Illiquidity and Closed-End Country Fund Discounts*

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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 the model prediction 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, providing additional evidence that the country fund premium may be partially explained by the liquidity risk premium.

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Financial assets with similar or even the same payoffs can often have different liquidity. 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. This paper tries to answer that question by investigating whether the fluctuation in the closed-end country fund (CEF) premium is related to liquidity over time.

Both the theoretical and empirical aspects of the interaction between liquidity and asset prices have been studied extensively. In a theoretical model that formally relates asset prices to liquidity, Kyle (1985) shows that the asset price is negatively related to a measure of market "depth" known as Kyle's lambda. Allen and Gale (1996) argue that the illiquid asset's price is given by the smaller amount of the asset's long-term fundamental value and the amount determined by the supply and demand of cash (liquidity).[1] There is also extensive empirical evidence that liquidity affects asset prices. The positive return-illiquidity 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). Amihud (2002) studies this relation over time and confirms that the expected excess stock return increases with the expected but decreases with the unexpected illiquidity in the stock market. Pastor and Stambaugh (2003), on the other hand, find that expected stock returns are significantly related to liquidity betas and provide evidence that liquidity is a priced state variable.[2]

Since liquidity matters for asset prices and liquidity risk is significantly priced by investors, it is not surprising that assets with similar payoffs but different liquidity levels or liquidity loadings command different prices. For example, on-the-run Treasury bonds are 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.[3] In the same vein, the closed-end fund price is likely to differ from the fund's underlying net asset value (NAV) if the fund shares and its underlying assets have different liquidity levels or different liquidity loadings.

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. Unlike an open-end fund, a closed-end fund maintains a fixed

[1] Other theoretical studies include Amihud and Mendelson (1986), Constantinides (1986), Glosten (1989), Vayanos (1998, 2003), Huang (2002), and Wang and Vayanos (2003), among others.

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

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

number of shares that are traded as a stock 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 different levels (discounts) to their NAV.[4]

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 been invoked to explain the puzzle. For example, Bonser-Neal, Brauer, Neal, and Wheatley (1990) find a significant relation between the country fund price-NAV ratios and the announcements of changes in foreign investment restrictions. While Malkiel (1977) finds no correlation between US discounts and management expense as a proportion of NAV, Ross (2002) argues that management fees can account for the magnitude of the closed-end fund discount. In an empirical examination of UK closed-end funds, Gemmill and Thomas (2002) find that the size of discounts is significantly related to proxies for arbitrage bounds and the freedom of managers to increase fees in the presence of costly arbitrage. Within the behavioral finance literature, investor sentiment is used as an alternative explanation.[5] This explanation is based on the observation that the U.S. closed-end fund shares are mainly held by individual investors, and that many small investors are irrational and driven by sentiment. Elton, Gruber, and Busse (1998), however, find no empirical support for small investor sentiment as a priced factor for either common stocks or closed-end funds, and Dimson and Minio-Kozerski (1999) point out that the behavioral explanation is inconsistent with the empirical evidence on the UK closed-end fund market, which is largely dominated by institutional owners. Gemmill and Thomas (2002) reject the hypothesis that noise-trader risk is the cause of the long-run discount, but they find that the retail-investor flows into mutual funds are associated with fluctuations in discounts. In general, however, none of the above explanations provides a satisfactory account of the time-varying behavior of the discount.

In this paper, we argue that the time-varying behavior of the closed-end fund discount provides a unique and interesting laboratory to study the effect of liquidity on asset prices. The set of closed-end funds has an important feature, i.e., the fund shares and its underlying assets are traded separately and are typically associated with different liquidity. To the extent that liquidity risk

[4]The 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]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), and Pontiff (1996, 1997) provide empirical evidence that the noise trader model is consistent with the closed-end fund discount, in general, and the country fund discount, in particular.

is priced and liquidity affects asset prices, the closed-end fund discount may, in part, reflect the difference between liquidity levels or liquidity loadings of the fund shares and its underlying assets.

Although this intuition also applies to domestic closed-end funds, this paper only investigates the effect of liquidity on country closed-end fund discounts. There are two reasons why we restrict our analysis to country funds. First, shares of country funds are traded in the U.S. (host) market while their underlying assets are traded in a separate foreign (home) market. Since it is not as easy to move an investment from one market to the other as it is to move an investment within the same market, it is more likely that the liquidity shock is confined to one market only. In this way, the liquidity shock in the home market is more likely to affect the fund's NAV while the liquidity shock in the host market is more likely to affect the fund's price, leading to sharper predictions of the effect of liquidity on fund discount. Liquidity shocks may affect both the fund price and the NAV of domestic funds simultaneously, making the effect of liquidity on fund discount harder to detect.[6] Second, while the effect of liquidity on asset prices and returns has been studied extensively in the U.S. market, the examination of liquidity and asset returns across different countries is quite limited. This paper fills this gap by linking the liquidity in both the host and the home markets to the country fund discount.

We use a toy model to motivate and guide our empirical analysis. The model is extended from Allen and Gale (1996) to a multiple-market setting by assuming segmented host and home markets for the country fund. The expression for the fund premium is derived analytically, which enables comparative static analysis in closed form. The analysis shows that the fund premium should decrease with higher illiquidity in the host market but increase with higher illiquidity in the home market. The fund premium can also be shown to decrease (increase) with the unexpected illiquidity, defined as the difference between the realized value and the mean of the illiquidity, in the host (home) market. In contrast to the simple intuition, the model indicates that the effect of expected (mean) illiquidity on fund premium is ambiguous when holding the magnitude of the unexpected illiquidity constant. The fund premium may not necessarily increase with its expected illiquidity, because the investors in the model optimally "hedge" against anticipated illiquidity so that the unexpected illiquidity has a stronger impact on fund premium. Therefore, it is the level of liquidity relative to its expected value that really matters in the determination of the fund premium or discount. When the unexpected illiquidity is zero for both the host and the home market, the fund premium will be zero even though the mean illiquidity may be different in the two markets.

It is also important to note that our simple model is based on the key assumption of market

[6] Although we may still obtain some interesting results if the sensitivity of the underlying assets differs from that of the fund shares, it is harder to obtain the necessary data to examine the difference in liquidity sensitivity.

segmentation. In a segmented market, the 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 of the movement in the fund premium. In an integrated market, however, illiquidity shocks get easily spilled over to other markets, so illiquidity in the fund's home and host markets can affect both the fund's NAV and its price, leading to an ambiguous effect on the fund premium. Therefore, we expect the model predictions to hold better for funds investing in segmented or emerging countries than for those investing in integrated or developed economies.

Finally, closed-end country funds provide alternative investment opportunities other than U.S. assets. Investors may invest in these funds for other reasons such as diversification. If the diversification benefit from investing in country funds outweighs the cost of trading in relatively less liquid assets, then the investment is made. Therefore, country fund discounts are not only affected by the absolute level of liquidity for country funds but also by the relative liquidity of the fund as compared to the host market as a whole.

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. 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 effect of liquidity on fund premium in three steps. First, we investigate the effect of the realized liquidity of the fund, the host market, and the home market, on the fund premium. Consistent with the model, 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 the market segmentation assumption, the funds are split into two groups: the first group comprises of funds that invest in open economies while the second group is made up of funds investing in emerging markets. As anticipated by the model, results for the open-economy funds are generally weak, while results for the country funds in emerging markets

strongly support model predictions in the whole sample and in the two sub periods.

In the second step, we study the association of fund spread, defined as the change in the discount, with expected and unexpected illiquidity. The unexpected fund illiquidity is significantly associated with lower fund spread. On the other hand, the unexpected home market illiquidity significantly and positively affects the fund premium only for the group investing in emerging markets, implying that unexpected illiquidity in the home market drives down the fund's NAV return and thus increases the fund's spread only when market segmentation is binding. Although neither the fund expected illiquidity nor the home market expected illiquidity has any effect on fund premium, we find that higher expected host market-wide illiquidity leads to a higher fund spread, 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 illiquidity is high.

In the last step, we examine the liquidity sensitivity of fund spread to the systematic Pastor-Stambaugh (2003) liquidity factor. 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, the funds investing in emerging markets not only have stronger association between their spreads and the level of illiquidity but also are more sensitive to the systematic liquidity factor, implying that illiquidity is an important element that affects the closed-end country fund prices even after controlling for their NAVs and other important factors. Although a comprehensive cross-sectional analysis is left to our future research agenda, we have obtained some preliminary evidence that the fund premium or spread may be at least partially driven by a liquidity risk premium.

The remainder of the paper is organized as follows. In section I, we extend the model of Allen and Gale (1996) to multiple markets so that it conforms to the setting of closed-end country funds, derive the theoretical expression for the fund premium, and then carry out comparative static analysis which relates the fund premium to illiquidity. The theoretical results serve as the motivation and guideline for the empirical analysis. 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. A Simple Model of Illiquidity

The effect of liquidity on asset prices and returns has been studied both theoretically and empirically. The general conclusion is that stock returns increase with illiquidity, and that the liquidity risk is systematic and commands an illiquidity risk premium.

However, the examination of liquidity and asset returns across different countries is quite limited. The closed-end country funds provide a unique and interesting set of data to study the relation between an asset's price and the asset's and the market's illiquidity. A unique feature of closed-end country funds is that the fund price is formed in the host market such as the United States or the United Kingdom while the Net Asset Value (NAV) is formed in the foreign (home) market and then reported by converting to the host market currency. Since liquidity in the host and home markets is usually different, it is plausible that liquidity differences account for at least a portion of the difference in prices between the home and host market.

To motivate the empirical study, we extend a two-period ($t = 0, 1, 2$) model of Allen and Gale (1996) to multiple markets. This toy 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 liquidity shocks to transmit from one market to the other, heterogeneous investors so that some are liquidity providers and some are liquidity demanders, and exogenous liquidity shock so that it is not caused by any strategic behavior of investors.

The investors in the host market (e.g., U.S.) all have log utility function 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 liquidity shock 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.[7] The first term in equation (1) is the expected utility of wealth if the investor becomes liquidity constrained and has to liquidate his portfolio at $t = 1$ and the second term is the expected utility of wealth if the investor gets to hold his portfolio to the terminal date $t = 2$. When the liquidity uncertainty is resolved at $t = 1$, the 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 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 amount of illiquid asset that has to be sold to meet the liquidity need, i.e., the demand of 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 given by

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

If the liquidity constraint is only binding in the host market, then the fund will be traded at

[7] 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.

a discount. If the liquidity constraint is only binding in the home market, then the fund will be traded at a premium. If it is binding in both markets, then we may observe either a discount or a premium.

For motivation purposes, suppose that the distributions of λ_f, λ_c and R are such that the constraint is always binding so that $P = \frac{(1-\lambda_f)x_f^*}{\lambda_f y_f^*}$ and $NAV = \frac{(1-\lambda_c)x_c^*}{\lambda_c y_c^*}$. Substituting the price and the constraint that $x_f + y_f = 1$ into equation (1) allows us to solve for x_f^* in the host market as $0 < x_f^* = \mathrm{E}(\lambda_f) \equiv \bar{\lambda}_f < 1$. Similarly, $0 < x_c^* = \mathrm{E}(\lambda_c) \equiv \bar{\lambda}_c < 1$. The equilibrium price and NAV are then given by

$$P = \frac{(1-\lambda_f)\bar{\lambda}_f}{\lambda_f(1-\bar{\lambda}_f)}, \quad \text{and} \quad NAV = \frac{(1-\lambda_c)\bar{\lambda}_c}{\lambda_c(1-\bar{\lambda}_c)}.$$

Comparative static analysis shows that $\frac{\partial P}{\partial \lambda_f} < 0$ and $\frac{\partial NAV}{\partial \lambda_c} < 0$ so that higher illiquidity in the host market pushes down the price while higher illiquidity in the home market pushes down the NAV.[8]

Depending on the realization of λ_f (λ_c), P (NAV) can be greater than or less than one, but the expected price $\mathrm{E}(P) = \frac{\bar{\lambda}_f}{1-\bar{\lambda}_f}\mathrm{E}\left(\frac{1-\lambda_f}{\lambda_f}\right) > \frac{\bar{\lambda}_f}{1-\bar{\lambda}_f}\left(\frac{1}{\mathrm{E}(\lambda_f)} - 1\right) = 1$ because of Jensen's inequality. Thus, investors always want to invest a portion of the wealth in the risky closed-end fund instead of putting everything in cash.

The closed-end country fund premium (or the negative of discount) is defined as

$$D \equiv \frac{P}{NAV} - 1 = \frac{\bar{\lambda}_f\lambda_c - \bar{\lambda}_c\lambda_f + \left(\lambda_f - \bar{\lambda}_f\right)\lambda_c\bar{\lambda}_c - \left(\lambda_c - \bar{\lambda}_c\right)\lambda_f\bar{\lambda}_f}{\bar{\lambda}_c(1-\bar{\lambda}_f)\lambda_f(1-\lambda_c)}. \tag{2}$$

This implies that the liquidity level *relative to its mean* in both the host and the home markets affects the level of fund premium or discount.

Comparative static analysis indicates that

$$\frac{\partial D}{\partial \lambda_f} = \frac{-\bar{\lambda}_f\lambda_c(1-\bar{\lambda}_c)}{\bar{\lambda}_c(1-\bar{\lambda}_f)\lambda_f^2(1-\lambda_c)} < 0, \quad \text{and} \quad \frac{\partial D}{\partial \lambda_c} = \frac{\bar{\lambda}_f(1-\lambda_f)(1-\bar{\lambda}_c)}{\bar{\lambda}_c(1-\bar{\lambda}_f)\lambda_f(1-\lambda_c)^2} > 0. \tag{3}$$

This equation indicates that when everything else is unchanged, an increase in host market illiquidity (λ_f goes up) leads to a lower value of D, i.e., a smaller premium or a larger discount, while an increase in home market illiquidity (λ_c goes up) leads to a higher value of D, i.e., a larger premium or a smaller discount. An increase in λ_f (λ_c) while holding $\bar{\lambda}_f$ ($\bar{\lambda}_c$) constant directly implies an

[8] Although illiquidity reduces asset prices in our simple model, it is not always true that illiquidity depresses the price of securities in a more general setting. For example, Longstaff (2004) shows that in an illiquid market, prices can either be higher or lower than they would otherwise be, because illiquidity breaks down the risk-return tradeoffs and prices are then driven more by the distribution of wealth in the economy.

increase in the unexpected illiquidity $\lambda_f - \bar{\lambda}_f$ $(\lambda_c - \bar{\lambda}_c)$, so equation (3) also implies that an increase in the unexpected illiquidity in the host (home) market tends to move down (up) D.

Because of symmetry, we also have

$$\frac{\partial D}{\partial \bar{\lambda}_f} > 0, \quad \text{and} \quad \frac{\partial D}{\partial \bar{\lambda}_c} < 0. \tag{4}$$

This equation shows that an increase in the expected illiquidity in the host market *while holding other variables constant* leads to a higher fund premium (or smaller discount) and an increase in the expected illiquidity in the home market leads to a lower premium (or larger discount). This comparative static analysis result, if taken at face value, is very misleading. The *ceteris parabus* condition implicitly means that the unexpected illiquidity goes down as $\bar{\lambda}_i$ $(i = f, c)$ goes up. To examine the separate effect of an increase in the expected illiquidity on the fund premium by holding the unexpected illiquidity constant, re-write λ_i as $\bar{\lambda}_i + \lambda_{iu}$ $(i = f, c)$ so that the comparative static analysis with respect to $\bar{\lambda}_f$ is:

$$\frac{\partial D}{\partial \bar{\lambda}_f}|_{\lambda_{fu}} = \frac{\bar{\lambda}_c(1-\bar{\lambda}_c)\lambda_c(1-\lambda_c)(\lambda_f - \bar{\lambda}_f)(1-\lambda_f-\bar{\lambda}_f)}{\left(\bar{\lambda}_c(1-\bar{\lambda}_f)\lambda_f(1-\lambda_c)\right)^2}, \tag{5}$$

which depends on the magnitude of λ_f relative to its mean $\bar{\lambda}_f$ and thus cannot be signed. Similarly, $\frac{\partial D}{\partial \lambda_c}|_{\lambda_{cu}}$ cannot be signed either. If there is no surprise in illiquidity, then both terms are zero and expected illiquidity has no effect on fund premium. This result is driven by the fact that the optimal cash holding in the model is a function of the expected illiquidity so that investors "hedge" all anticipated liquidity shocks. If realized illiquidity happens to be the same as the expected one, then all shocks are hedged. If the realized illiquidity is different from the expected one, then the effect of expected illiquidity on the fund premium is ambiguous.

Although the above analysis shows that the closed-end fund discount is affected negatively by a liquidity shock in the host market, and positively, by a liquidity shock in the home market, it does not give a definite answer as to whether we should, in general, observe a discount or a premium.

The most obvious objection to the liquidity story in explaining closed-end country fund discounts is that the host market such as the U.S. and the UK, where the funds are traded, generally have higher liquidity than most foreign markets, especially emerging markets, where the underlying assets are traded. If liquidity is important in affecting asset prices, then the price in the host market should be higher than the price in the foreign home market. If anything, the liquidity story should point to a closed-end fund premium, even though we often observe discounts. This interpretation, however, misses an important point contained in equations (2) and (5): it is the

unexpected illiquidity that matters more to the fund premium or discount. For example, when $\lambda_f = \bar{\lambda}_f$ and $\lambda_c = \bar{\lambda}_c$, then $P = NAV = 1$ and $D = 0$ even though the host market is on average more liquid than the home market ($\bar{\lambda}_f < \bar{\lambda}_c$).

Of course, if a serious liquidity shock in a home market drastically reduces the NAV to below the fund price, then a premium appears. This is actually supported by our closed-end country fund data. 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) also 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.

In fact, there is an additional aspect of the liquidity effect on the price of closed-end country funds that is not captured by our toy model. The above analysis is based on a 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, host investors invest in the funds by evaluating the benefit of diversification against the cost of possibly lower fund liquidity relative to the rest of the host market. What is important to them is not only the absolute level of closed-end fund liquidity but also the relative liquidity of the fund as compared to the other assets in their opportunity set. They are willing to invest in closed-end country funds only if the diversification benefit is big enough and/or the price is low enough to justify the "opportunity liquidity cost," which is affected by the difference between the funds' and the market's liquidity difference. Therefore, 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.[9]

Following the intuitions from equations (2)-(4) and the above discussion, we will empirically examine the following two relations between closed-end country fund premium (or negative discount)

[9]Of course, the benefit of diversification also directly or indirectly affects the country funds' discount or premium.

and illiquidity:

$$
\begin{aligned}
D_{f,c,t} &= a_0 + a_1 IL_{f,t} + a_2 AIL_{h,t} + a_3 AIL_{c,t} + \epsilon_t, && (6)\\
\Delta D_{f,c,t} &= b_0 + b_1 ILE_{f,t} + b_2 ILU_{f,t} + b_3 AILE_{h,t} + b_4 AILU_{h,t} \\
&+ b_5 AILE_{c,t} + b_6 AILU_{c,t} + u_t, && (7)
\end{aligned}
$$

where $D_{f,c,t}$ denotes the premium (negative discount) for fund f at month t whose assets are traded in country c, $IL_{f,t}$ ($ILE_{f,t}$, $ILU_{f,t}$) denotes the realized (expected, unexpected) illiquidity of fund f at month t, $AIL_{c,t}$ ($AILE_{c,t}$, $AILU_{c,t}$) is the home market realized (expected, unexpected) illiquidity measure for country c at month t, and $AIL_{h,t}$ ($AILE_{h,t}$, $AILU_{h,t}$) is the host market realized (expected, unexpected) illiquidity measure. The variable $\Delta D_{f,c,t} = D_{f,c,t} - D_{f,c,t-1}$ is the change in the fund's premium or discount.

The comparative static analysis in equation (3) implies that $a_1 < 0$ and $a_3 > 0$, but the impact of host market average illiquidity AIL_h on the fund premium is ambiguous. On the one hand, when the host market illiquidity goes up, it represents a market wide tightness of liquidity in the host market. The investors price down all assets, including closed-end funds, so that D goes down, which implies $a_2 < 0$.[10] On the other hand, in a world with multiple risky assets, investors may engage in asset substitution whenever the liquidity shock to a subset of assets is greater than the rest of the market. A decline in the market-wide liquidity may represent a good opportunity to hold closed-end country funds since the "opportunity liquidity cost" of holding the less-liquid asset (the closed-end country fund) reduces, implying a higher D and thus $a_2 > 0$.

Equations (3)-(5) imply that $b_2 < 0$, $b_4 < 0$ and $b_6 > 0$, but fail to provide specific guidelines as to the sign of b_1, b_3 or b_5 in a multiple regression setting after controlling for the unexpected illiquidity . Overall, our model suggests that the fund premium should have a stronger association with the *unexpected* illiquidity in regression (7), because the investor's optimal cash holding depends on the *expected* illiquidity and this "hedging" behavior dampens the effect of the expected illiquidity.

Finally, it is important to note that our simple model is based on the key assumption of market segmentation, and equations (6)-(7) may not hold well in an integrated capital market. In a segmented market, any illiquidity shock is mostly confined to one market only, so the 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 a clear-cut reaction of the fund premium to liquidity shocks. In an integrated market, however, illiquidity shocks get easily spilled over to

[10] Since closed-end funds as a group generally has lower liquidity than the market average, there may be a "flight to liquidity" effect as well, further pushing down D.

other markets,[11] so illiquidity in the fund's home and host markets can affect both the fund's NAV and its price, leading to an ambiguous effect on the fund premium. Therefore, we expect the above two equations to hold better for funds investing in segmented or emerging countries than for those investing in developed or open economies.

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 the time variation in fund premium or discount 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 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

[11] 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.

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 (negative discount) is defined as the ratio of the price-NAV difference over the NAV:

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

Columns (9) - (12) of Table 3 report the sample mean, sample volatility, the maximum and minimum discounts 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, because capital controls and market segmentation directly affect the liquidity of the fund's home market so that we consider the liquidity measure as a more efficient and more economically relevant proxy for the effect of capital controls on the home market than any government announcement dates. This treatment of capital control implicitly assumes that the presence or removal of capital controls can only affect the fund premium through its impact on market liquidity.

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%.

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

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

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.

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%.

Figure 1 plots the time series of the average discount from August 1987 to December 2001. The average country fund discount fluctuates substantially during the sample period. It starts with a premium of 28% in August 1987 but then drops rapidly to a discount of 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.[12] 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[13] 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.

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

[12]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.

[13]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.

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 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. We calculated 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.[14] 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

$$IL_{i,c,t} = \frac{1}{D_t} \sum_{d=1}^{D_t} |R_{i,d}|/VOL_{i,d}, \tag{8}$$

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

[14] We were unable to calculate average market illiquidity for Ireland, Turkey, and Vietnam.

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 (8) 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 month:

$$AIL_{c,t} = \frac{1}{N_{c,t}} \sum_{i=1}^{N_{c,t}} IL_{i,c,t}, \tag{9}$$

where $N_{c,t}$ is the number of stocks traded in country c in month t. The stocks included in the above calculation should (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) not be considered 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).[15]

We then construct the Amihud illiquidity measure for each individual closed-end country fund f, $IL_{f,t}$, using equation (8), 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 (9).

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

[15]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.

time, implying an increasingly large "opportunity liquidity cost" of investing in closed-end country funds.

Figure 1 and Figure 2 taken together indicate that when the average liquidity difference between the 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, consequently, the generally different level of local currency volume, so a direct cross-sectional comparison of the absolute value of the Amihud illiquidity measure is not meaningful.[16] 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.

To avoid possible spurious relations caused by time trend in the illiquidity measures, we detrend 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

[16] 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.

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 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 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 the possible relations between fund price and NAV returns and illiquidity. In the last subsection, we investigate the relation between fund spread and the 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 Fund Discounts

As a first pass, we use individual OLS regression to test the equation,

$$D_{f,c,t} = a_{f,0} + a_{f,1} IL_{f,t} + a_{f,2} AIL_{h,t} + a_{f,3} AIL_{c,t} + \epsilon_t, \tag{10}$$

which relates each individual closed-end country fund's premium to the level of liquidity of the fund itself, of the host market, and of the home market for each of the 47 country funds. The regression results for the whole sample and for two equal sub-samples are reported in Table 5. If the home market illiquidity measure is not available, then the regressor is omitted from the regression.[17]

The adjusted R^2 ($\bar{R}^2$) from the time series regression ranges from -1.1% to 64.7% across the 47 funds, and 36 out of the 47 funds have $\bar{R}^2$ over 10%. The $F-$statistic rejects the null that $a_{f,1} = a_{f,2} = a_{f,3} = 0$ at 5% significance level in 42 out of 47 cases. This implies that there is a significant association between the time-variation in fund premium and the illiquidity of the fund

[17] To strictly follow the theoretical model, the regression is also estimated by constraining $a_{f,2} = 0$. For the majority of funds, the regression results are very similar to those reported in Table 5. The adjusted R^2 in this constrained regression ranges from -0.8% to 50.7%, and 31 out of the 47 funds have $\bar{R}^2$ over 10%. As a robustness check, we also add the fund's size as a control variable in the regression, and the results are virtually unchanged.

itself, the host market, and the home market.

The coefficient associated with the fund's own illiquidity, $a_{f,1}$, which is predicted to be negative, is negative in about half of the funds, but only nine of them are significant at the 5% level. Among the funds with positive estimates of $a_{f,1}$, nine are also significant at the 5% level. The theoretical relation between the fund premium and the host market illiquidity is ambiguous, but the estimate of $\hat{a}_{f,2}$ is negative in 33 out of 47 funds with 15 of them significant at 5% level. This suggests that prices of most closed-end funds are negatively associated with the market wide illiquidity of the host market even after controlling for their own illiquidity, so that the effect of "commonality in liquidity" dominates the effect of "liquidity opportunity cost." Finally, consistent with the model prediction, the estimate of $a_{f,3}$ is positive in more than two-thirds of the funds and is significantly so in 18 of them. Interestingly, eleven of the thirteen funds with negative $\hat{a}_{f,3}$'s invest in countries with open and well integrated capital markets: nine of them in developed European countries, one in Israel, and one in Singapore.[18] Moreover, $\hat{a}_{f,1}$ is of the wrong sign for nine of these 13 funds. This observation is consistent with the conjecture that the "spillover" illiquidity effect from one location to the other is stronger in an integrated capital market so that the regression holds better for funds investing in segmented or emerging countries.

To examine the stability of the relation, we re-estimate equation (10) using two equal sub periods, where the first sub period runs from August 1987 to October 1994 and the second sub period runs from November 1994 to December 2001. The sub-sample analysis may also help answer the question of how the gradual integration of international capital markets affects the association between illiquidity and the fund premium. A minimum of fifteen observations is required for the regression, so the regression is not carried out for eleven funds in the first sub period and not for one fund in the second sub period. Using the adjusted R^2 as a metric of goodness-of-fit, we find that the association between illiquidity and the fund premium for most funds is stronger in the first sub period, which is presumably the period with less integrated markets. On the other hand, the results from the second sub period are more or less consistent with the results from the whole sample. In some cases, the goodness-of-fit in both sub periods is better than it is in the whole sample, suggesting that there may have been a structural change in the relation during the past 14 years.

The regression across the 47 funds is then estimated jointly using both the constrained and unconstrained Seemingly Unrelated Regressions (SUR) approach. In the unconstrained regression where the coefficients are different for each fund, the estimates are broadly consistent with the

[18]Both Israel and Singapore have open capital markets, which are integrated with the U.S. market. In addition, the First Israel Fund also invests in ADRs.

findings from the individual OLS regressions, and are thus not reported. The constrained regression results for,

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

where the coefficients are constrained to be the same across all funds, are reported in Table 6.

When all funds are pooled together, $\hat{a}_1$ is significant and negative. The estimate of $\hat{a}_2$ is also significantly negative, which largely conforms to the general observations from the individual OLS regressions. This suggests that the host market illiquidity has an incremental explanatory power for the fund's premium or discount, possibly due to the effect of "flight to liquidity." 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-sample, parameter estimates for the fund and the U.S. market illiquidity are highly significant and have the sign as predicted by the theory, 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.

In light of the findings from the OLS regressions, 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. The results for the open-economy funds are quite 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 SUR model is examined for six groups of funds: those investing in non-Asian developed economies, those investing in Japan, those investing in Singapore, those investing in Asian-crisis economies, those investing in Latin American economies, and those investing in the remaining emerging economies. The results are reported in Table 6a. In the pre-crisis period, while $\hat{a}_2$ is significantly negative for funds investing in all the emerging economies and Japan as suggested by the model, it is significantly positive for funds investing in non-Asian open economies which is the opposite of the model implication. A similar pattern is observed for $\hat{a}_1$. On the other hand, $\hat{a}_3$ is only significant for the funds investing in Latin American economies. In contrast, during the Asian crisis period, $\hat{a}_3$ is highly significant and positive for all fund groups except for the fund investing in Singapore. Moreover, $\hat{a}_1$ and $\hat{a}_2$ are mostly significant and negative during this period. Finally, in the post-crisis period, the results are broadly consistent with those in the pre-crisis period. Therefore, implications of the simple illiquidity model are most strongly supported by the results during the Asian crisis while the support for the model's implications is weaker during both the pre- and the post-crisis periods.

B. Illiquidity and Fund Spreads

In this subsection, we examine how the change in discounts, i.e., the spread, relates to the expected and unexpected illiquidity of the fund, and of the home and host markets. The spread is an approximation of price returns after taking out the NAV returns. An increase in spread indicates an increase in the premium or a decrease in the discount. The regression,

$$S_{f,c,t} = b_0 + b_1 ILE_{f,t} + b_2 ILU_{f,t} + b_3 AILE_{h,t} + b_4 AILU_{h,t} + b_5 AILE_{c,t} + b_6 AILU_{c,t} + u_t, \quad (11)$$

relates the change in the fund premium or discount to measures of the expected and unexpected illiquidity. The comparative static analysis of our toy model implies that $b_2 < 0$, $b_4 < 0$ and $b_6 > 0$, but 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:

$$IL_t = \theta + \rho IL_{t-1} + v_t. \tag{12}$$

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 $AILU$.

The regression (11) is first analyzed for each of the 47 closed-end country fund using an individual OLS approach. In general, we observe that the unexpected illiquidity has a stronger association with the spread than the expected one. The regressions generate mostly weak results except for a few funds. We then 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):[19]

$$\begin{array}{rccccc} S = & -0.001 & + & 0.014 FILE & - & 0.045 FILU \\ & (0.38) & & (1.98) & & (4.18) \end{array} \qquad \bar{R}^2 = 10.7\%. \tag{13}$$

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

[19]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 (13), 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.

standard deviation (0.62), the fund average spread goes up by 0.9%.

Equation (11) is also analyzed in the constrained SUR framework with results reported in Table 7. Consistent with the model prediction, $\hat{b}_2$ 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 emerging economies, during the whole sample period. This implies that the unexpected fund illiquidity is associated with lower fund spread. The estimate of $\hat{b}_3$ is positive and significant for the group of funds investing in emerging markets and for the all-funds group, but it is not significant for the group of funds investing in developed economies. This result indicates that higher expected U.S. market illiquidity leads to a higher fund spread and an increase in the fund premium. This 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 only significantly positive for the group of funds investing in emerging markets, implying that unexpected illiquidity in the home market drives down the fund's NAV return and thus increases the fund's spread only for segmented markets. In contrast to Table 6 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.

To avoid the interactions 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 8. 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, but the regression coefficients are highly significant and have the right sign for the funds investing in emerging markets in the whole and in the second sub period.In the first sub period, neither group's fund premium is significantly related to any of the regressors, but interestingly, the fund premium for the combined all-funds group is significantly associated with both the U.S. market expected and unexpected illiquidity in the same way as suggested by the model.

C. Aggregate Illiquidity Factor and Fund Spreads

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 in a way that is consistent with our model. Although the level of illiquidity is an important characteristic and is thus highly relevant to asset pricing, Pastor and Stambaugh (2003) argue that it is equally important to examine whether the market-wide liquidity is a priced state variable. They find that the illiquidity beta is

significantly priced in the U.S. stock market, leading to a large and significant illiquidity premium. 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. In light of the findings in Pastor and Stambaugh (2003), a significant beta loading implies that liquidity risk at least provides a partial explanation for the fund spread.

As a first pass, we examine whether the average spread S is significantly related to a systematic liquidity factor after controlling for the popular Fama-French market, size, and value factors in the U.S. market.[20] We find a significant relation between the average fund spread, S, and both the level ($PSLIQL$) and the innovation ($PSLIQI$) of the systematic liquidity factor constructed by Pastor and Stambaugh (2003) for the sample period of August 1987 to December 1999 even after we control for the popular three factors.[21]

The following equation reports the regression results using the level of the Pastor-Stambaugh liquidity measure:

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

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, while the variable $PSLIQL$ stands for 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.

The same regression is carried out for individual funds in the simple OLS and the constrained

[20] Bodurtha et. al. (1995) find that the closed-end country spread is generally not significantly related to the home market return or to the change in the foreign exchange rates, possibly because the spread is approximately the difference between the fund price return and the NAV return. As a robustness check, we also estimate the constrained SUR model by including the foreign exchange rate changes and the home market return as additional regressors. Although both regressors enter the regression significantly, parameter estimates for the liquidity and the Fama-French factors remain virtually unchanged.

[21] 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. If we use the Amihud market-wide illiquidity measure, AIL_h, in the regression of the *average* fund spread, the beta becomes insignificant. The individual fund OLS regression and the SUR model, however, produce similar results when either $PSLIQL$ or AIL_h is used. We only report the results involving $PSLIQL$ in the paper.

SUR model, since the unconstrained SUR model is equivalent to the simple OLS when the regressors are the same. In the simple OLS regression, about half of the funds load significantly on the U.S. excess market return, but only four funds have a Newey-West adjusted $t-$ratio above two for the loadings of SMB and eight funds have a $t-$ratio above two for the loadings of HML. In addition, only eight funds load significantly on the systematic liquidity factor $PSLIQL$.

Results from the pooled regression, as reported in Table 9, are more encouraging. The pooled regression for the whole sample 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 emerging markets. The loading 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.

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; the market beta for the second group is almost twice as much as that for the first group; and while the loading for the value factor is highly significant for the first group, it is not for the second group.

In contrast, in the second half of the sample period, the liquidity loading for the all-funds group is slightly negative and insignificant. 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 that for the first group.

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 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.

V. Conclusion

Using a toy model of market segmentation and exogenous liquidity shock, we derive a simple theoretical expression for the closed-end country fund premium. Comparative static analysis implies that the fund premium decreases (increases) with higher illiquidity in the host (home) market. Similar predictions apply to the unexpected shocks, but the association between fund premium and the expected illiquidity is ambiguous. Our model also suggests that the relation between the fund premium and illiquidity hold better for funds investing in a foreign market that is less integrated with the U.S. market. Motivated by these theoretical predictions, 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.

Consistent with the comparative static analysis, 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 host 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.

Although 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 sign consistent with the theory 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 closed-end country fund and its corresponding home market became closer substitutes. As the illiquidity in one market can easily transmit to the other, illiquidity may affect the price and the NAV of a fund simultaneously, leading to an ambiguous effect on the fund premium. For the same reason, results for the open-economy funds are generally weak, while the results for the emerging country funds strongly support model predictions.

In addition, higher unexpected fund illiquidity is associated with lower fund spread while higher expected U.S. market illiquidity leads to a higher fund spread. The former result is suggested by the model, while the latter finding is consistent with the notion 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 illiquidity in the home market significantly and positively affects the fund premium only for the group investing in emerging markets, implying that home-market unexpected illiquidity raises the fund's spread only when market segmentation is binding.

Finally, the spread of funds investing in emerging economies 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 emerging markets not only has stronger association with the level of illiquidity but also is more sensitive to the systematic liquidity factor, lending some support that illiquidity is an important element affecting the closed-end country fund premium or discount. Although a cross-sectional investigation is delegated to a future research project, in this paper we have provided some preliminary evidence that the fund premium or spread may be at least partially explained by a liquidity risk premium.

Appendix: Bias Adjustment

If u_t in equation (11) and v_t in equation (12) 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 (12).

AH shows that running OLS regression on equation (11) 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 From	Raw Data To	Change of Structure or Investment Objective Nature of Change	Change of Structure or Investment Objective 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 OLS Regression of Fund Premium on Illiquidity

This table contains the regression results of the fund premium, D, on the illiquidity of the fund itself, of the host market, and of the home market:

$$D_{f,c,t} = a_{f,0} + a_{f,1} IL_{f,t} + a_{f,2} AIL_{h,t} + a_{f,3} AIL_{c,t}$$

The $t-$ratios reported in brackets are adjusted for HAC using the Newey-West method. The adjusted R^2 is reported in percentages.

		Whole Sample: 1987/8 to 2001/12						Sub-sample: 1987/8 to 1994/10						Sub-sample: 1994/11 to 2001/12					
No.	Ticker	Obs.	a_0	a_1	a_2	a_3	R^2	Obs.	a_0	a_1	a_2	a_3	R^2	Obs.	a_0	a_1	a_2	a_3	R^2
1	AF	93	0.006	-0.035	0.039	0.011	3.9	15	-0.001	0.015	-0.185	0.011	24.8	78	0.006	-0.033	0.049	-0.005	4.1
			[0.54]	[2.81]	[1.08]	[0.86]			[0.18]	[1.50]	[2.88]	[1.04]			[0.47]	[2.38]	[1.31]	[0.27]	
2	BZF	90	-0.013	-0.028	-0.031	0.031	15.0	74	-0.030	-0.147	0.396	n.a.	15.0	86	-0.017	-0.014	-0.058	0.026	15.0
			[0.79]	[1.57]	[0.61]	[1.72]			[1.02]	[6.14]	[7.12]				[1.01]	[0.66]	[1.03]	[1.37]	
3	BZL	90	0.007	0.051	-0.056	0.034	29.3	25	0.046	-0.054	0.162	n.a.	21.7	86	0.006	0.052	-0.059	0.032	29.1
			[0.78]	[5.01]	[1.78]	[3.36]			[1.47]	[3.12]	[1.55]				[0.63]	[5.12]	[1.90]	[2.91]	
4	CH	141	0.003	0.014	-0.102	-0.028	26.4	55	0.063	0.025	-0.244	-0.015	64.1	86	-0.014	0.047	-0.105	-0.044	31.4
			[0.27]	[1.00]	[4.05]	[1.49]			[5.37]	[2.61]	[8.58]	[0.50]			[1.71]	[3.04]	[4.71]	[4.40]	
5	CRF	31	0.005	-0.026	0.011	0.001	3.5				n.a.			31	0.005	-0.026	0.011	0.001	3.5
			[0.24]	[2.31]	[0.25]	[0.29]									[0.24]	[2.31]	[0.25]	[0.29]	
6	FAK	58	-0.048	-0.030	-0.161	0.110	64.7				n.a.			58	-0.048	-0.030	-0.161	0.110	64.7
			[2.84]	[1.70]	[3.97]	[5.20]									[2.84]	[1.70]	[3.97]	[5.20]	
7	FGF	58	0.006	-0.041	-0.029	n.a.	12.8	51	0.019	-0.025	-0.049	n.a.	25.2				n.a.		
			[0.50]	[2.29]	[1.44]				[1.91]	[1.43]	[2.80]								
8	FPF	140	0.004	0.010	-0.096	0.003	27.0	54	-0.007	-0.002	-0.010	-0.044	35.6	86	-0.009	0.017	-0.134	0.019	38.7
			[0.47]	[1.44]	[3.39]	[0.26]			[0.69]	[0.16]	[0.33]	[2.75]			[1.40]	[2.43]	[3.90]	[1.41]	
9	FRF	134	0.000	0.000	0.013	-0.009	-1.1	48	0.051	-0.016	-0.103	-0.020	42.9	86	-0.007	0.013	0.062	-0.014	62.2
			[0.04]	[0.00]	[0.62]	[0.49]			[3.17]	[0.74]	[3.88]	[1.31]			[2.44]	[3.08]	[7.22]	[1.06]	
10	FRG	45	-0.042	0.027	-0.058	-0.024	28.4	50	0.024	-0.041	-0.041	n.a.	34.5	45	-0.042	0.027	-0.058	-0.024	28.4
			[3.51]	[2.08]	[1.58]	[3.81]			[2.56]	[2.08]	[2.31]				[3.51]	[2.08]	[1.58]	[3.81]	
11	GER	84	-0.015	0.037	0.107	-0.011	58.4	87	0.032	-0.191	0.034	n.a.	59.5	84	-0.015	0.037	0.107	-0.011	58.4
			[1.95]	[2.92]	[3.87]	[0.99]			[1.58]	[4.40]	[1.16]				[1.95]	[2.92]	[3.87]	[0.99]	
12	GF	84	-0.006	0.024	0.018	-0.007	25.3	52	0.026	0.014	-0.046	n.a.	7.5	84	-0.006	0.024	0.018	-0.007	25.3
			[1.17]	[2.99]	[0.99]	[1.26]			[2.65]	[0.86]	[3.14]				[1.17]	[2.99]	[0.99]	[1.26]	
13	GSP	95	0.001	-0.024	-0.004	-0.019	8.5	51	0.026	-0.022	-0.047	-0.011	25.1	44	-0.031	-0.007	-0.028	-0.041	35.6
			[0.11]	[2.02]	[0.22]	[1.39]			[1.62]	[0.93]	[1.43]	[0.70]			[1.98]	[0.79]	[0.83]	[1.91]	
14	IAF	163	0.001	-0.023	0.062	-0.016	9.7	77	0.018	-0.045	0.046	-0.039	26.4	86	-0.013	0.006	0.021	0.001	6.9
			[0.15]	[1.63]	[2.35]	[1.32]			[1.49]	[3.24]	[1.37]	[3.02]			[1.81]	[0.40]	[0.92]	[0.12]	
15	IF	134	0.008	-0.001	-0.090	0.024	3.3	50	0.049	-0.040	-0.122	0.026	33.8	84	-0.004	0.009	-0.017	0.057	3.2
			[0.24]	[0.02]	[0.86]	[0.82]			[1.73]	[2.55]	[1.97]	[0.72]			[0.09]	[0.16]	[0.08]	[1.61]	
16	IFN	84	0.004	0.008	-0.038	0.083	25.4				n.a.			84	0.004	0.008	-0.038	0.083	25.4
			[0.26]	[0.29]	[1.08]	[3.58]									[0.26]	[0.29]	[1.08]	[3.58]	

n.a. indicates that the illiquidity measure for the foreign country is not available or the number of observations is less than fifteen.

Table 5 (continued)

		Whole Sample: 1987/8 to 2001/12						Sub-sample: 1987/8 to 1994/10						Sub-sample: 1994/11 to 2001/12					
No.	Ticker	Obs.	a_0	a_1	a_2	a_3	R^2	Obs.	a_0	a_1	a_2	a_3	R^2	Obs.	a_0	a_1	a_2	a_3	R^2
17	IGF	83	0.005	-0.079	-0.085	0.056	34.0	69	0.011	-0.070	-0.142	n.a.	31.8	83	0.005	-0.079	-0.085	0.056	34.0
			[0.20]	[2.19]	[1.17]	[1.00]			[0.25]	[1.73]	[1.43]				[0.20]	[2.19]	[1.17]	[1.00]	
18	IIF	84	0.002	0.010	-0.062	0.104	29.9				n.a.			84	0.002	0.010	-0.062	0.104	29.9
			[0.10]	[0.47]	[1.65]	[4.27]									[0.10]	[0.47]	[1.65]	[4.27]	
19	IRL	136	0.003	0.010	-0.088	n.a.	35.7	50	0.031	-0.015	-0.121	n.a.	67.3	86	-0.006	0.018	-0.089	n.a.	25.0
			[0.42]	[0.89]	[6.33]				[3.83]	[1.98]	[8.67]				[0.83]	[0.86]	[3.45]		
20	ISL	102	0.007	0.037	0.060	-0.015	20.3	17	-0.004	0.088	-0.001	-0.085	6.6	85	-0.005	0.016	0.084	-0.001	42.2
			[0.58]	[1.75]	[2.73]	[1.66]			[0.05]	[3.11]	[0.00]	[1.65]			[0.83]	[1.17]	[6.02]	[0.31]	
21	ITA	173	0.000	-0.012	0.011	-0.048	19.1	87	0.013	-0.051	-0.007	-0.060	30.7	86	-0.019	0.017	0.037	-0.005	40.2
			[0.00]	[0.72]	[0.38]	[3.14]			[0.66]	[2.16]	[0.18]	[2.92]			[4.02]	[2.48]	[2.30]	[0.91]	
22	JEQ	108	-0.016	-0.031	-0.201	0.124	36.7	22	-0.034	-0.164	-0.132	0.267	52.8	86	-0.001	0.022	-0.220	0.082	41.1
			[0.73]	[0.64]	[4.72]	[2.53]			[0.79]	[4.93]	[0.98]	[4.35]			[0.04]	[0.50]	[5.90]	[1.96]	
23	JFI	84	0.002	0.018	-0.015	0.059	11.2				n.a.			84	0.002	0.018	-0.015	0.059	11.2
			[0.16]	[1.09]	[0.46]	[2.52]									[0.16]	[1.09]	[0.46]	[2.52]	
24	JGF	114	0.014	0.105	-0.250	-0.023	21.1	49	0.065	-0.017	-0.175	0.025	45.1	65	-0.081	0.185	-0.524	-0.008	37.7
			[0.58]	[2.76]	[2.46]	[1.40]			[2.71]	[1.03]	[3.39]	[1.04]			[2.29]	[4.55]	[2.85]	[0.43]	
25	JOF	133	0.008	0.044	-0.144	0.082	33.6	47	0.014	-0.056	-0.104	0.131	22.1	86	-0.010	0.076	-0.170	0.053	48.9
			[0.50]	[1.64]	[4.17]	[1.85]			[0.53]	[1.86]	[1.94]	[2.53]			[0.52]	[3.79]	[3.79]	[1.22]	
26	KEF	92	-0.013	0.018	-0.172	0.100	44.4				n.a.			86	-0.016	0.012	-0.171	0.104	45.1
			[0.70]	[0.84]	[3.81]	[3.27]									[0.84]	[0.53]	[3.76]	[3.26]	
27	KF	173	0.000	-0.051	-0.168	0.050	21.2	87	0.020	-0.146	-0.201	0.023	43.7	86	0.016	0.080	-0.104	0.068	32.1
			[0.00]	[1.26]	[3.55]	[1.81]			[0.60]	[2.95]	[2.72]	[0.52]			[0.94]	[2.32]	[1.97]	[2.07]	
28	KIF	108	-0.011	0.057	-0.162	0.075	36.2	27	0.026	0.001	-0.179	0.039	4.4	81	-0.024	0.058	-0.154	0.095	45.9
			[0.56]	[3.44]	[2.70]	[2.35]			[1.32]	[0.03]	[1.63]	[1.44]			[1.03]	[2.49]	[2.46]	[2.50]	
29	MEF	90	0.020	-0.044	-0.001	0.056	11.9	43	0.010	-0.012	-0.178	0.009	61.4	47	0.121	-0.056	0.282	0.057	22.2
			[0.68]	[1.03]	[0.02]	[2.10]			[0.77]	[0.65]	[5.29]	[1.30]			[1.58]	[0.63]	[1.89]	[1.72]	
30	MF	170	0.004	-0.093	-0.116	0.132	12.8	84	-0.005	-0.120	0.040	0.083	27.3	86	-0.038	0.059	-0.575	0.116	31.6
			[0.12]	[2.17]	[1.59]	[2.77]			[0.23]	[2.37]	[1.43]	[1.56]			[0.90]	[0.76]	[5.03]	[2.44]	
31	MXE	131	0.007	-0.047	0.075	0.041	11.2	45	0.048	-0.034	-0.112	0.032	68.7	86	-0.002	-0.026	0.100	0.051	12.7
			[0.37]	[2.17]	[2.10]	[2.00]			[3.97]	[2.91]	[4.45]	[3.65]			[0.13]	[0.78]	[2.54]	[1.20]	
32	MXF	167	0.003	-0.092	0.083	0.023	42.1	82	0.006	-0.073	0.034	0.001	52.2	85	0.011	-0.127	0.161	0.034	37.4
			[0.24]	[5.29]	[4.37]	[1.55]			[0.54]	[5.99]	[2.24]	[0.07]			[0.64]	[4.08]	[3.62]	[1.50]	

n.a. indicates that the illiquidity measure for the foreign country is not available or the number of observations is less than fifteen.

Table 5 (continued)

		Whole Sample: 1987/8 to 2001/12						Sub-sample: 1987/8 to 1994/10						Sub-sample: 1994/11 to 2001/12					
No.	Ticker	Obs.	a_0	a_1	a_2	a_3	R^2	Obs.	a_0	a_1	a_2	a_3	R^2	Obs.	a_0	a_1	a_2	a_3	R^2
33	OST	142	0.000	0.033	-0.033	-0.016	7.2	56	0.065	0.009	-0.153	0.003	52.7	86	-0.010	0.015	0.062	-0.015	22.2
			[0.01]	[3.15]	[1.10]	[1.24]			[4.73]	[0.64]	[6.53]	[0.29]			[0.91]	[1.38]	[1.78]	[1.17]	
34	PGF	68	0.024	-0.030	0.078	0.019	25.8				n.a.			56	0.009	-0.004	0.064	0.009	19.4
			[1.34]	[1.97]	[1.41]	[1.54]									[0.52]	[0.24]	[1.55]	[1.33]	
35	PKF	66	-0.042	-0.014	-0.136	0.009	23.3				n.a.			61	-0.037	-0.014	-0.137	0.005	19.3
			[3.51]	[1.46]	[2.83]	[1.13]									[3.14]	[1.50]	[2.81]	[0.37]	
36	ROC	128	0.011	-0.021	-0.092	0.061	16.7	42	0.065	0.004	-0.132	-0.014	20.7	86	-0.004	-0.013	-0.110	0.067	24.8
			[0.89]	[1.39]	[2.10]	[4.31]			[3.09]	[0.13]	[2.96]	[0.49]			[0.36]	[0.87]	[2.08]	[4.22]	
37	SGF	132	-0.001	0.015	-0.202	-0.023	48.9	46	0.011	-0.050	-0.144	-0.039	66.0	86	-0.006	0.036	-0.202	0.006	48.4
			[0.09]	[0.86]	[6.87]	[1.16]			[0.76]	[2.03]	[2.72]	[1.39]			[0.63]	[2.48]	[7.81]	[0.50]	
38	SNF	143	-0.029	-0.011	0.157	-0.057	20.5	57	-0.007	-0.068	0.039	-0.105	37.0	86	0.003	0.018	0.310	-0.067	61.3
			[1.67]	[0.42]	[3.69]	[2.22]			[0.31]	[2.09]	[0.80]	[3.63]			[0.20]	[0.70]	[6.60]	[2.32]	
39	SWZ	140	0.008	0.000	0.020	0.009	2.6	54	0.060	-0.012	-0.054	0.014	20.6	86	-0.012	0.002	0.034	0.008	19.4
			[0.94]	[0.00]	[0.88]	[0.72]			[10.03]	[0.76]	[2.55]	[0.74]			[2.18]	[0.26]	[2.07]	[0.85]	
40	TCTF	123	0.038	0.085	-0.172	0.048	24.1	48	-0.003	0.038	-0.046	0.004	15.7	75	0.032	0.109	-0.155	0.075	26.3
			[1.49]	[3.63]	[2.54]	[2.53]			[0.13]	[2.08]	[1.06]	[0.22]			[0.68]	[3.52]	[1.11]	[2.38]	
41	TKF	139	0.004	0.032	-0.113	n.a.	4.0	53	0.129	0.041	-0.393	n.a.	27.8	86	-0.020	0.054	0.001	n.a.	10.3
			[0.13]	[0.96]	[1.57]				[2.05]	[1.15]	[4.03]				[1.00]	[2.61]	[0.03]		
42	TRF	73	-0.005	0.025	-0.072	0.049	7.4				n.a.			73	-0.005	0.025	-0.072	0.049	7.4
			[0.23]	[1.03]	[1.40]	[3.13]									[0.23]	[1.03]	[1.40]	[3.13]	
43	TTF	161	0.002	0.069	-0.170	0.160	31.5	75	0.025	-0.044	-0.046	0.165	37.8	86	-0.016	0.129	-0.276	0.183	33.3
			[0.05]	[1.53]	[2.34]	[6.14]			[0.60]	[0.78]	[0.88]	[4.71]			[0.23]	[2.12]	[1.86]	[3.62]	
44	TVF	82	-0.004	0.023	-0.048	n.a.	9.5				n.a.			82	-0.004	0.023	-0.048	n.a.	9.5
			[0.43]	[2.22]	[1.86]										[0.43]	[2.22]	[1.86]		
45	TWN	128	-0.003	-0.037	-0.026	0.060	10.4	42	0.044	0.008	-0.114	-0.088	25.8	86	0.002	-0.032	0.005	0.080	36.3
			[0.16]	[1.46]	[0.46]	[3.51]			[1.42]	[0.15]	[1.14]	[1.75]			[0.18]	[1.66]	[0.10]	[5.96]	
46	TYW	58	0.022	-0.007	-0.035	0.069	31.8				n.a.			58	0.022	-0.007	-0.035	0.069	31.8
			[1.04]	[0.47]	[0.69]	[7.69]									[1.04]	[0.47]	[0.69]	[7.69]	
47	UKM	127	-0.002	-0.028	0.010	0.021	23.1	82	0.011	-0.028	-0.021	0.026	32.7	45	-0.026	-0.002	0.000	-0.015	-0.8
			[0.28]	[2.65]	[0.92]	[2.85]			[1.44]	[2.20]	[1.34]	[3.98]			[1.66]	[0.23]	[0.01]	[0.81]	

n.a. indicates that the illiquidity measure for the foreign country is not available or the number of observations is less than fifteen.

Table 6 Fund Premium and Illiquidity in a SUR Model

This table contains the regression results of the fund premium on the fund's own, the host market, and the home market illiquidity in a constrained Seemingly Unrelated Regressions framework,

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

where the coefficients are constrained to be the same across all funds. 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-sample 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-sample 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 6a Fund Premium and Illiquidity in a SUR Model around the Asian Crisis

This table contains the regression results of the fund premium on the fund's own, the host market, and the home market illiquidity in a constrained Seemingly Unrelated Regressions framework,

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

where the coefficients are constrained to be the same across all funds. The $t-$ratios reported in brackets are adjusted for heteroskedasticity and contemporaneous correlation.

		Pre-crisis: 1994/11 to 1996/12				Asian Crisis: 1997/1 to 1999/1				Post-crisis: 1999/2 to 2001/12			
		a_0	a_1	a_2	a_3	a_0	a_1	a_2	a_3	a_0	a_1	a_2	a_3
Funds Investing in Non-Asian Open Economies	Estimates	-0.065	0.003	0.048	0.002	-0.052	0.003	-0.020	0.008	0.001	-0.004	0.028	0.009
	$t-$ratio	[23.81]	[2.05]	[5.61]	[1.45]	[15.60]	[1.90]	[2.80]	[7.00]	[0.41]	[1.84]	[2.52]	[3.41]
Funds Investing in Japan	Estimates	-0.054	-0.029	-0.241	0.015	0.090	-0.018	-0.022	0.130	0.007	0.050	-0.322	-0.098
	$t-$ratio	[2.26]	[1.48]	[2.73]	[0.45]	[3.00]	[0.91]	[0.46]	[3.09]	[0.26]	[2.36]	[4.04]	[1.62]
Funds Investing in Singapore	Estimates	0.066	0.010	0.016	-0.042	-0.026	0.046	-0.193	0.038	-0.046	0.030	-0.110	-0.017
	$t-$ratio	[3.02]	[0.31]	[0.14]	[1.60]	[0.95]	[2.12]	[4.90]	[1.34]	[4.27]	[1.79]	[2.48]	[0.98]
Funds Investing in Asian Crisis Economies[1]	Estimates	-0.063	0.004	-0.048	0.005	-0.001	-0.005	-0.026	0.064	-0.033	0.006	-0.032	-0.002
	$t-$ratio	[10.63]	[1.38]	[2.63]	[1.74]	[0.23]	[2.42]	[2.76]	[17.70]	[6.14]	[2.12]	[1.77]	[0.48]
Funds Investing in Latin American Economies	Estimates	0.010	-0.013	-0.117	0.024	-0.074	-0.013	-0.045	0.013	-0.003	0.006	0.025	0.015
	$t-$ratio	[0.81]	[2.09]	[3.08]	[3.66]	[12.14]	[2.80]	[3.41]	[3.22]	[0.49]	[1.51]	[1.28]	[3.25]
Funds Investing in other Emerging Economies[2]	Estimates	-0.018	-0.013	-0.102	0.003	-0.060	0.016	-0.014	0.020	-0.039	-0.014	0.019	0.013
	$t-$ratio	[1.15]	[2.19]	[2.12]	[1.00]	[7.52]	[2.99]	[0.92]	[2.68]	[5.44]	[3.09]	[0.66]	[1.18]

1. The funds include those investing in Korea, Indonesia, Malaysia, Philippines, Taiwan, Thailand, and Vietnam.
2. The funds include those investing in the Czech Republic, India, Pakistan, Russia, and Turkey.

Table 7 Fund Spread and Individual, Market-Wide Illiquidity in a SUR Model

This table contains the regression results of the fund spread on the expected and unexpected illiquidity of the fund, the host market, and the home market in a constrained Seemingly Unrelated Regressions framework,

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

where the coefficients are constrained to be the same across all funds. 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_1	b_2	b_3	b_4	b_5	b_6
	Panel A: Whole Sample 1987/8 to 2001/12							
All	Estimates	0.001	-0.002	-0.006	0.010	-0.012	0.000	0.002
Funds	$t-$ratio	[0.52]	[1.14]	[4.62]	[3.08]	[1.57]	[0.09]	[1.19]
Funds Investing in	Estimates	0.001	0.002	-0.007	0.005	-0.001	0.001	-0.001
Open Economies	$t-$ratio	[0.39]	[0.72]	[3.59]	[1.40]	[0.15]	[0.44]	[0.57]
Funds Investing in	Estimates	-0.000	-0.002	-0.004	0.017	-0.026	0.000	0.005
Emerging Economies	$t-$ratio	[0.23]	[1.23]	[3.26]	[3.22]	[2.15]	[0.04]	[2.34]
	Panel B: Sub-sample 1987/8 to 1994/10							
All	Estimates	-0.001	0.002	-0.011	0.014	-0.020	0.002	-0.001
Funds	$t-$ratio	[0.52]	[0.71]	[5.32]	[2.62]	[1.56]	[1.00]	[0.34]
Funds Investing in	Estimates	-0.000	0.005	-0.015	0.009	-0.021	0.002	-0.003
Open Economies	$t-$ratio	[0.15]	[1.05]	[4.59]	[1.39]	[1.43]	[0.65]	[0.67]
Funds Investing in	Estimates	-0.001	-0.003	-0.011	0.020	-0.024	0.005	0.001
Emerging Economies	$t-$ratio	[0.25]	[0.88]	[2.58]	[1.84]	[1.02]	[1.20]	[0.22]
	Panel C: Sub-sample 1994/11 to 2001/12							
All	Estimates	0.002	-0.003	-0.002	0.012	0.000	-0.000	0.004
Funds	$t-$ratio	[1.59]	[2.18]	[1.61]	[3.79]	[0.00]	[0.01]	[2.99]
Funds Investing in	Estimates	0.001	0.002	-0.007	0.006	0.000	0.001	-0.002
Open Economies	$t-$ratio	[0.41]	[0.69]	[3.64]	[1.48]	[0.02]	[0.43]	[0.72]
Funds Investing in	Estimates	0.001	-0.004	-0.000	0.022	-0.016	-0.002	0.007
Emerging Economies	$t-$ratio	[0.84]	[2.29]	[0.13]	[4.31]	[1.43]	[1.00]	[2.88]

Table 8 Fund Spread and Market-Wide Illiquidity in a SUR Model

This table contains the regression results of the fund spread on the expected and unexpected illiquidity of the fund, the host market, and the home market in a constrained Seemingly Unrelated Regressions framework,

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

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

Table 9 Fund Spread and Systematic Factors in a SUR Model

This table contains the regression results of the fund spread on the systematic liquidity factor, $PSLIQL$, and the market (MMF), the size (SMB), and the value (HML) factors in a constrained Seemingly Unrelated Regressions framework,

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

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

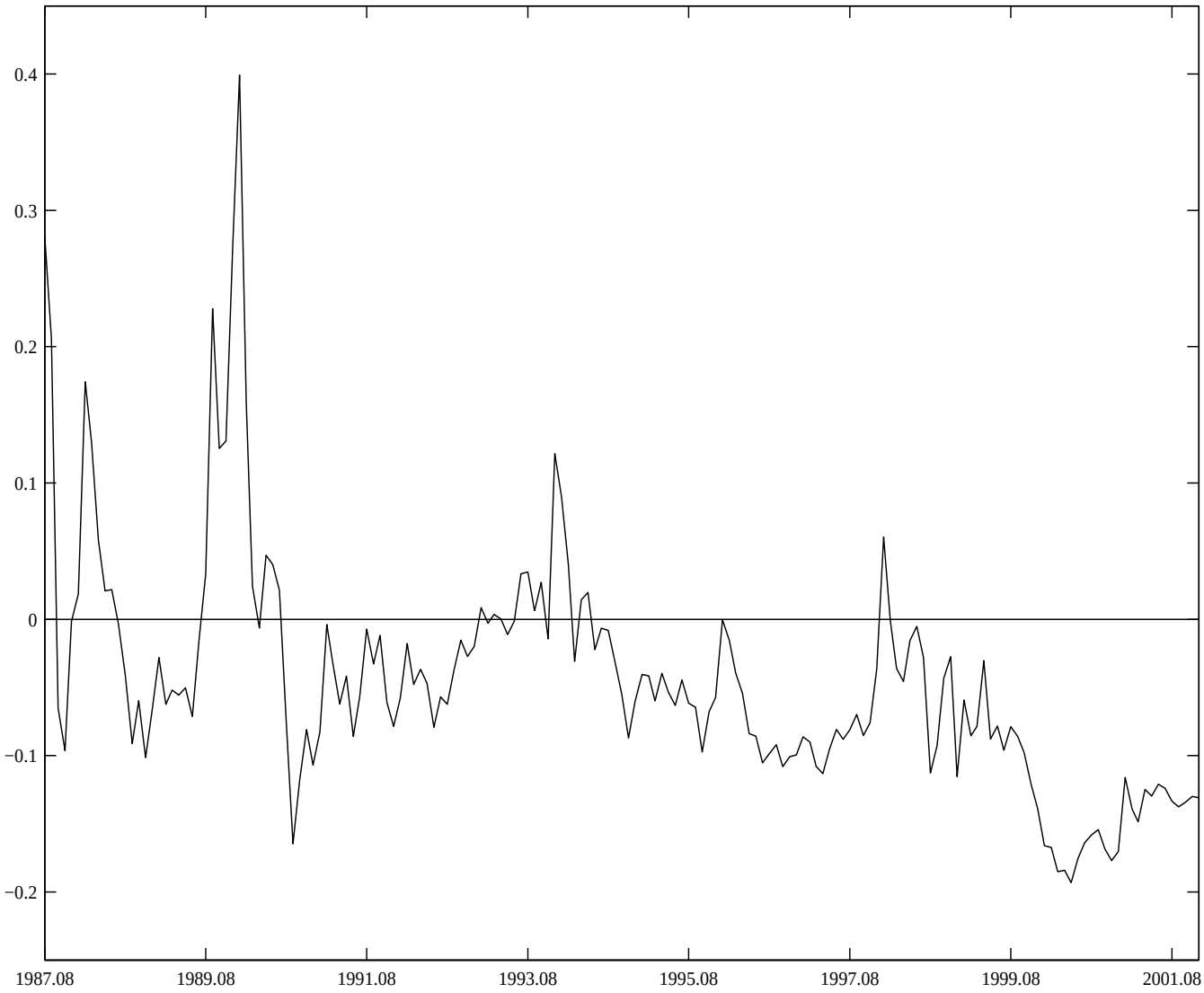
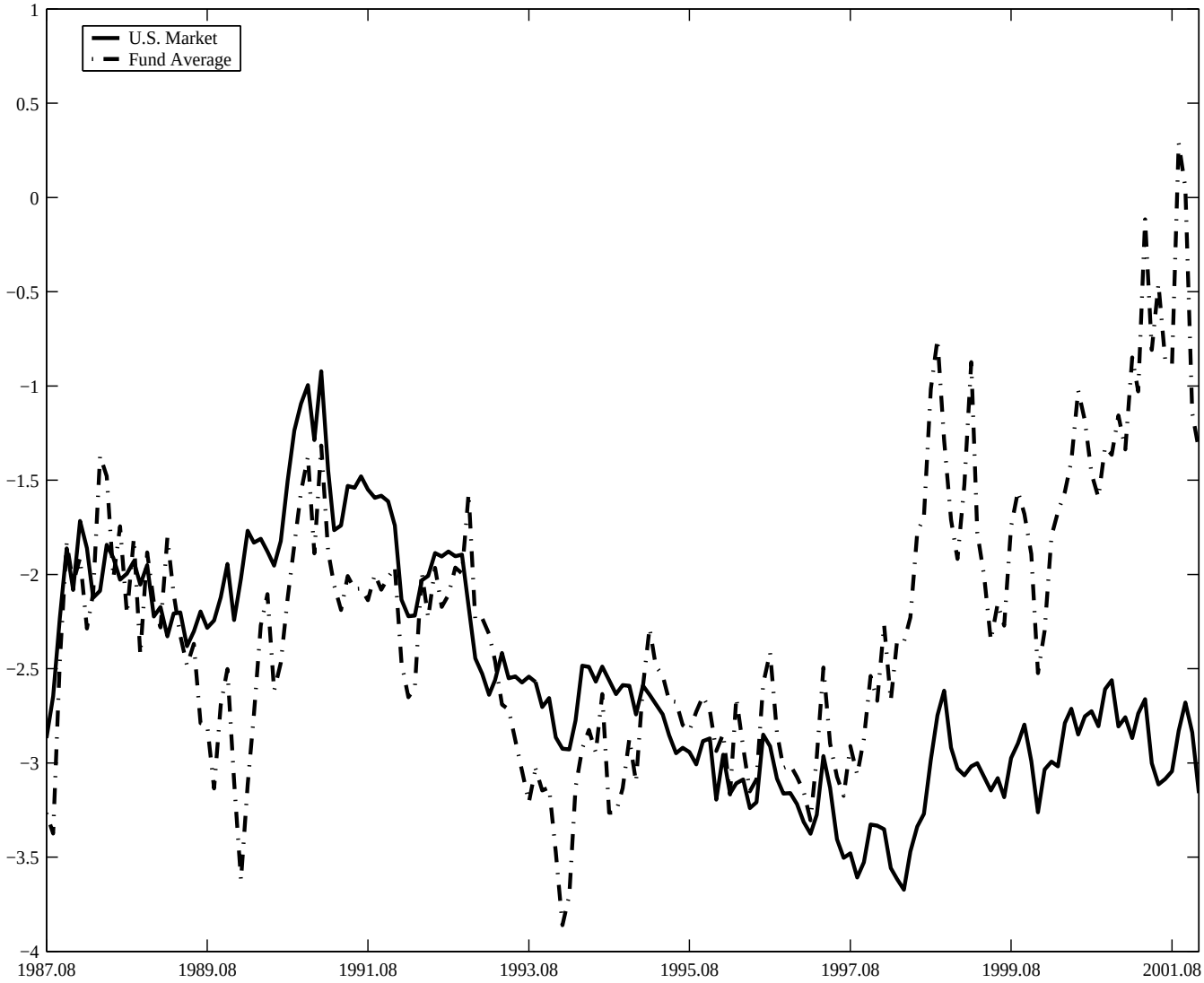


Figure 2
Time Series of Average Fund Amihud Illiquidity and the U.S. Market Amihud Illiquidity

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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