ARROWSTREET CAPITAL
LIMITED PARTNERSHIP

Measuring and Monitoring Capacity in Emerging Markets
May 2011

Introduction

Consistent with our commitment to our clients and our focus on investment performance, we closely monitor and evaluate each investment strategy's implementation costs and the associated implications regarding incremental capacity. We adopt a conservative approach and have closed investment strategies in the past due to capacity and will continue to do so as necessary in the future.

This investment note describes the analytics and measures we believe should be considered when thinking about capacity issues in a capacity constrained asset class. As such, we will review the following points:

- How we measure our emerging markets asset under management
- An analysis of our trading costs and portfolio process over time
- Our conclusions based upon this analysis

I. Assets Deployed in Arrowstreet's Emerging Markets Strategy

For purposes of measuring assets under management in our emerging markets strategy, we take a comprehensive perspective. We consider our existing emerging markets assets firm wide as well as our capacity for future alpha growth and the growth of other mandates which include emerging markets.

We consider assets in three distinct kinds of mandates managed at Arrowstreet:

- Dedicated emerging markets mandates: 100% of these assets are set against our total emerging markets capacity.
- MSCI All Country World Index (ACWI), MSCI All Country World ex US Index (ACWI ex US), or mandates with comparable benchmarks: The benchmark weight of emerging markets in these mandates is set against our total emerging markets capacity. Of course, at any time the actual portfolios may be either over-weight or under-weight emerging markets stocks in these mandates.
- Opportunistic mandates: Defined as mandates that do not include emerging markets stocks in the benchmark, but where Arrowstreet may take positions on an opportunistic basis. In these instances, we approximate the exposure to emerging markets stocks at half of the maximum allowed exposure. While the actual exposure will vary from this value, based upon our experience this is a reasonable approximation and we reserve capacity for these mandates as well.

We also consider future demands when assessing the capacity of our dedicated emerging markets product:

- Future alpha growth: If we are successful in meeting our performance targets over time, we would expect our assets under management to grow at a slightly faster rate

than the market. We retain some capacity in anticipation of future alpha-driven growth.
- Future ACWI and ACWI ex US mandates: We retain some capacity for future ACWI and ACWI ex US mandates.

II. Impact of Asset Growth

As part of our efforts to prudently manage investment capacity, we regularly measure our assets under management as a proportion of the investable universe, carefully monitor the transaction costs of each trade session, and look at trends in transaction costs over time. Our analysis is designed to identify whether, as our assets under management in the emerging markets strategy have grown, we have begun to generate increased market impact or otherwise compromised our ability to meet our investment objectives.

For active managers, all other things being equal, an increase in assets under management should result in higher implementation costs. There are, however, specific actions that Arrowstreet has undertaken to offset or mitigate this impact. For example, Arrowstreet has accessed more pools of liquidity through increased usage of alternative trading systems, conducted smaller but more frequent portfolio rebalances to access greater liquidity, and expanded usage of trading algorithms. The analysis below evaluates the success of these initiatives.

We focus on three distinct measures to evaluate the efficacy of our efforts:

- Transaction costs: This is the most obvious, and conceptually most straightforward, measure. Measuring market impact practically, however, is difficult. To do so perfectly would require the analyst to observe not only the prices that actually prevailed during the trading session, but also what the prices would have been had the investor traded less. This latter measure, while not directly observable, can be inferred, albeit with some ambiguity or noise.
- Turnover: Even if trading costs have not increased, it is important to consider other potential consequences of having grown too large. One such consequence could be reduced turnover as a result of responding to higher market impact and transaction costs. While this would seem to be an appropriate response to increased assets being deployed, it could result in a reduction in the effectiveness of the strategy as reduced turnover could lead to less optimal portfolios.
- Style drift: Similar to the turnover concern described above, another potential response to growing too large could be concentrating trading in larger, more liquid names, eschewing the smaller less liquid names. Again, while this may be an appropriate response to excessive growth, it could suggest reduced prospects for outperformance as the practical range of opportunities shrinks.

III. Results of the Analysis

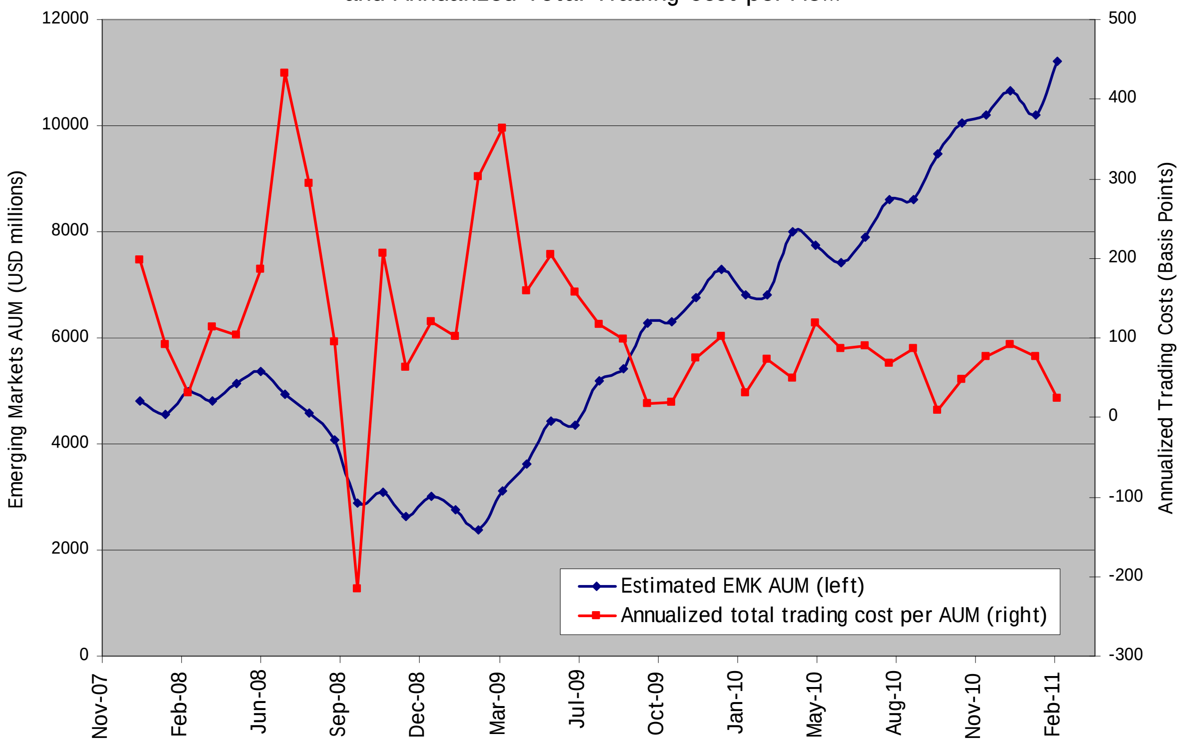
While our emerging markets assets under management have grown over time, obviously helped by the rise in the markets, the trading costs associated with managing our strategy have not grown. In addition, our style and turnover have remained consistent. Of course, as the market conditions fluctuate, trading costs, turnover, and style can also fluctuate.

Importantly, however, while there is a clear upward trend in assets under management, there is no similar trend in trading costs, turnover or style drift.

Transaction Costs

Figure 1 illustrates how our emerging market transaction costs have evolved as our assets under management have grown. The blue line in Figure 1 shows our estimate of assets deployed in our emerging markets strategy. The red line in Figure 1 shows our estimate of the annualized drag that trading costs impose on portfolio performance, which has been relatively flat through 2010. The trading costs are estimated using Arrowstreet's proprietary post-trade impact models. The choice of the model is not critical, as the results we obtain from an external vendor's model are similar.

Figure 1: Emerging Markets Assets Under Management (AUM)
and Annualized Total Trading Cost per AUM

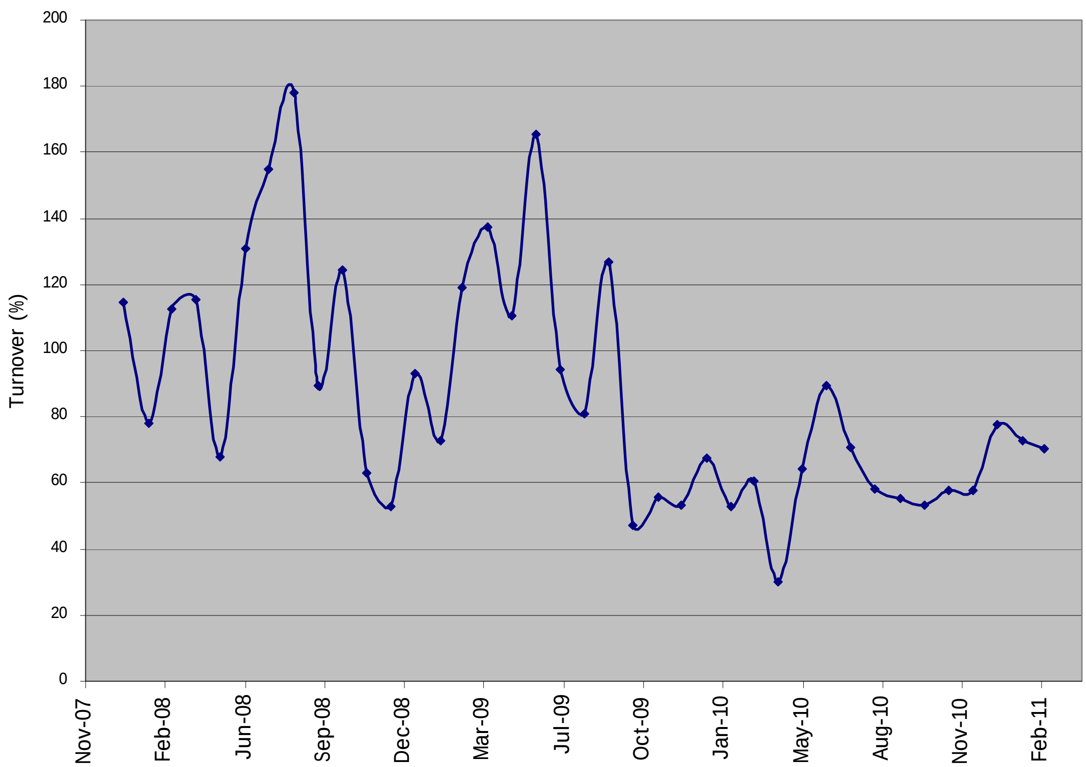


Source: Arrowstreet Capital analysis using proprietary post-trade impact models

Turnover

While relatively flat transaction costs are encouraging, we also want to verify that the absence of the upward trend in trading costs is not caused by the investment process changing in some important way. Figure 2 shows how our turnover has varied as our assets have grown. To get a clean picture of our trading activity in our emerging markets strategy, Figure 2 is created using our dedicated emerging markets accounts only.

Figure 2: Annualized Turnover for Dedicated Emerging Markets Accounts



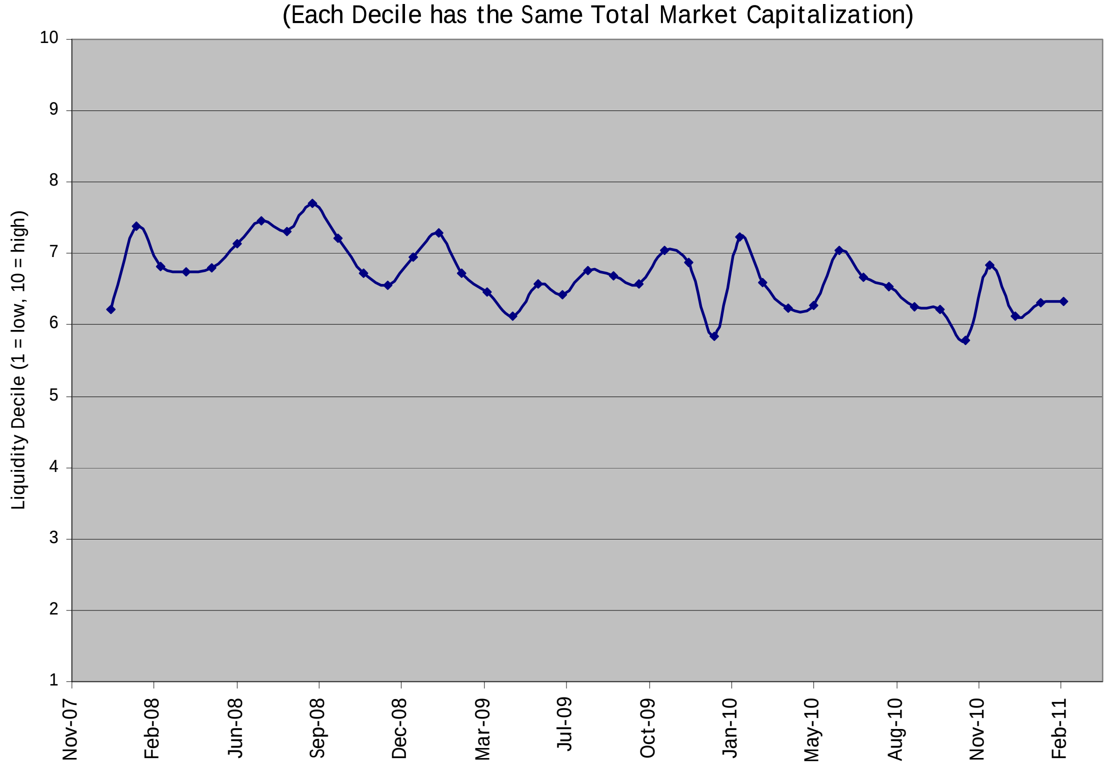
Source: Arrowstreet Capital analysis using ((Minimum of month's buys or sells) / (Dedicated Emerging Market AUM) *12)

There has been some variation in the turnover of our strategy over time, but this variation is explained by the changes in market environment. In particular, the financial crisis caused our process to aggressively shift from cyclical to defensive investments and back. Importantly, however, during the relatively stable market environment for the last 18 months, the turnover has remained stable. Our conclusion is that our process continues to be appropriately active in refreshing the portfolios to reflect our latest views.

Style Drift

Figure 3 addresses whether the characteristics of the stocks that we trade have changed as our assets have grown. In particular, it shows whether our style has drifted into trading more liquid stocks as our assets under management have grown. Figure 3 confirms that we have not drifted into more liquid stocks. Each month, we assign each stock into a liquidity decile based on the trailing one-month median USD trading volume, such that each decile has the same amount of market capitalization. Least liquid stocks have a decile assignment of one and the most liquid stocks have the decile assignment of ten. Then, we compute the tradeweighted average liquidity decile for stocks we traded. The time series of this average is a good measure of whether our trading has drifted towards more or less liquid stocks over time. Figure 3 shows some variation over time, but no style drift towards more or less liquid names.

Figure 3: Average Liquidity Decile for Traded Stocks
(Each Decile has the Same Total Market Capitalization)



Source: Arrowstreet Capital analysis using trailing one-month median USD trading volume data from FactSet

Conclusions

Based on the evidence presented above, we believe that our approach to managing capacity in emerging markets has been prudent and that we have not reached a level that should cause concern. We have the appropriate firm structure, process, and tools in place to make capacity decisions with clients interests in mind. As we have in the past, we will continue to monitor our realized transaction costs and other characteristics of our process as our assets under management rise, and will continue to communicate the results of that analysis to our clients.