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Abstract

In a simple model of segmented markets and exogenous liquidity shock, the closed-end country fund premium is negatively affected by the illiquidity in the host market where shares of the country fund are traded, and positively affected by the illiquidity in the home market where the underlying assets are traded. To the extent that expected and unexpected liquidity affects asset prices and returns, the closed-end country fund premium should reflect the difference between the illiquidity of the fund shares and its underlying assets. Using the Amihud measure of illiquidity, we examine this conjecture for U.S.-traded single country closed-end funds, and find a strong association between the fund premium and illiquidity in both the host and the home markets. Moreover, this relation is much stronger for funds investing in emerging markets where market segmentation is more likely to be binding. These funds are also more sensitive to the systematic liquidity factor, suggesting that the country fund premium may contain a significant liquidity risk premium.

Illiquidity and Closed-End Country Fund Discounts

Liquidity is an abstract concept with several important dimensions including the cost of a transaction, the ability to trade promptly, the ease with which large quantities can be traded, and the impact of trading on prices. Financial assets with similar, or even the same, payoffs can often have different liquidity in terms of the above mentioned dimensions. Since liquidity is a key feature of the capital market and the macroeconomic environment, an important question to ask is how liquidity affects asset prices. Both the theoretical and empirical aspects of the interaction between liquidity and asset prices have been studied extensively.

The theoretical implication of illiquidity on asset prices is so far mixed. On the one hand, Kyle (1985) shows that the order flow or the market "depth," also known as Kyle's lambda, conveys information and affects the asset price. Allen and Gale (1996) argue that an illiquid asset's price is given by the smaller of the asset's long-term fundamental value and the amount determined by the supply and demand of cash (liquidity). On the other hand, Constantinides (1986) and Vayanos (1998) show that illiquidity in the form of transaction costs has large effect on asset turnover but only very small effect on asset prices.[1] Finally, there is ambiguous prediction of how illiquidity affects asset prices. For example, while illiquidity always depresses the asset price to below its fundamental value in Allen and Gale (1996), Vayanos (1998) and Longstaff (2004) show that a risky asset's price may increase in illiquidity measured as transaction costs or immediacy to trade.

Empirical evidence is generally more supportive of the hypothesis that illiquidity depresses asset prices and leads to higher asset returns. In the government bond market, on-the-run Treasury bonds are usually much more liquid and more expensive than their off-the-run counterparts even though they have very similar cash flows and characteristics, and Treasury bonds are often priced differently from similar government agency bonds even after controlling for coupon payment and default risk.[2] In the stock market, the positive return-illiquidity relation over time is examined and confirmed in Amihud (2002). The similar relation across different stocks has been documented in studies such as Amihud and Mendelson (1986), Brennan and Subrahmanyam (1996), and Brennan, Chordia, and Subrahmanyam (1998).[3] Finally, Pastor and Stambaugh (2003) find that stock returns are related not only to liquidity levels but also to liquidity risk factors.

In contrast to studies using Treasury bond yields where bond cash flow and characteristics can be

[1]Other theoretical studies include Amihud and Mendelson (1986), Glosten (1989), Vayanos (2003), Huang (2002), Wang and Vayanos (2003), and Longstaff (2004), among others.

[2]For example, Longstaff (2002) finds a large liquidity premium in Treasury bond prices by comparing Treasury bond prices with prices of bonds issued by Refcorp, a U.S. Government agency, that are guaranteed by the Treasury.

[3]Other empirical studies include Datar, Narayan and Radcliffe (1998), Chordia, Roll and Subrahmanyam (2000, 2001), and Lo and Wang (2000), among others.

directly matched, the examination on the stock return-illiquidity relation usually does not have this luxury since it is difficult to control for cash flows and other characteristics across different stocks. While factor models are often used to filter out well-known risk factors, it is cleaner to directly control for cash flows and other characteristics of the stocks in a test of the impact of liquidity on stock returns. This paper tries to address this issue by investigating whether fluctuations in the closed-end country fund (CEF) premium are related to changes in liquidity.

A closed-end fund is a firm that issues a fixed number of shares and uses the proceeds to invest in the shares of other companies. The closed-end country fund is a special subset where the firm issues shares in one country such as in the UK and the US (host market) and then invests the proceeds in the shares of companies from a specific foreign country such as Korea (home market). Unlike an open-end fund, a closed-end fund maintains a fixed number of shares that are traded on an exchange. Closed-end funds announce their portfolio net asset value per share (NAV) at regular intervals (usually weekly or daily) and it is observed that their share prices typically trade at a discount to their NAV.[4]

Closed-end country funds have the important feature that the fund shares and the underlying assets are close substitutes, but are traded in two different markets with typically different market microstructures and different levels of liquidity. This feature implies that there are several advantages of using closed-end country funds in the test of impact of illiquidity on risky asset prices and returns. First, the net effect of illiquidity on the fund price after controlling for its effect on underlying asset values allows us to obtain a cleaner test of the return-liquidity relation. Both fund price and fund net asset values may change for many fundamental and economic reasons other than liquidity. By examining the discount-illiquidity relation, we are able to control for cash flows and other fundamental characteristics of the fund portfolio and thus reduce noise in our analysis. Second, the effect of illiquidity on the fund premium or discount provides empirical evidence on how illiquidity affects close substitutes traded in different markets and helps us better understand the liquidity spillover effect. Finally, the relation between liquidity and fund discount may shed light on the time series behavior of fund discount and provide a preliminary explanation for the highly volatile closed-end fund discounts observed in the US data.[5] While many explanations have been

[4]Closed-end funds are generally issued at a premium. Weiss (1989) and Hanley, Lee, and Seguin (1994) provide empirical evidence of closed-end fund premium at the issuance, and initial price stabilization behavior provided by the lead underwriters. Cherkes (2003) argues that this special feature of buyers paying the IPO costs via IPO over-pricing with the underwriters providing prolonged after-market price support as a supplement to the IPO over-pricing is neither anti-competitive nor predatory.

[5]Many explanations have been offered for the existence and the behavior of the discrepancy between the fund share price and its NAV. Within the rational framework, management fees, agency costs, tax effects, market segmentation, and mis-valuation of underlying (illiquid) assets, have all been invoked to explain the puzzle. See, for example, Bonser-Neal, Brauer, Neal, and Wheatley (1990), Gemmill and Thomas (2002), Malkiel (1977), and Ross (2002). Within the behavioral finance literature, investor sentiment is used as an alternative explanation. See, for example, De Long, Shleifer, Summers, and Waldmann (1990) and Palomino (1996) for theoretical models. Lee, Shleifer, and Thaler (1991), Hardouvelis, La Porta, and Wizman (1994), Kalibanoff, Lamont, and Wizman (1996), Bodurtha, Kim, and Lee (1995), Pontiff (1996, 1997), and Swaminathan (1996) provide empirical evidence supporting the investor sentiment explanation, while Elton, Gruber, and Busse (1998) and Dimson and Minio-Kozerski

provided to understand the existence and the magnitude of the closed end fund discount or premium, there is virtually no good explanation for the time variation in the discount.

Although this intuition applies to domestic as well as international closed-end funds, this paper only investigates the effect of liquidity on discounts of closed-end country funds. There are two reasons why we restrict our analysis to country funds. First, while the effect of liquidity on asset prices and returns has been studied extensively in the U.S. market, studies of liquidity and asset returns across different countries are quite limited. This paper fills this gap by linking the liquidity in both the host and the home markets to the country fund premium or discount. Secondly, we are also interested in studying how liquidity spills over to close substitutes in an international capital market setting. Shares of country funds are often traded in the host market (U.S.) while their underlying assets are traded in a home market (foreign). With different degrees of market segmentation between the US and other countries, we expect to observe different spillover effects. It is not as easy to substitute an investment in one market with its close substitutes traded in the other in a segmented market setting as it is to do so in an integrated market setting. Thus, if the market is segmented, the liquidity in the home market is more likely to affect only the fund's NAV while the liquidity in the host market is more likely to affect only the fund's price, leading to sharper predictions of the effect of liquidity on fund discounts.

Since there are mixed theoretical predictions on the relation between illiquidity and asset prices, we only use a simple model, which is an extension of Allen and Gale (1996), for motivational purposes. In such a model, higher illiquidity is associated with lower asset price. Under the assumption of a completely segmented international capital market, the model implies that high illiquidity in the host (home) market leads to lower fund price (NAV) and thus smaller (higher) premium. In a fully integrated market, however, the liquidity in one market can easily transmit to another, so that high illiquidity in the host market (home) may cause both the fund price and the fund NAV to drop while having an ambiguous or even zero effect on the fund premium. Therefore, any significant relation between illiquidity and fund premium implies that there is a differential effect of illiquidity on close substitutes such as fund prices and fund NAVs. This additional result cannot be obtained by the examination of the association between illiquidity and fund price or NAV alone.

Liquidity is an abstract concept with several important dimensions, and we use Kyle's price impact of order flow as our liquidity measure in the paper. Such a liquidity measure is constructed for all relevant funds and for the host and home markets using the approach suggested in Amihud (2002). We find commonality in the illiquidity of individual funds with both the host and the home market.

Using price and NAV data for 47 U.S.-traded closed-end country funds, we empirically examine the

(1999) cast doubt on this hypothesis. In general, none of the above explanations provides a satisfactory account of the time series behavior of the discount.

effect of liquidity on the fund premium in three steps. First, we investigate how the level of fund premium relates to the level of illiquidity of the fund, the host market, and the home market. We find that the fund premium is significantly and negatively related to the fund's own illiquidity. In addition, there is a significant and negative association between the fund premium and the U.S. market-wide illiquidity. This suggests that the host market illiquidity has an incremental explanatory power for the fund's premium, and provides additional evidence that market-wide liquidity is a good candidate for a priced state variable. While the home market illiquidity has an insignificant effect on the fund premium during the whole sample period from August 1987 to December 2001, the estimate is highly significant and has the right sign in the second half of the sample period.

To check the importance of market segmentation on the liquidity spillover effect, the funds are split into two groups: the first group consists of funds that invest in open economies whose markets are likely integrated with the US market, while the second group consists of funds investing in emerging markets which are mostly segmented from the US market. As anticipated, results for the open-economy funds are generally weak, while results for the emerging-market country funds provide strong evidence that high host (home) market illiquidity is associated with a lower fund price (NAV) and thus a smaller (larger) premium in both the whole period and the two sub periods.

In the second step, we study how changes in fund premium, labeled fund spreads, relate to expected and unexpected illiquidities. On the one hand, unexpectedly high fund's own illiquidity is found to be significantly associated with a reduction in the fund premium. On the other hand, unexpectedly high home market illiquidity significantly and positively affects the fund premium, mainly for funds investing in segmented markets. This result implies that high unexpected illiquidity in the home market reduces the fund NAV much more than it affects the fund price in a segmented market setting so that it leads to higher fund premium; while the high unexpected home market illiquidity affects the fund NAV and price similarly in an integrated market setting so that no effect on fund premium is found. Although neither the fund expected illiquidity nor the home market expected illiquidity has any effect on changes of fund premium, higher expected *host* market illiquidity is associated with an increase in the fund premium, which provides additional evidence that the market-wide illiquidity risk is priced so that investors ask for a higher fund price return when the expected market wide illiquidity is high.

In the last step, we examine whether the change in fund premium has a significant factor loading on the systematic Pastor-Stambaugh (2003) liquidity factor, which is found to have statistically significant and economically large risk premium. The spread of funds investing in emerging economies loads significantly on the liquidity factor in a regression that also includes the popular Fama-French three factors, but the liquidity loading is virtually zero for the funds investing in open economies. Therefore, spread of funds investing in emerging markets not only has stronger association with the level of illiquidity but also is more

sensitive to the priced systematic liquidity factor as compared to that of funds investing in open economies. The significant factor loading implies that illiquidity is an important element that affects the closed-end country fund prices even after controlling for their NAVs and other important factors, and changes in fund premium may be partially driven by a liquidity risk premium.

The remainder of the paper is organized as follows. In section I, we motivate the paper by extending the model of Allen and Gale (1996) to multiple markets. In section II, we discuss the closed-end country fund data set and report summary statistics. In Section III, we provide detailed information on constructing our illiquidity measures for the country funds, the U.S. market, and the foreign markets. In Section IV, we report empirical findings and their implications. Section V summarizes and concludes the paper.

I. Motivation

The general conclusion of the empirical literature is that U.S. stock returns increase with illiquidity, and that liquidity risk is systematic and commands an illiquidity risk premium, but studies of liquidity and asset returns across different countries are quite limited. Moreover, the theoretical literature provides ambiguous predictions on how stock prices and returns relate to illiquidity.

While it is beyond the scope of this paper to develop a comprehensive theoretical model relating illiquidity and closed-end country fund discounts, we extend a two-period ($t = 0, 1, 2$) model of Allen and Gale (1996) to multiple markets, mainly for motivational purposes. The simple model depends on four key assumptions: limited market participation so that liquidity constraint may be binding in certain periods, market segmentation so that it is not easy for shocks affecting liquidity in one market to transmit to the other, heterogeneous investors so that some are liquidity providers and some are liquidity demanders, and exogenous determination of liquidity in the market so that liquidity is not affected by any strategic behavior of investors.

The investors in the host market (e.g., U.S.) have log utility functions and have access to a single long-life illiquid asset in the form of a closed-end fund, which has zero cash payment at $t = 1$ but has a fundamental long-term gross cash return of $R > 1$ at $t = 2$. In addition, investors can invest in a liquid asset (cash) with zero net return. The investors are identical at $t = 0$, but a proportion λ_f ($0 < \lambda_f < 1$) of them become early consumers and have to liquidate all their assets at $t = 1$. The remaining $1 - \lambda_f$ investors will hold their portfolio to the terminal date $t = 2$.

In this setup, the only source of uncertainty is the (stochastic) level of liquidity, λ_f, at $t = 1$. If the investor is sure that he will not be liquidity constrained at $t = 1$, then he will put all his wealth in the illiquid asset, because the illiquid asset strongly dominates cash if held to the terminal date. The possibility that the illiquid asset has to be sold at a gross return less than 1 at $t = 1$ forces the investor to hold some

cash in the first period. The optimization problem of a typical investor is given by:

$$\begin{aligned} \max_{x_f, y_f} \quad & \mathrm{E}\left\{\lambda_f \log\left(x_f + P y_f\right) + (1-\lambda_f)\log\left[(x_f/P + y_f)R\right]\right\} \\ s.t. \quad & x_f + y_f = 1 \quad 0 \le x_f, y_f \le 1, \end{aligned} \tag{1}$$

where x_f and y_f are, respectively, the proportion of wealth invested in cash and in the closed-end fund, and P is the first-period equilibrium gross return.[6] The first term in equation (1) is the utility if the investor becomes liquidity constrained and has to liquidate his portfolio at $t = 1$ and the second term is the utility if the investor holds his portfolio to the terminal date $t = 2$. After $t = 1$, the original illiquid asset becomes equivalent to cash but earns a higher or equal return, so a typical investor converts all the cash holdings to the risky asset.

Allen and Gale (1996) show that the first period equilibrium gross return P of the illiquid asset is given by

$$P = \min\left(R, \frac{(1-\lambda_f)x_f^*}{\lambda_f y_f^*}\right),$$

where $(1-\lambda_f)x_f^*$ is the aggregate amount of cash available to purchase the illiquid asset at $t = 1$, i.e., the supply of liquidity, while $\lambda_f y_f^*$ is the aggregate amount of illiquid asset that has to be sold to meet the liquidity need, i.e., the demand for liquidity. The equilibrium P is then the smaller value of the fundamental return R or the amount determined by the supply and the demand of liquidity. An important characteristic of P is that $P = R$ with probability 1 is not an equilibrium if $\lambda_f > 0$. If $P = R > 1$ with probability one were the equilibrium first-period gross return, then the illiquid asset would dominate cash during the first period so that $y_f^* = 1$ and $x_f^* = 0$. At $t = 1$, however, there would be a positive demand for liquidity ($\lambda_f y_f^* > 0$) but zero supply of liquidity ($(1-\lambda_f)x_f^* = 0$), which would push the re-sale value of the illiquid asset to 0 at $t = 1$ and contradict the initial assumption of $P = R$. Therefore, there is always a positive probability that the equilibrium price at $t = 1$ is less than the intrinsic value of the underlying asset and is instead determined by the demand and supply of the available liquidity.

On the other hand, the underlying asset of the fund is traded in a different (home or foreign) and segmented market, where ex-ante identical investors also face a liquidity shock at $t = 1$ with probability λ_c ($0 < \lambda_c < 1$). With a similar argument, the equilibrium net asset value (NAV) in the home market is

[6] If the illiquid asset price is normalized to one at $t = 0$, then P is also the equilibrium price at $t = 1$. Therefore, P will be interpreted as the first-period equilibrium gross return and the equilibrium price at $t = 1$, interchangeably.

given by

$$NAV = \min\left(R, \frac{(1-\lambda_c)x_c^*}{\lambda_c y_c^*}\right).$$

Let

$$D \equiv \frac{P}{NAV} - 1, \tag{2}$$

then D is usually named as fund premium when it is positive while it is often called the fund discount when it is negative.

In this highly stylized model based on complete market segmentation, high illiquidity in the host market pushes down the fund price P as well as D, while high illiquidity in the home market pushes down the fund NAV and thus increases D. One interesting example of the effect of illiquidity on fund premium or discount is given by our closed-end country fund data during the Asian Crisis, when a few Asian countries experienced liquidity crunch while the host market (U.S.) was not affected. As of June 26, 1998, all the funds investing in countries, which were part of the Asian financial crisis, have premia, while other country funds have discounts. More specifically, closed-end funds invested in Indonesia, Malaysia, Thailand, and Korea all were traded at huge premia. Indirectly hit by the crisis, Japan funds were also traded at a premia. Russia was another country with closed-end fund premia when it was in financial difficulty. Cohen and Remolona (2001) report that prices of those country funds move from a discount to NAV before the crisis to a premium when the crisis started, and the premia rose for all the funds during the crisis and then the premia declined gradually or moved back to a discount after the crisis in most cases. At the same time, all other funds, no matter whether they invested in emerging or developed markets, were all traded at discounts. Even those funds invested in Asian markets such as Taiwan, China, Hong Kong and India, which were less exposed to the crisis, were still traded at discounts.

The clear cut implication on fund premium, D, is based on the strong assumption of complete market segmentation. The implication of illiquidity on D, however, is ambiguous if illiquidity in the host or home market affects both the fund price and the fund NAV, when λ_f and λ_c are highly correlated random variables due to illiquidity spillover effects.[7] In reality, some degree of integration between markets exists and investors can, to some extent, substitute their investment in the closed end fund with a direct investment in the underlying asset. When one market is plagued by high illiquidity, investors will optimally divert some of their demand for liquidity to another market or move some of the supply of liquidity to this

[7]For example, Newman and Rierson (2004) find strong evidence that the illiquidity in one corporate bond spills over to other bonds in the same sector.

particular market: as a result, the illiquidity in one market gets transmitted to another. Since the degree of liquidity spillover and its effect on close substitutes traded in different markets depend on the degree of market segmentation, we expect that the impact of illiquidity on fund premium or discount depends on the degree of integration of the fund's home market with its host market. In particular, we expect that the negative (positive) relation between host (home) market illiquidity and D to hold better for country funds investing in segmented markets than for those investing in open economies.

The model is also based on the simplified assumption that the closed-end fund is the only risky asset available in the host market. In practice, host (U.S.) market investors have access to many risky assets. To the extent that the closed-end funds provide different investment opportunities from domestic assets, the closed-end fund discount or premium is not only affected by the difference of liquidity between the fund and the home market as given in equation (2), it is also affected by the difference between the fund's and the host market's liquidity. Nonetheless, this model makes some interesting predictions on the relation between illiquidities in different markets on the fund premium or discount, which renders the country fund discounts a unique and interesting dataset to test the impact of illiquidity on asset returns and the effect of liquidity spillover across borders.

This simple model is only used to motivate our empirical analysis, and it does not give a definite answer as to whether we should, in general, observe a discount or a premium, which depends on the joint probability distribution of λ_f and λ_c. The size of the discount is also most likely related to the institutional arrangement of the fund, especially the magnitude of management fees.[8] Instead of carrying out a comprehensive examination of the magnitude of the fund premium or discount, our focus is on how the time variation in illiquidity across different markets affects the time series behavior of the fund premium or discount. While many explanations have been provided to understand the existence and the magnitude of the closed end fund discount or premium, there is virtually no good explanation for the time variation in the discount.

II. Closed-end Country Fund Data

We use monthly (last Friday of month) data from U.S.-traded single country closed-end funds to test how time variation in fund premia or discounts is related to illiquidity. As in most prior studies, we exclude any international closed-end funds that invest in a region, or a sector, or primarily in commodities. Each week, usually on Monday, the Wall Street Journal reports the closing price, the net asset value (NAV), and the discount, as of the previous Friday (or the last trading day of the previous week), on all U.S.-traded

[8] See, for example, Malkiel (1977), and Ross (2002).

closed-end funds. The raw data from the Wall Street Journal are electronically available through the Dow Jones Interactive service beginning on 8/7/1987. The data are collected each week for all funds, depending on availability, for the 8/7/1987-12/31/2001 period. Observations on the last Friday of each month are used in the analysis. Table 1 lists the fund name, its IPO date, the dates of data availability, and the dates of any announced changes in the firm's structure or investment objective. There were only seven country closed-end funds prior to August 1987 and only three prior to 1986, so the sample used in this study is fairly comprehensive. We have altogether 47 single country funds traded in the U.S., with their underlying assets trading in 29 different countries.

For our tests, we apply two screens based on the firm's startup date and windup provision, if any. First, we only use data for a fund six months after its IPO date. Weiss (1989) finds that closed-end funds usually start out at a premium and most of the price decline in closed-end funds occurs between 30 and 100 days after the issue. Hanley, Lee and Seguin (1994) find substantial evidence of price stabilization by lead underwriters during the first 100 days of issuance. Thus, in the initial trading period of a fund, the discount may have an obvious deterministic trend.

Second, all observations are omitted for a fund one month before any announced liquidation, or open-ending, or change in investment objective. Banerjee and Gangopadhyay (1997) report that when a closed-end fund approaches its windup date or turns open-ended, its price converges to its NAV and thus its discount shrinks in a trended way. The announcement date used for any such change is the day on which the fund's managers or board of directors propose a change in the structure or investment objective of the fund. If a shareholder(s) proposes a change, then the announcement date is the date of approval by shareholders of such a change. This approach is used because shareholders frequently propose changes but are rarely successful. The announcement date is determined based on news announcements and/or SEC filings.

The adjusted starting and ending dates, the number of monthly and weekly observations, and the average market capitalization of each fund, after applying the screening criteria, are reported in Table 2. The adjusted starting date is the later of the raw data starting date and the date six months after the IPO, and the adjusted ending date is the earlier of the raw data ending date and one month before the open-ending or liquidating announcement date. The number of observations is reported in column (5) for monthly data (M) and in column (6) for weekly data (W). The Czech Republic Fund has only 36 months of data, but all other funds have more than 50 observations. A few funds, such as the Germany Fund, the First Australia Fund and the Taiwan Fund, have complete observations during the sample period from August 1987 to December 2001. The average market capitalization ranges from a low of $35.6 million for the Jakarta Growth Fund to a high of $581.4 million for the Mexico Fund. Roughly, half of the 47 funds have market capitalization over $100 million.

The summary statistics of the monthly data are reported in Table 3. The price return and the NAV return are calculated, respectively, from the reported market value (P) and Net Asset Value (NAV) of the closed-end fund, using equations

$$r_{p,t} \equiv \frac{P_t - P_{t-1}}{P_{t-1}}, \quad \text{and} \quad r_{nav,t} \equiv \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}}.$$

Columns (3) - (6) in Table 3 report the sample mean and sample standard deviation of the price return and the NAV return. The price return ranges from an average of -1.16% (Pakistan Investment) to 2.19% (Templeton Russia) per month, and the average NAV return ranges from -1.19% (Pakistan Investment) to 1.65% (Templeton Russia) per month across the forty-seven funds. The sample volatility of the price return ranges from about 5.4% (Czech Republic) to 18.7% (Templeton Russia) per month while the sample volatility of NAV returns is only slightly smaller, ranging from 4.5% (Czech Republic) to 17.5% (Thai Capital) per month.

The fund premium is defined as the ratio of the price-NAV difference over the NAV:

$$D_{f,c,t} \equiv \frac{P_{f,t} - NAV_{f,t}}{NAV_{f,t}}.$$

When D is negative, it is often called discount. Columns (9) - (12) of Table 3 report the sample mean, sample volatility, the maximum and minimum premium for the 47 funds. Thirty-six funds have negative sample-average D's, indicating that negative premium (or discounts) are common for most of the closed-end country funds during this sample period. Most of these funds have sample average premium of -15% or lower. For example, the New Germany (GF) Opportunity and the First Philippine (FPF) funds have mean D of -17.6% and -17.7%, respectively.

Of the eleven funds with an average positive sample premium, ten are Asian country funds, and the other is the Turkish Investment fund (TKF) with a marginal premium of only 0.82%. The Korea fund (KF) and the Indonesia fund (IF) both have the largest sample mean premium of almost 22%, followed by the Thai fund (TTF) with a sample average premium of almost 20%. On the other hand, five funds (Future Germany, Emerging Germany, New Germany, Growth Fund Spain, Irish Investment), all of which are European country funds, never had a single period of positive premium during the sample period analyzed. The first group of eleven funds all invest in emerging markets, and the large fund premiums, especially those observed in the early sample period (before 1990) may be driven by capital controls imposed in those countries as examined in Bonser-Neal *et. al.* (1990); while the second group of five funds invest in developed capital markets where capital controls are absent. We do not explicitly consider the effect of capital controls using government policy announcements as events, but instead use the Edison-Warnock

(2003) simple measure of capital control intensity[9] as an additional explanatory variable in one of our robustness checks. In addition, since capital controls and market segmentation directly affect the liquidity of the fund's home market, the home market illiquidity measure is likely to be a more efficient gauge of the effect of capital control on the home market than any government announcement dates.

The sample volatility of the fund premium also varies widely across different funds, ranging from a low of 5% per month for the United Kingdom fund (UKM) to a high of more than 35% per month for the Korea fund (KF). This large sample volatility is also confirmed by the great difference between the minimum and maximum discount during the sample period. For example, the Korean fund had discounts ranging from -33% to over 148%.

Figure 1 plots the time series of the average fund premium from August 1987 to December 2001, which fluctuates substantially during the sample period. It starts with a premium of 28% in August 1987 but then drops rapidly to almost -10% in two months, which corresponds to the period when the U.S. stock market experienced the famous stock market crash. In January 1990, the average fund premium reached a high of almost 40%. In the early period up to 1990, there were only a few closed-end single country funds available to investors.[10] For example, only six single country funds existed in August to October 1987. The huge average premium in the early period was dominated by the incredible premia of the two Asian country funds: the Korea fund[11] and the Taiwan fund. Interestingly, both Taiwan and Korea had strict capital controls in place during most of the period when the corresponding funds had a premium. The absence of free capital flows may have induced high illiquidity in home markets, which in turn helped contribute to the observed large premium.

The average fund premium also exhibits a clear time trend during the period. A regression of the average discount on the simple time trend yields a significantly negative coefficient and large R^2, indicating that the average fund premium has become smaller and then eventually become a discount over time. The regression of individual fund premium on the time trend also yields a significant coefficient in 41 out of the 47 funds and 35 of these significant coefficients are negative, which suggests that most funds have experienced a declining premium or an increasing discount during this period.

The "spread" is defined as the change in the discount:

$$S_t \equiv D_t - D_{t-1} \approx [\ln P_{f,t} - \ln NAV_{f,t}] - [\ln P_{f,t-1} - \ln NAV_{f,t-1}] = r_{p,t} - r_{nav,t}.$$

[9] We thank Craig Doidge for suggesting this measure to us and Edison and Warnock for making this measure available on the web page of the Federal Reserve Board http://www.federalreserve.gov/pubs/ifdp/2001/708/default.htm.

[10] The high volatility in this period may be partly driven by the introduction of new funds into and the disappearance of old funds from the average series.

[11] The Korea fund started with a premium of more than 140% and the premium persisted for more than ten years before it became a discount at the end of 1998.

Since it is approximately the price return minus the NAV return, it can also be interpreted as the return on a zero-investment portfolio where investors long the closed end country fund and short the underlying assets. Columns (7) - (8) of Table 3 provide sample mean and volatility of the spread for the 47 funds. About half of the 47 funds have positive mean spread, indicating that the premium increases on average during the sample period. The spread is also quite volatile, with a sample standard deviation ranging from 3% to 15% across different funds. As the first difference of the fund premium, the spread usually does not contain a time trend.

In each month, we average across all available funds to derive the time series of cross-sectional average (AVG) price returns, NAV returns, spreads, and discounts. The sample statistics for these cross-sectional "average fund" are reported at the end of Table 3 under "AVG." This average fund had a mean price return per month of 0.24%, an NAV return per month of only 0.06%, a spread of -0.14%, and a discount of -4.5%. The sample standard deviation of the discount of this average fund is about 8.4%.

III. Measures of Illiquidity

There are several definitions of illiquidity in the theoretical market micro-structure literature. In this paper, we use the Kyle's (1985) lambda, which is the impact of order flow on price, as our measurement of liquidity. Many different measures of illiquidity have been used in empirical studies. For example, Amihud and Mendelson (1986) used the quoted bid-ask spread on stock returns and Chalmers and Kadlec (1998) used the amortized effective spread as a measure of liquidity. Brennan and Subrahmanyam (1996) measured illiquidity with the price response to signed order flow and with the fixed cost of trading based on continuous data on transaction and quotes, Pastor and Stambaugh (2003) estimated liquidity cost from *signed* volume related return reversals, and Amihud (2002) constructed a Kyle-type illiquidity from daily returns and volume. Most of these empirical liquidity measures require TAQ data, which is not available for foreign markets. While the Pastor and Stambaugh (2002) measure only uses daily return and volume data and has substantial ex ante appeal, it requires enough number of observations to run OLS regressions in each month and for each stock, which is not feasible for many stocks in emerging markets. The Amihud (2002) measure of the price impact has the advantage that it only requires daily data on trading volume and asset price, which are readily available even for emerging markets. In addition, Hasbrouck (2003) finds the Amihud measure to be highly correlated with the TAQ-based price impact measure in the U.S. market. To capture the effects of both home and foreign market liquidity on discounts, we use the Amihud measure of illiquidity for the U.S. stock market and for each home country that has a corresponding U.S.-traded country closed-end fund.

The Amihud illiquidity measure is calculated for the host market, for the closed-end country funds,

and for each home country as of the last Friday of each month for all dates from 8/7/1987 to 12/31/2001, which is the period that the closed-end country funds price and NAV data are available. To calculate the Amihud illiquidity measure, daily data of prices, returns, and volumes on individual stocks in the host market (U.S.) are collected from CRSP, while the corresponding data in the home (foreign) markets are collected from Datastream.

Table 4 lists the stock index or market that was used to select the initial group of individual stocks whose returns and dollar volumes are used to calculate the Amihud market illiquidity measure for each country. We can only calculate the average market illiquidity measure for 26 home countries (corresponding to 44 of the 47 funds in our sample) in addition to the host (U.S.) market.[12] For many emerging markets, our illiquidity measure is available for a shorter sample period than the fund premium data.

First, as of the last Friday of each month, a monthly measure of illiquidity for each individual stock in the host and each home market is calculated as the average ratio of the daily absolute return to the daily dollar trading volume within that month. The Amihud illiquidity measure for stock i at month t in country c, $IL_{i,c,t}$, is defined as

$$IL_{i,c,t} = \frac{1}{D_t} \sum_{d=1}^{D_t} |R_{i,d}|/VOL_{i,d}, \tag{3}$$

where D_t is the number of trading days in month t (approximately 21 days), R_{id} and VOL_{id} are, respectively, fund (or country) i's daily return and its local currency volume in day d of month t. Unlike Amihud (2002) where illiquidity is calculated annually with at least 200 daily data each year, we only use 21 days to calculate IL for each month. This is because we would like to use non-overlapping data in constructing our illiquidity measure so that we can relate this measure to closed-end country fund discounts at a monthly frequency.

The ratio, $|R_{id}|/VOL_{id}$, is the absolute proportional price change in local currency per unit of daily trading volume also measured in local currency, or equivalently the daily price impact of the order flow. This is closely related to Kyle's (1985) concept of illiquidity defined as the response of price to order flow. The Amihud illiquidity measure for each month is the average daily illiquidity within the month.

Second, the individual stock measure of illiquidity in (3) is then averaged across all stocks in market c to compute a measure of market-wide monthly market illiquidity, $AIL_{c,t}$, as of the last Friday of each

[12] We were unable to calculate average market illiquidity for Ireland, Turkey, and Vietnam. The average market illiquidity for Czech Republic and Pakistan has many missing observations during the sample period.

month:

$$AIL_{c,t} = \frac{1}{N_{c,t}} \sum_{i=1}^{N_{c,t}} IL_{i,c,t}, \tag{4}$$

where $N_{c,t}$ is the number of stocks traded in country c in month t. This procedure implies that the market wide illiquidity measure is equally weighted across illiquidity of individual stocks. The stocks included in the above calculation satisfy two criteria: (i) have trading volume greater than 1000 shares and returns data available for at least 14 of the 21 days in the month, and (ii) are not outliers, where outliers are defined as stocks whose estimated illiquidity measure is at the highest or lowest 5% tails of the distribution after satisfying criterion (i).[13]

We then construct the Amihud illiquidity measure for each individual closed-end country fund f, $IL_{f,t}$, using equation (3), since each fund itself is a traded stock in the U.S. market. An average illiquidity measure across the 47 funds, FIL_t, at each month t, is created via equation (4).

The time series of the logarithm of the average closed-end fund illiquidity and the U.S. market wide illiquidity are plotted in Figure 2. There is an obvious downward trend in the U.S. market Amihud illiquidity from 1990 to 1997 and then it stabilizes from 1997 to 2001, indicating that the U.S. market liquidity has improved during the early 1990s. The average closed-end country fund illiquidity tracked the U.S. market average illiquidity closely until 1997 but then moved up dramatically from 1997 to 2001. In the first half of the sample (August 1987 to the mid-1994), the average closed-end country fund illiquidity is generally lower than the market average, implying that the closed-end country funds as a group exhibited higher liquidity and smaller price impact during this period. In contrast, the average illiquidity of the closed-end funds is always higher than the market average in the second half of the sample, and the difference between the two widens over time, implying an increasingly large "opportunity liquidity cost" of investing in closed-end country funds.

Consistent with the observation from the figure, the regression of the fund average and the US. market illiquidity on the time trend yields significantly negative coefficient for the U.S. market but significantly positive coefficient for the fund average illiquidity. In the individual fund illiquidity regression, the coefficient in front of the time trend is significant at 5% level in 37 out of the 47 funds and at least two-thirds of them are positive, which suggests that many closed end country funds experienced a significant increase in illiquidity during this period.

Figure 1 and Figure 2 taken together indicate that when the average liquidity difference between the

[13] The measure of illiquidity for each individual stock is scaled by a multiplication of 10^6. Criterion (ii) here is similar to criterion (iv) in Amihud (2002). Our screening criteria are less stringent than those in Amihud (2002) due to the need to calculate illiquidity for foreign and especially emerging markets.

funds as a group and the market widens, the average fund premium goes down. While there are many explanations for the fluctuations in closed-end discounts, it seems that the fluctuation in liquidity provides another important piece to the puzzle.

The illiquidity measure varies widely across different countries. This is primarily due to differences in currency values and strikingly different level of local currency volume, so a direct cross-sectional comparison of the absolute value of the Amihud illiquidity measure is not meaningful.[14] We will only focus on time series analysis to examine how the fluctuations in discounts relate to the fluctuations in the illiquidity of the market and the fund itself. There is also a significant time trend in 20 out of the 26 home country illiquidity measures, with 11 of them negative while nine of them positive so that about half of the home markets have a significant declining illiquidity over time.

To avoid possible spurious relations caused by time trend in the illiquidity measures, we de-trend all the Amihud illiquidity. To detrend an illiquidity series, we first run a regression of the log of the illiquidity measure on a time-trend variable, and then use the residual from the time-trend regression as the de-trended illiquidity measure. Illiquidity measures used thereafter are all de-trended series.

The sample standard deviation of the de-trended illiquidity for each fund is reported in the last column of Table 3, and it ranges from a low of 0.29 for the Future Germany fund to a high of 1.17 for the Indonesia fund. It is about 0.70 for the cross-sectional average fund. The individual country's illiquidity sample standard deviation is reported in Table 4, and it has a low value of 0.4 for Japan and U.S. and a high value of 1.75 for Pakistan.

We then check how each individual fund's illiquidity is associated with the average illiquidity of the group of closed-end country funds, its home (foreign) market illiquidity, and the host market (the United States) illiquidity. The de-trended fund log illiquidity, IL_c is regressed on the de-trended fund average illiquidity, FIL, the de-trended U.S. market average illiquidity, AIL_h, and the de-trended home country average illiquidity, AIL_c. The results are omitted for brevity.

Most regressions have $\bar{R}^2$ of 10% or better, and 46 out of 47 funds have positive coefficients for FIL and 40 out of 47 coefficients are significant at better than the 5% level. Thus there is significant commonality in liquidity among all foreign country funds. Even after controlling for the effect of the fund average illiquidity, the individual fund illiquidity is still significantly (at the 5% significance level) related to the host (U.S.) market illiquidity in 21 out of 47 cases. Most of the significant coefficients for AIL_h are also positive, but we do observe several significant negative values. This implies that the broad host market illiquidity may play a separate role in explaining the closed-end country fund price illiquidity. Finally, the individual fund illiquidity, even though calculated using price and volume data solely determined in the

[14] An additional reason why a cross-sectional comparison may be misleading is that the number of firms in each country's index varies widely with some indices containing relatively few companies while other indices have many.

host market, is significantly related to its respective home country illiquidity in 12 cases. Again, these 12 significant coefficients are all positive. This suggests that there is some "spill-over" effect of illiquidity in the home market that translates into the country fund's illiquidity in at least one-fourth of the funds.

IV. Empirical Analysis

In this section, we explore the relation between illiquidity and the discount of closed-end country funds. In the first subsection, we examine how the time series variation in the level of closed-end country fund premium or discount is associated with the time series variation in the illiquidity in the home market, the host market, and the fund itself. In the second subsection, we explore how the change of the fund premium or discount, labeled as fund spread, depends on the expected and unexpected illiquidity. In the last subsection, we investigate whether the fund spread has a significant loading on a significantly priced systematic liquidity factor. Because both the discount and the illiquidity measures have a time trend, we use detrended (and de-meaned) series in the empirical analysis to avoid the possibility of spurious results driven by the time trend.

A. Illiquidity and the Level of Fund Premium

Since many funds only have a few dozens of observations, we carry out a pooled regression across all 47 funds to enhance the power of the estimation and hypothesis testing:

$$D_{f,c,t} = a_0 + a_1 IL_{f,t} + a_2 AIL_{h,t} + a_3 AIL_{c,t} + \epsilon_t,$$

where the coefficients are constrained to be the same across all funds. The simple model in section I implies that the fund's own and the host market illiquidity tends to be associated with a lower fund price and thus a smaller D while the host market illiquidity is associated with a lower fund NAV and thus a higher D. This intuitive relation between the fund premium and the illiquidity is summarized by the following null hypothesis $H_0 : a_1 < 0, a_2 < 0$ and $a_3 > 0$.

Table 5 reports the results from the pooled regression. When all funds are pooled together, $\hat{a}_1$ is significant and negative. The estimate of $\hat{a}_2$ is also significantly negative, which suggests that the host market illiquidity has an incremental explanatory power for the fund's premium or discount. This highly significant parameter also provides additional evidence that market-wide liquidity is a good candidate for a priced state variable. The estimate of $\hat{a}_3$ is positive, but is not significant, implying that the home market illiquidity has a negligible effect on the funds as a whole during the period from August 1987 to December 2001.

To control for any possible structural changes during the past 14 years, the same regression is carried out in the two equal sub periods as well. During the first sub period, parameter estimates for the fund and the U.S. market illiquidity are highly significant and have the sign as suggested by the simple model, but the foreign market illiquidity enters the equation insignificantly. Interestingly, the parameter estimate for the foreign market illiquidity is highly significant with the right sign in the second sub period while the other two estimates are not significant. The parameter estimates also indicate that illiquidity is more economically important in the first sub period. For example, a one standard deviation increase in the fund's own illiquidity is associated with a decrease in the fund premium ranging from about 0.3% for the Future Germany fund to 1.4% for the Indonesia fund, and a one standard deviation increase in the U.S. market illiquidity causes a decrease of over 1.7% in the all-funds premium.

To examine the impact of market segmentation on the spillover effect of illiquidity from one market to the other, we split the funds into two groups: the first group comprises of funds that invest in developed and open economies and the second group is made up of funds investing in emerging markets. The first group includes all the Australian, European (except for the Czech Republic, the Russian and the Turkish funds), Japanese, Israeli and Singaporean funds (altogether eighteen of them), while the remaining twenty-nine funds are included in the second group.

In a segmented market, home market illiquidity should mostly affect the fund NAV while the host market as well as the fund's own illiquidity should mostly affect the fund price, leading to clear-cut implications on the movement in the fund premium. In an integrated market, however, illiquidity shocks easily spill over to other markets, so that illiquidity in the fund's home (host) market will affect both the fund's NAV and its price, leaving an ambiguous or even zero effect on the fund premium. Therefore, we expect the model predictions to hold better for funds in the second group than for those in the first group.

The results for the open-economy funds are indeed very weak in that none of the parameters are significant in the whole sample. While parameter estimates a_1 and a_2 are significantly negative as suggested by the model for the first sub period, a_2 is positive (and significant) in the second sub period, suggesting that closed-end country funds for developed open economies are close substitutes for direct investment in their home markets. In contrast, the results for the emerging country funds strongly support model predictions in the whole sample and in the two sub periods. These findings are consistent with the hypothesis that while capital markets for developed economies became more integrated in the later period so that the illiquidity in the fund itself and in the home market gets easily transmitted from one to the other, some degree of market segmentation still exists for emerging economies.

The second sub-period results for the funds investing in emerging markets are possibly affected by the 1997-98 Asian crisis, when some of the countries hit by the crisis reinstated capital controls after a decade of gradual liberalization of the capital market. To examine this possibility, we divide the second sub-period

into three periods: the pre-crisis period (1994.11 - 1996.12), the Asian crisis period (1997.01 - 1999.01), and the post-crisis period (1999.02 - 2001.12). In each period, the relation is examined for four groups of funds: those investing in non-Asian open economies, those investing in Asian open economies (Japan and Singapore), those investing in Asian-crisis emerging economies, those investing in other emerging economies. The results, omitted for brevity, indicate that there is a strong support for the null hypothesis in all four groups of funds during the Asian crisis, but the null hypothesis is rejected by funds investing in open economies during the other two periods. While the null hypothesis is not rejected for funds investing in segmented markets during the pre-crisis period, it is rejected in the post-crisis period, consistent with the conjecture that emerging economies are gradually integrated into the international capital market.

B. Illiquidity and Changes of Fund Premium

While the above evidence shows that the level of fund premium or discount is significantly associated with the level of illiquidity, we examine in this subsection how the change in fund premium, i.e., the fund spread, relates to the expected and unexpected illiquidity of the fund, and of the home and host markets. The spread

$$S \equiv \Delta D \approx r_{p,t} - r_{nav,t}$$

is approximately equal to the price return minus the NAV return. It can be interpreted as the return on a zero investment portfolio, where the investors long the closed end fund and short the portfolio of the underlying asset. An increase in spread indicates an increase in the premium.

Following Amihud (2002), we examine the regression,

$$S_{f,c,t} = b_0 + b_1 ILE_{f,t} + b_2 ILU_{f,t} + b_3 AILE_{h,t} + b_4 AILU_{h,t} + b_5 AILE_{c,t} + b_6 AILU_{c,t} + u_t, \qquad (5)$$

which relates the change in the fund premium or discount to measures of the expected and unexpected illiquidity. Intuitively, an unexpectedly high host (home) or fund illiquidity pushes down the current fund price (NAV) and results in a lower (higher) current period realized return S, which implies that $b_2 < 0$, $b_4 < 0$ and $b_6 > 0$. In contrast, the effect of expected illiquidity is less clear cut. On the one hand, investors, anticipating a higher level of fund or host (home) market illiquidity, may request a higher compensation for holding the fund (the underlying asset), leading to a higher price (NAV) return, and thus a higher (lower) fund spread S. On the other hand, as suggested by Constantinides (1986) and Vayanos (1998), investors may choose to hedge against the anticipated high illiquidity by optimally changing their liquid-illiquid asset mix and/or their asset holding period so that expected illiquidity has virtually no or even the opposite effect on fund spread. Therefore, the signs of b_1, b_3 and b_5 are undetermined.

In order to construct proxies for the expected and unexpected illiquidity, we follow the approach in Amihud (2002) and model the realized illiquidity as an AR(1) process:

$$IL_t = \theta + \rho IL_{t-1} + v_t. \tag{6}$$

The expected and unexpected illiquidity are then constructed as

$$ILE_t \equiv \hat{\theta} + \hat{\rho}^c IL_{t-1}, \quad \text{and} \quad ILU_t \equiv IL_t - ILE_t,$$

where $\hat{\theta}$ is the OLS estimator of θ and $\hat{\rho}^c$ is the bias-corrected estimator of ρ, the expression of which is given in the appendix. The same procedure can be used to construct $AILE$ and $AILU$.

We first examine the relation between the average fund spread and the expected and unexpected illiquidity, and the results are reported in the following equation with the Amihud and Hurvich (2003) adjusted $t-$statistics in parenthesis (see the appendix for details):[15]

$$\begin{array}{rccccc} S = & -0.001 & + & 0.014FILE & - & 0.045FILU \\ & (0.38) & & (1.98) & & (4.18) \end{array} \qquad \bar{R}^2 = 10.7\%. \tag{7}$$

The expected and unexpected illiquidity explains about 11% of the total variation in the average fund spread. Consistent with the predictions of the model, the results indicate that the closed-end country fund spread, on average, has a highly significant negative relation with the unexpected illiquidity, and when the unexpected illiquidity goes up by one standard deviation (0.35), the fund average spread goes down by 1.6% as compared to the sample mean of only -0.14% and the sample volatility of 5.2% for S. On the other hand, the expected illiquidity only has a marginally significant positive relation with the average fund spread, and when the expected illiquidity goes up by one standard deviation (0.62), the fund average spread goes up by 0.9%.

Equation (5) is then analyzed in a pooled regression whose results are reported in Table 6. Consistent with the null hypothesis, $\hat{b}_2$ is significant and negative for all three groups of funds, i.e., for the group of all funds as well as separately for the group of funds investing in open economies and in segmented markets, during the whole sample period. This implies that the unexpected fund illiquidity is associated with lower fund spread, i.e., a decrease in fund premium. The estimate of $\hat{b}_3$ is positive and significant

[15] Since it is impossible to construct a good average illiquidity measure across all foreign markets, it is omitted from the regression. If we use the host market expected and unexpected illiquidity measure in equation (7), then the coefficient for the unexpected measure remains highly significantly negative, while the coefficient in front of the expected measure, although still positive, becomes insignificant. If all four variables are included in the regression, then the expected and unexpected fund average illiquidity measures dominate those of the host market.

for the group of funds investing in segmented markets, where illiquidity is mostly confined to the local market, and for the all-funds group. This result indicates that higher expected U.S. market illiquidity leads to a higher fund spread and an increase in the fund premium, and is consistent with the empirical finding of Amihud (2002) and with the notion that the market-wide illiquidity risk is priced so that investors ask for a higher fund price return when the systematic expected illiquidity is high. The estimate of $\hat{b}_6$ is also only significantly positive for the group of funds investing in segmented markets. Since illiquidity is easy to spill over from one market to the other in an integrated international market so that illiquidity in the home or host market may affect both the fund price and the fund NAV and thus leads to ambiguous or virtually no effect on fund premium or spread, it is not surprising to find that coefficients in the regression for the group of funds investing in developed economies are generally insignificantly different from zero.

To avoid the interaction between the expected and unexpected illiquidity of the individual fund and those of the host market, we regress the equation without the fund specific variables ILE and ILU and report the results in Table 7. The results are more or less consistent with those reported in Table 6: neither expected nor unexpected host market or home market illiquidity has any explanatory power for funds investing in developed economies during all of the three sample periods, while the regression coefficients are highly significant and have the right sign for the funds investing in segmented markets in the whole and in the second sub period.

In contrast to Table 5 where the sub period analysis produced different results, the results in the two sub periods are more or less consistent with those in the whole sample, with results in the first sub period slightly weaker than those in the whole sample and the second sub period. In results not reported in the paper, we also examine the effect of the Asian crisis on model implications. We find that both the expected and unexpected home market illiquidity significantly affect the fund spread for funds investing in Asian crisis economies during the crisis but neither has any significant effect during the pre- and the post-crisis periods.

C. Does Fund Spread Contains Liquidity Risk Premium?

So far we have found that the closed-end country fund premium and spread are significantly related to the illiquidity level of the fund, the host market, and the home market. Although the level of illiquidity is an important characteristic and is thus highly relevant to asset pricing, it is equally interesting to examine whether the fund spread loads significantly on a priced liquidity risk factor and thus contains a significant amount of liquidity risk premium.

Pastor and Stambaugh (2003) construct a market wide liquidity factor and find that its beta is significantly priced in the U.S. stock market, indicating an economically large and statistically significant

illiquidity premium ($\lambda_{liq} \approx 10\%$ per year). Although a cross-sectional analysis is beyond the scope of the current paper, we nonetheless examine whether the closed-end country fund spread has a significant loading on the systematic liquidity risk factor after we control for the popular Fama-French market, size, and value factors in the U.S. market. While the market wide Amihud illiquidity measure can be used as a proxy for the systematic illiquidity factor, we choose to use the level ($PSLIQL$) of the systematic liquidity factor constructed by Pastor and Stambaugh (2003) (PS), because the latter has been shown to have a significant illiquidity risk premium while the magnitude of the risk premium associated with the former measure is still unknown.[16] In light of the PS results, a significant beta loading would then imply that liquidity risk premium is an important component in the fund spread.

As a first pass, we examine whether the fund average spread S, which is approximately the return on a zero-investment portfolio of longing the closed end country fund and shorting the underlying assets, is significantly related to a systematic liquidity factor after controlling for the Fama-French three factors. We find a significant relation between the average fund spread, S, and $PSLIQL$ for the sample period of August 1987 to December 1999:

$$\begin{array}{lccccccccc} S = & -0.003 & + & 0.170 PSLIQL & + & 0.554 MMF & + & 0.077 SMB & + & 0.256 HML \\ & (0.84) & & (2.75) & & (4.21) & & (0.68) & & (2.09) \end{array} \qquad \bar{R}^2 = 22.4\%,$$

where MMF, SMB, and HML are, respectively, the market excess return, the return of a portfolio long on small stocks but short on large stocks, and the return of a portfolio long on value stocks but short on growth stocks, and $PSLIQL$ is the level of the Pastor-Stambaugh (2003) aggregate liquidity state variable.

The four factors altogether explain about 22% of the total variation in the average fund spread S. The coefficients for $PSLIQL$, MMF, and HML are highly significant, but the one for SMB is not. If we omit $PSLIQL$ from the above regression, then SMB becomes marginally significant. This seems to imply that the average fund spread is not significantly related to the size factor, SMB, after controlling for liquidity.

Results from the pooled regression, as reported in Table 8, are supportive of a significant liquidity risk premium, especially for funds investing segmented market. In the whole sample, the regression yields a highly significant market beta of 0.34 and a highly significant HML beta of 0.18, but the SMB and the liquidity betas are close to zero and insignificant. The funds are then split into two groups. The first group of funds invests in open economies while the second group invests in segmented markets. The loading

[16] The Pastor-Stambaugh (2003) liquidity measure data ends in December 1999. We thank Rob Stambaugh for making this liquidity measure data available and Ken French for making the market, SMB, and HML factors available on his web page.

for the liquidity risk factor is 0.11 and highly significant ($t-$ratio = 3.4) for the second group, but the loading is virtually zero ($t-$ratio =0.2) for the first. The difference of the loadings from these two groups is also highly significant. In addition, the second group has a 50% higher market return beta than the first one, but the first group has a significant and higher HML beta than the second one. In addition to the earlier observation that both the premium and the spread of funds investing in emerging markets have a stronger association with the level of illiquidity, we also find that funds of this group are more sensitive to the systematic liquidity factor.

The sample is then divided into two equal sub periods. In the first half of the sample period, the liquidity loading for the all-funds group is 0.1 and highly significant. The fund spread also significantly loads on the other three factors. The results for the two separate groups of funds again yields a pattern similar to that observed in the whole sample: the liquidity loading of 0.22 for the second group is highly significant ($t-$ratio = 2.9) while the loading of only 0.07 for the first group is not statistically significant; the market beta for the second group is almost twice as much as that for the first group; and the loading for the value factor is highly significant for the first group but not for the second group. In contrast, the liquidity loading for the all-funds group is slightly negative and insignificant in the second half of the sample period. Interestingly, the liquidity loading for the first group is now highly significant but negative while it is very close to zero and insignificant for the second group. The market beta is again much larger for the second group than it is for the first group. In results not reported here, we also examine the effect of the Asian crisis on the empirical results from the second period. The loadings on the four factors change dramatically during the pre-crisis and the crisis periods, but no obvious pattern can be detected.

In summary, funds with higher liquidity loadings also tend to have higher market betas in all three samples. This is consistent with the implication of Vayanos (2003), who shows that illiquid assets are riskier in the sense that their market betas are also higher. Moreover, the fund spread, especially that of the funds investing in emerging markets, significantly loads on a priced systematic liquidity risk factor. Finally, the group with the higher liquidity beta also seems to have a slightly higher average Amihud illiquidity. This implies that illiquidity is an important element affecting closed-end country fund prices after controlling for their NAVs and other popular factors, and that the fund premium or spread may be partially explained by a liquidity risk premium.

D. Robustness Checks

In this subsection, we perform several robustness checks on our empirical results. First, we examine whether the quality of the data for a few funds has a material effect on our outcome. Five funds (CRF, IRL, PKF, TKF, and TVF) have no or low quality home country illiquidity data. To control for any possible

omitted-variable effects from these five funds, we use only the remaining 42 funds in our empirical analysis and find that the results from the pooled regression are virtually unchanged.

One concern about our results is that they are simply driven by the effect of capital control. To explicitly control for the impact of capital control on the empirical analysis, we also examine the empirical analysis presented in previous subsections by adding the Edison-Warnock (2003) simple measure of the intensity of capital control as an additional explanatory variable in the regressions. Such a measure is available for all twenty-nine emerging home markets classified on page 21, while it is not available nor necessary for any developed home markets except for Portugal. The results, not reported here for brevity, are broadly consistent with those reported in Tables 5-8.

While the fund price is determined in the U.S. market and denominated in dollars, the fund NAV is determined in the home market and then converted to a dollar amount at prevailing foreign exchange rate on the reporting date. One concern is thus that the home market risk factor as well as foreign exchange rates may affect the fund spread. Bodurtha, Kim and Lee (1995) find that the closed-end country spread is generally not significantly related to the home market index return or to changes in the foreign exchange rates, possibly because the spread is approximately the difference between the fund price return and the NAV return and the effects are already netted out. As a robustness check, we also estimate the model by including the foreign exchange rate changes and the home market return as additional regressors. Although both these two regressors enter the regression significantly, parameter estimates for the liquidity and the Fama-French factors remain virtually unchanged.

For reasons given in Section 3C, we use $PSLIQL$ instead of the Amihud market-wide illiquidity measure, AIL_h, in the regression of fund spread on systematic risk factors. The pooled regression, however, produces qualitative similar results[17] when either $PSLIQL$ or AIL_h is used. Therefore, the significant loading on the systematic liquidity factor is not driven by a particular choice of the liquidity series.

V. Conclusion

We use the price and NAV data of 47 U.S. single country closed-end funds to examine the relationship between fund premium and illiquidity. While the illiquidity in the host (home) market may only affect the fund price (NAV) and thus leads to clear cut implication on the fund premium in a segmented international capital market, the illiquidity in one market can easily transmit to the other so that illiquidity may affect both the fund price and the fund NAV, leading to an ambiguous or even zero effect on the fund premium.

[17] The point estimates are different because the two series, $PSLIQL$ and AIL_h, have very different moments and time series properties.

We find that the fund premium is significantly and negatively related to the fund's own and the host market illiquidity. while the home market illiquidity has an insignificant effect on the funds during the whole sample period from August 1987 to December 2001. All the parameter estimates are highly significant and have the right sign in the first half of the sample period, possibly because market segmentation was still binding for most funds during the earlier period of the sample. On the other hand, the results are weaker in the second sub period, prompting us to conjecture that as international capital markets became more integrated in the later period, the illiquidity is easier to transmit across borders as investors substitute the investment in the closed-end country fund with a direct investment in the underlying assets or vice versa. Consistent with the intuition, we find a highly significant relation between illiquidity and premium of funds investing in segmented markets but much weaker results for funds investing in the open markets.

In addition, there is a significant negative association between the *unexpected fund* illiquidity and the fund spread, which is approximately fund price return minus the fund NAV return, and a significant and positive relation between the *expected home* market illiquidity and the fund spread. The former result is consistent with the intuition that higher illiquidity of the fund pushes down the current period fund price and thus leads to a lower realized fund price return and fund spread, while the latter finding is supportive of the hypothesis that the market-wide illiquidity risk is priced so that investors ask for a higher fund price return when the expected illiquidity is high. The *unexpected home* market illiquidity significantly and positively affects the fund premium only for the funds investing in segmented markets, where the home-market unexpected illiquidity is confined to the local market and mostly affects the fund's NAV return and thus the fund spread.

Finally, the spread of funds investing in segmented markets loads significantly on the systematic Pastor-Stambaugh (2003) liquidity factor in a regression that also includes the popular Fama-French three factors, but the liquidity loading is virtually zero for the funds investing in open economies. Therefore, the spread of funds investing in segmented markets not only has stronger association with the level of illiquidity but also is more sensitive to the systematic liquidity factor, lending support that fund premium contains a significant liquidity risk premium.

Appendix: Bias Adjustment

If u_t in equation (5) and v_t in equation (6) are correlated, then simply using the OLS estimator $\hat{\rho}$ in the regression yields biased estimates for the b's as shown in Stambaugh (1999) for a single regressor and Amihud and Hurvich (2003) (AH) for multiple regressors. As a result, both papers suggest a bias correction for $\hat{\rho}$. In a setting with multiple regressors X, AH suggests that the adjustment can be done separately by treating each of the regressor as a univariate AR(1) process if the coefficient matrix Φ in the regression $X_t = \Phi X_{t-1} + V_t$ is diagonal. This is assumed in the current paper, and the adjustment procedure is as follows.

First, estimate each regressor's autoregressive coefficient ρ by univariate OLS and then correct this estimator using the formula:

$$\hat{\rho}^c = \hat{\rho} + \frac{1 + 3\hat{\rho}}{n} + \frac{3(1 + 3\hat{\rho})}{n^2},$$

where n is the number of observations, and $\hat{\theta}$ and $\hat{\rho}$ are the OLS estimators of θ and ρ in (6).

AH shows that running OLS regression on equation (5) produces unbiased estimates for b_2, b_4 and b_6, while the bias for estimators b_1, b_3 and b_5 is of the order $O\left(n^{-2}\right)$, when $\hat{\rho}^c$ is used in constructing the expected and unexpected variables. In addition, the standard errors for b_2, b_4 and b_6 are unbiased, but AH suggests that the standard errors for b_1, b_3 and b_5 be calculated as

$$\widehat{SE}^c\left(\hat{b}_i\right) = \sqrt{\left[\hat{b}_{i+1}\left(1 + 3/n + 9/n^2\right)\right]^2 \widehat{\mathrm{Var}}(\hat{\rho}) + \widehat{\mathrm{Var}}(\hat{b}_i)}, \quad i = 1, 3, 5.$$

We report both the Newey-West adjusted and the AH $t-$statistics in the table when applicable. In most cases, the AH adjustment produces little difference in either the parameter estimates or the standard errors.

Table 1 Information on Closed-end Country Funds Traded in the U.S.

This table provides information on all the U.S.-traded single country closed-end funds (CEF) in our sample. Funds investing in a region, or a sector, or primarily in commodities, are not included. Weekly data on each fund's closing price as of Friday (or the last trading day of the week), the net asset value (NAV), and the discount, are collected from the Wall Street Journal/Dow Jones Interactive Service for all dates beginning August 7, 1987. During the period analyzed, several funds announced that they were either open-ending or liquidating or merging with another fund or converting to a new closed-end fund with a different investment objective. The announcement date for these changes is the day on which the fund's managers or board of directors propose a change in the structure or investment objective of the fund. If a shareholder(s) proposes a change, then the announcement date is the date of approval by shareholders of such a change. The announcement date is determined from news announcements and/or SEC filings.

	Fund	Fund	IPO	Raw Data		Change of Structure or Investment Objective	
No.	Ticker	Name	Date	From	To	Nature of Change	Announcement Date
1	AF	Argentina	10/22/1991	10/25/1991	12/14/2001	Open-ending	6/11/2001
2	BZF	Brazil	3/31/1988	4/15/1988	12/28/2001		
3	BZL	Brazilian Equity	4/3/1992	4/10/1992	12/28/2001		
4	CH	Chile	10/26/1989	11/3/1989	12/28/2001		
5	CRF	Czech Republic	9/30/1994	9/30/1994	2/27/1998	Converting to New CEF	12/18/1997
6	FAK	Fidelity Advisor Korea	10/25/1994	11/4/1994	6/30/2000	Open-ending	3/17/2000
7	FGF	Future Germany Fund	2/27/1990	3/9/1990	6/23/1995	Converting to New CEF	4/28/1995
8	FPF	First Philippine	11/8/1989	12/1/1989	12/28/2001		
9	FRF	France Growth	5/10/1990	5/18/1990	12/28/2001		
10	FRG	Emerging Germany Fund	3/29/1990	4/20/1990	4/23/1999	Open-ending	11/6/1998
11	GER	Germany	7/18/1986	8/7/1987	12/28/2001		
12	GF	New Germany	1/14/1990	2/9/1990	12/28/2001		
13	GSP	Growth Fund Spain	2/14/1990	3/9/1990	12/11/1998	Open-ending	8/3/1998
14	IAF	First Australia[1]	12/12/1985	8/7/1987	12/28/2001		
15	IF	Indonesia	3/1/1990	3/16/1990	12/28/2001		
16	IFN	India	2/1/1994	2/18/1994	12/28/2001		
17	IGF	India Growth	8/12/1988	8/26/1988	12/28/2001		
18	IIF	MSDW India[2]	2/1/1994	3/11/1994	12/28/2001		
19	IRL	Irish Investment Fund[3]	3/3/1990	4/12/1990	12/28/2001		
20	ISL	First Israel	10/1/1992	10/30/1992	12/28/2001		
21	ITA	Italy	2/26/1986	8/7/1987	12/28/2001	Liquidating	11/21/2002
22	JEQ	Japan Equity	7/24/1992	8/14/1992	12/28/2001		
23	JFI	Jardine Fleming India	3/1/1994	3/11/1994	12/28/2001		
24	JGF	Jakarta Growth	4/16/1990	4/20/1990	6/8/2001	Merging with another CEF	10/11/2000
25	JOF	Japan OTC Equity	3/14/1990	3/30/1990	12/28/2001		

Table 1 (continued)

No.	Fund Ticker	Fund Name	IPO Date	Raw Data		Change of Structure or Investment Objective	
				From	To	Nature of Change	Announcement Date
26	KEF	Korea Equity	11/24/1993	12/3/1993	12/28/2001		
27	KF	Korea	8/22/1984	8/7/1987	12/28/2001		
28	KIF	Korean Investment	2/18/1992	3/13/1992	11/23/2001	Open-ending	9/14/2001
29	MEF	Emerging Mexico	10/8/1990	10/12/1990	4/1/1999	Liquidating	10/26/1998
30	MF	Malaysia	5/8/1987	8/7/1987	12/28/2001		
31	MXE	Mexico Equity and Income	8/14/1990	9/7/1990	12/28/2001		
32	MXF	Mexico	6/3/1981	8/7/1987	12/28/2001		
33	OST	Austria	9/21/1989	10/6/1989	12/28/2001		
34	PGF	Portugal	11/1/1989	12/29/1989	6/1/2001	Open-ending	8/20/1999
35	PKF	Pakistan Investment	12/1/1993	12/31/1993	6/22/2001	Liquidating	3/20/2000
36	ROC	ROC Taiwan	5/19/1989	5/19/1989	12/28/2001		
37	SGF	Singapore	7/24/1990	8/3/1990	12/28/2001		
38	SNF	Spain	6/21/1988	7/22/1988	12/28/2001		
39	SWZ	Swiss Helvetia[4]	8/19/1987	8/28/1987	12/28/2001		
40	TCTF	Thai Capital[5]	5/22/1990	6/8/1990	12/28/2001		
41	TKF	Turkish Investment	12/5/1989	12/22/1989	12/28/2001		
42	TRF	Templeton Russia	6/1/1995	9/15/1995	12/28/2001	Converting to New CEF	2/12/2002
43	TTF	Thai	2/17/1988	2/26/1988	12/28/2001		
44	TVF	Templeton Vietnam Opportunity[6]	9/19/1994	9/23/1994	12/28/2001	Converting to New CEF	3/20/1998
45	TWN	Taiwan	12/23/1986	8/7/1987	12/28/2001		
46	TYW	Taiwan Equity	7/1/1994	7/29/1994	5/5/2000	Liquidating	12/2/1999
47	UKM	United Kingdom	8/6/1987	8/7/1987	4/23/1999	Liquidating/Open-ending	9/15/1998

1. Also known as Aberdeen Australia Equity
2. Also known as Morgan Stanley India
3. Also known as New Ireland fund
3. Also known as Helvetia fund
5. The Thai Capital fund changed its ticker symbol from TC to TF on 3/16/2001
6. The new name is Templeton Vietnam and Southeast Asia

Table 2 Summary Statistics of the U.S. Closed-end Country Fund Discounts

This table contains the starting date, the ending date, the number of observations for monthly (M) and weekly (W) data, and the average market capitalization for the 47 U.S. closed-end country funds. The market capitalization is measured in millions of dollars.

	Fund		Adjusted		Observations		Market Cap
No.	Ticker	Fund Name	Starting Date	Ending date	M	W	Mean
1	AF	Argentina	4/24/1992	5/11/2001	109	473	100.77
2	BZF	Brazil	9/30/1988	12/28/2001	160	692	248.05
3	BZL	Brazilian Equity	10/2/1992	12/28/2001	111	483	54.51
4	CH	Chile	4/27/1990	12/28/2001	141	610	208.12
5	CRF	Czech Republic	3/31/1995	2/27/1998	36	153	60.64
6	FAK	Fidelity Advisor Korea	4/28/1995	2/11/2000	58	251	42.86
7	FGF	Future Germany Fund	10/26/1990	6/23/1995	58	252	165.24
8	FPF	First Philippine	5/11/1990	12/28/2001	140	608	104.38
9	FRF	France Growth	11/9/1990	12/28/2001	134	582	153.10
10	FRG	Emerging Germany Fund	9/28/1990	10/2/1998	97	419	119.03
11	GER	Germany	8/7/1987	12/28/2001	173	752	154.68
12	GF	New Germany	7/13/1990	12/28/2001	138	599	353.41
13	GSP	Growth Fund Spain	8/17/1990	7/2/1998	95	412	191.47
14	IAF	First Australia	8/7/1987	12/28/2001	173	752	93.94
15	IF	Indonesia	9/7/1990	12/28/2001	136	591	37.70
16	IFN	India	8/5/1994	12/28/2001	89	387	330.09
17	IGF	India Growth	2/17/1989	12/28/2001	154	671	100.66
18	IIF	MSDW India	8/5/1994	12/28/2001	89	387	346.40
19	IRL	Irish Investment Fund	9/7/1990	12/28/2001	136	591	61.58
20	ISL	First Israel	4/2/1993	12/28/2001	104	456	64.45
21	ITA	Italy	8/7/1987	12/28/2001	173	752	83.41
22	JEQ	Japan Equity	1/29/1993	12/28/2001	108	466	94.53
23	JFI	Jardine Fleming India	9/2/1994	12/28/2001	88	383	96.88
24	JGF	Jakarta Growth	10/19/1990	6/8/2001	128	556	35.62
25	JOF	Japan OTC Equity	9/14/1990	12/28/2001	136	590	93.06
26	KEF	Korea Equity	5/27/1994	12/28/2001	92	397	46.64
27	KF	Korea	8/7/1987	12/28/2001	173	752	512.31
28	KIF	Korean Investment	8/21/1992	8/10/2001	108	469	52.49
29	MEF	Emerging Mexico	4/12/1991	7/17/1998	90	390	95.55
30	MF	Malaysia	8/7/1987	12/28/2001	170	738	104.33
31	MXE	Mexico Equity and Income	2/15/1991	12/28/2001	131	568	101.30
32	MXF	Mexico	8/7/1987	12/28/2001	172	751	581.35
33	OST	Austria	3/23/1990	12/28/2001	142	615	86.08
34	PGF	Portugal	5/4/1990	8/18/1999	110	481	70.01
35	PKF	Pakistan Investment	6/3/1994	2/18/2000	68	299	62.32
36	ROC	ROC Taiwan	11/24/1989	12/28/2001	146	632	278.11
37	SGF	Singapore	1/25/1991	12/28/2001	132	571	73.59
38	SNF	Spain	12/16/1988	12/28/2001	157	680	122.93
39	SWZ	Swiss Helvetia	2/19/1988	12/28/2001	167	724	209.19
40	TCTF	Thai Capital	11/23/1990	12/28/2001	132	575	60.46
41	TKF	Turkish Investment	6/8/1990	12/28/2001	139	604	53.60
42	TRF	Templeton Russia	12/1/1995	12/28/2001	73	318	105.82
43	TTF	Thai	8/19/1988	12/28/2001	161	698	173.43
44	TVF	Templeton Vietnam Opportunity	3/24/1995	12/28/2001	82	354	60.48
45	TWN	Taiwan	8/7/1987	12/28/2001	173	752	205.08
46	TYW	Taiwan Equity	1/6/1995	10/29/1999	58	252	48.98
47	UKM	United Kingdom	2/5/1988	8/14/1998	127	554	44.12
	AVG	Cross-sectional Average	8/28/1987	12/28/2001	173	752	106.88

Table 3 Summary Statistics of the U.S. Closed-end Country Fund Data

This table contains the summary statistics of the 47 closed-end country funds' price return, NAV return, the spread (which is defined as the first order difference in the discount), and the discount. The sample volatility of the fund's own de-trended and de-meaned illiquidity is reported in the last column.

	Fund		Price return (%)		NAV return (%)		Spread (%)		Discount (%)				Illiquidity
No.	Ticker	Fund Name	Mean	STD	Mean	STD	Mean	STD	Mean	STD	Max	Min	STD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	AF	Argentina	0.235	10.26	0.383	7.87	-0.368	4.94	-8.335	15.14	25.258	-33.432	0.61
2	BZF	Brazil	1.035	12.08	1.113	13.27	0.051	7.28	-12.396	15.86	31.145	-52.763	0.87
3	BZL	Brazilian Equity	0.019	12.05	0.227	11.87	-0.220	6.90	-11.576	12.55	16.613	-34.419	0.95
4	CH	Chile	0.133	11.10	0.070	8.60	-0.154	5.45	-13.927	10.11	11.489	-33.903	1.01
5	CRF	Czech Republic	0.277	5.39	0.644	4.53	-0.359	4.28	-10.156	6.80	3.708	-21.722	0.55
6	FAK	Fidelity Advisor Korea	0.867	13.02	1.400	14.77	-0.266	6.24	-5.926	11.47	27.888	-28.304	0.90
7	FGF	Future Germany Fund	0.549	8.10	0.593	5.61	-0.169	3.95	-12.989	4.98	-2.482	-23.240	0.29
8	FPF	First Philippine	-0.304	10.94	-0.493	9.41	0.035	4.66	-17.749	6.19	10.250	-32.921	1.15
9	FRF	France Growth	0.077	6.70	-0.046	5.42	0.040	3.18	-15.038	5.67	6.448	-22.899	0.62
10	FRG	Emerging Germany Fund	0.804	6.56	0.652	4.73	0.045	3.47	-16.178	5.63	-3.631	-27.461	0.45
11	GER	Germany	0.200	10.21	0.012	6.49	-0.088	8.64	-5.166	14.84	100.000	-23.526	0.65
12	GF	New Germany	-0.264	7.98	-0.354	6.15	-0.032	3.80	-17.570	5.10	-2.954	-26.342	0.63
13	GSP	Growth Fund Spain	1.158	7.04	0.917	5.60	0.130	3.08	-15.589	5.00	-2.764	-28.058	0.42
14	IAF	First Australia	-0.202	7.74	-0.320	6.68	0.049	4.91	-14.584	6.23	15.628	-27.536	0.77
15	IF	Indonesia	-0.623	13.52	-0.674	13.18	0.048	14.53	21.884	22.83	121.963	-21.042	1.17
16	IFN	India	0.101	10.46	0.165	9.97	-0.097	4.53	-16.603	11.47	9.453	-34.942	0.50
17	IGF	India Growth	0.560	11.03	0.379	9.96	0.055	9.47	-5.924	19.02	49.283	-38.386	0.89
18	IIF	MSDW India	-0.142	10.07	-0.120	8.63	-0.143	5.49	-13.995	14.38	14.943	-37.932	0.50
19	IRL	Irish Investment Fund	0.597	6.84	0.403	4.99	0.063	3.90	-16.385	5.91	-1.716	-30.120	0.56
20	ISL	First Israel	0.133	7.93	0.072	6.60	-0.024	4.51	-11.671	11.67	21.285	-27.653	0.58
21	ITA	Italy	0.199	9.56	0.010	7.36	0.003	5.82	-11.387	9.53	36.364	-35.866	0.73
22	JEQ	Japan Equity	-0.165	9.35	-0.366	7.01	0.016	8.11	4.534	14.56	38.240	-23.251	0.47
23	JFI	Jardine Fleming India	-0.240	11.05	-0.178	10.25	-0.138	4.85	-14.863	12.94	17.706	-36.952	0.66
24	JGF	Jakarta Growth	-0.635	13.17	-1.126	11.11	0.326	12.00	8.009	19.24	94.237	-23.033	0.98
25	JOF	Japan OTC Equity	0.253	10.51	0.055	8.68	0.039	7.80	0.923	14.90	34.892	-33.414	0.66

Table 3 (continued)

No.	Fund Ticker	Fund Name	Price return (%)		NAV return (%)		Spread (%)		Discount (%)				Illiquidity
			Mean	STD	Mean	STD	Mean	STD	Mean	STD	Max	Min	STD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
26	KEF	Korea Equity	-0.792	11.15	-0.399	11.69	-0.297	6.56	-7.465	14.88	43.604	-32.732	0.66
27	KF	Korea	-0.150	12.96	0.303	11.32	-0.980	11.79	21.733	35.19	148.843	-33.570	0.64
28	KIF	Korean Investment	0.118	12.13	0.344	12.30	-0.201	8.70	-1.613	16.43	44.811	-31.756	0.77
29	MEF	Emerging Mexico	-0.362	12.85	-0.397	11.23	-0.081	7.52	-6.673	13.66	37.900	-25.839	0.47
30	MF	Malaysia	0.648	13.30	0.239	9.32	0.035	13.75	1.524	23.15	108.352	-27.305	1.15
31	MXE	Mexico Equity and Income	0.456	10.13	0.359	9.42	0.064	6.47	-9.534	11.95	39.571	-29.625	0.73
32	MXF	Mexico	1.145	12.95	0.721	10.79	0.128	6.53	-15.063	10.98	21.717	-46.940	0.91
33	OST	Austria	-0.199	8.69	-0.329	7.51	0.038	4.98	-13.827	7.73	8.418	-30.390	0.80
34	PGF	Portugal	0.359	8.33	0.272	5.75	-0.093	5.62	-11.096	7.92	10.759	-25.582	0.63
35	PKF	Pakistan Investment	-1.160	11.87	-1.194	10.68	-0.062	5.90	-16.584	9.26	3.591	-37.049	0.74
36	ROC	ROC Taiwan	-0.147	11.15	-0.339	8.68	-0.027	6.78	-7.404	11.65	29.473	-31.554	0.91
37	SGF	Singapore	0.003	9.73	-0.143	7.40	-0.023	6.90	-5.457	11.27	31.652	-24.630	0.82
38	SNF	Spain	0.373	11.21	0.007	6.65	0.047	10.88	-1.042	25.13	129.740	-22.724	0.65
39	SWZ	Swiss Helvetia	0.207	7.11	0.260	5.88	-0.122	4.04	-10.784	8.17	15.900	-25.205	0.63
40	TCTF	Thai Capital	-0.341	14.20	-0.615	10.93	-0.023	12.17	9.549	27.46	86.567	-28.402	1.08
41	TKF	Turkish Investment	0.594	16.00	0.886	17.45	0.013	11.03	0.820	21.34	100.258	-32.903	0.86
42	TRF	Templeton Russia	2.188	18.72	1.647	14.81	-0.125	12.31	10.599	15.63	51.719	-18.033	0.81
43	TTF	Thai	0.092	14.31	-0.158	11.12	-0.068	15.02	19.653	33.25	122.222	-20.908	0.99
44	TVF	Templeton Vietnam Opportunity	-0.070	10.06	-0.298	8.21	0.056	4.27	-17.332	7.59	0.937	-34.422	0.62
45	TWN	Taiwan	0.142	13.79	-0.070	10.06	-0.560	14.21	3.954	23.30	112.532	-26.864	0.72
46	TYW	Taiwan Equity	1.084	10.48	0.897	9.98	0.113	4.44	-13.233	10.81	13.762	-29.730	0.92
47	UKM	United Kingdom	0.642	6.01	0.458	4.47	0.086	3.69	-13.926	5.00	4.574	-24.528	0.61
	AVG	Cross-sectional Average	0.241	7.95	0.061	5.39	-0.138	5.18	-4.471	8.44	39.930	-19.322	0.70

Table 4 List of Stock Index or Market used to Calculate the Amihud Illiquidity

This table lists the name of each country and the corresponding stock index or market that was used to select the initial group of individual stocks whose returns and dollar volumes are used to calculate the Amihud market illiquidity measure as of the last Friday of each month for all dates from 8/7/1987 to 12/31/2001, for which the necessary data are available on Datastream. The sample period corresponds to the period of closed-end country fund discount data. The sample volatility of each country's de-trended and de-meaned illiquidity is reported in the last column.

		Illiquidity Data		
Country	Stock Index/Market	From	To	STD
Argentina	MerVal	08/13/93	12/31/01	0.46
Australia	All Ordinaries	06/22/88	12/31/01	0.65
Austria	ATX	08/07/87	12/31/01	0.70
Brazil	Bovespa	07/22/94	12/31/01	0.79
Chile	IGPA	07/21/89	12/31/01	0.55
Czech Republic	PX50	04/07/95	12/31/01	1.12
France	CAC 40	05/16/89	12/31/01	0.44
Germany	DAX 100	01/19/95	12/31/01	0.81
India	BSE 500	01/19/95	12/31/01	0.44
Indonesia	Jakarta Composite	04/23/90	12/31/01	1.05
Israel	TA-100	05/21/93	12/31/01	1.18
Italy	MIBTel	08/07/87	12/31/01	0.84
Japan	Nikkei 225	12/20/90	12/31/01	0.40
Korea	KOSPI	08/07/87	12/31/01	0.59
Malaysia	KLSE Syariah	08/07/87	12/31/01	0.98
Mexico	INMEX	01/22/88	12/31/01	0.93
Pakistan	Karachi 100	08/05/92	12/31/01	1.75
Philippines	Manila All Shares	08/07/87	12/31/01	0.59
Portugal	PSI-20	11/03/93	12/31/01	0.88
Russia	Moscow Times	09/26/95	12/31/01	0.81
Singapore	Straits Times	08/07/87	12/31/01	0.59
Spain	Madrid SE	02/22/90	12/31/01	0.59
Switzerland	SWI New Swiss	05/14/90	12/31/01	0.44
Taiwan	FTAI: Taiwan Ordinary Securities	05/17/91	12/31/01	0.86
Thailand	SET 50	08/07/87	12/31/01	0.96
United Kingdom	FTSE All-Share	08/07/87	12/31/01	0.78
United States of America	NYSE	08/07/87	12/31/01	0.40

Table 5 Pooled Regression of Fund Premium on Illiquidity

This table reports the results from the pooled regression of the fund premium on the fund's own, the host market, and the home market illiquidity:

$$D_{f,c,t} = a_0 + a_1 IL_{f,t} + a_2 AIL_{h,t} + a_3 AIL_{c,t}$$

where the coefficients are constrained to be the same across all funds and are estimated using the Feasible Generalized Least Square (GFLS) approach. The $t-$ratios reported in brackets are adjusted for heteroskedasticity and contemporaneous correlation.

		a_0	a_1	a_2	a_3
	Panel A: whole sample 1987/8 to 2001/12				
All Funds	Estimates	-0.004	-0.005	-0.024	0.001
	$t-$ratio	[3.09]	[4.63]	[6.53]	[0.98]
Funds Investing in Open Economies	Estimates	-0.004	-0.002	-0.002	-0.003
	$t-$ratio	[2.00]	[1.23]	[0.42]	[1.95]
Funds Investing in Emerging Economies	Estimates	0.002	-0.008	-0.051	0.006
	$t-$ratio	[0.71]	[4.65]	[8.80]	[3.04]
	Panel B: sub-period 1987/8 to 1994/10				
All Funds	Estimates	-0.001	-0.012	-0.043	-0.003
	$t-$ratio	[0.24]	[6.76]	[7.64]	[1.80]
Funds Investing in Open Economies	Estimates	-0.006	-0.011	-0.023	-0.004
	$t-$ratio	[1.68]	[3.59]	[2.92]	[1.50]
Funds Investing in Emerging Economies	Estimates	0.003	-0.023	-0.035	0.001
	$t-$ratio	[1.02]	[6.72]	[3.50]	[0.45]
	Panel C: sub-period 1994/11 to 2001/12				
All Funds	Estimates	-0.015	-0.000	0.005	0.003
	$t-$ratio	[12.25]	[0.55]	[1.35]	[3.90]
Funds Investing in Open Economies	Estimates	-0.009	0.001	0.030	0.000
	$t-$ratio	[4.91]	[0.38]	[6.30]	[0.23]
Funds Investing in Emerging Economies	Estimates	-0.002	-0.001	-0.024	0.011
	$t-$ratio	[0.88]	[0.87]	[3.37]	[6.40]

Table 6 Pooled Regression of Fund Spread on Fund and Market Illiquidity

This table reports the results from the pooled regression of fund spreads on the expected and unexpected illiquidity of the fund, the host market, and the home market:

$$S_{f,c,t} = b_0 + b_1 ILE_{f,t} + b_2 ILU_{f,t} + b_3 AILE_{h,t} + b_4 AILU_{h,t} + b_5 AILE_{c,t} + b_6 AILU_{c,t} + u_t$$

where the coefficients are constrained to be the same across all funds and are estimated using the Feasible Generalized Least Square (GFLS) approach. The expected and unexpected illiquidity are constructed from the whole sample, even when they are used in the sub-period regressions. The results are similar if the expected and unexpected variables are constructed from their own sub-periods. The $t-$ratios reported in brackets are adjusted for heteroskedasticity and contemporaneous correlation.

		b_0	b_1	b_2	b_3	b_4	b_5	b_6
	Panel A: whole sample 1987/8 to 2001/12							
All Funds	Estimates	0.001	-0.002	-0.006	0.010	-0.012	0.000	0.002
	$t-$ratio	[0.52]	[1.14]	[4.62]	[3.08]	[1.57]	[0.09]	[1.19]
Funds Investing in Open Economies	Estimates	0.001	0.002	-0.007	0.005	-0.001	0.001	-0.001
	$t-$ratio	[0.39]	[0.72]	[3.59]	[1.40]	[0.15]	[0.44]	[0.57]
Funds Investing in Emerging Economies	Estimates	-0.000	-0.002	-0.004	0.017	-0.026	0.000	0.005
	$t-$ratio	[0.23]	[1.23]	[3.26]	[3.22]	[2.15]	[0.04]	[2.34]
	Panel B: sub-period 1987/8 to 1994/10							
All Funds	Estimates	-0.001	0.002	-0.011	0.014	-0.020	0.002	-0.001
	$t-$ratio	[0.52]	[0.71]	[5.32]	[2.62]	[1.56]	[1.00]	[0.34]
Funds Investing in Open Economies	Estimates	-0.000	0.005	-0.015	0.009	-0.021	0.002	-0.003
	$t-$ratio	[0.15]	[1.05]	[4.59]	[1.39]	[1.43]	[0.65]	[0.67]
Funds Investing in Emerging Economies	Estimates	-0.001	-0.003	-0.011	0.020	-0.024	0.005	0.001
	$t-$ratio	[0.25]	[0.88]	[2.58]	[1.84]	[1.02]	[1.20]	[0.22]
	Panel C: sub-period 1994/11 to 2001/12							
All Funds	Estimates	0.002	-0.003	-0.002	0.012	0.000	-0.000	0.004
	$t-$ratio	[1.59]	[2.18]	[1.61]	[3.79]	[0.00]	[0.01]	[2.99]
Funds Investing in Open Economies	Estimates	0.001	0.002	-0.007	0.006	0.000	0.001	-0.002
	$t-$ratio	[0.41]	[0.69]	[3.64]	[1.48]	[0.02]	[0.43]	[0.72]
Funds Investing in Emerging Economies	Estimates	0.001	-0.004	-0.000	0.022	-0.016	-0.002	0.007
	$t-$ratio	[0.84]	[2.29]	[0.13]	[4.31]	[1.43]	[1.00]	[2.88]

Table 7 Pooled Regression of Fund Spread on Market Illiquidity

This table contains the results from the pooled regression of fund spread on the expected and unexpected illiquidity of the host market and the home market only:

$$S_{f,c,t} = b_0 + b_3 AILE_{h,t} + b_4 AILU_{h,t} + b_5 AILE_{c,t} + b_6 AILU_{c,t} + u_t$$

where the coefficients are constrained to be the same across all funds and are estimated using the Feasible Generalized Least Square (GFLS) approach. The expected and unexpected illiquidity are constructed from the whole sample, even when they are used in the sub-sample regressions. The results are similar if the expected and unexpected variables are constructed from their own sub-samples. The $t-$ratios reported in brackets are adjusted for heteroskedasticity and contemporaneous correlation.

		b_0	b_3	b_4	b_5	b_6
	Panel A: whole sample 1987/8 to 2001/12					
All Funds	Estimates	0.000	0.008	-0.019	-0.000	0.001
	$t-$ratio	[0.41]	[2.80]	[2.62]	[0.25]	[0.98]
Funds Investing in Open Economies	Estimates	0.000	0.005	-0.007	0.001	-0.002
	$t-$ratio	[0.31]	[1.39]	[0.84]	[0.49]	[0.76]
Funds Investing in Emerging Economies	Estimates	-0.001	0.015	-0.034	-0.001	0.005
	$t-$ratio	[0.31]	[3.11]	[2.84]	[0.36]	[2.11]
	Panel B: sub-period 1987/8 to 1994/10					
All Funds	Estimates	-0.001	0.012	-0.029	0.002	-0.003
	$t-$ratio	[0.52]	[2.23]	[2.27]	[1.06]	[1.12]
Funds Investing in Open Economies	Estimates	0.000	0.007	-0.030	0.002	-0.007
	$t-$ratio	[0.03]	[1.09]	[1.97]	[0.80]	[1.43]
Funds Investing in Emerging Economies	Estimates	-0.001	0.015	-0.035	0.004	-0.001
	$t-$ratio	[0.28]	[1.49]	[1.51]	[0.99]	[0.25]
	Panel C: sub-period 1994/11 to 2001/12					
All Funds	Estimates	0.001	0.009	-0.002	-0.000	0.004
	$t-$ratio	[1.34]	[3.07]	[0.23]	[0.44]	[3.10]
Funds Investing in Open Economies	Estimates	0.001	0.003	0.005	-0.001	0.001
	$t-$ratio	[0.76]	[0.73]	[0.59]	[0.36]	[0.65]
Funds Investing in Emerging Economies	Estimates	0.001	0.018	-0.020	-0.003	0.007
	$t-$ratio	[0.72]	[3.93]	[1.86]	[1.36]	[2.85]

Table 8 Pooled Regression of Fund Spread on Systematic Factors

This table contains the results from the pooled regression of fund spread on the systematic liquidity factor, $PSLIQL$, and the market (MMF), the size (SMB), and the value (HML) factors:

$$S_{f,c,t} = b_0 + b_1 PSLIQL_t + b_2 MMF_t + b_3 SMB_t + b_4 HML_t + \varepsilon_t$$

where the coefficients are constrained to be the same across all funds and are estimated using the Feasible Generalized Least Square (GFLS) approach. The $t-$ratios reported in brackets are adjusted for heteroskedasticity and contemporaneous correlation.

		b_0	b_1	b_2	b_3	b_4
	Panel A: whole sample 1987/8 to 1999/12					
All Funds	Estimates	-0.003	0.026	0.342	0.014	0.181
	$t-$ratio	[2.31]	[1.20]	[9.44]	[0.32]	[3.37]
Funds Investing in Open Economies	Estimates	-0.003	-0.006	0.293	0.040	0.229
	$t-$ratio	[1.74]	[0.23]	[6.79]	[0.77]	[3.61]
Funds Investing in Emerging Economies	Estimates	-0.005	0.111	0.446	-0.025	0.107
	$t-$ratio	[2.51]	[3.36]	[7.45]	[0.35]	[1.22]
	Panel B: sub-period 1987/8 to 1994/10					
All Funds	Estimates	-0.001	0.099	0.352	0.190	0.255
	$t-$ratio	[0.58]	[2.21]	[6.02]	[2.37]	[2.85]
Funds Investing in Open Economies	Estimates	-0.001	0.074	0.340	0.149	0.343
	$t-$ratio	[0.61]	[1.34]	[4.99]	[1.62]	[3.39]
Funds Investing in Emerging Economies	Estimates	-0.003	0.224	0.599	0.187	0.281
	$t-$ratio	[0.71]	[2.91]	[5.75]	[1.29]	[1.84]
	Panel C: sub-period 1994/11 to 1999/12					
All Funds	Estimates	-0.006	-0.018	0.200	-0.125	-0.017
	$t-$ratio	[6.71]	[1.55]	[8.25]	[4.67]	[0.48]
Funds Investing in Open Economies	Estimates	-0.003	-0.059	0.159	-0.054	0.065
	$t-$ratio	[1.97]	[2.61]	[3.52]	[1.07]	[0.99]
Funds Investing in Emerging Economies	Estimates	-0.007	0.011	0.259	-0.054	0.028
	$t-$ratio	[3.78]	[0.45]	[5.13]	[0.98]	[0.38]

Figure 1
Time Series of Average Fund Discount

This figure plots the average discounts across available closed-end country funds at the end of each month from August 1987 to December 2001.

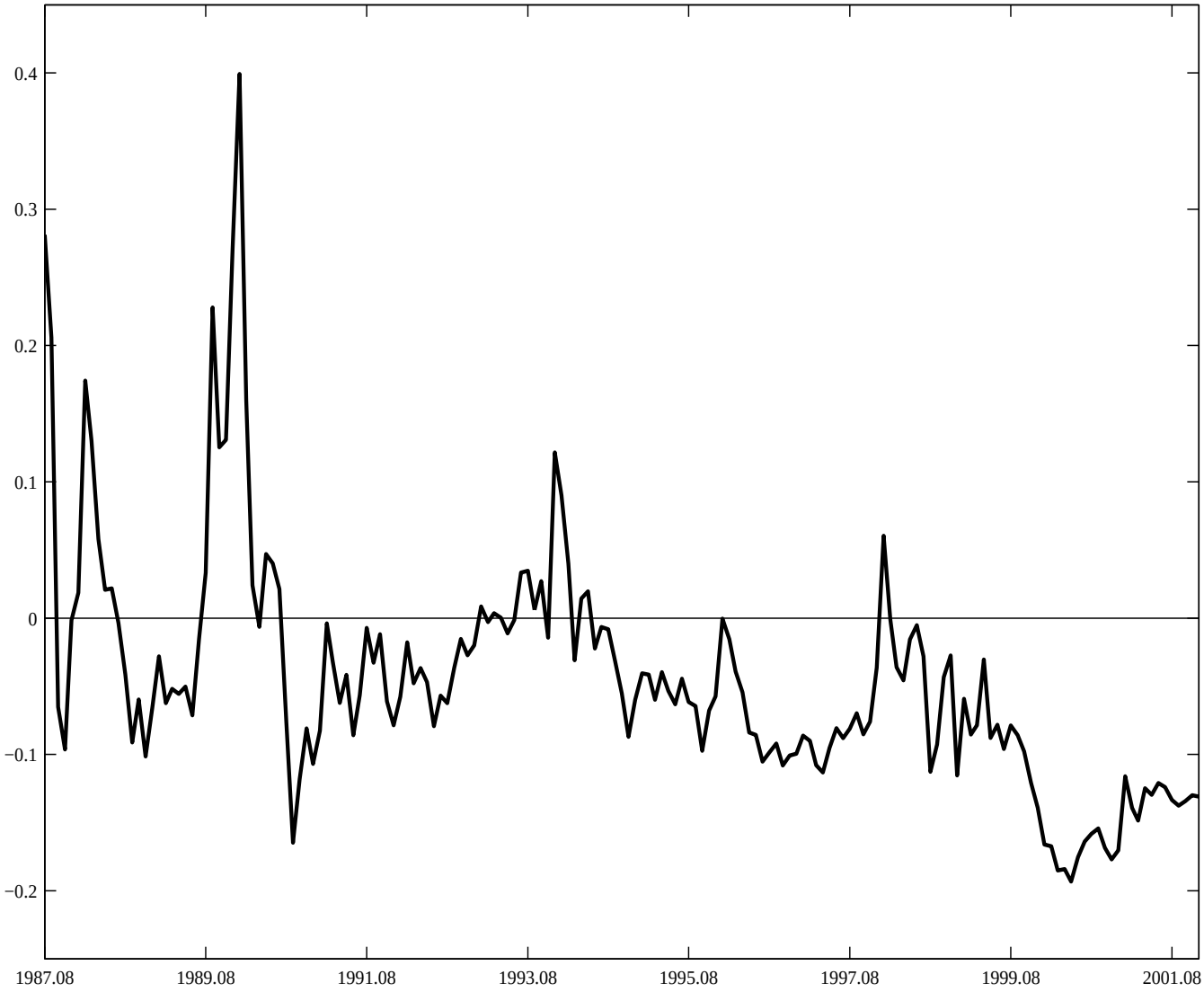
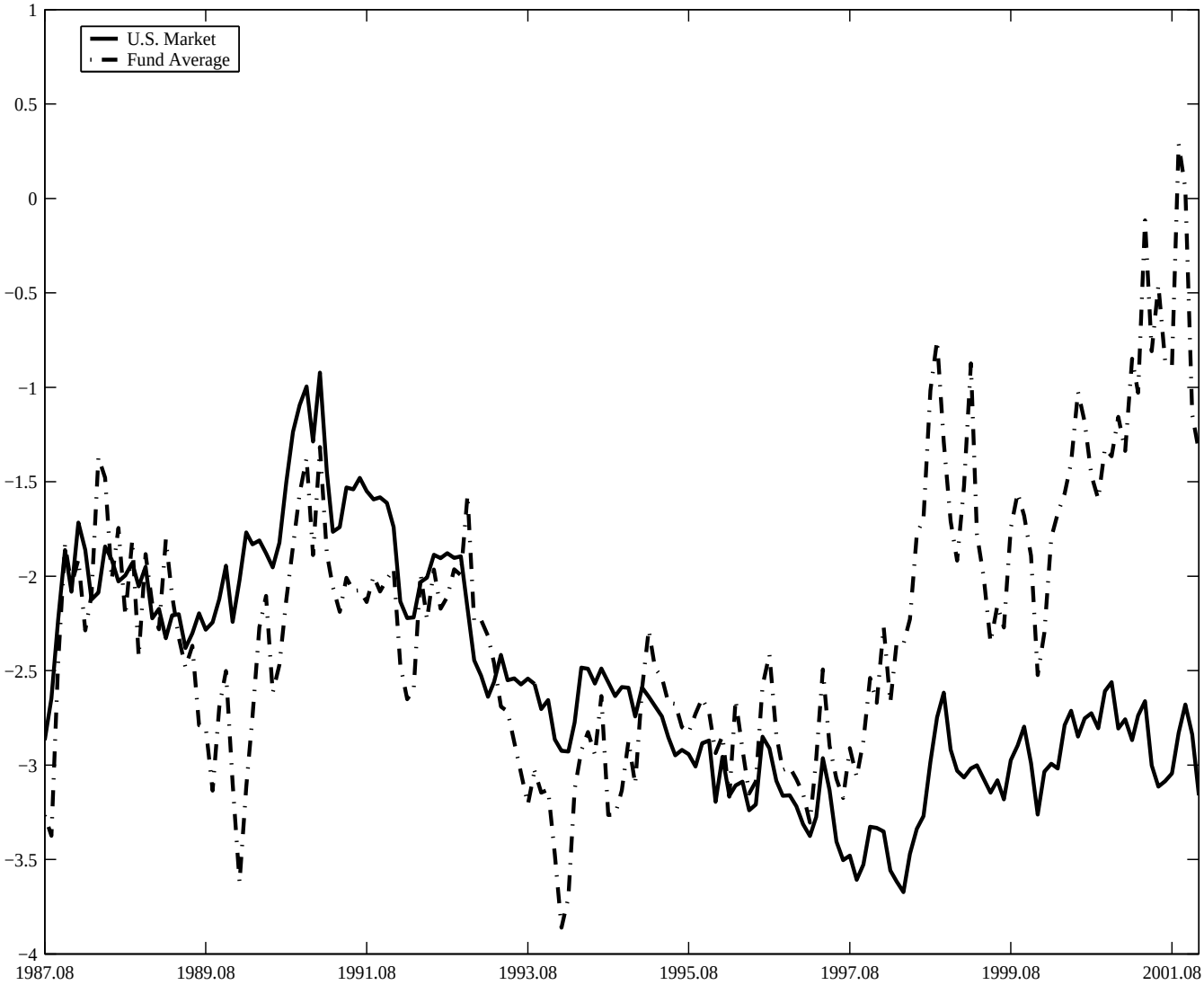


Figure 2
Time Series of Average Fund Amihud Illiquidity and the U.S. Market Amihud Illiquidity

This figure plots the logarithm of the U.S. market Amihud illiquidity, $\ln(AIL_{US})$, and the logarithm of the average Amihud illiquidity, $\ln(FIL)$, across available closed-end country funds at the end of each month from August 1987 to December 2001.



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