{it}^A = \log(1 + turnover_{it}^A)$ and $\tau_{it}^B = \log(1 + turnover_{it}^B)$. Here, we expect the coefficient c_{1t} to be positive. We incorporate the turnover of B shares in the regression, since it is possible that a speculative component may also exist in B shares ($S_{it}^B > 0$). If this is the case, we expect a positive relationship between S_{it}^B and τ_{it}^B since both are generated by heterogeneous beliefs among the foreign investors who trade the firm's B shares, and the coefficient c_{2t} should be negative. Another explanation for A-B share premium is a liquidity discount for B shares, since B shares, which have much less active trading than A-shares, might be illiquid. If so, we expect that firms with smaller B share turnover would have a bigger price discount in B shares and a higher A-B share premium. Thus, the B share illiquidity argument would also imply a negative coefficient c_{2t}.

The results of this regression are reported in Panel A of Table 3.[20] In the period that precedes the liberalization of B-shares trading to domestic investors and that is covered by our data, April 1993 to December 2000, A and B share turnover explain on average 25% of the cross-sectional variation in A-B share premium. The average c_{1t}, the coefficient on A-share turnover, is positive and highly significant with a Fama-MacBeth

[18] There are several reasons why the volatility of the difference in investors' beliefs would vary across stocks. First, since the A-share markets are dominated by individual investors, each stock is likely to have a different investor bases at a given point of time. Second, individuals could display different overconfidence degrees with respect to information related to individual stocks. Finally assets may also differ in the amount of fundamental uncertainty that creates room for investors' beliefs to diverge.

[19] We could also run a time-series regression. However, given the persistence in turnover data and the well known difficulty of removing the persistence, (see Lo and Wang (2000)), our study will focus on explaining the cross-sectional variation of A-B share premia.

[20] During the period of 1997-2000, the first day returns for Chinese IPO averaged 211% in high-tech industries and 141% in other industries. For this reason we exclude from our data set observations that correspond to the first twelve months after an IPO.

t- statistics of 8.3,[21] and A-share turnover explains 20% of the cross sectional variation of the premium. A 5% increase in A-share turnover is associated with an increase in excess of 15% of a stock's A-B premium. The coefficient of B-share turnover, c_{2t}, is not statistically significant.

Several other studies, *e.g.* Chen, Lee and Rui (2001) and Eun, Janakiramanan, and Lee (2001), have attempted to use the share turnover to explain the cross-sectional variation in the A-B share premia. Their specification of the cross-sectional regression of the A-B share premia is different from ours in that they all use the ratio between A share turnover and B share turnover as an independent variable, while we use the A share turnover and B share turnover as separate variables. Chen, Lee and Rui find a positive and statistically significant coefficient for the turnover ratio, but the R^2 of the regression is small. Furthermore, Eun, Janakiramanan, and Lee show that the coefficient of the turnover ratio becomes insignificant when some other control variables, such as betas of A and B shares and the volatility of A share return, are included in the regression. Since our point estimates for A share turnover and B share turnover are both positive (see Table 3), combining them in a ratio could result in a statistically insignificant estimate. Indeed, when we use our data and repeat the regressions of Eun, Janakiramanan, and Lee (2001), our estimates are similar to theirs.[22]

The positive cross-sectional correlation between the A-B share premia and A-share turnover is also consistent with the experience of U.S. stock markets in the internet "bubble" period 1996-2000. Cochrane (2002) documents a cross-sectional correlation between log market-to-book ratio and log turnover rate for U.S. stocks during this period. Thus, while China is an emerging market, its stock price behavior seems similar to that of other more developed markets.

5.2 Controlling for Illiquidity

Liquidity is an important factor in explaining cross-sectional differences in stock prices and stock returns, for example, see Amihud and Mendelson (1986), and Pastor and Stam-

[21]The Fama-McBeth t-statistics are computed by multiplying the square root of the number of time periods minus one by the ratio between the time series mean and the standard deviation of the parameter estimates.

[22]The exact results are available upon request.

baugh (2003) for U.S. stock prices and returns, Bekaert, Harvey, and Lundblad (2003) for emerging market stock returns, and Chen and Xiong (2002), and Chen, Lee, and Rui (2001) for Chinese stock prices. The basic argument for liquidity is that investors incur larger transaction costs when trading illiquid stocks, and therefore have less willingness to pay for these stocks.

In the case of China's A-share markets, illiquidity is unlikely to explain much of the the cross-sectional variation of A-share prices. As we discussed earlier, A-share markets are dominated by individual investors who trade heavily. Domestic investment institutions such as mutual funds and pension funds are not fully developed yet. The observed turnover and the likely demand by these individual investors indicate that illiquidity is not a problem. On the other hand foreign institutions invest in Chinese stocks, but only through the listings in Hong Kong stock markets or through Chinese B-share markets. Liquidity might be a problem for institutional investors in the B-share markets. We will further examine whether the trading in A-share and B-share markets is generated by speculation or liquidity reasons in Section 5.3.

In order to control for the effects of illiquidity in the A-B share premia, we use the proportion of no-price-change days of a stock over a month as a measure of liquidity. Lesmond, Ogden, and Trzcinka (1999) used this variable to measure liquidity for NYSE stocks, and found that it is highly correlated with other liquidity estimators such as quoted bid-ask spread and Roll's measure of the effective spread. Recently, Bekaert, Harvey, and Lundblad (2003) suggested that this measure is particularly useful in emerging markets where direct measures of trading cost such as bid-ask spreads are usually not available. They found that the fraction of no-price-change days is significant in explaining expected stock returns using data of 19 developing countries (China not included). On the other hand, they also found that share turnover rates are insignificant.

We obtained daily return data for the period 1995-2001. Table 2 shows that A shares averaged only 2.1% of trading days with no price changes in this period, while the corresponding B shares averaged 14.3%. This suggests that B shares are more illiquid than A shares. Figures 5A and 5B plot the time series of the average and cross-sectional variation of the percentage of no-price-change dates in a month for both A shares and

B shares. They show that B shares have not only more no-price-change dates, but also more cross-sectional variation in no-price-change dates.

Panel B of Table 3 reports the cross-sectional regression of A-B share premium on the turnover rates of A-shares and B-shares, and the corresponding proportion of no-price-change days, denoted by z_{it}^A and z_{it}^B, for the period 1995-2000 that precedes the liberalization of B-shares. A comparison with Panel A shows that using our control for liquidity does not change much the coefficients of A-share and B-share turnover rates. If anything, the point estimate of the effect of A-share turnover goes up, while that of B shares is still not significant. This indicates that the effects of turnover rates of the A shares on A-B share premium does not result from the demand for liquidity.

The proportion of no-price-change days of B shares has a significant and positive effect on the A-B share premium. It is consistent with the results in Bekaert, Harvey, and Lundblad (2003) for other emerging markets. The proportion of no-price-change days in A-shares is not statistically significant for the determination of the A-B premia. This is consistent with our earlier argument that liquidity in A markets has a smaller effect than in B markets. Panel C provides similar results by regressing A-B share premium on z_{it}^A and z_{it}^B only. Dropping the turnover variables does not change much the point estimates of the no-trade days coefficient.

5.3 Effects of Asset Float on Turnover

To further differentiate the effects of speculative trading and liquidity factors, we examine the relation between the turnover rate of shares and asset float in both A-share markets and B-share markets. The theories summarized in Section 3 suggest that when investors are risk averse and trade for speculative reasons, the turnover rate of the asset's share decreases with the float of the asset. On the other hand, share turnover is positively related to asset float if investors trade for liquidity reasons.[23]

[23] A positive correlation between share turnover and asset float is supported by empirical analysis on liquidity trading. For example, Amihud and Mendelson (1991) attribute the difference in the liquidity between on-the-run treasury bonds and off-the-run bonds to the holding of off-the-run bonds by entities such as insurance companies that typically do not trade. Chordia, Subrahmanyam and Anshuman (2001) provide evidence of a positive link between firm size, liquidity and turnover in US stocks. Chan, Chan and Fong (2002) provide evidence that a reduction in asset float may suppress liquidity and asset trading.

To investigate the effect of float on A-share turnover, we run the following cross-sectional regression:

$$\tau_{it}^{A} = \alpha_{0t} + \alpha_{1t} \log(MarketCap_{i,t}^{A}).$$

The results are shown in Table 4 for the period April 1993 to December 2000. Panel A shows that a firm's A-share turnover decreases with its own market capitalization as suggested by our model and the coefficient is highly significant. The same regression is conducted for B-share turnover and is reported in Panel B. It indicates that, in the same period, a firm's B-share turnover increases with its own market capitalization, and that the coefficient is also highly significant. The positive relation between B-share turnover and B-share capitalization is consistent with a liquidity story, as opposed to a speculative trading theory. B shares are usually less liquid than A shares. When a firm's B-share float becomes larger, more foreign investors (especially foreign institutions) will be interested in trading in this share, and liquidity improves. As a result, shares are turned over faster. The different nature of A-share and B-share turnovers is consistent with our earlier result that speculative trading is important for A-share prices but liquidity is important for B-share prices.

5.4 Other Determinants of A-B Share Premia

Besides speculation and liquidity, the A-B share premia could also be driven by differential demand curves of domestic and foreign investors, or difference in the risk of A and B shares. To control for these effects, we incorporate the asset float and various risk measures of both A-shares and B-shares into the cross-sectional regression:

$$\begin{aligned} \rho_{it} &= c_{0t} + c_{1t}\tau_{it}^{A} + c_{2t}\tau_{it}^{B} + c_{3t}\log(MarketCap_{1,t}^{A}) + c_{4t}\log(MarketCap_{i,t}^{B}) \\ &\quad + c_{5t}Cov(R_{Bi}, R_F) + c_{6t}Cov(R_{Bi}, R_B) + c_{7t}Cov(R_{Ai}, R_C) + c_{8t}Var(R_{Ai}). \quad (3) \end{aligned}$$

We use the same risk measures as Eun, Janakiramanan, and Lee (2001). The covariances of a firm's B share returns with the Morgan Stanley world return index, R_F, and China's B-share return index, R_B, are measures of risk in B-share markets. We measure systematic risk and firm specific risk in A-share markets by the covariance between a firm's

A-share returns and China's A-share return index, $Cov(R_{Ai}, R_C)$, and the variance of the firm's A-share returns, $Var(R_{Ai})$.[24]

The regression results are reported in Table 5 for the period April 1993 to December 2000. In the first set of regressions, we only add the market capitalization of A and B shares. The market capitalization of A shares has a negative and highly significant effect on A-B share premium, consistent with the hypothesis that more floating A shares of a firm lead to a lower price. The market capitalization of B shares also has a negative and highly significant effect on A-B share premium. Since B-share price appears in the denominator of the premium, a negative coefficient implies that more floating B shares lead to a higher B-share prices, consistent with the liquidity story that we discuss in Section 3. More importantly, A-share turnover is still highly significant with a t-stat of 6.31, and it explains 13% of the cross-sectional variations in A-B share premium. Figure 4 illustrates how the time series variation of the (cross-sectional) standard deviation of the premia is explained by the turnover rates and market capitalizations of A and B shares.

The second set of results in Table 5 reports the effects of measures of risk in A-share and B-share returns. The inclusion of the four risk measures does not affect much the coefficients and significance of A-share and B-share turnover rates. Furthermore, the impact of a one standard deviation of A-share asset float is at least seven times the impact of a one standard deviation of any of the four risk measures, while that of B shares is at least five times.

6 Panel Regressions

In the cross-sectional regressions of the previous section, we have not fully accounted for the effect of the discount rates for A and B shares, which are different across firms and change over time. To further account for this effect, we use a panel regression approach to include firm effects and time effects. To conserve degrees of freedom, the following

[24] We also replaced log($MarketCap$) with log($shares\ outstanding$) and the results are quite similar.

parsimonious form is employed by imposing constant c_{1t} and c_{2t}:

$$\rho_{it} = u_i + c_{0t} + c_1 \tau_{it}^A + c_2 \tau_{it}^B + \epsilon_{it}. \quad (4)$$

The terms u_i and c_{0t} come from linearizing the term $\frac{R_{it}^B - g_i}{R_{it}^A - g_i}$ in equation (1). The firm effect term u_i deals with the effects caused by the cross-sectional differences in the firm's growth rate, such as liquidity or other risk factors that we have considered in the previous section. The time effect term c_{0t} summarizes time-series variables, such as the Chinese interest rate, the world interest rate, equity premiums, and the risk premium associated with China's political risk.

In Table 6, specification I (time effects and firm effects) allows both effects. Specification II (time effects and random firm effects) allows time effects as well as firm heterogeneity but assumes the firm effects are uncorrelated cross-sectionally. This assumption allows us to treat the firm effects as random errors so that we can avoid explicitly estimating them in order to save degrees of freedom. Specification III (firm effects and random time effects) allows firm effects as well as time effects but assumes the time effects c_{0t} have no serial correlation. This assumption also allows us to treat the time effects as random errors to save degrees of freedom. Specification IV (time effects only) only allows time effects. Specification V (firm effects only) only allows firm effects.

Table 6 gives the estimates for the different model specifications as well as results for the specification tests for the 1993-2000 period. In our estimation process, we have used both balanced panel (stocks that have no missing observation during the sample period) and unbalanced panel (all stocks during the sample period). The results are quite similar. We report our results using the balanced panel.

In order to determine which model should be used, we perform a specification test described by Hausman (1978). Under a given specification, the test statistic follows a chi-square distribution with 2 degrees of freedom. Based on a critical value of 5.99 corresponding to a 5% significance level, we can see that the two most restrictive specifications IV and V, with either only the time effects or firm effects, are strongly rejected.[25] The model specification III, with firm effects and random time effects, is not rejected for the

[25] We have also performed two F-tests of specifications IV and V against specification I. Both of IV & V are strongly rejected as well.

sample period, but it is strongly rejected for the period 1997-2000 with a $\chi^2 = 8.06$. This is to be expected, since Figure 2 shows that the premia vary over time and are auto-correlated. On the other hand, the model specification II, with time effects and random firm effects, is not rejected by the data. This implies that, while the time effects are important for capturing the time-varying average premium in Figure 2, the firm effects are also present but could be treated as a random error.[26] As a result,we can obtain a consistent estimates of turnover and time effects in a parsimonious model while allowing cross-sectional variables such as risk and liquidity to influence a firm's average A-B share premium through the random firm effects.

Under specification II, we can see that A turnover has a statistically and economically significant effect on the premia. A one-standard deviation increase in A turnover raises the A-B premium by 22%. On the other hand, B turnover has an insignificant effect.

Equation (1) suggests that the time effect term, c_{0t}, incorporates the effects of variables such as Chinese interest rates, world interest rates, and the risk premium from China's political risk.[27] This suggests that we examine the specification:

$$c_{0t} = \vartheta_0 + \vartheta_1 r_{China} + \vartheta_2 r_{World} + \vartheta_3 i_{ChinaSprd}.$$

Intuitively, an increase in Chinese interest rates should lower A-share price due to an increase in the discount rates. Thus, we would expect ϑ_1 to be negative. Also, an increase in world interest rates should lower B-share prices and thus increasing the A-B premium ρ_{it} . Moreover, an increase in China's political/sovereign risk, which we proxy by using the spread between Chinese long-term bond and US 10-year bond ($i_{Chinasprd}$), should also lower B-share prices.[28] This implies that ϑ_2 and ϑ_3 should be positive. Here we use the Chinese three-month deposit rate for Chinese risk free rate r_{China} and US three-month Treasury bill rate to proxy for world interest rate r_{World}. Table 7 presents

[26] These effects are constant over time but vary randomly across stocks and tend to affect the mean premium of individual stocks.

[27] Here we ignore the Chinese as well as the world market equity risk premium, since the ex ante risk premium is hard to measure.

[28] Kim and Mei (2001) discover that China's political risk affect stock prices in Hong Kong. This imply that political risk could affect B share prices as well, since investors in Hong Kong shares are likely to invest in B shares as well.

the results for the time period March 1994-December 2000,[29] using c_{0t} estimated from specification II of our panel regression. The R^2 is 85%, ϑ_1 and ϑ_3 have the right signs and are highly significant, while ϑ_2 has the right sign but is not statistically significant. Hence the time effect is well described by a combination of Chinese interest rates, world interest rates and a measure of the political risks, and each of these variables contributes with the expected sign. This is consistent with the importance of the difference in discount factors between domestic and foreign investors as emphasized by Fernald and Rogers (2002).

7 The 2001 Relaxation of B-Share Restrictions

On February 28, 2001, Chinese authorities opened the markets for B shares to domestic investors, provided they used foreign currency. This change allows us to further examine the behavior of A and B share markets. In addition to documenting the change in the A-B share premia after the rule change as in other studies, e.g., Karolyi and Li (2003) and Chan, Menkveld and Yang (2003), we are especially interested in examing whether the relationship among A-B share premia, share turnover and asset float has changed after the regulatory shift.

Table 8 reports the market reaction to the change. Panel A shows that from February 16, 2001 to March 9, 2001, A-share prices on average decreased by 0.5%, and the drop is statistically insignificant with a standard deviation of 22%. On the other hand, B-share prices increased by 63% on average and the increase is highly significant with a standard deviation of only 7.3%. Therefore, most price reaction came from B shares. Panel B shows the change in B share turnover rates around the change in regulation. Before the event, B shares have an average monthly turnover of 12.3%, while post-event it becomes 44.4%, which is similar to the A-share turnover rate reported in Table 1. These observations indicate that after allowing Chinese domestic investors to buy B shares, B shares turned over faster and prices became higher, behaving more like A shares.

To further investigate the behavior of B-share markets after February 2001, we repeat the cross-sectional regression of Table 3 (regressing A-B premium to A-share and B-share

[29] Our sample here is a little short since the Chinese Long-term bond data starts at March 1994.

turnover) for the period of March 2001 to December 2001. The results are reported in Part I of Table 9. The coefficient of A-share turnover is still positive and significant, while the coefficient of B-share turnover becomes negative and also significant, in contrast to the results for the earlier period shown in Table 3. This suggests that a speculative component might have appeared in B-share prices after the rule change. These results are robust even after we control for liquidity by using the proportion of no-price-change days. In addition, we note that the coefficient of B-share liquidity becomes insignificant, in contrast to the positive and significant result for the earlier period. This is consistent with the view that liquidity is no longer a main determinant of B-share prices after a dramatic increase in the trading volume of B-shares after the liberalization.

Part II of Table 9 repeats the same cross-sectional regression in Table 4 (regressing A and B-share turnover rates on their float) after the rule change. This time, while the A-share coefficient remains negative, the B share coefficient turns negative and significant, which is the opposite of the positive coefficient found for the period before the event as shown in Table 4.[30] As we have discussed earlier, a negative association between turnover and float supports the view that trading in B-share markets is driven more by speculation than liquidity reasons after the opening of B-shares markets to local investors. This result is also consistent with Part I, suggesting a possible speculative component in B-shares after the rule change.[31]

8 Conclusion and Further Discussion

By analyzing data on Chinese A-B share premia, we argue that speculative trading can contribute a significant non-fundamental component to stock prices. Although this is a special market episode, it displays many common features with the recent Internet bubble in the US. Our results should help in understanding non-fundamental determinants of asset prices in other contexts.

[30] To see whether there is a significant coefficient change post liberalization, Part I & II also provide a simple t-test by comparing the mean coefficient estimates post liberalization to the same mean estimates before liberalization. The results show that while the coefficient change in A share float is insignificant, the coefficient change in B share float is highly significant.

[31] We have also conducted an event study of the change in the A-B share premia across the rule change period. We find that the change is mostly driven by the B-share turnover

The determination of stock prices and price volatility in emerging markets has received considerable attention in the recent economic and finance literature, since it affects the cost of capital and investment flows in these markets. Previous studies have used capital controls, information asymmetries, corporate governance, liquidity, as well as price discrimination to explain price differences between shares that are exclusive to foreign or domestic investors. Our analysis indicates that speculative trading could also contribute to explaining this price difference.

The speculative nature of stock prices can also help us comprehend the challenge faced by many governments in achieving true privatization. It has been widely recognized that the dominance of state ownership in public companies has been an important contributing factor to the weakness in their governance,[32] since state ownership is often controlled by bureaucrats who have little incentive to profit maximize and perhaps aim at expropriating shareholders. While privatization through selling state-shares to the public can improve governance in the long-run, the increase in share float may temporarily depress share prices in a speculative market, and creating resistance to reform.

On July 24, 2001, the government approved the listing of four new IPOs with sharply reduced non-tradable shares, indicating a policy shift aiming at reducing state ownership, as part of economic reforms. Despite the apparent improvement in governance that such a policy might bring, the stock markets reacted strongly and negatively, falling by over 20% and eventually causing the government to abandon this policy.[33] Although it is possible that this market reaction reflected the fear of investors that the government would stop favoring the public companies after it reduced its stake, it seems more likely that this reaction demonstrates the high sensitivity of stock prices to asset float in China's markets. This phenomena mimicks the experience of internet stocks in U.S. markets between November 1999 and April 2000 when the lockup restrictions on insider selling in many internet companies expired. During this period, according to Ofek and Richardson

[32]See, for example, a World Bank report written by Tenev, Zhang and Brefort (2002).

[33]Specifically, the market index dropped 3.1% the next day. During the next three months, the market index fell an additional 19.2%. On October 23, 2001, the government announced the postponement of the plans to float non-tradable shares, and the market index jumped 9.8%. On June 23, 2002, the government further announced that it would suspend the policy in order to boost investor confidence in the stock markets. The next day, the market index rose 9.1%.

(2003), selling by insiders caused a dramatic increase in the asset float of internet stocks, and may have ultimately led to the crash of internet stocks. This is also consistent with the theory summarized in Section 3 that the existence of a speculative component in stock prices makes them very sensitive to asset float.

A Restrictions in Panel Regressions

To avoid perfect collinearity in the panel regression, we set $c_{01} = 0$. While the model in equation (4) is a reasonable extension to model (2), the downside is that it consumes many degrees of freedom since we need to estimate each u_i individually. We can simplify this estimation, if we view the firm specific terms as randomly distributed across the cross-sectional units. More precisely we will assume that the components u_i are uncorrelated and with identical variances, and *orthogonal* to the regressors. That is,

$$\begin{aligned} &E[\epsilon_{it}] = 0, \quad E[\epsilon_{it}^2] = \sigma_\epsilon^2, \quad Var[u_i^2] = \sigma_u^2, \\ &Cov[u_i, u_j] = 0 \text{ if } i \neq j, \\ &E[\epsilon_{it} u_j] = 0 \; \forall \; i, j, t, \\ &E[\epsilon_{it}\epsilon_{js}] = 0 \text{ if } t \neq s \text{ or } i \neq j. \end{aligned} \tag{5}$$

The combination of model (4) and the assumptions in (5) constitutes a random effects model. By the same token, we may impose the random effects restriction on the time dimension instead of the cross-sectional dimension. This would imply that c_{0t} varies randomly over time. Alternatively, we may further simplify model (4) by eliminating either the time or firm effect.

In order to determine which model should be used, we will perform a specification test described by Hausman (1978).[34] Under the hypothesis given in (5), both the OLS estimate of (4) and the GLS estimate of the random effect model described in Greene (2002) are consistent, but OLS is inefficient. Therefore, under the null hypothesis, a test statistic defined by

$$W = [c - \theta]'\Sigma^{-1}[c - \theta] \tag{6}$$

should be asymptotically distributed as a chi-square with 2 degrees of freedom.[35] Here, c and θ are vector of estimates for c_1 and c_2 with or without imposing (5), and $\Sigma = Var[c - \theta] = Var[c] - Var[\theta]$.

[34] See also Wu (1973).

[35] See Greene (2002) for details.

References

[1] Amihud, Y. and H. Mendelson, 1986, Asset Pricing and the Bid-Ask Spread, *Journal of Financial Economics* 17, 223-249.

[2] Amihud, Y. and H. Mendelson, 1991, Liquidity, Maturity, and the Yields on the U.S. Treasury Securities, *Journal of Finance* 46, 1411-1425.

[3] Bailey, W., and J. Jagtiani, 1994, Foreign Ownership Restrictions and Stock Prices in the Thai Capital Market, *Journal of Financial Economics* 36, 57-87

[4] Bailey, W.,1994, Risk and Return on China's New Stock Market, *Pacific-Basin Finance Journal,* 243-260.

[5] Bailey, W., P. Chung, and J.K. Kang, 1999, Foreign Ownership Restrictions and Equity Price Premiums: What Drives the Demand for Cross-Border Investments? *Journal of Financial and Quantitative Analysis* 34(4), 489-511.

[6] Baker, M. and J. Wurgler, 2002, Market Timing and Capital Structure, *Journal of Finance* 57, 1-32.

[7] Barberis, N. and R. Thaler, 2003, A Survey of Behavioral Finance, in *Handbook of the Economics of Finance*, edited by G. Constantinides, M. Harris and R. Stulz, North-Holland.

[8] Bekaert, G., C. Harvey, and C. Lundblad, 2003, Liquidity and Expected Returns: Lessons from Emerging Markets, Working Paper, Duke University.

[9] Chakravarty, S., A. Sarkar and L. Wu, 1998, Information Asymmetry, Market Segmentation and the Pricing of Cross-Listed Shares: Theory and Evidence from Chinese A and B Shares, *Journal of International Financial Markets, Institutions and Money* 8, 325-355.

[10] Chan, K., Y. Chan, and W. Fong, 2002, Free Float and Market Liquidity: Evidence from Hong Kong Government's Intervention, Working Paper, HKUST.

[11] Chan, K.A., A.J. Menkveld, and Z. Yang, 2003, Evidence on the Foreign Share Discount Puzzle in China: Liquidity or Information Asymmetry? Working Paper, HKUST.

[12] Chen, G., B. Lee, and O. Rui, 2001, Foreign Ownership Restrictions and Market Segmentation in China's Stock Markets, *Journal of Financial Research* 24, 133-155.

[13] Chen, Z. and P. Xiong, 2001, Discounts on Illiquid Stocks: Evidence from China, Working paper, Yale University.

[14] Chordia, T., A. Subrahmanyam and V. Anshuman, 2001, Trading Activity and Expected Stock Returns, *Journal of Financial Economics* 59, 3-32.

[15] Chui, A. and Chuck Kwok, 1998, Cross-Autocorrelation between A Shares and B Shares in the Chinese Stock Market, *Journal of Financial Research* 21, 333-353.

[16] Cochrane, J., 2002, Stocks as Money: Convenience Yield and the Tech-stock Bubble, NBER Working Paper 8987.

[17] Diamond, Douglas and Robert Verrecchia (1987), Constraints on short-selling and asset price adjsutment to private information, *Journal of Financial Econonomics* 18, 277-311.

[18] Duffie, D., N. Garleanu and L. Pedersen, 2003, Over-the-Counter Markets, Working Paper, Stanford University.

[19] Eun, C. and S. Janakiramanan, 1986, A Model of International Asset Pricing with a Constraint in the Foreign Equity Ownership, *Journal of Finance* 41, 897-914.

[20] Eun, C., S. Janakiramanan, and B. Lee, 2001, The Chinese Discount Puzzle, Working Paper, Gorgia Institute of Technology.

[21] Fama, E. and J. MacBeth, 1973, Risk, Return, and Equilibrium: Empirical Tests, *Journal of Political Economy* 81, 607-636.

[22] Feng, L. and M. Seasholes, 2003, A Profile of Individual Investors in an Emerging Stock Market, Working Paper, U.C. Berkeley.

[23] Fernald, J. and J. Rogers, 2002, Puzzles in the Chinese Stock Market, *Review of Economics and Statistics* 84, 416-432.

[24] Froot, K. and E. Dabora, 1999, How Are Stock Prices Affected by the Location of Trade? *Journal of Financial Economics* 53, 189-216.

[25] Gao, S., 2002, China Stock Market in a Global Perspective, Research report, Dow Jones.

[26] Greene, W., 2002, *Econometric Analysis,* Prentice Hall.

[27] Harris, Milton and Artur Raviv (1993), Differences of Opinion Make a Horse Race, *Review of Financial Studies* 6, 473-506.

[28] Harrison, M. and D. Kreps, 1978, Speculative Investor Behavior in a Stock Market with Heterogeneous Expectations, *Quarterly Journal of Economics* 92, 323-336.

[29] Hausman, J., 1978, Specification Tests in Econometrics, *Econometrica* 46, 1251-71.

[30] Hietala, P., 1989. Asset Pricing in Partially Segmented Markets: Evidence from the Finnish Market, *Journal of Finance* 44, 697-718.

[31] Hirshleifer, D., 2001, Investor Psychology and Asset Pricing, *Journal of Finance* 56, 1533-1597.

[32] Hong, H., J. Scheinkman, and W. Xiong, 2003, Asset Float and Speculative Bubbles, Working Paper, Princeton University.

[33] Karolyi, A. and L. Li, 2003, A Resolution of the Chinese Discount Puzzle, Working Paper, Ohio State University.

[34] Keynes, 1931, *The General Thoery,* Harcourt, Brace and World, New York.

[35] Kim, K and J. Mei, 2001, What Makes the Stock Market Jump?—An Analysis of Political Risk on the Hong Kong Stock Returns, *Journal of International Money and Finance,* 1003-1016.

[36] Lamont, O. and R. Thaler, 2003, Can the Market Add and Subtract? Mispricing in Tech Stock Carve-outs, *Journal of Political Economy* 111, 227-268.

[37] Lee, C., A. Shleifer and R. Thaler, 1991, Investor Sentiment and the Closed-End Fund Puzzle, *Journal of Finance* 46, 75-110.

[38] Lesmond, D., J.P. Ogden, and C. Trzcinka, 1999, A New Estimate of Transaction Costs, *Review of Financial Studies* 12, 1113-1141.

[39] Lichtenstein, S., B. Fischhoff, and L. Phillips, 1982, Calibration of Probabilities: The State of the Art to 1980, in Daniel Kahneman, Paul Slovic, and Amos Tversky, ed.: *Judgement under Uncertainty: Heuristics and Biases,* Cambridge University Press, Cambridge.

[40] Lo, A., and J. Wang, 2000, Trading Volume: Definitions, Data Analysis, and Implications of Portfolio Theory, *Review of Financial Studies,* 13, 257-300.

[41] Malkiel, B., and J. Mei, 1997, *Global Bargain Hunting,* Simon and Schuster, New York.

[42] Milgrom, Paul and Nancy Stokey (1982), Information, Trade and Common Knowledge, *Journal of Economic Theory* 12, 112-128.

[43] Mitchell, M., T. Pulvino, and E. Stafford, 2002, Limited Arbitrage in Equity Markets, *Journal of Finance* 57, 551-584.

[44] Morris, S., 1996, Speculative Investor Behavior and Learning, *Quarterly Journal of Economics* 110, 1111-1133.

[45] Odean, Terrance (1998), Volume, Volatility, Price, and Profit When All Traders Are above Average, *Journal of Finance* 53, 1887-1934.

[46] Ofek, E. and M. Richardson, 2003, Dotcom Mania: The Rise and Fall of Internet Stock Prices, *Journal of Finance* 58, 1113-1137.

[47] Pastor, L. and R. Stambaugh, 2003, Liquidity Risk and Expected Stock Returns, *Journal of Political Economy* 111, 642-685.

[48] Scheinkman, J. and W. Xiong, 2003, Overconfidence and Speculative Bubbles, *Journal of Political Economy* 111, 1183-1219.

[49] Stulz, R.M. and W. Wasserfallen, 1995, Foreign Equity Investment Restrictions and Shareholder Wealth Maximization: Theory and Evidence, *Review of Financial Studies*, 1019-1057.

[50] Sun, Q. and W. Tong, 2000, The Effect of Market Segmentation on Stock Prices: The China Syndrome, *Journal of Banking and Finance* 24, 1875-1902.

[51] Sun, Q. and W. Tong, 2003, China Share Issue Privatization: the Extent of Its Success, *Journal of Financial Economics* 70, 183-222.

[52] Tenev, S., C. Zhang, and L. Brefort, 2002, *Corporate Governance and Enterprise Reform in China,* The World Bank and the International Finance Corporation.

[53] Tirole, Jean (1982), On the Possibility of Speculation under Rational Expecations, *Econometrica* 50, 1163-1181.

[54] Weill, P. 2003, Liquidity Premia in Dynamic Bargaining Markets, Working paper, Stanford University.

[55] Williams, John Burr, 1938, *The Theory of Investment Value,* Harvard University Press, Cambridge.

[56] Wu, D. M., 1973 Alternative Tests of Independence between Stochastic Regressors and Disturbances, *Econometrica* 41 (4), 733-750.

[57] Vayanos, D. and T. Wang, 2003, Search and Endogenous Concentration of Liquidity in Asset Markets, Working paper, MIT.

Table 1: Summary statistics for monthly data (A shares)

This table provides summary statistics for all firms that have listed A-shares on the Shanghai Stock Exchange or the Shenzhen Stock Exchange between January 1997 and December 2000. Our data includes market capitalization, daily closing prices, monthly turnover rates of shares and trading volume, monthly returns (with dividends reinvested), and return volatility. We classified G (info tech including telecom and computer), C5, C51, C5110, C5115 (electronics), C85, C8501, C8599 (biotech, Pharmersuticals), L20, L2001, L2005, L2099 (info services) as high tech, and all others as low tech.

Variables	High tech	Mean	Median	Std
Market Cap (Billion)	Yes	3.37	2.39	2.73
	No	2.96	2.11	3.2
Price (Yuan)	Yes	16.73	15.67	5.04
	No	12.09	11.97	3.64
Monthly turnover	Yes	0.43	0.43	0.10
	No	0.39	0.39	0.09
Volume (Million)	Yes	24.17	16.45	20.59
	No	27.80	21.97	21.62
Monthly return (%)	Yes	1.61	1.79	0.79
	No	1.07	1.03	0.95
Monthly volatility (%)	Yes	14.39	13.87	2.82
	No	12.28	12.09	2.06

Table 2: Summary statistics of A-B pairs.

This table provides summary statistics for all firms that had issued both A-shares and B-shares between April 1993 and December 2001. There were 75 such firms. The share turnover and logarithm of market capitalization are both calculated based on the amount of floating shares.

		Turnover	% of No-price-change Days	Log (market cap)	Premium
Mean	A	0.474	2.1%**	19.63	421.8%
	B	0.107	14.3%	19.13	
Cross-sectional STD*	A	0.185	3.0%	0.801	167.3%
	B	0.053	11.8%	0.909	

*Time average of cross-sectional standard deviation.
**Sample period Jan. 1995-Dec.2001

Table 3. Cross-Sectional Regression of A-B Share Premium

This table presents a summary of monthly cross-sectional regression of A-B share premium on the following variables:

$$\rho_{it} = \frac{P_{it}^{A} - P_{it}^{B}}{P_{it}^{B}} = c_{0t} + c_{1t}\tau_{it}^{A} + c_{2t}\tau_{it}^{B} + c_{3t}z_{it}^{A} + c_{4t}z_{it}^{B} + \varepsilon_{it}$$

where $\tau_{it}^{A} = \log(1 + turnover_{it}^{A})$, $\tau_{it}^{B} = \log(1 + turnover_{it}^{B})$, z_{is}^{A} is the proportion of no-price-change days for the A-shares of firm i in month t, and z_{is}^{B} is the proportion of no-price-change days for the B-shares of firm i in month t. The coefficients are reported by the time-series average of each month's estimate, and the Fama-MacBeth t-stat is computed by $\sqrt{T-1}$ multiplied by the average coefficient and then divided by the time series standard deviation of coefficients based on Fama-MacBeth (1973). T is the number of time periods. Average Marginal R^2 is the time-series average of marginal R^2 for the cross-sectional regression over time.

A. Turnover Only (April 1993-Dec.2000)						
	c_{0t}	c_{1t}	c_{2t}	c_{3t}	c_{4t}	Average Adj.R^2
Average Coefficient	3.442	3.756	1.600			0.255
FM t-Stat	21.14	6.956	1.190			
Average Marginal R^2	-	0.203	0.046			
B. Turnover and No-price-change Days (Jan. 1995-Dec.2000)						
	c_{0t}	c_{1t}	c_{2t}	c_{3t}	c_{4t}	Average Adj.R^2
Average Coefficient	3.386	4.273	1.834	1.922	3.341	0.270
FM t-Stat	21.563	6.260	1.231	1.346	6.821	
Average Marginal R^2	-	0.157	0.032	0.027	0.044	
C. No-price-change Days Only (Jan. 1995-Dec.2000)						
	c_{0t}	c_{1t}	c_{2t}	c_{3t}	c_{4t}	Average Adj.R^2
Average Coefficient	4.432			2.033	4.201	0.091
FM t-Stat	22.52			1.350	7.917	
Average Marginal R^2	-			0.029	0.060	

Table 4. Cross-Sectional Relation between Turnovers and Market Capitalization (April 1993-December 2000)

This table presents monthly cross-sectional regression of both A-share turnovers and B-share turnovers, $\tau_{it}^{A} = \log(1 + turnover_{it}^{A})$ and $\tau_{it}^{B} = \log(1 + turnover_{it}^{B})$, onto the corresponding market capitalization. Average Coeff. provides the time-series average of coefficients and FM t-stat is computed by $\sqrt{T-1}$ * Average Coeff. divided by the time-series standard deviation of coefficients based on Fama-MacBeth (1973). T is the number of time periods. Average Marginal R^2 is the time-series average of marginal R^2 for the cross-sectional regression over time.

A. Summary Of Average Cross-Sectional Regressions for A shares

$$\tau_{it}^{A} = \alpha_{0t} + \alpha_{1t} Log\,(MarketCap_{i,t}^{A}) + \varepsilon_{it}$$

	α_{0t}	α_{1t}	Average Adj.R^2
Average Coeff.	1.338	-0.051	0.125
FM t-Stat	7.022	-5.260	

B. Summary Of Average Cross-Sectional Regressions for B shares

$$\tau_{it}^{B} = \alpha_{0t} + \alpha_{1t} Log\,(MarketCap_{i,t}^{B}) + \varepsilon_{it}$$

	α_{0t}	α_{1t}	Average Adj.R^2
Average Coeff.	-0.058	0.006	0.067
FM t-Stat	-1.458	2.949	

Table 5. Explaining Cross-Sectional Variation of A-B Premium by Turnovers and Market Capitalization (April 1993- December 2000)

This table presents a summary of the following monthly cross-sectional regression:

$$\rho_{it} = c_{0t} + c_{1t}\tau_{it}^{A} + c_{2t}\tau_{it}^{B} + c_{3t}Log(MarketCap_{i,t}^{A}) + c_{4t}Log(MarketCap_{i,t}^{B}) + c_{5t}Cov(R_{Bi}, R_{F}) + c_{6t}Cov(R_{Bi}, R_{B}) + c_{7t}Cov(R_{Ai}, R_{C}) + c_{8t}Var(R_{Ai}) + \varepsilon_{it}$$

where $\tau_{it}^{A} = \log(1 + turnover_{it}^{A})$, and $\tau_{it}^{B} = \log(1 + turnover_{it}^{B})$. The coefficients are reported by the time-series average of each month's estimate, and the Fama-MacBeth t-stat is computed by $\sqrt{T-1}$ multiplied by the average coefficient and then divided by the time-series standard deviation of coefficients based on Fama-MacBeth (1973). T is the number of time periods. Average Marginal R^2 is the time-series average of marginal R^2 for the cross-sectional regression over time.

	c_{0t}	c_{1t}	c_{2t}	c_{3t}	c_{4t}	c_{5t}	c_{6t}	c_{7t}	c_{8t}	Average Adj.R^2
Average Coefficient	27.83	2.145	5.105	-1.034	-0.195					0.509
FM t-Stat	14.67	6.367	3.500	-11.02	-5.084					
Average Marginal R^2	-	0.127	0.068	0.255	0.065					
	c_{0t}	c_{1t}	c_{2t}	c_{3t}	c_{4t}	c_{5t}	c_{6t}	c_{7t}	c_{8t}	Average Adj.R^2
Average Coefficient	20.759	2.060	5.532	-0.600	-0.232	23.420	-36.34	9.079	0.021	0.503
FM t-Stat	11.816	6.195	4.669	-7.954	-6.246	3.000	-12.24	2.637	0.968	
Average Marginal R^2		0.148	0.041	0.286	0.217	0.011	0.036	0.040	0.032	

Table 6. Specification Test for Pooled Time-series and Cross-Sectional Regressions for A-B premium (April 1993-December 2000)

$$\rho_{it} = \frac{P_{it}^A - P_{it}^B}{P_{it}^B} = u_i + c_{0t} + c_1 \tau_{it}^A + c_2 \tau_{it}^B + \varepsilon_{it}$$

		c_1	C_2	Adjusted R^2
I. Time effects and firm	Coeff.	1.608	-1.108	0.797
effects	t-Stat	9.989	-1.701	
II. Time effects and	Coeff.	1.631	-1.085	-*
random firm effects	t-Stat	10.04	-1.651	
	Economic Significance	0.22	0.04	
	Specification Test against A: χ^2= 1.46			Not Rejected
III. Firm effects and	Coeff.	1.564	-1.082	-*
random time effects	t-Stat	9.592	-1.638	
	Specification Test against A: χ^2= 3.23			Not Rejected**
IV. Time effects only	Coeff.	2.756	0.168	0.590
	t-Stat	12.62	0.187	
	Specification Test against B: χ^2= 76.3			Rejected
V. Firm effects only	Coeff.	-0.019	0.681	0.229
	t-Stat	-0.087	0.717	
	Specification Test against C: χ^2= 117.4			Rejected

Note: Specifications I-V are estimated based on a balanced panel of 28 stocks with no missing data from 4/1993-12/2000. Specification VI is estimated based on an unbalanced panel of 73 stocks with missing data from 4/1993-12/2000.

* Adjusted R^2 not reported due to the use of generalized least squares.

** This specification is rejected for the Jan 1997-Dec 2000 period with χ^2= 8.06.

Table 7. Explaining the Time Variation of c_{0t}

(March 1994-December 2000)

This table presents the following time-series regression c_{0t}

$$c_{0t} = \vartheta_0 + \vartheta_1 r_{China} + \vartheta_2 r_{world} + \vartheta_3 i_{ChinaSprd} + \eta_t$$

where c_{0t} is the time-effect coefficient from the panel regression in Table 7 (specification II) of A-B share premium on A and B share turnovers, r_{China} is the Chinese 3-month deposit rate, r_{world} is the U.S. 3-month treasury rate, and $i_{ChinaSprd}$ is the spread between Chinese long-term bond and U.S. 10-year treasury bond. The t-statistics are computed using Newey-West autocorrelation-consistent standard errors with 6 lags.

	ϑ_0	ϑ_1	ϑ_2	ϑ_3	Adj. R^2
Coefficient	-1.866	-0.683	0.187	2.473	0.851
t-Stat	-1.355	-11.02	1.020	9.806	

Table 8. Market Reactions to the Event of Opening B Shares to Domestic Investors in February 2001

This table presents a summary of market reactions of the opening of B shares to Chinese domestic investors in February 28, 2001.

A. Price reactions (2/16/2001 – 3/09/2001)

	N	Mean	STD
A share price changes	73	-0.5%	22%
B share price changes	73	63%	7.3%

B. Changes in monthly turnover of B shares (6 months before and after)

	N	Mean	Median	STD
Pre-event turnover	73	12.3%	10.5%	7.7%
Post-event turnover	73	44.4%	44.7%	15.8%
Ratio (Post/Pre)	73	3.62	4.25	2.06

Table 9. Regression Results after the Opening of B shares (March 2001-December 2001)

This table presents a summary of several cross-sectional regressions for the period after the opening of B-shares.

Part I: Cross-Sectional Regression of A-B Share Premium

$$\rho_{it} = \frac{P_{it}^A - P_{it}^B}{P_{it}^B} = c_{0t} + c_{1t}\tau_{it}^A + c_{2t}\tau_{it}^B + c_{3t}z_{it}^A + c_{4t}z_{it}^B + \varepsilon_{it}$$

where $\tau_{it}^A = \log(1 + turnover_{it}^A)$, $\tau_{it}^B = \log(1 + turnover_{it}^B)$, z_{is}^A is the proportion of no-price-change days for the A-shares of firm i in month t, and z_{is}^B is the proportion of no-price-change days for the B-shares of firm i in month t. The coefficients are reported by the time-series average of each month's estimate, and the Fama-MacBeth t-stat is computed by $\sqrt{T-1}$ multiplied by the average coefficient and then divided by the time-series standard deviation of coefficients based on Fama-MacBeth (1973). T is the number of time periods. Average Marginal R^2 is the time-series average of marginal R^2 for the cross-sectional regression over time.

A. Turnover Only

	c_{0t}	c_{1t}	c_{2t}	c_{3t}	c_{4t}	Average Adj.R^2
Average Coefficient	1.974	0.402	-0.427			0.086
FM t-Stat	18.66	2.614	-2.229			
Average Marginal R^2	-	0.053	0.065			
T-test of Sig. Change	7.560	5.974	1.493			

B. Turnover and No Price Change Days

	C_{0t}	c_{1t}	c_{2t}	c_{3t}	c_{4t}	Average Adj.R^2
Average Coefficient	2.010	0.383	-0.408	-0.754	-0.495	0.106
FM t-Stat	19.02	2.456	-2.121	-1.725	-0.577	
Average Marginal R^2	-	0.052	0.062	0.010	0.014	
T-test of Sig. Change	7.270	5.556	1.492	1.792	3.883	

C. No Price Change Days Only

	c_{0t}	c_{1t}	c_{2t}	c_{3t}	c_{4t}	Average Adj.R^2
Average Coefficient	1.929			-0.957	-0.818	0.026
FM t-Stat	34.79			-2.936	-0.947	
Average Marginal R^2	-			0.009	0.018	
T-test of Sig. Change	12.242			1.941	4.951	

Part II. Cross-Sectional Relation between Turnovers and Market Capitalization

A. Summary of Average Cross-Sectional Regressions for A shares

$$\tau_{it}^{A} = \alpha_{0t} + \alpha_{1t} Log(MarketCap_{i,t-1}^{A}) + \varepsilon_{it}$$

	α_{0t}	α_{1t}	Average Adj. R^2
Average Coefficient	1.602	-0.068	0.138
FM t-Stat	3.378	-3.100	
T-test of Sig. Change	-0.517	0.709	

B. Summary of Average Cross-Sectional Regressions for B shares

$$\tau_{it}^{B} = \alpha_{0t} + \alpha_{1t} Log(MarketCap_{i,t-1}^{B}) + \varepsilon_{it}$$

	α_{0t}	α_{1t}	Average Adj. R^2
Average Coefficient	0.758	-0.021	0.020
FM t-Stat	5.410	-5.807	
T-test of Sig. Change	-5.603	6.507	

Note: T-test of Sig. Change is a test of significant coefficient change post liberalization comparing to the same coefficient before liberalization.

Figure 1: Shanghai A and B Share Price Indices

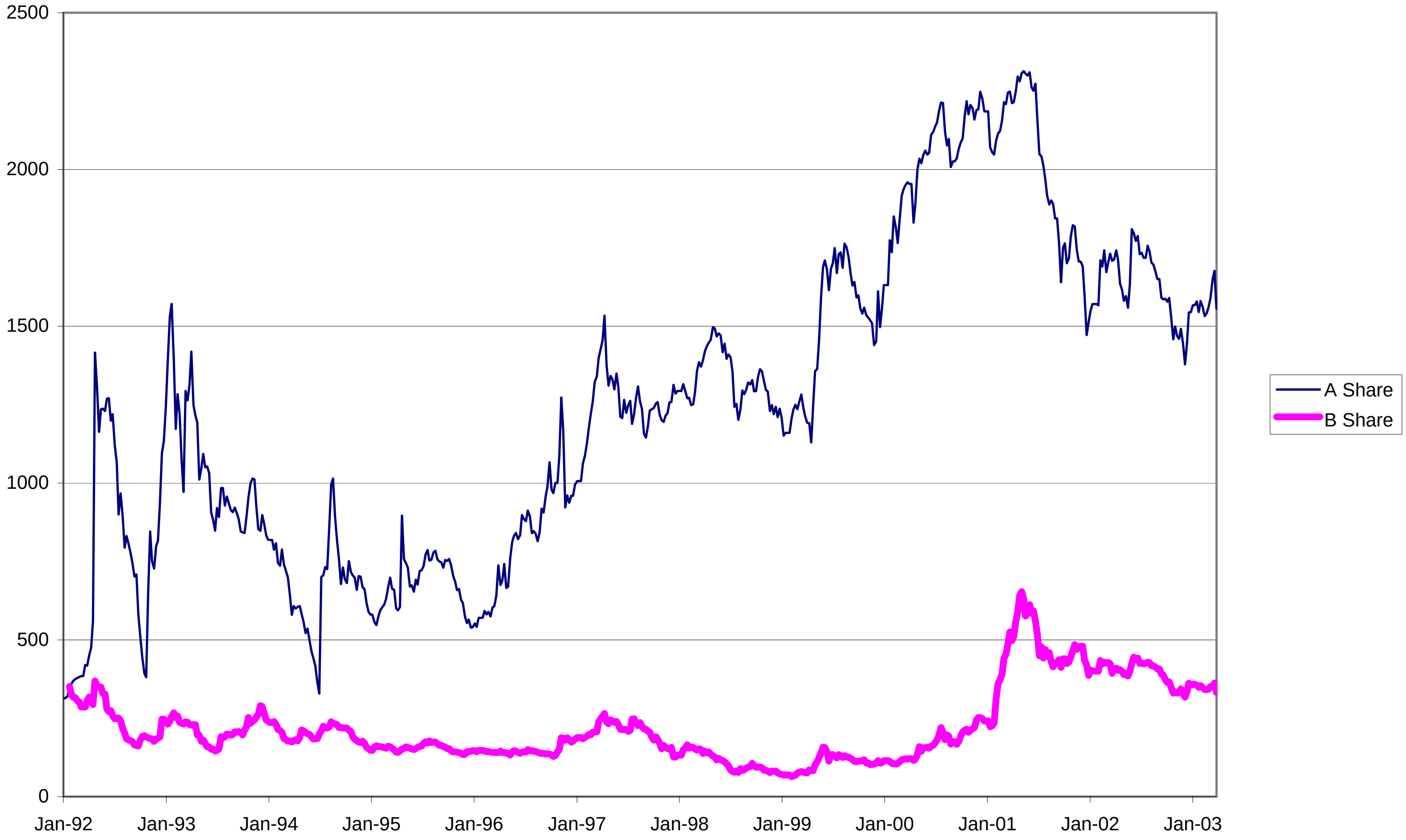

Figure 2: A Share Price Premium over B Shares and Number of Firms in the Sample (4/1993-12/2001)

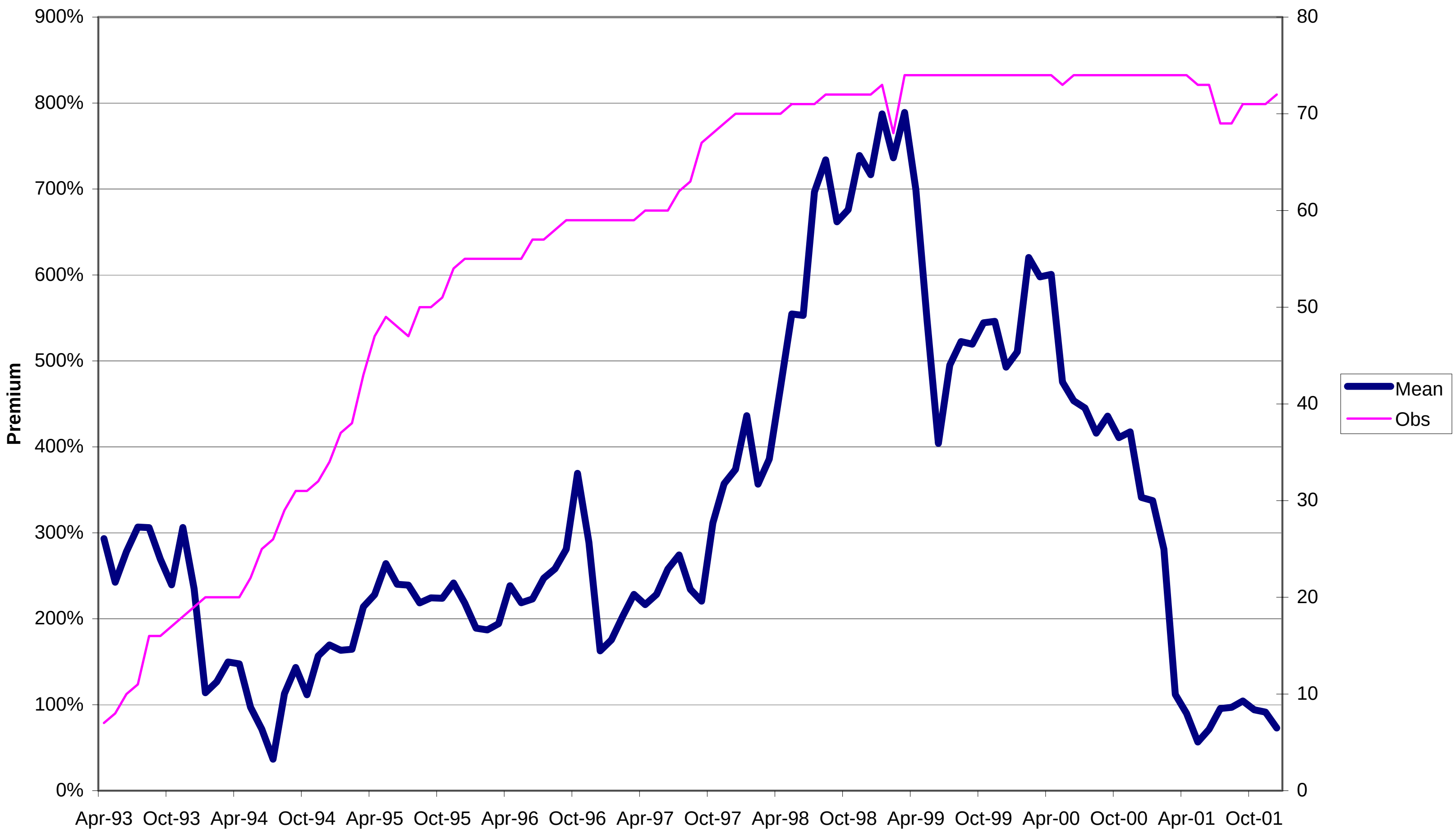

Figure 3A: Time Series of Average Monthly Turnover Rates for A & B Shares

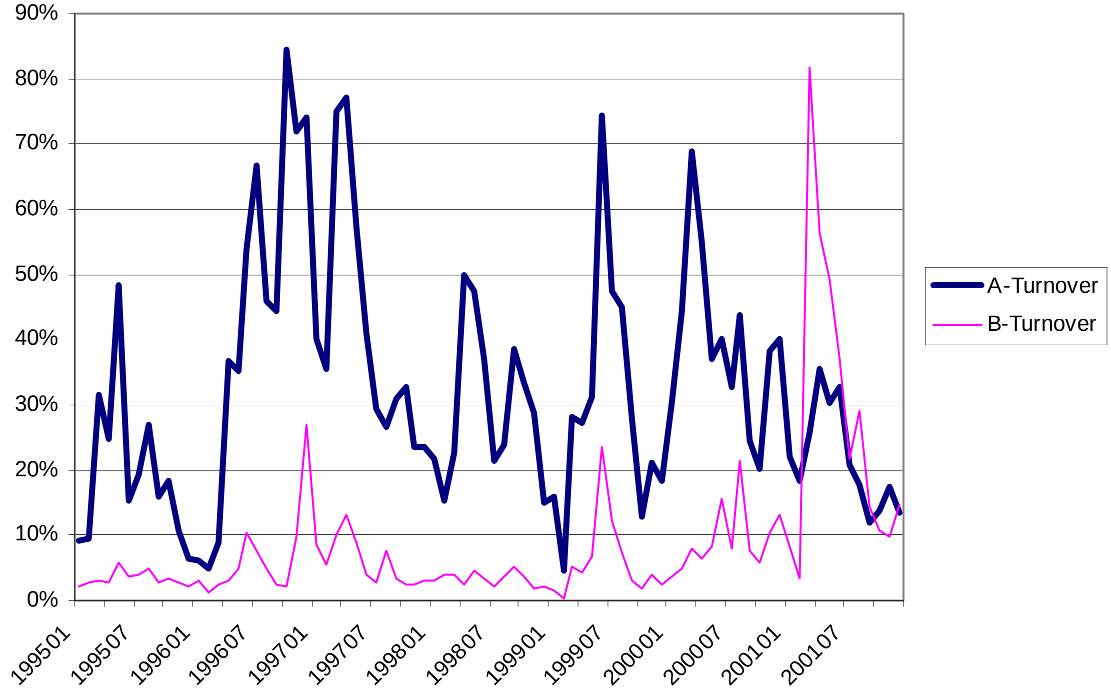

Figure 3B: Time Series of Cross-Sectional Variation of Monthly Turnover Rates for A & B Shares

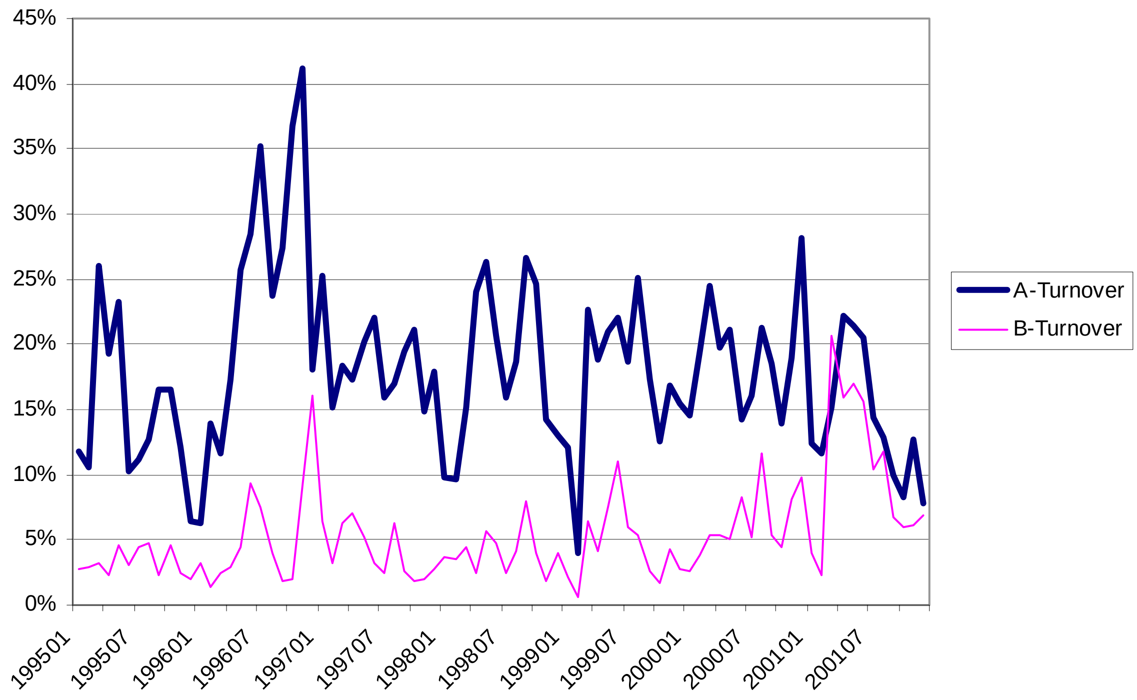

Figure 4: Cross-sectional Standard Deviation of Price Premium over Time and the Variation Explained by the Following Regression (4/1993-12/2001)

$$\rho_{it} = c_{0t} + c_{1t} Log(Turnover_{it}^{A}) + c_{2t} Log(Turnover_{it}^{B}) + c_{3t} Log(MarketCap_{it}^{A}) + c_{4t} Log(MarketCap_{it}^{B}) + \varepsilon_{it}$$

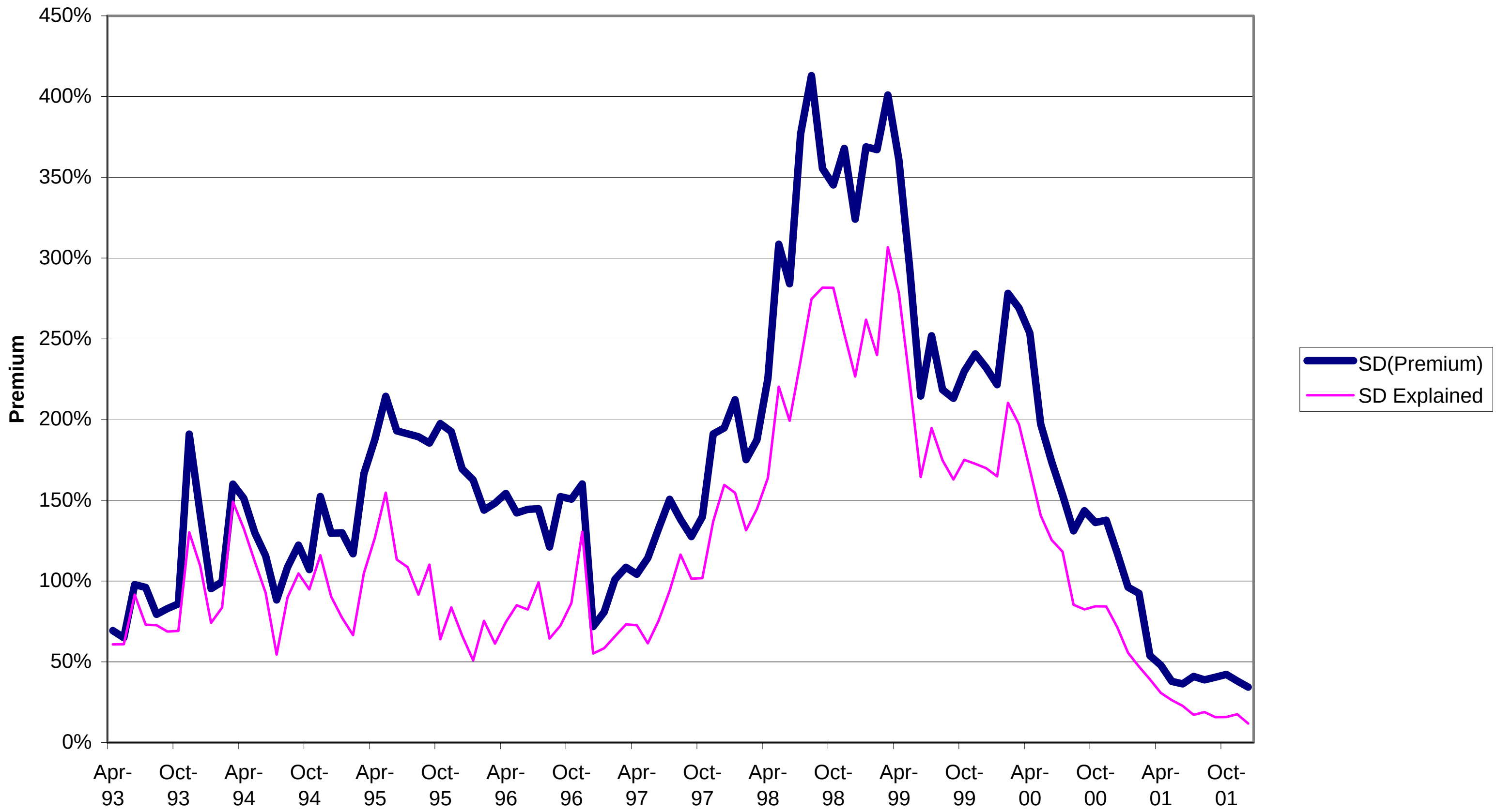

Figure 5A: Time Series of Average Percentage of No-Price-Change Dates in a Month for A & B Shares

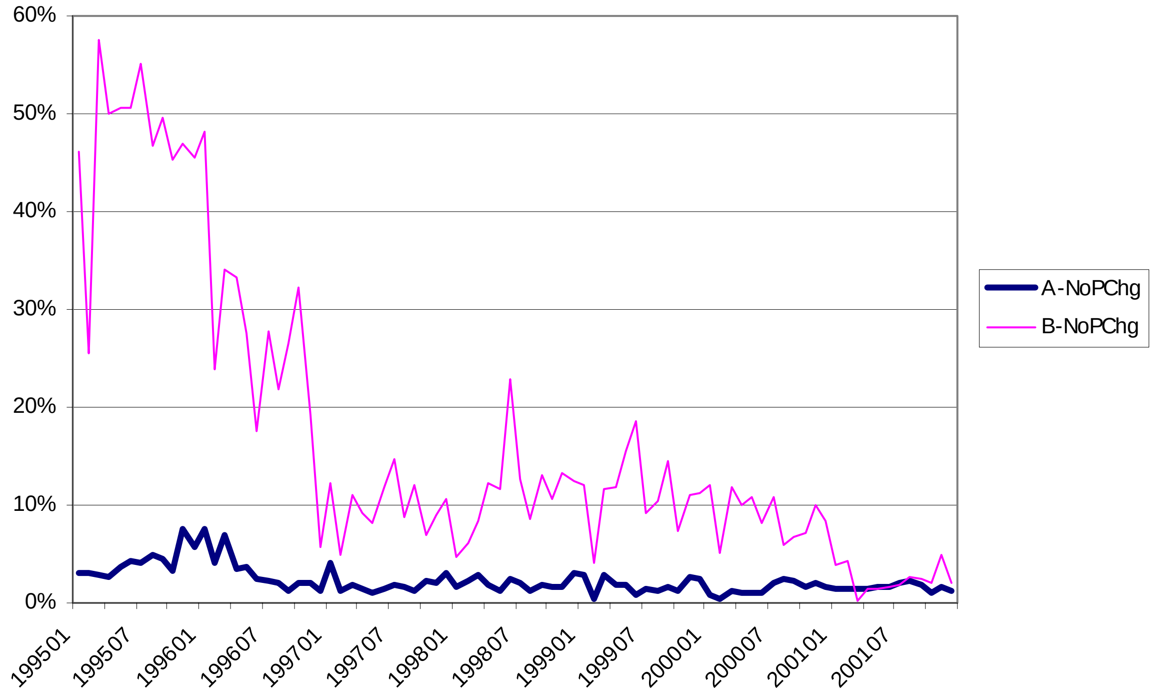

Figure 5B: Time Series of Cross-Sectional Variation of Percentage of No-Price-Change Dates in a Month for A & B Shares