A First Look at Closed-end Funds in China

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Abstract

This paper documents a number of stylized facts about Chinese closed-end funds. Although Chinese capital markets are immature, and the first closed-end fund was sold in 1998, many characteristics of the closed-end funds resemble those in the US market. In particular, (1) there are substantial and persistent discounts to the majority mutual funds; (2) most closed-end funds enjoy high premia at the IPO and disappear after six months; and (3) discounts predict future fund returns. We also document that the premium on a fund is positively related to its return persistence, and negatively influenced by the residual volatilities of underlying assets at the IPO stage. Discounts occuring in the post IPO stage are determined by the managerial ownership and the risk adjusted performance of the underlying assets. In addition, we show that discounts fluctuate with the trading volume and the market return over time. Due to the unique feature of the Chinese market, we believe that "investor sentiment", imperfect arbitrage, performance, and a "momentum effect" are major factors for premia or discounts in the Chinese closed-end fund market.

Introduction

One of the persistent puzzles in financial economics is the so called "close-end fund puzzle." One often observes that shares of closed-end funds sell at prices below the net asset value (NAV) of the underlying portfolio of securities. Although the first closed-end fund, "New York Stock Trust", was offered to public in 1889, this pricing discrepancy was first formally documented by Pratt (1966). Since then, we have learnt from empirical study that the useful factors to explain discounts on closed-end funds include: unrealized capital gains (Pratt, 1966; Vives, 1975; Malkiel 1977; and Mendelson, 1978), portfolio turnover (Pratt, 1966; and Boudreaux, 1973), distribution policy (Malkiel, 1977; Mendelson, 1978; and Thompson, 1978), illiquid assets (Malkiel, 1977; and Anderson and Born, 1987), and investor sentiment and market condition (Zweig, 1973; Malkiel, 1977; De Long, Shleifer, Summers, and Waldmann, 1990; and Brauer, 1993). Other factors derived from theoretical models include the open ending option proposed by Brauer (1988), the tax-timing option of Brickley, Manaster, and Schallheim (1991) and Kim (1994), and the stochastic turnover risk that was modeled by Xu (2000). The dynamics of closed-end fund discounts are also of interest. Various empirical studies (for example, Thompson, 1978; Hardouvlis, La Porta, and Wizman, 1993; and Pontiff, 1995) have shown that funds with positive premia provide negative abnormal future returns, while funds with discounts earn positive abnormal future returns.

Most research of closed-end funds has concentrated on mature stock markets, such as the US and UK. There are relatively few studies that focus on the similarities and differences for closed-end funds traded in emerging markets. At present, we can at best explain fifty percent of the discounts on closed-end funds using "rational factors" (see Malkiel, 1995). In other words, the puzzle is far from being completely resolved. It is possible that there are other unknown factors contributing to the discount problem. Thus, we are still unable to conclude whether the remaining unexplained discounts are due to the market efficiency. Given the divergent conclusions of studies in this field, we might obtain further insights through investigating an alternative set of financial markets, in particular a set of emerging markets. Emerging markets present a unique data source which has low correlations with more developed markets. Hence, any data-snooping biases are lessened. Moreover, the majority closed-end funds in US and UK are country fund. Cooper and Kaplanis (1994) provide evidences on home bias in investor portfolios. The discounts may be due to market segmentation. On the contrary, all the closed-end funds in China are invested in domestic

securities. It is also reasonable to argue that the capital markets are much more efficient in mature markets than they are in premature markets. Therefore, in general, we should expect to see a high discount level for Chinese closed-end funds than that of the US funds if market inefficiency is a major factor.

The first closed-end fund in China was sold to public in April 1998. The industry has grown steadily since then. In this paper we take another look at the discount issue from the Chinese closed-end fund market perspective. We intend to achieve two goals. As a first study of its kind, we document some of the stylized facts about the Chinese closed-end funds. It is interesting to see that many characteristics of these funds resemble those in the US market, for example: (1) there are substantial and persistent discounts for the majority funds; (2) most closed-end funds enjoy high premia at the IPO, which disappear after six months; and (3) discounts predict future fund returns. This information can be indirectly used to assess the major contributors to discounts.

Second, some of the factors influencing discounts are unique to the US experience, such as factors related to the capital gains taxes and the liquidity of the underlying holdings. Others are more universal–for example, the investor sentiment risk, the imperfect arbitrage opportunity, the stochastic turnover risk, and the market inefficiency. By comparing the characteristics found in the Chinese closed-end fund market with those we know from the most mature capital markets in the world, we will have a better understanding of closed-end fund behavior. From our empirical study, we found that the premium on a fund is positively related to the fund's return persistence, and negatively influenced by the residual volatilities of underlying assets at the IPO stage. Discounts occurred in the post IPO stage are determined by the managerial ownership and the performance of the underlying assets. Due to the uniqueness of the Chinese market, we believe "investor sentiment", imperfect arbitrage, performance, and "momentum effect" represent major factors for premia or discounts in the Chinese closed-end fund market.

For the reader to understand the past and present of Chinese investment companies, we offer some background knowledge in the next section. We then discuss our unique data set, followed by possible hypotheses we might be able to test, in section 2. The next section establishes some of the stylized facts about Chinese closed-end funds. The empirical tests of various hypotheses are presented in section 4. Section 5 studies the time series behavior of discounts and the predictability issue. Section 6 concludes the paper.

1 A Brief History of Chinese Investment Companies

The first investment fund in China, "Nanshan Venture Capital Fund", was established in November 1991. Its establishment marked the beginning of the fund industry in the securities market in mainland China. In the beginning, most of the funds were established with the approval of the local governments or the People's Bank of China. As the funds were initiated for the purpose of attracting capital, their investments covered a wide spectrum, from securities investment and equity investment in non-listed companies to real estate investment. They were named "old funds" as opposed to the relatively standardized investment funds. These old funds expanded rapidly. By the end of 1997, there were 75 old funds with more than 5.8 billion RMB in book value and 10 billion RMB in market value. However, these old funds were not standardized in many aspects, including fund initiation, fund operations, information disclosure, supervision, and regulation. Many daily operation difficulties have led to a halt in offering new funds practically since 1994.

On November 14, 1997, the Securities Committee of the State Council (which later merged into the China Securities Regulatory Commission) issued its "Interim Regulation on the Securities Investment Funds" (hereafter referred to as the Interim Regulation). Detailed rules were promulgated later, elaborating on fund initiation, capital raising and trading, fund trustees and managers, the rights and obligations of fund holders, fund investment operations, and supervision and management. As stipulated by the Interim Regulation, the percentage of bond and equity investments made by a fund shall not fall below 80 percent of the fund's total asset value; the total stock value of one listed company shall not exceed 10 percent of the fund's NAV; and the percentage of investments in the national bonds shall not fall below 20 percent of the fund's NAV. These rules have had a large impact on the investment behavior of the investment funds.

In March 1998, two new funds founded in line with the Interim Regulation, Fund Kai Yuan and Fund Jintai, were issued nationwide and publicly listed in April (see Table 1). As the new funds were only allowed to invest in publicly traded stocks and bonds in the Chinese security markets, they were named "securities investment funds" (hereafter referred to as the closed-end funds). From the regulatory perspective, the funds are established mainly for two purposes: one is to exploit the advantages of "expert management" and provide the individual investors with a good investment tool; the other is to nurture institutional

investors and to promote the steady and healthy development of the security markets.

Insert Table 1 Approximately Here

To support the healthy development of those closed-end funds, the Chinese government has issued a series of preferential policies. On October 11, 1998, the CSRC promulgated the "Notice on the Distribution of New Issues to the Securities Investment Funds," prescribing that the funds have preferential rights in the new issues distribution.[1] On November 11, 1999, the CSRC issued the "Supplementary Notice", which prescribed the distribution percentage of new issues to the funds, the fund's maximum capital to purchase the distributed new issue shares, and the tradability of the distributed new issue shares. In May 2000, this preferential policy was abolished. After years of development, the number of funds was growing and the old funds were gradually standardized and transformed into new funds.[2] The motivation to restructure the old funds was to increase capital and to revive the fund operations through asset clarification among several old funds. These restructured funds are operated under the same methods as the newly issued funds. By the end of 2000, there were 33 publicly traded closed-end funds under the management of 10 fund management companies, with a total of 56 billion RMB in floating volume and 84.6 billion in net asset value. These funds have become a very important force in Chinese security markets.

[1]The major contents of the Notice include: all new issues with a public issuance volume over 50 million can be distributed to the funds; new issues with a public issuance volume between 50 million to 100 million can distribute 10 percent of the volume to the funds; new issues with a public issuance volume between 100 million to 200 million can distribute 15 percent to the funds; new issues with a public issuance volume over 200 million can distribute 20 percent to the funds; each fund can only apply for the distributed of no more than 5 percent of the public issuance volume of a new issue; and the new issue shares that funds are distributed can not be traded until 2 months after the IPO.

[2]Restructuring of the old funds began in the later half of 1999 and nearly all the new funds that went public in the first half of 2000 were transformed from the old funds.

2 The Data and Hypothesis

2.1 About the Data

We have obtained Chinese closed-end fund data from the only two stock exchanges in China– the Shanghai Stock Exchange and the ShenZhen Stock Exchange. The data set starts from the first two closed-end fund inception on April 1998 to the end of 2000. This is a weekly data set of the 33 funds ever existed in China. Although these funds are traded daily, their net asset value (NAV) information is only available weekly. Similar to the US practice, the NAVs are published on either the Wednesday or the Friday edition of major Chinese financial newspaper, such as Shenzhen Securities Times, China Securities, and so on.[3] The available information includes weekly closing prices, the NAVs of fund portfolios, total weekly returns including dividends, weekly trading volume in terms of number of shares traded in a week, percentage holdings by fund themselves, and the total market capitalization of each fund. The summary statistics for those variables over each quarter are reported in Table 2.

Insert Table 2 Approximately Here

The number of funds has gradually increased from 2 to 31 over the three-year sample period.[4] Although relatively small, the total market capitalization of Chinese Closed-end funds grew rapidly from 7.16 billion RMB (about $0.84 billion) to 59.17 billion RMB (about $7 billion) over the three-year period. In the third quarter of 2001, China offered the first open-end mutual fund–Hua An Chuang Xin Securities Investment Fund. The average weekly trading volumes[5] fluctuate between 0.7% to 7%. These numbers are close to the trading volume for common stocks in the Chinese equity markets. Therefore, closed-end funds are actively traded securities. In contrast to US closed-end funds, the percentage holdings by the fund themselves are relatively small (about 2%). The average share price is around 1.2 RMB.

[3]The quality of our data used in this study should be high since it is directly provided by the two stock exchanges.

[4]Two funds established in the fourth quarter of 2000 are not included in the calculation of summary statistics.

[5]There are a variety ways to define trading volume. We use the most commonly used definition, i.e., the ratio between the total number of shares traded in a week and the total number of shares outstanding.

The discount phenomenon on most closed-end funds is the predominant issue in the literature. As a fist step to study Chinese closed-end funds, we plot the average weekly closed-end fund premia across funds in Figure 1. As not many funds existed in 1998, and most funds were in their IPO stage, the plot starts in 1999. In 1999, the premia fluctuated from positive to around zero. However, in 2000, the premia were turned into discounts. In particular, there are about 10% discounts on close-end fund prices. Therefore, the same discount issue prevails in the Chinese market. It is also important to observe from Table 2 that in all the quarters over our sample period except for one, the aggregate return from the net asset value beats the market index return. This makes the puzzle more interesting, as those funds did perform well when investors lost their interest in the funds.

Insert Figure 1 Approximately Here

In this study, we will not only establish some of the stylized facts about Chinese closed-end funds, but also try to gain additional insights into the determination of discounts.

2.2 Possible Hypotheses about Discounts

The discount issue has not been fully resolved using the US and UK data. Therefore, it is very helpful, to examine the same issue in the emerging markets, such as the Chinese markets, for two reasons. First, it is important to know whether the discount phenomenon is unique to mature capital markets and how discounts behave in other markets. If we find great similarities between the behaviors of funds operated in a mature market and those of in an immature market, market inefficiency may not be a dominant factor for discounts. This is because mature capital markets tend to be more efficient. Using variance-ratio tests, Chen, Lee and Rui (2001) have rejected the hypothesis that stock returns follow a random walk process in China. Therefore, the level of discounts or premia for the Chinese closed-end funds should be much higher than that of the US closed-end funds when market inefficiency is an important factor.

Hypothesis 1 *Market efficiency influences discounts to a large degree.*

We are only able to examine this hypothesis informally in the next section.

Second, since the structure of the Chinese capital markets is very different from that of the US, many important determinants of discounts may offer no or little insights into understanding Chinese closed-end funds. For example, one of the most important factors influencing discounts is unrealized capital gains. As the unrealized capital gains impose tax liabilities on the current fund holders even when they are not entitled to such capital gains, closed-end funds should sell at discounts relative to their net asset value. Currently the Chinese government does not levy capital gains taxes. Therefore, this is not an issue for Chinese closed-end funds. At the same time, the liquidity of underlying assets should also play little role in affecting discounts. Unlike the closed-end funds traded in the mature markets that heavily invest in foreign countries, there are no foreign investment or restricted assets in the portfolios of Chinese closed-end funds. If not held in cash, each fund has to investment in either traded government bonds or traded equities. Therefore, home bias is not a problem.

One of the reasons for investors to hold an actively managed fund is the management skill and/or private information. Therefore, if the premium is the price that investors pay for managers' unique abilities and private information, while the discount compensates investors for poor management, then the premium/discount should be related to performance. Given the existing evidence, the past performance of a fund has no relationship with the premium/discount. Perhaps the size of a fund's ownership in itself may serve as a better proxy for private information, as a fund would be likely to increase (decrease) its own holdings should the managers' private information point to a good (bad) future cash flow. Although, NAVs are public information, the exact compositions of the funds are unknown, which sustains the asymmetric information (see Xu, 2000). Moreover, if it is the public perception about a fund management that matters and such perception is correlated with the managers' confident in its own skill, the percentage holdings will also likely to be high. In other words,

Hypothesis 2 *the premium on a fund increases with the percentage holdings by the fund in itself.*

The intercept from a market model, or the Jensen's alpha, has been used to measure the risk adjusted performance of a fund. If a fund manager does possess superior management skill, then returns from the net asset value tend to have large Jensen's alpha. Naturally, there will be high demand for those funds, which will drive up the price for fixed supply

of the funds. In other words, we will likely to observe high premia.[6] Therefore, we can hypothesize that

Hypothesis 3 *the premia and discounts are a function of a fund risk adjusted performance of the net asset value.*

Of course, superior performance can also be tied to unique information in addition to managers various skills. Malkiel (1977) has tested a similar hypothesis and has failed to find any supporting evidence.

In an immature capital market, since the mechanism of institutional investment is poorly established, investor sentiment could play a large role. During the period when investors have positive views toward investment, especially when investors favor closed-end funds, discounts on closed-end funds should narrow. Bodurtha, Kim and Lee (1995) test the investor sentiment hypothesis using closed-end country funds (CECFs). They find that changes in the average premium on CECFs are positively related to return on the U.S. stock market, controlling for the return on the foreign market and exchange rate movements. In the case of Chinese closed-end funds, they are sole held by domestic investors. Anecdotal evidence suggests that Chinese investors are aggressive and more enthusiastic toward individual stocks when the markets are high. During stock market slumps, individual investors try to seek professionals' help by investing in closed-end funds. Therefore, we expect to see a relationship between a major Chinese stock market index and the premia.[7]

Hypothesis 4 *Returns from the composite index of Chinese stock markets negatively covary with the closed-end funds' premia over time.*

Another variable which may affect closed-end fund discounts is the liquidity of the fund itself. A liquid asset can be traded rapidly and at a low bid/ask cost. Therefore, if there exists a liquidity premium, a more liquid fund will enjoy a high premium than an illiquid fund. Liquidity issue has been studied in the literature extensively. A recent paper by Lo and Wang (2000) uses trading volume as a measure of liquidity and builds a factor model

[6]For this argument to go through, we have implicitly assumed that the fund portfolios can not be perfectly replicated at all times, which is reasonable even in the US.

[7]It may be more accurate to use a small stock index instead. However, only relatively large and well-established companies are allowed to go public. Therefore, there is no small stock index.

that relies on the return structure of the underlying assets. This suggests the following hypothesis.

Hypothesis 5 *The trading volume should be positively related to the closed-end fund premium.*

When the portfolio held by a fund is easy to arbitrage, the discount will be relatively small. To measure the degree of imperfect arbitrage, Pontiff (1996) has suggested measuring how difficult it is to replicate a fund's portfolio. In particular, we can estimate the residual variance as a measure of replication risk by regressing weekly NAV returns of each fund on the returns of the market index. Xu (2000) has also pointed out that if a fund portfolio changes stochastically over time, then it imposes additional risk to investors by holding the fund instead of the underlying assets directly. Such a stochastic turnover assumption can be supported by the empirical findings of no relationship between the turnover and the performance of a fund. To compensate for the risk, a fund should sell at a discount. In his model, the fund risk is now affected by the multiplication of both the turnover and underlying assets. Therefore, the residual risk can also be used as a proxy for the stochastic turnover risk. These two effects lead to the following hypothesis.

Hypothesis 6 *A closed-end fund premium is negatively correlated with the residual volatility of the fund's underlying assets.*

Momentum trading strategies have been extensively discussed in recent literature following the work of Jegadeesh and Titman (1993). In an immature market, investors tend to focus on short-term investment strategies instead of long-term capital appreciation. Anecdotal evidence also suggests that most Chinese investors follow momentum trading strategies much more often than others. If there truly exists momentum in investment, then a closed-end fund that follows momentum trading strategy will be rewarded with a large premium, while the fund will be punished should it follow a long-term investment strategy. Given the existence of momentum and a fund manager picks stocks based on momentum, returns from the underlying assets should be autocorrelated, i.e., they should persist. In other words, we should observe that:

Hypothesis 7 *There is a positive relationship between a closed-end fund premium and the predictability of the underlying assets.*

In order for this argument to hold, we again rely on the assumption that portfolio composition of a fund is not perfectly observable. Otherwise, individual investors could simply mimic the investment of the fund without paying the premium.

The above seven hypotheses will be tested through both time series analysis and cross-sectional regression. Although these implications may also be consistent with other theories, the related empirical evidences by themselves will be important. In addition, we study the informational content of trading volume and price in predicting future discounts.

3 The Characteristics of Chinese Closed-end Funds

As documented by Lee, Shleifer, and Thaler (1991) using US data, in initial public offerings, closed-end funds are issued at premia of nearly 10%. But the premia quickly turned into discounts in four months. This is even more challenging under a rational framework than the discount phenomenon. Denote r_m as the benchmark market return, r_{NAV} as the return from the net asset value, and NAV_1 and NAV_{120} as the net asset values at an IPO and at the 120th date respectively. For the closed-end fund to perform at least as well as the market, we should have, $\frac{0.9NAV_{120}-1.1NAV_1}{1.1NAV_1} = r_m$, or simply $r_{NAV} = 1.2r_m + 22\%$. This means that an average closed-end fund's net asset value will out perform the benchmark by 20% plus an extra 22% return within four months, which is highly implausible.

Given the uniqueness of our data set, which includes both the IPO period and post IPO period for each fund, we can also study the premium and discount issue using the event study approach. In Figure 2 we have plotted the average weekly premia across funds after the IPO of the closed-end funds. The pattern is surprisingly similar to the US experience documented by Lee, Shleifer, and Thaler (1991). A 30% premium at the IPO for a typical fund disappears in 25 weeks (about six months). For this reason, we define the first 25 weeks as the IPO period. After the IPO stage, we basically observe substantial discounts. It is also interesting to note from the same graph that the fund returns are highly persistent and positive during the IPO period.

Insert Figure 2 Approximately Here

In order to investigate the dynamics of closed-end fund returns and premia, we first compute the autocorrelation for an equally weighted index of discounts across all funds. The first line in Figure 3 suggests that discounts are very persistent with an autocorrelation of 92% at the first lag. The correlation only drops to 66% at the eighth lag. Perhaps the most interesting time series property is the negative (positive) correlation between premia (discounts) and future returns, which was first documented by Thompson (1978) and confirmed in Pontiff (1995). Using the equally weighted index returns and the index of discounts, we also plot such cross-correlations between current fund premia δ_t and future returns R_{t+i} in Figure 3 as a function of future date i. The cross-correlations are very stable (about 14%) up to $i = 8$, and drop to 7% afterwards. Such a cross-correlation for Chinese closed-end funds

cannot be explained by the popular dividend taxation effect proposed by Pontiff (1995) as there are no capital gains taxes in China. We also observe a positive autocorrelation in the aggregate fund returns. However, it quickly becomes negative at the third lag.

Insert Figure 3 Approximately Here

The qualitative characteristics of Chinese closed-end funds resemble those observed in the US and UK closed-end fund markets. We take a further look at the summary statistics on the individual fund level. As Figure 2 suggests that there are substantial differences with respect to a fund's premia during the IPO period v.s. the post IPO period, we study each subsample period separately in Table 3.[8] From the distribution we see that the majority of funds are sold at premia in the IPO period with an average premium of 16%. These premia have turned into discounts in the post IPO stage with a magnitude of 16%. In contrast to a positively skewed distribution for premium, the negative premia in the post IPO stage have a negatively skewed distribution. In other words, we tend to observe a large premium in the IPO stage and a large discount in the post IPO stage very often. At the same time, discounts in the post IPO stage are more persistent (about 86% v.s. 79%). Moreover, the persistence of discounts seems to vary much less across funds in the post IPO stage than that in the IPO stage. Similarly, volatilities of discounts over time are about 30% lower than that of in the IPO stage (about 8.8%) with less cross-sectional variation. Therefore, large and stable discounts are observed more often in the post IPO period.

If market efficiency is highly correlated with the degree of maturity of the markets, then other things being equal, we may conclude that capital market inefficiency plays an important role in causing the discount after comparing the 16% discount for the average Chinese close-end fund with the 10% discount observed in the US market.[9] On the other hand, as Brauer (1984) has argued that the discounts may reflect the option value of "open ending" a fund in the future, the level of discounts should be relatively high if most Chinese closed-end funds have maturity dates. It is stipulated that a closed end fund must operate for at least five years. However, there is no mandatory maturity date for Chinese closed-end funds.

Insert Table 3 Approximately Here

[8]For stationary purposes, we have ignored the first two weeks of data in computing the summary statistics except for the premium.

[9]The average discount for US equity funds is only about 5% in recent years.

Consistent with the premium/discount pattern over the two different periods, the average weekly fund return (about 1.37%) is about three times as high as the average weekly return from the NAVs of underlying assets during the IPO period. While the average weekly return from the NAVs of underlying assets is in turn 40% as high as that of the fund return (about 0.38%) in the post IPO period. As new funds came onto the markets fairly evenly throughout our sample period (see Table 2), the average returns in the two sample periods are comparable. With this kind of return, it is justifiable for investors to buy funds in the IPO stage. It is also interesting to note when the underlying assets of closed-end funds performed well in the post IPO period with an average return of 0.53% relative to that of in the IPO period (about 0.43%), investors have rewarded most of the funds with big discounts. Perhaps funds have different risk exposure during the two different periods that are shown from the beta measure in Table 3. However, the risk adjusted alpha measure also points to the same direction. This suggests that either investors have sentiment toward IPO funds or the market is sufficiently inefficient, or both. It can also serve as a preliminary indication that the fund performance may not be an important factor in causing the discounts in the post IPO stage.

It is also puzzling to observe that a fund itself is exposed to less market risk than its underlying assets, no matter whether it is in the IPO stage or in the post IPO period. Furthermore, the average betas are very high, with 2.72 over the IPO period and 3.11 for the post IPO period for the underlying asset returns. The average R^2s for the market model are over 50% and 36% for the NAV returns and the fund returns, respectively. In general, a fund has to expose at least the amount of market risk as the underlying assets. This result suggests that Chinese closed-end funds are subject to other risks in an important way.

Although returns from the underlying assets vary substantially (about 2.68%) in the IPO stage, the fund returns fluctuate much more (over three times). If we interpret the net asset value as the fundamental value of the closed-end fund, then such a discrepancy in the volatilities is consistent with the so-called "excess volatility" phenomenon found in stock returns by Shiller (1989) and later confirmed by Pontiff (1995) for closed-end funds. However, in the post IPO period, the "excess volatility" disappears. Both volatilities for the fund returns and the returns of the NAVs are comparable.

Table 3 also shows that the cross-correlations between current discount and future returns are mostly negative and substantial (about -15%) in the post IPO period. However, such

cross-correlation varies substantially across funds during the IPO stage. Given a large and persistent discount in the post IPO stage, we also observe a large positive cross-correlation between current discount and future returns from the NAVs.

Despite the structural and institutional differences across the US and Chinese capital markets, the qualitative characteristics of closed-end funds are very similar with greater magnitude. Although, inefficiency could have played a vital role in causing the discounts on most Chinese closed-end funds, many important rational factors such as tax related effects are irrelevant in understanding the discounts of Chinese funds. This imposes a great challenge on explaining the discounts.

4 Understanding Discounts–A Cross-sectional Perspective

As the discount phenomenon on closed-end funds directly contradicts the efficient market hypothesis on first appearances, researchers have struggled for a long time to find rational factors that might explain the discount phenomenon. Due to the unique features of the Chinese markets, many of the useful factors, including the unrealized capital gains, income distribution policy, and illiquid assets are inoperational. This is the challenge that we are facing. As a first step, we study Hypotheses 2, 3, 6, and 7 in this section. As most empirical studies on US and UK closed-end funds focus on post IPO period, we know little about the determinants of premia in the IPO stage. Given our survivalship bias free data set, we can study both the IPO period and the post IPO period. According to the four hypotheses discussed in the previous section, we report the cross-sectional regression results of regressing average premia on various factors in Table 4.

Insert Table 4 Approximately Here

A fund manager may possess unique information in choosing its investment in the underlying assets. *Hypothesis 2* suggests that such an informational effect can be tested using the fund ownership variable. In other words, high ownership should be associated with high premia or low discounts. Although the signs from the second regression for both sample periods are correct as shown in the second equation of Table 4, it is only significant at a 10% level for the post IPO period. This is understandable, as investors do not believe that this variable conveys too much information when there are great uncertainties about management in the IPO stage. It is a useful variable in explaining discounts during post IPO period as is evident later from the multi-variate regression.

Past returns do not seem to explain the cross-sectional difference in the US close-end fund discounts. This conclusion carries over to Chinese closed-end funds. Perhaps what is more relevant is the risk adjusted measure for reasons discussed in *Hypothesis 3*. As shown in the first equation of Table 4, when the risk adjusted alpha measure is used it is significant at a 1% level for the post IPO stage with an R^2 as high as 47%. Although, the alpha is also significant at a 5% level for the IPO period, the sign for the variable is wrong. It is possible

that it is correlated with other unidentified variables which are negatively correlated with the premia. In general, we find strong evidence to support hypothesis 3. It is possible that the variable is too noisy when used alone, as suggested by the multi-variate regression.

When both alpha and ownership variables are used in the cross-sectional regression of equation V of Table 4, we find that the alpha variable and the ownership variable are statistically significant at the 1% level and 10% level, respectively in the post IPO period. Moreover, the R^2 is over 54%. However, at the same time only the alpha variable is significant at a 5% level with a wrong sign for the IPO period.

We can also study the imperfect arbitrage argument of Pontiff (1996) and the stochastic turnover effect of Xu (2000). As predicted in *Hypothesis 6*, the residual standard deviations of underlying assets are very important in explaining the cross-sectional differences in premia occurred in the IPO stage. The regression coefficient of equation III in Table 4 is significant at a 5% level with an R^2 of 18%. Therefore, the high the idiosyncratic volatility of the underlying portfolio becomes, the more difficult to replicate the fund's portfolio or the higher the turnover risk, which leads to a low premia. However, this negative relationship becomes positive in the post IPO period. Again this is due to a high correlation with other variables, as shown in the multivariate regression.

As the momentum trading strategy has become popular in recent years, the momentum factor has been shown to be important in explaining asset returns. In a highly speculative market, such as the one in China, momentum trading strategies are followed extensively. Therefore, investors prefer funds that follow such a strategy. In other words, the premium should be high for a fund executing a momentum strategy. As there is no reported information on trading strategy, we use the return predictability as a proxy suggested in *Hypothesis 7*. Equation IV shows that this variable is very significant with R^2s of 32% for the IPO periods. However, a momentum effect is not important for the post IPO period.

In a multiple regression that tests *Hypothesis 6* and *Hypothesis 7* jointly, as shown in equation VI of Table 4, we find that both the residual volatility of underlying assets and the persistency in the fund returns are very crucial in explaining IPO premia. The R^2 is as high as 52%. In contrast, only the residual variance of underlying assets is significant with the wrong sign during the post IPO period.

Finally, we jointly test Hypotheses 2, 3, 6, and 7 in the last equation of Table 4. Overall, the four variable regression equations explain 61% of the cross-sectional difference in premia/discounts over both sample periods. It is now seen that both the residual standard deviation of the underlying assets and the persistence in the fund returns are very significant with the correct sign in the IPO period. This means that both imperfect arbitrage opportunities and momentum effects influence the IPO premium of Chinese closed-end funds. At the same time, the ownership variable and the risk adjusted performance variable are very significant in the post IPO period. Other variables may have helped to filter out noise in the ownership variable. Therefore, we conclude that the performance of underlying assets and the information effect are key to understand the post IPO discounts of Chinese closed-end funds.

It is also of interest to investigate the determinants of the cross-correlations between current premium and future fund returns. In the absence of capital gains taxes in China, such cross-correlations can not be explained by the dividend taxation effect proposed by Pontiff (1995). When a fund suffers a large discount, its current price will be low. Other things being equal, future returns will be high for the same amount of income distribution. In other words, factors that affect closed-end fund discounts will be likely to influence the cross-correlations. For this reason, we run a cross-sectional regression of cross-correlations on the four factors discussed above. As the cross-correlations are negative and strong only for the post IPO period, we will focus on this subsample period. Both the alpha measure and the persistence measure do not explain any differences in the cross-correlation. In the following equation, we only report the other two variables.

$$\begin{aligned} Corr(\delta, R^C) &= -27.2 + 15.3\sigma^I_{R^{\mathsf{NAV}}} - 4.54OS \qquad R^2 = 34.4\% \qquad (1) \\ &\qquad\quad (9.21)\ \ (5.9) \qquad\qquad (2.28) \end{aligned}$$

When a fund's ownership increases, the premium is likely to be high. This means that future returns are likely to be low, which will induce a negative relationship. As expected, we observe a statistically significant (at a 1% level) and a negative coefficient in equation (1). At the same time, when the residual volatilities of underlying assets are high, we expect to see a low premium, which will result in large future returns. This is exactly the pattern shown in equation (1), with a statistically significant coefficient estimate (at a 5% level). Therefore, both the information argument and the imperfect arbitrage opportunities are important in explaining the cross-correlations.

5 A Further Look at Discounts and Predictability

We now investigate the issue of what factors explain fluctuations in premia/discounts over time. The investor sentiment argument has been extensively discussed in the recent literature. Researchers have used variables related to small stocks as proxies for sentiment risk (see Lee, Shleifer, and Thaler, 1991; and Brauer, 1993). Given the size and the speculative nature of the Chinese capital markets, it is difficult to construct such measures. Instead, we use the composite index of the Chinese stock markets as a proxy for the sentiment factor for reasons discussed in *Hypothesis 4*. Although liquidity does not seem to influence the level of premia, it might affect the dynamics of premia. To mitigate the heteroscedasticity problem, we use the log volume instead.

In our sample, there are new funds introduced over time. To accommodate this, we first study the time series behavior of premia using aggregate data across funds with equal weights. The following regression equation examines the explanatory power of the lagged premium, contemporaneous trading volume, lagged trading volume variables, and the market return. The numbers in the parentheses are standard deviations.

$$\begin{aligned} \delta_t &= -0.6 + 0.903\delta_{t-1} + 1.882V_t - 1.972V_{t-1} - 0.881R_{m,t} + 0.807R_{m,t-1} \quad R^2 = 87.9\% \quad (2) \\ &\quad (0.5)\ (0.038) \qquad (0.478) \qquad (0.458) \qquad (0.502) \qquad (0.482) \end{aligned}$$

This equation is estimated by using our weekly aggregate data from 1999 to 2000. We exclude the 1998 data in order to reduce the IPO effect since there are very few funds during that period. As suggested in Table 3, the aggregate premia are very persistent over time, with a coefficient estimate of 0.9. Premia also have a very significant contemporaneous relationship with trading volume. The positive sign on the estimate is consistent with the liquidity premium hypothesis. As many empirical studies have shown that trading volume is persistent, our estimates will be biased should this persistence not be appropriately controlled. Therefore, in equation (2) we have also included the lagged trading volume. The result suggests that the lagged volume variable is very significant with a negative sign. Moreover, it is interesting to note that the coefficient estimates on the two volume variables are very close to each other. The "investor sentiment" hypothesis is tested using the market index return as a proxy. Although the sign is correct on the market return variable, it is only significant at a 10% level. This could be due to the autocorrelation in market returns. Indeed, the lagged market index variable has a similar effect with an opposite sign. We further test the

hypothesis of equal coefficients by imposing the constraint in the following regression:

$$\begin{aligned} \delta_t &= -0.626 + 0.906\delta_{t-1} + 1.919\Delta V_t - 0.835\Delta R_{m,t} \quad R^2 = 87.9\% \qquad (3) \\ &\quad (0.320)\ (0.035) \qquad (0.454) \qquad (0.348) \end{aligned}$$

Clearly, a simple $F-$test fails to reject the hypothesis of equal coefficients. This result suggests that it is not the level of trading volume or market return but changes (or innovations) in trading volume or market return that affect the dynamics of premia of Chinese closed-end funds. If investor sentiment (liquidity) changes over time, then it should primarily be reflected in the innovations of trading volume (liquidity) rather than its levels. In other words, both investor sentiment risk and liquidity risk are important factors in understanding time variations in the premia of Chinese closed-end funds.

Although the ownership variable is important in explaining the cross-sectional difference in premia of the Chinese closed-end funds, we cannot establish a link between the time variations in premia and ownership from a similar regression. This is because the ownership variable does not change much over time. Due to the limitation of our time series sample size, we cannot investigate the significance of the volatility and the correlation variables studied in the previous section.

As revealed in our cross-sectional study, premia can behave very differently in different sample periods. To study the robustness of our results, we now examine the dynamic behavior of premia for individual funds over both IPO and post IPO period. As changes in the trading volume are more important than the level of trading volume in the time series study, we run regressions similar to equation (3) for individual funds. However, it seems that the level of market return is more important than changes for individual funds. In this part of the study, we only include funds that had at least 24 weeks of returns in the post IPO period to have a comparable number of funds for both periods. Therefore, we have 22 funds in total. The results are reported in Table 5. During the IPO period, most funds have persistence coefficients of above 0.6, except for three funds with persistence coefficients of below 0.3. In other words, premia are also very persistent in the IPO stage. Unlike the cross-sectional study, innovations in the trading volume do not have much impact on the time-variations of discounts of individual funds. There are only two funds have significant coefficient estimates on trading volume at a 5% level. In contrast, the market return is significant for half of the funds. "Investor sentiment" risk does seem to influence the dynamics of individual funds in the IPO period.

Insert Table 4 Approximately Here

For the post IPO period, our results are much stronger. Most funds have persistence coefficients of above 0.8. In addition, there are 8 (10) funds out of a total of 22 funds examined have significant coefficient estimates on trading volume at a 5% (10%) level with correct signs. Although the level of trading volume does not seem to explain the cross-sectional differences in discounts in the post IPO period, the innovations in volume, i.e. changes in the liquidity risk is very important in determining the time variations of discounts for individual funds. The market return is significant at a 5% (10%) level for 6 (9) funds. The results suggest that the "investor sentiment" risk is robust in both the sample period and individual funds.

Finally, we study the predictability issue of closed-end fund returns, as discounts could serve as an important predictor due to the cross-correlation. In particular, as Thompson (1978) suggested using some kind of abnormal return measures, we use first difference in return instead. To control for the auto correlations in the fund premia, we also include the lagged premium variable in the following regression using aggregate data. Again, the numbers in the parentheses are standard deviations.

$$\begin{aligned} \Delta R_t^C &= -0.220 - 0.385\delta_{t-1} + 0.341\delta_{t-2}, \qquad R^2 = 5.5\%. \\ &\qquad (0.554)\ (0.164) \qquad\quad (0.159) \end{aligned} \tag{4}$$

As the coefficient estimate on δ_{t-1} is significant at a 5% level with a correct sign, the lagged discount contains information about changes in the future fund returns. Due to high persistence in discount, we also observe that the magnitude on δ_{t-2} estimate is very similar to that of δ_{t-1}. Therefore, we impose a constraint of equal coefficients in the following equation.

$$\begin{aligned} R_t^C - R_{t-1}^C &= -0.063 - 0.354(\delta_{t-1} - \delta_{t-2}) \qquad R^2 = 5.0\% \\ &\qquad (0.510)\ (0.158) \end{aligned} \tag{5}$$

A simple F-test suggests that the constraint is binding. Therefore, the innovations in discounts are useful in predicting future return changes of Chinese closed-end funds.

We continue to investigate the predictability issue on individual fund levels. For the reason discussed above, we only estimate equations similar to equation (5) in Table 5. During the IPO period, there are 12 funds out of a total of 22 funds with a significant estimate (at

a 1% level) and with a correct sign. The results are much stronger for the post IPO period. 14 funds are significant at a 1% level. There are an additional 4 funds that are significant at a 5% level. Therefore, the cross-correlation between current discounts and future fund returns is not only highly significant, but also very robust.

Insert Table 5 Approximately Here

Using the same specification for returns from the NAVs of underlying assets, R_t^{NAV}, we do not observe a similar relationship between discounts and future returns from the NAVs (not reported in the Table). This suggests that the predictability of premia is not due to the persistence of the underlying asset returns.

6 Concluding comments

This research offers additional insights into the discount issue of closed-end funds by exploring less mature capital markets with different regulations. Due to the uniqueness of our data set, we are also able to study the premium issue in the IPO stage.

As a first study of Chinese closed-end funds, we have documented some stylized facts. In general, Chinese closed-end funds are sold at a substantial premium of 16% in the IPO period, which lasts for about 25 weeks. After the IPO stage, all Chinese closed-end funds are traded at 16% below their net asset value. Current discounts are also highly correlated with future fund returns. Qualitatively, these phenomena are very similar to those experienced in the US. Quantitatively, they are much stronger and persistent. It is also interesting to note that Chinese closed-end funds do not exhibit the "excess volatility" found in the US data.

While market inefficiency may be a direct cause for the observed premium (discount) in the Chinese closed-end fund markets, many important factors, such as those related to capital gains taxes and liquidity, are irrelevant to understand Chinese closed-end funds. Instead, we have used Jensen's alpha, trading volume, market return, residual volatilities of underlying assets, ownership, autocorrelation in the fund returns as proxies for other factors such as, risk adjusted performance, the liquidity risk, investor sentiment, imperfect arbitrage, stochastic turnover effect, information, and the momentum effect, respectively. The momentum effect, imperfect arbitrage, and stochastic turnover risk are important in explaining the cross-sectional difference in the IPO premia. In contrast, the performance of underlying assets and informational effects are crucial in determining the post IPO discounts of Chinese closed-end funds. We also demonstrate that the liquidity risk and the sentiment risk are useful factors in understanding time variations in discounts.

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Table 1: Fund Information (including old funds listed after restructuring)

No.	Name	Date of Setup	Listing Place	Date of Listing	Size (100 m)	Magt Company	Trustee
1	Kaiyuna	03/27/98	Shenzhen	04/07/98	20	Nanfang	Industrial & Commercial Bank
2	Jintai	03/27/98	Shanghai	04/07/98	20	Guotai	Industrial & Commercial Bank
3	Xinghua	04/23/98	Shanghai	05/08/98	20	Huaxia	Bank of Construction
4	Anxin	06/22/98	Shanghai	06/26/98	20	Hua'an	Industrial & Commercial Bank
5	Yuyang	07/25/98	Shanghai	07/30/98	20	Boshi	Agricultural Bank
6	Puhui	01/06/99	Shenzhen	01/27/99	20	Penhua	Agricultural Bank
7	Jingbo	06/01/92	Shenzhen	10/22/99	10	Daheng	Agricultural Bank
8	Jingyang	05/01/92	Shanghai	10/22/99	10	Dacheng	Agricultural Bank
9	YuYuan	06/01/92	Shanghai	10/28/98	15	Boshi	Industrial & Commercial Bank
10	Tongsheng	11/05/99	Shenzhen	11/26/99	30	Changsheng	Bank of China
11	Jinxing	10/21/99	Shanghai	11/26/99	30	Guotai	Bank of Construction
12	Taihe	04/08/99	Shanghai	04/20/99	20	Jiashi	Bank of Construction
13	Tongyi	04/08/99	Shenzhen	04/21/99	20	Changsheng	Industrial & Commercial Bank
14	Jinghong	05/05/99	Shenzhen	05/18/99	20	Dacheng	Bank of China
15	Hansheng	05/10/99	Shanghai	05/18/99	20	Fuguo	Agricultural Bank
16	Anshun	06/15/99	Shanghai	06/22/99	30	Hua'an	Bank of Communicaitons
17	Yulong	06/15/99	Shenzhen	06/24/99	30	Boshi	Agricultural Bank
18	Xinghe	07/14/99	Shanghai	07/30/99	30	Huaxia	Bank of Construction
19	Pufeng	07/14/99	Shenzhen	07/30/99	30	Penghua	Industrial & Commercial Bank
20	TianYuan	08/26/99	Shenzhen	09/20/99	30	Nanfang	Industrial & Commercial Bank
21	Jingfu	12/30/99	Shenzhen	01/10/00	30	Dacheng	Agricultural Bank
22	Hanxing	12/30/99	Shanghai	01/10/00	30	Fuguo	Bank of Communicaitons
23	Hanbo	05/30/92	Shanghai	10/17/00	5	Fuguo	Bank of Construction
24	LongRMB	12/29/92	Shenzhen	10/18/00	5	Nanfang	Industrial & Commercial Bank
25	Yuhua	12/31/92	Shenzhen	04/24/00	5	Boshi	Bank of Communications
26	Tongzhi	03/13/92	Shenzhen	05/15/00	5	Changsheng	Bank of China
27	Yuze	05/31/96	Shenzhen	05/17/00	5	Boshi	Industrial & Commercial Bank
28	Jinsheng	12/01/94	Shenzhen	06/30/00	5	Guotai	Bank of Construction
29	JinYuan	05/28/92	Shanghai	07/11/00	5	Nanfang	Industrial & Commercial Bank
30	Xingke	05/31/92	Shenzhen	07/18/00	5	Huaxia	Bank of Communications
31	Handing	01/01/94	Shanghai	08/17/00	5	Fuguo	Industrial & Commercial Bank
32	Jindng	05/31/92	Shanghai	08/04/00	5	Guotai	Bank of Construction
33	Xing'an	12/29/92	Shenzhen	09/20/00	5	Huaxia	Bank of China

Table 2: Summary Statistics for Chinese Closed-end Equity Funds

In this table, we report the number of funds "#", the average index return R^{Idx} (%), the average fund return R^{C} (%), the average return from a fund's NAV R^{NAV} (%), average trading volume "Vol." (%), the average fund ownership "OW" (%), and the total market capitalization, "Cap", in terms of million RMB.

Quarter	#	R^{Idx}	R^{C}	R^{NAV}	Vol.	OW	Cap
98.II	2	0.120	4.586	0.347	6.93	3.00	7613.33
98.III	4	-0.159	-1.730	-0.040	1.23	3.00	11221.42
98.IV	5	-0.116	-0.809	0.150	0.95	3.10	12544.61
99.I	5	0.022	-0.153	0.500	0.68	3.01	11752.00
99.II	6	0.511	1.684	2.513	3.05	2.36	13592.30
99.III	12	-0.027	-1.605	0.096	2.30	2.29	34311.42
99.IV	15	-0.259	-0.562	-0.492	0.69	2.01	41215.38
00.I	20	0.566	1.245	1.627	6.36	2.08	50625.06
00.II	22	0.118	-0.267	0.520	1.89	1.77	53084.51
00.III	26	-0.014	0.462	0.004	3.65	1.78	56931.29
00.IV	31	0.148	0.876	0.564	3.98	1.68	59168.27
Average	14	0.083	0.325	0.523	2.88	2.37	32005.42

Table 3: Characteristics for Chinese Closed-end Equity Funds

This table summarizes the statistics for the Chinese equity closed-end funds. The results are based on weekly data from February 1999 to December 2000. $\bar{\delta}$, ρ_δ, and σ_δ are the average, the persistent coefficient (AR(1) coefficient), and the volatility of premia over time, respectively. R^c, ρ_{R^c}, and σ_{R^c} denote the time series average, the autocorrelation, and the volatility of a closed-end fund returns, respectively, while R^{NAV}, $\sigma_{R^{NAV}}$, and $\sigma_{R^{NAV}}$ are the average, the autocorrelation, and the volatility of returns from net asset values, respectively. α_x, β_x, and R^2_x are from fitting return x to a market model. $Corr(\delta_t, R^c_{t+1})$ and $Corr(\delta_t, R^{NAV}_{t+1})$ are the cross-correlations between current discounts and future fund returns and future NAV returns, respectively. "10%", "50%", and "90%" are the tenth, fifty-th, and ninety-th percentiles across funds. All numbers in the table are in percentage form.

	IPO Period				Post IPO Period			
	10%	50%	90%	Mean	10%	50%	90%	Mean
$\bar{\delta}$	-6.19	7.45	54.92	15.63	-21.26	-18.34	-7.13	-16.59
σ_δ	3.83	6.88	15.36	8.79	1.679	5.944	12.42	6.34
ρ_δ	58.85	82.70	95.99	79.59	70.626	89.798	97.89	85.76
R^c	-0.69	0.38	4.67	1.37	0.222	0.375	0.54	0.38
σ_{R^c}	1.59	5.03	22.10	10.11	1.307	2.360	3.28	2.33
ρ_{R^c}	-39.86	-11.13	16.24	-11.40	-22.857	5.650	16.84	-1.53
α_{R^c}	-0.79	-0.26	0.41	-0.22	0.001	0.174	0.32	0.16
β_{R^c}	0.35	1.76	3.84	1.95	0.991	2.626	3.45	2.37
$R^2_{R^c}$	0.01	0.36	0.72	0.36	0.102	0.493	0.57	0.36
R^{NAV}	-0.17	0.26	1.27	0.43	0.324	0.485	0.81	0.53
$\sigma_{R^{NAV}}$	1.13	2.57	3.70	2.68	1.398	2.706	3.44	2.47
$\rho_{R^{NAV}}$	-29.47	2.94	29.96	2.11	-10.462	3.468	26.06	4.20
α_{NAV}	-0.04	0.28	0.70	0.29	0.243	0.322	0.47	0.35
β_{NAV}	1.10	3.04	3.92	2.72	2.701	3.103	3.53	3.11
R^2_{NAV}	0.15	0.60	0.75	0.51	0.474	0.636	0.71	0.61
$Corr(\delta_t, R^c_{t+1})$	-49.84	-0.92	35.4	-3.88	-31.044	-14.105	4.60	-14.78
$Corr(\delta_t, R^{NAV}_{t+1})$	-32.74	8.56	36.6	2.19	0.341	13.453	51.53	18.96

Table 4: Explaining Premia of Closed-end Funds from Cross-sectional Regressions

This table shows the significance of determinants for cross-sectional differences in closed-end fund premia. The time-series averages of each fund are used for cross-sectional regressions with the average premium as the independent variable. There are 29 and 22 funds in the "IPO period" and "post IPO period," respectively. Numbers in the parentheses denotes standard deviations. α^{NAV} and $\sigma^{I}_{R^{\mathrm{NAV}}}$ are the intercept and residual standard deviation from a market model fitted to the NAV returns. $\rho_{R^{\mathrm{C}}}$ denotes persistence in the NAV returns. "OS" is the percentage of managerial ownership, respectively. "*" means a coefficient is significant at 5% level and "**" represents significance at 1% level.

	IPO Period					Post IPO Period				
Equation	α^{NAV}	OS	$\sigma^{I}_{R^{\mathrm{NAV}}}$	$\rho_{R^{\mathrm{C}}}$	R^2	α^{NAV}	OS	$\sigma^{I}_{R^{\mathrm{NAV}}}$	$\rho_{R^{\mathrm{C}}}$	R^2
I	-26.52*				17.0	39.93**				46.8
	(11.27)					(9.528)				
II		0.963			0.3		2.247			14.2
		(3.490)					(1.235)			
III			-16.45*		17.5			8.772**		31.5
			(6.872)					(2.895)		
IV				0.453**	32.1				0.021	0.3
				(0.126)					(0.080)	
V	-26.47*	0.844			17.2	37.33**	1.628			54.0
	(11.48)	(3.241)				(9.207)	(0.940)			
VI			-17.64**	0.471**	52.2			8.951**	0.042	32.8
			(5.338)	(0.108)				(2.957)	(0.068)	
VII	-18.66*	1.332	-16.41**	0.439**	61.0	24.75*	2.192*	4.812	0.071	61.2
	(8.352)	(2.352)	(5.140)	(0.103)		(11.44)	(1.038)	(2.968)	(0.064)	

Table 5: The Dynamics of Premium

This table shows individual regression results of regressing premium on the lagged premium δ_t and first difference in volume ($Vol_t - Vol_{t-1}$) over the IPO period and post IPO period. Only those funds that had at least 24 weeks of returns in the post IPO period are included. The dependent variable is the premium δ_t. "Coeff." and $p - v$ denote the coefficient estimate and the p-value of the coefficient estimate, respectively.

Fund	IPO Period							Post IPO Period						
	δ_{t-1}		$Vol_t - Vol_{t-1}$		R^m_{t-1}			δ_{t-1}		$Vol_t - Vol_{t-1}$		R^m_{t-1}		
No.	Coeff.	$p - v$	Coeff.	$p - v$	Coeff.	$p - v$	R^2	Coeff.	$p - v$	Coeff.	$p - v$	Coeff.	$p - v$	R^2
1	0.98	0.0	6.95	10.9	4.38	24.5	90.7	0.95	0.0	1.28	0.1	-0.73	10.0	96.3
2	0.97	0.0	1.54	3.3	-0.03	96.0	86.9	0.88	0.0	0.62	24.1	-0.55	40.4	81.1
3	0.73	0.0	0.80	35.6	0.49	61.3	59.8	0.95	0.0	0.33	8.3	-0.58	8.2	95.5
4	0.24	25.	-1.40	40.4	0.67	63.0	21.0	0.79	0.0	0.12	81.0	0.35	61.9	71.3
5	0.74	0.0	1.07	16.7	-2.60	1.7	71.9	0.85	0.0	0.43	17.1	0.07	88.7	87.1
6	0.90	0.0	0.24	58.4	-1.79	0.7	79.8	0.86	0.0	-0.27	30.5	-1.09	1.5	93.4
7	0.17	0.0	-0.59	73.2	0.90	62.9	48.7	0.83	0.0	0.80	2.9	-0.75	19.2	74.1
9	0.95	0.0	1.35	0.6	-2.97	0.0	97.3	0.86	0.0	0.28	22.2	-0.97	4.7	78.5
10	0.99	0.0	0.50	22.0	-1.06	6.5	94.7	0.74	0.0	0.18	49.7	-1.14	4.5	63.2
11	0.97	0.0	-0.06	85.9	-2.06	0.0	95.4	0.77	0.0	0.33	8.2	-1.59	0.8	77.0
18	0.94	0.0	0.59	87.3	7.84	3.5	91.3	0.96	0.0	0.88	1.5	-0.25	54.1	97.2
19	0.57	1.4	0.71	57.7	0.52	65.7	29.6	0.95	0.0	0.41	1.9	-1.25	0.0	97.8
20	0.86	0.0	-0.11	76.8	2.78	0.0	97.2	0.92	0.0	0.93	2.8	-0.09	86.0	91.3
21	0.56	0.5	0.07	92.0	0.39	57.7	39.4	0.86	0.0	1.06	0.5	-0.18	74.5	83.4
22	0.95	0.0	1.03	10.7	0.81	36.6	85.4	0.87	0.0	1.56	1.1	-0.03	96.2	80.3
23	0.23	0.0	0.06	97.4	-0.60	80.4	58.5	0.68	0.0	0.24	39.0	-0.48	38.9	51.8
24	0.91	0.0	1.80	18.5	5.09	0.1	98.5	0.91	0.0	1.77	0.1	-0.46	49.4	86.9
25	0.65	0.0	0.56	42.1	-1.85	5.6	78.8	0.90	0.0	0.30	25.6	-0.34	42.1	93.6
27	0.98	0.0	0.56	20.7	-2.61	0.0	97.1	0.52	0.9	-0.39	23.2	-0.45	47.4	35.5
28	0.75	0.0	0.04	92.6	-1.32	3.7	81.2	0.75	0.0	0.54	16.9	-1.24	6.6	69.0
29	0.85	0.0	-1.03	26.7	1.49	17.9	89.2	0.54	1.0	0.19	64.3	0.14	85.0	31.5
30	0.81	0.0	-0.09	88.8	-1.27	12.3	67.3	0.83	0.0	0.13	65.4	-1.16	1.0	90.6

Table 6: The Predictive Power of Premium

This table shows individual results of regressing a fund's returns on the lagged premia over the IPO period and post IPO period. Only those funds that had at least 24 weeks of returns in the post IPO period are included. The dependent variable is the first difference in return ΔR_t^C), and the independent variable is the lagged first difference in premium ($\delta_{t-1} - \delta_{t-2}$). "No", StD_{Vol}, and $p - v$ denote the fund number, the standard deviation, and the p-value of the coefficient estimate, respectively.

	IPO Period				Post IPO Period			
No.	$\delta_{t-1} - \delta_{t-2}$	StD_{Vol}	$p - v$	R^2	$\delta_{t-1} - \delta_{t-2}$	StD_{Vol}	$p - v$	R^2
1	-0.513	0.138	0.1	39.6	-0.457	0.122	0.0	11.2
2	-1.313	0.299	0.0	47.8	-0.293	0.120	1.7	8.0
3	-1.370	0.237	0.0	61.4	-0.752	0.292	1.3	10.3
4	-1.464	0.143	0.0	83.1	-0.409	0.161	1.4	10.6
5	-1.326	1.279	31.2	4.9	-0.996	0.242	0.0	25.7
6	0.124	0.321	70.2	0.7	-0.280	0.130	3.7	9.5
7	0.829	0.061	0.0	89.6	-0.917	0.232	0.0	32.7
9	-0.023	0.241	92.4	0.0	-0.478	0.217	3.5	11.8
10	-0.176	0.304	56.9	1.6	-0.448	0.215	4.7	13.8
11	0.254	0.172	15.4	9.4	-0.562	0.246	3.4	20.6
18	-0.470	0.137	0.2	36.0	-0.752	0.117	0.0	27.2
19	-1.094	0.159	0.0	69.2	-0.458	0.269	9.4	4.8
20	-0.594	0.177	0.3	34.9	-1.372	0.121	0.0	56.3
21	-1.571	0.308	0.0	55.3	-0.617	0.183	0.1	17.4
22	-0.760	0.189	0.1	43.4	-0.495	0.110	0.0	17.7
23	1.602	0.130	0.0	87.8	-1.082	0.327	0.2	25.4
24	-0.571	0.139	0.1	44.5	-0.334	0.080	0.0	14.1
25	-0.831	0.147	0.0	60.2	-0.700	0.249	0.7	13.9
27	0.123	0.159	44.7	2.8	-0.959	0.258	0.1	33.8
28	-0.317	0.172	8.0	13.9	-0.480	0.265	8.6	14.0
29	-1.044	0.246	0.0	46.1	-0.746	0.252	0.6	22.5
30	-0.306	0.295	31.2	4.9	0.019	0.155	90.0	0.0

Figure 1. Weekly Closed-End Fund Premia (1999.01-2000.12)

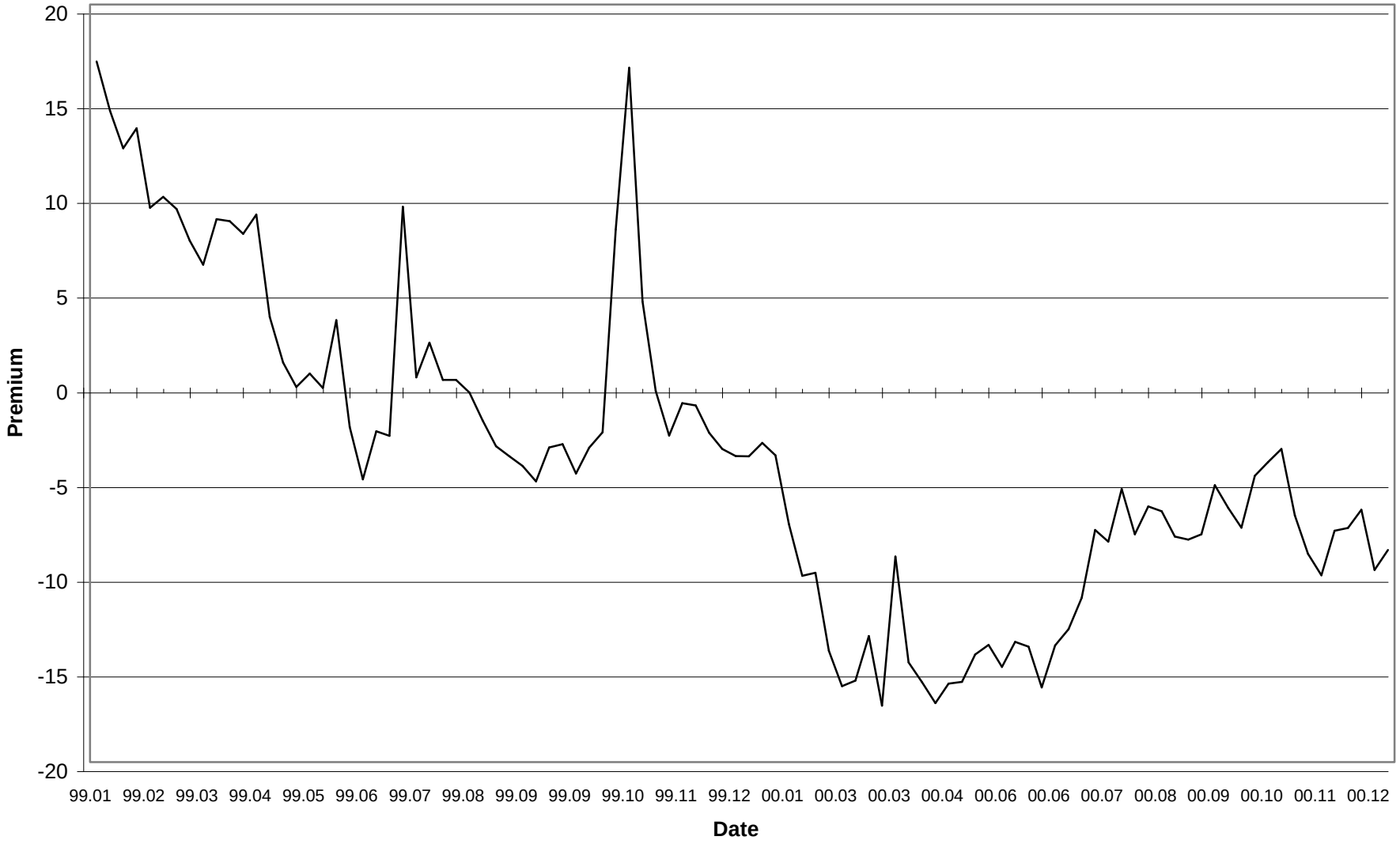

Figure 2. Close-End Fund Premia and Returns after IPO

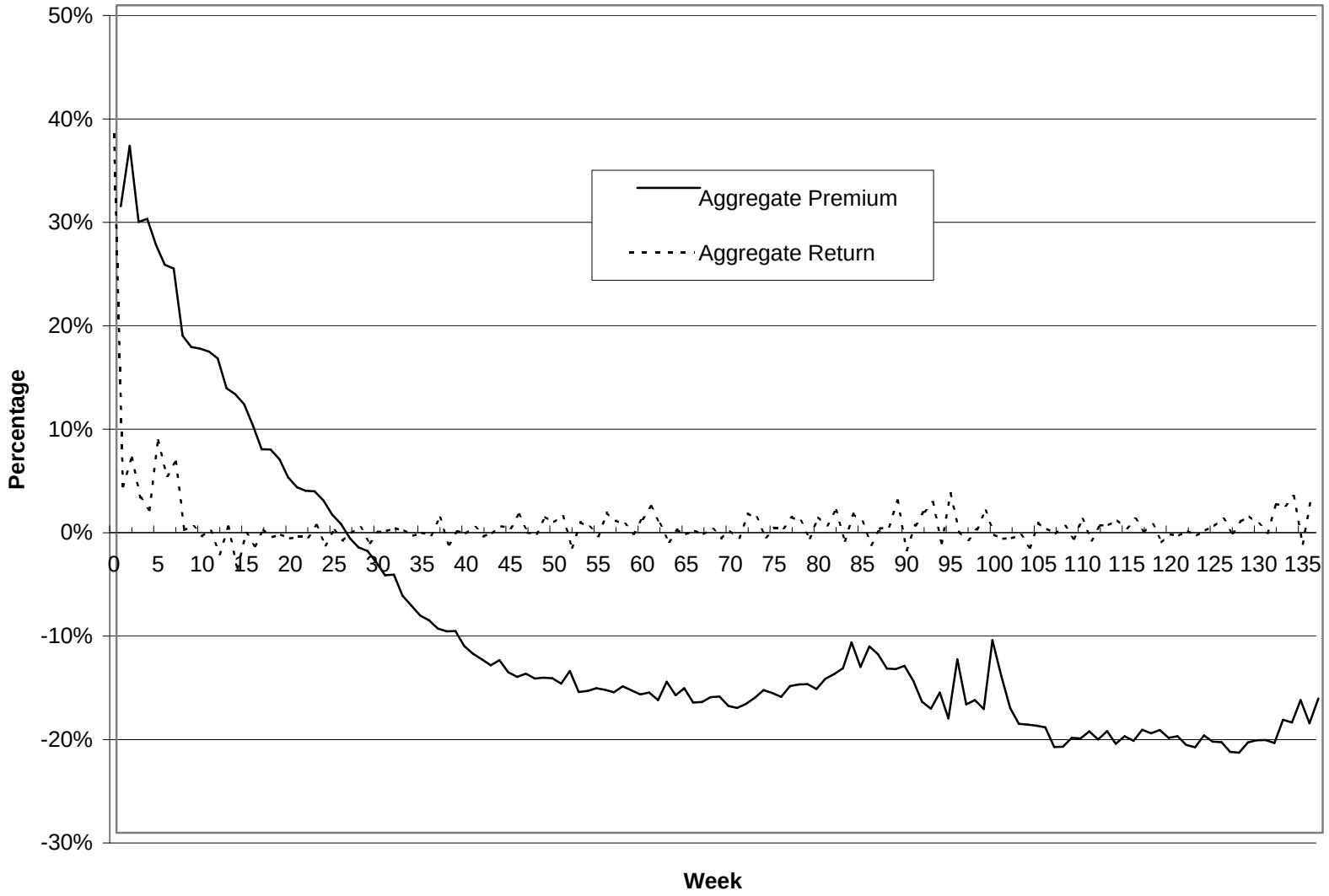

Figure 3. AutoCorrelations and Cross-Correlations for Returns and Premia