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Why Worry About Transaction Costs?

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Why Worry About Transaction Costs?

Given an equity market with poor returns, cost control has become an essential part of superior performance. According to a study conducted by Merrill Lynch BARRA Strategic Consulting Group, management of Embedded Alpha, the frictional costs of running a portfolio, will continue to emerge as an essential contributor to investment manufacturing quality and performance.[1]

Theses frictional costs include:

1.) Tangible Costs - **management fees** and **trading commissions**.
2.) Managed Costs – **unintended risk exposures**, **tax costs**, and **not-equitized cash**
3.) Invisible Cost – the adverse **market or price impact of trading** and the **opportunity cost** of delaying trade execution

Notably, three of the seven elements of Embedded Alpha are related to transaction costs.

The total transaction cost of a trade consists of two major elements.
Order processing costs are all costs explicitly incurred to accomplish the transaction, most notably trading commissions. While investors place considerable emphasis on controlling these costs, they typically represent only 20% of total transaction costs (see table 1).

Market impact costs are largely invisible, and make up the bulk of total transaction costs. This category includes the bid/ask spread, price impact (temporary and permanent), and opportunity costs. According to ITG, "the permanent component of price impact is information-based; it captures the persistent price change as a result of the information conveyed to the market that the trade occurred. The temporary price impact is transitory in nature; it is the additional liquidity concession to get the liquidity provider to take the order into inventory. The permanent impact means that the first trade of a multi-trade order will affect the prices of all subsequent sub-blocks sent to the market."[2]

The more aggressive the trading strategy is, the higher the cost (as BARRA notes, "If the transaction size exceeds the quote depth, then the transaction price will usually be on less favorable terms than the quoted prices").[3] The level of trading aggressiveness can be measured in terms of how rapidly the trader wants to execute the trade given the trade's size relative to normal liquidity. The opportunity cost is directly related to a security's volatility. Growth or momentum managers should be more concerned with opportunity costs, as they are typically liquidity demanders, purchasing stocks which are already moving higher.

Table 1

	Assumed Costs (BARRA)
Order Processing Costs	0.05
Bid-Ask Half Spread	0.07
Incremental Market Impact	**0.13**
Permanent	fixed
Temporary	
Total	0.25

Source: "Should You Worry about Transaction Costs?" BARRA Newsletter, Spring 1998.

Impact on Total Return-
"Assuming a portfolio turnover of 100% per year, each stock would be bought and sold each year. The total transactions cost will be $0.50 per stock. Assuming a 12% total return, and an average

price of $40 per stock, the average yearly profit per stock would be $4.80. The fifty cent transaction cost is just over 10% of the total stock return.

Impact on Active Return-
Assuming a top quartile manager with an information ratio of 0.5, and an active risk of 4%, we would expect to see an annual active return of 2%. For a median-priced stock, a 2% annual return amounts to $0.80 per share. Again assuming a portfolio turnover of 100% per year, each trading decision will contribute $0.40 to the active portfolio performance, net of transaction costs. The $0.25 of transaction costs represents, therefore, approximately 40% of the manager's value added."[4]

We should note BARRA's assumptions for average price per share and total return. Given the severe bear market of the past 3 years, the actual median share price of the 1500 largest US companies is now $24.60. Further, actuarial assumptions have been ratcheted lower; a 10% assumed annual return is now more commonplace than a 12% return. Given these changes in the market, the significance of transaction costs is greater. A simple update of the BARRA study would now state these costs account for 20% of the total stock return, and over 50% of total active return! Further, although decimalization has reduced trading spreads, it has also served to increase incremental market impact. Trading is now more expensive on a per share basis than was assumed in the original BARRA study.

Based on these comments, we can see the importance of controlling transaction costs. We can achieve this by reducing the cost of each trade, as well as intelligently containing turnover. Below we examine the steps we have taken to limit each element of the transaction cost equation.

Order Processing Costs

Advanced Investment Partners' decision not to engage in soft dollar relationships couples with our heavy reliance on ECN's to curb our commission structure from BARRA's assumed industry rate of $.05 per share to just over $.02 per share.

An imbedded positive in our investment methodology is our core investment approach. While momentum or growth style managers typically submit aggressive liquidity-demanding trades, our core investment approach involves both liquidity supplying value-type trades and liquidity demanding trades. Thus, we are as likely to capture the spread as we are to pay the spread.

Market Impact Costs

Bid-Ask Spread
While there is nothing one can do to affect the bid-ask spread of a stock, we can observe that more liquid stocks tend to have smaller spreads. By focusing our trading on stocks with sufficient liquidity, we can contain our average spread. For instance, we note that the average spread for all stocks in the Frank Russell 3000 Index is $.055 per share. However, by monitoring the liquidity of these stocks to determine which can be purchased for a meaningful position in our investment strategies, we can effectively eliminate one half of these names. Those stocks which we eliminate from our investable universe have an average spread of $.078, while those remaining eligible for purchase have an average spread of $.032.

Table 2

Group	Average Spread
Russell 3000	0.055
Top 500	0.026
Top 1000	0.030
Top 1500	0.032
Bottom 1500	0.078

Incremental Market Impact

Price Impact is a function of the information relayed to the market by a trade order as well as the underlying supply and demand conditions surrounding a stock.

We can mute the information we are relaying to the market by measuring our maximum transaction size relative to the typical quote depth. AIP measures this via a customized liquidity measure for each stock in our investment universe. We begin by determining the minimum average daily dollar volume over the trailing one, two and three month time periods. Next, we calculate the total strategy assets applicable to each issue, using the greater of an assumed $300m minimum demand or the actual AUM for each AIP strategy. We then determine what percentage of the appropriate firm assets can be invested in each issue. We must be able to invest at least .75% of our assets in a given stock in order for the stock to remain in our investable universe.[a]

In addition to ensuring our share demand does not exceed the minimum daily average volume, we also seek to execute the trade in a fashion which will have minimal price impact on an intraday basis. We submit our orders with the understanding that our trader is to be benchmarked against VWAP execution, which presents many advantages.

We use an automated participation VWAP strategy, breaking up orders over the day to participate proportionately in the day's volume. Stocks often trade most heavily at the open and close of the trading day, with lighter volume around noon. An automated participation strategy generates a prediction of the stock's volume pattern over the trading day, and creates a trading distribution to match the anticipated pattern, trading most heavily when the most volume is anticipated. While a large block trade executed at mid-day might relay information to the market, this methodology helps "hide" our trade from the market.

The use of crossing networks became more important with the advent of decimalization. While decimalization has reduced trading costs for all investors by reducing trading spreads, the retail and institutional investor trading on NASDAQ or the NYSE have experienced decidedly mixed results.

Overall market transparency for issues trading on the traditional exchanges and NASDAQ has significantly degraded. As the number of pricing levels available has increased, the inside market is no longer a collection of interest within a sixteenth or greater of any price. Decimalization has allowed traders to step ahead of a public limit order by as little as one penny. This increased stepping-ahead of limit orders has created a significant disincentive for market participants to enter any sizeable volume into the markets, and has resulted in the reduction in the value of displaying limit orders.

An investor who carries on with his trading plans independent of the presence or absence of matching order flow is a *liquidity demander*. An example of such an investor would be one who submits market orders. An investor who adjusts his trading to accommodate mismatched order flow a *liquidity provider*. Limit order submitters are liquidity providers. Decimalization pushes limit orders to market orders –

[a] The minimum is .5% of firm assets for the AIP SMidCap strategy.

hence, there is less liquidity. The size of the inside market at any one time is now much smaller and less representative of the true underlying supply and demand. Having depth of liquidity information is vital for many investors as this data is often effectively used to determine timing and price of buys and sells.

Despite the adverse impact of decimalization on market depth, our active liquidity screening, core investment approach, and an effective trading strategy serve to limit market impact.

Effectively Limiting Turnover

BARRA notes one can achieve at least three-quarters of the value added with only half of the turnover. And the key qualifier is "at least". An extremely simple strategy, reducing each trade by the same fraction, can achieve 96% of the value added with only 80% of the turnover (see exhibit 1). One can do even better by distinguishing transaction costs between stocks and scheduling the most valuable trades first.[5]

Accurate Stock-Specific Transaction Cost Measurement
Our model explicitly models transaction costs, assigning a discrete value to each stock based on an aggressive estimate of AIP's potential share demand. AIP's share demand is assumed to be:

The lesser of:
(Total firm-wide assets for each investment universe the stock belongs to * the stock's largest benchmark (BM) weight in any of the relevant strategies' BM + 2.5%) / Current Price
or
60% of the maximum of the 1,2, and 3 month average volume

If this amount exceeds the current 21 day median composite dollar volume of the stock, we adjust the desired share amount to equal the current median daily volume.

We then submit this figure to Investment Technology Group's Agency Cost Estimator Model[b], ACE. Critical Features of the ACE Model include:

- ACE allows us to accurately model the costs faced by our trader given our trading instructions (typically single day, round lot, VWAP binned from open to close).
- ACE incorporates actual transaction information in its cost estimate.
- ACE incorporates both the permanent (information relating) component of the trade cost and the temporary (liquidity-inducing) components of the trade. This is critical when the trade is bucketed.

Given these specifics, ACE returns a transaction cost estimate, along with confidence bands. The assumed transaction cost, then, is the 66th percentile of the calculated buy and sell cost. Combining this highly accurate measurement with our conservative liquidity measurement has a number of interesting effects:

[b] ACE™ is a mathematical/econometric model that provides a pre-trade forecast of the price impact cost of an order.

Table 3

Russell 3000	Closing Price	Spread	Expected Cost/Share	66th Percentile	Reliability of Estimate*
Top 500	31.819	0.026	0.164	0.377	1.364
Top 1000	27.372	0.030	0.294	0.482	2.307
Top 1500	24.600	0.032	0.346	0.517	2.697
Bottom 1500	13.869	0.078	0.435	0.553	3.567
All	19.258	0.055	0.390	0.535	3.130

**1 is very reliable, 2 is reliable, 3 is unreliable, 4 is very unreliable Source: ITG, AIP*

By focusing on the 1500 largest stocks in the Russell 3000, we are focusing on higher-priced stocks, which effectively lowers the percentage impact of transaction fees. In addition, as mentioned earlier, the more liquid stocks carry a substantially lower average spread. Finally, transaction cost estimates are much more reliable for highly liquid stocks, enabling us to be more confident in understanding what our expected transaction costs will be.

Limiting Turnover

BARRA, in developing their Market Impact Model, notes the importance of using a transaction cost function which reflects the increasing cost of trading larger and larger positions. A linear transaction cost assumption does not sufficiently limit the turnover as the size of the portfolio increases (thereby increasing market impact). All other factors being equal, as the size of a portfolio increases, the optimal level of turnover decreases. Our liquidity and transaction cost models accurately reflect this reality, and by accurately anticipating transaction costs we are able to focus turnover on the most attractive opportunities net of costs.

Table 4

Trading Costs			
	Assumed (BARRA)	**Updated (Russell 3000)***	**AIP**
Processing Costs	0.050	0.050	0.020
Half Spread	0.070	0.028	0.016
Incremental Market Impact	**0.130**	**0.362**	**0.294**
Permanent	Fixed	Fixed	Fixed
Temporary			
Total	**0.250**	**0.440**	**0.330**

**This includes the impact of decimalization; note the collapse in half-spread and the rise in Incremental Market Impact*

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Concluding Remarks

"Frictional costs" have a very real impact on performance. We've illustrated a clear and executable path towards reducing overall transaction costs for a managed portfolio. Key control points include accurate assessment of available liquidity, a fair estimate of implicit and explicit transaction cost, a core investment approach which results in a balance of liquidity-demanding and liquidity-supplying trades, heavy use of 'intelligent" ECN's, avoidance of soft-dollar relationships, and more efficient turnover. This multifaceted approach has allowed us to trim total transaction costs from $0.88 per share on an annual basis to $0.53 per share. This approach translates into a 14% improvement in total returns[c], and a 23% improvement in active return[d].

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[c] Under BARRA's assumed 100% turnover and an unrestricted Russell 3000 trading universe, the total transaction cost would be $0.88 per stock (2 * $0.44). By reducing our portfolio turnover to 80% per year through accurate transaction cost modeling, and lowering our average cost per share by trading more liquid stocks, using ECN's, and combining a core investment approach with a VWAP trading strategy, our total transaction cost would be $0.53 per stock (1.6 * $0.33). Assuming a 10% total return, and an average stock price of $24.60, the average yearly profit per stock would be $2.46. The thirty-five cent transaction cost saving amounts to just over 14% of the total stock return.

[d] Assuming a realized Information Ratio of 0.75, and active risk of 4.167%, we would expect to see an annual active return of 3.125%. For a median-priced stock, a 3.125% annual return amounts to $0.77 per share. Again assuming a portfolio turnover of 80% per year, each trading decision (to buy or to sell) will contribute $0.48 to the active portfolio performance, net of transaction costs. The $0.11 transaction costs saving represents, therefore, approximately 23% of the manager's value added.

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Endnotes:

[1] "Success in Investment Management: Building and Managing the Complete Firm" Merrill Lynch & Co. Inc and BARRA Strategic Consulting Group, June 2000.
[2] "ACE – Agency Cost Estimator." Investment Technology Group, May 2002
[3] Torre, Nicolo, "The Market Impact Model --First in a Series," BARRA Newsletter, Winter 1998.
[4] Ibid.
[5] Kahn, Ronald, "Seven Quantitative Insights into Active Management-Part 6, Implementation Subtracts Value," BARRA Newsletter, Spring 1998

Eq.	1	$\alpha = IR * \omega$		$3.125 = 0.75 * 4.167$
Eq.	2	$VA = \alpha - \lambda\omega^2$		$1.563 = 3.125 - (9 * .04167^7)$
Eq.	3	$VA = IR - \omega - \lambda\omega^2$		$1.563 = 0.75 - 4.167 - (9 * .04167^7)$
Eq.	4	$\omega^* = (IR / 2\lambda)$	(given)	$4.167 = (0.75 / (2 * 9))$
Eq.	5	$VA^* = ((IR)^2 / 4\lambda)$	(given)	$1.563 = ((0.75)^2 / (4 * 9))$
Eq.	6	$IR = 2\lambda\omega^2$		$0.75 = 2 * 9 * 4.167^2$
Eq.	7	$VA^* = \lambda\omega^2$		$1.563 = 9 * 4.167^2$
Eq.	8	$VA = VA^* \{2(\omega/\omega^*) - (\omega/\omega^*)^2\}$		$1.563 = 1.563 * \{2 (4.167 / 4.167) - (4.167 / 4.167)^2\}$
Eq.	9	$TO = x * TO^*$		$80 = .8 * 100$
Eq.	10	$\Delta n_t = x * \Delta n_t^*$		$80 = .8 *$ each trade
Eq.	11	$\omega = x * \omega^*$		$3.333 = .8 * 4.167$
Eq.	12	$\alpha = x * \alpha^*$		$2.5 = .8 * 3.125$
Eq.	13	$VA = VA^* \{2(TO/TO^*) - (TO/TO^*)^2\}$		$1.5 = 1.563 * \{2(.8 / 1) - (.8 / 1)^2\}$

Result: We can maintain 96% of optimal Value-Added after reducing turnover by 20%

KEY:
α = Alpha
IR = Information Ratio
ω = Standard Deviation
VA = Value added
λ = Risk Aversion
ω* = optimal level of risk
VA* = optimal level of Value Added
TO = Turnover
n = amount turnover is reduced by