

Transactions Costs for TSE-listed stocks

Transactions costs can erode the performance of an investment strategy.

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Transactions costs are an important consideration for both retail and institutional investors. Retail investors must consider how much performance in percentage terms they sacrifice in the form of transactions costs. For example, assuming an average of only one trade per year involving stocks priced at \$20 or higher, our estimated one-way median transaction cost of 2.3 per cent is in the range of the typical management expense ratio (MER) for Canadian mutual funds. With more than one trade per year, they would be higher. Institutional investors should care about transactions costs (particularly market impact costs for less liquid securities) because they can erode the performance of investment strategies. The manager is no longer singularly focused on commission levels - depending on the quantitative importance of transactions costs, the manager may find it worthwhile to pay higher commissions in order to achieve less expensive executions. The issue of transactions costs is so important that the Securities Exchange Commission (SEC) is to release disclosure rules on execution quality for market centres and brokers in the United States later this year.

Our research analyzes transactions costs for stocks traded on the Toronto Stock Exchange (TSE), Canada's largest and most liquid equity market, over the 1989 to 1998 period. Transactions costs are derived from daily price and transaction data on the TSE during this time period. We focus on bid-ask spreads and retail commission charges, which are representative of the costs for retail trades. However, it is important to recognize that institutional trades account for approximately half of the trading on the TSE, and over 40 per cent of these trades are in the form of block trades (10,000 shares or more). The trading costs for institutional trades are commonly measured by reference to commission fees, market impact costs, effective spreads and opportunity costs. While we do not examine these costs directly, our results are of obvious interest to institutional investors, since the trends in bid-ask spreads and commission fees for trades in various categories of stocks will be directly related to institutional trading costs. In addition, we report some of the results from a recent study of institutional trades on the TSE by Elkins/McSherry (1998) for comparative purposes.

Data and Methodology

The sample for the present study was formed by randomly choosing one day in each of four quarters over the 10-year period between 1989 and 1998, for a total of 40 days. The relevant price data was obtained for every TSE-listed stock included in the Canadian Financial Markets Research Centre data base.¹ The bid-ask spread (hereafter spread) is derived by taking the ask price minus the bid price and dividing that by the midway point between the closing bid and ask price.

Each stock is assigned a price group number 1 through 5, according to the average of their closing bid and ask price. The price groups are: 1 - less than or equal to \$5; 2 - between \$5 and \$10; 3 - between \$10 and \$15; 4 - between \$15 and \$20; and 5 - above \$20. The market capitalization (size) is defined in the standard manner, while liquidity is measured as the daily volume of shares traded divided by the

total number of outstanding shares. For each date, the stocks are also assigned a size (and liquidity) quintile ranking. Quintile 1 includes stocks with size (liquidity) in the lowest 20 per cent of all stocks on that day. A higher number means it is a larger (more liquid) company.

We used the 1992, 1995, and 1999 commission schedules of prominent Canadian brokers to estimate all commission fees. The average number of shares traded in a stock on a particular day was used to measure trade size, which was then used to determine the one-way commission cost as a percentage of the average trade value for each stock.

TABLE 1							
BID-ASK SPREADS (%) FOR THE TOTAL SAMPLE PERIOD AND PRE- AND POST-DECIMALIZATION							
Price Groups		p <= \$5 1	\$5 < p <= \$10 2	\$10 < p <= \$15 3	\$15 < p <= \$20 4	p > \$20 5	Total Sample
Total Sample Period	Mean	11.5	4.4	2.9	2.4	2.1	7.6
	Median	6.5	2.9	1.9	1.5	1.1	3.5
	Std.Dev.	15.3	6.2	4.0	5.1	5.7	12.5
	Number	24,285	7,283	4,837	3,323	6,134	45,861
Pre-Decimalization (January 1, 1989 to April 14, 1996)							
	Mean	12.6	4.6	3.0	2.4	2.3	8.4
	Median	7.0	3.2	2.0	1.5	1.1	3.8
	Std.Dev.	16.7	6.3	3.8	5.5	6.0	13.7
	Number	17,392	5,173	3,454	2,409	3,680	32,107
Post-Decimalization (April 15, 1996 to December 31, 1998)							
	Mean	8.8	4.0	2.9	2.5	1.8	5.8
	Median	5.4	2.2	1.8	1.4	0.9	3.0
	Std.Dev.	10.8	5.9	4.4	3.8	5.1	9.0
	Number	6,893	2,110	1,383	914	2,454	13,754

Results

Table 1 presents summary statistics for bid-ask spread percentage by price group over the entire period. The entire sample consists of 45,861 observations, comprised of the following number of observations per price group: (1) 24,285; (2) 7,283; (3) 4,837; (4) 3,323; and (5) 6,134. These numbers highlight the large proportion (53 per cent) of stocks in the lowest price group (less than \$5). This indicates that one may expect a relatively large bid-ask spread percentage on the TSE due to the presence of a high percentage of lower-priced stocks. This seems to be the case, according to the data presented in the second column of Table 1.² Table 1 shows that there is a dramatic difference in spreads as we move across the price groups, with the median spread declining monotonically from 6.5 per cent for group 1, to 1.1 per cent for group 5.

Table 1 also includes data for two sub-periods to reflect the fact that the TSE moved to decimalization approximately three-quarters of the way through our sample period, on April 15, 1996. The monotonic decline in spreads across the price groups observed in the total sample remains intact during both sub-periods. In addition, we note that the post-decimalization groups have lower spreads across every price group, reflecting a widespread decline in trading costs.

The bid-ask spread represents a measure of the non-commission component of trading costs for retail investors. A similar measure that applies to institutional investors is the market impact cost, which is defined by Elkins/McSherry (1998) as "the deviation from the unperturbed price, or the price which would have prevailed had the trade not occurred." This "unperturbed price" is not directly measurable, but it may be estimated using several approaches involving the use of pre- and post-trade prices. Elkins/McSherry (1998) use various samples based on actual trades by institutional investors to examine trading costs. Based on all the trades for which they have data, they estimate the 1997 market impact cost for trades on the TSE is 0.29 per cent, versus 0.18 per cent on the NYSE, and 0.35 per cent for NASDAQ.³ Since the average price for stocks in their TSE sample was US\$26.90, this figure is best compared to the mid-point of the post-decimalization bid-ask spread for the over-\$20 price category from Table 1 (0.45 per cent). Taken at face value, these results suggest that the average

institutional trade is executed at approximately two-thirds of the non-commission-based trading cost of the median retail trade. However, Elkins/McSherry estimate market impact by "comparing the execution price of each trade to the average of the high, low, open and close prices of the stock on the day of the trade." This approach may understate the actual price deviations caused by the trades, due to the "smoothing effect" of using these averages. In addition, their sample includes a larger proportion of highly liquid stocks than is the case for our entire sample.

TABLE 2						
BID-ASK SPREADS (%) FOR PRICE GROUPS WITHIN SIZE QUINTILES						
Price Groups		p <= \$5	\$5 < p <= \$10	\$10 < p <= \$15	\$15 < p <= \$20	p > \$20
Size Groups		1	2	3	4	5
Smallest 1	Mean	19.6	13.1	12.0	16.4	12.0
	Median	12.9	9.2	6.5	4.7	2.6
	Std.Dev.	20.5	11.6	14.3	21.9	22.5
	Number	8,962	185	59	14	6
2	Mean	9.0	7.1	7.6	7.6	4.4
	Median	6.2	4.8	4.7	6.1	2.7
	Std.Dev.	9.7	10.4	8.7	6.4	4.3
	Number	7,851	849	264	117	89
3	Mean	5.0	4.9	3.8	5.0	4.0
	Median	3.7	3.8	2.9	3.1	2.6
	Std.Dev.	5.0	5.2	3.3	7.1	5.1
	Number	5,211	2,260	936	384	372
4	Mean	3.4	3.5	2.6	2.3	3.2
	Median	2.3	2.6	2.1	1.6	1.9
	Std.Dev.	5.0	4.5	2.5	1.8	6.0
	Number	1,999	2,821	1,813	996	1,537
Largest 5	Mean	4.0	2.4	1.7	1.5	1.5
	Median	1.7	1.6	1.1	0.9	0.8
	Std.Dev.	7.1	3.6	2.2	4.8	5.4
	Number	262	1,168	1,765	1,812	4,130

Table 2 presents a matrix of bid-ask spreads across market capitalization and price groups. It shows that, as one would expect, lower-priced stocks tend to have smaller market capitalization values, and vice versa. This effect is most obvious in the observations for our smallest size group, which consists of 97 per cent of stocks with prices less than \$5. The pattern is less dramatic for the other groups; however, 45 per cent of the stocks in quintile 5 have prices above \$20.

Table 2 illustrates two important trends. First, the monotonic decline in spreads across the price groups that was observed in Table 1 is also prevalent across the size quintiles, with a few minor exceptions. Second, as the market capitalization of a stock increases, the spread decreases within the price groups, except for two minor exceptions that are likely attributable to small sample sizes. Combining these two results, we observe that the median spreads reported in Table 2 range from a high of 12.9 per cent for the lowest price group and smallest size quintile, to a low of 0.8 per cent in the high price, large size category. This is consistent with the notion that the larger capitalized stocks have a larger general following by the investing public, and that there is a better quality and quantity of public information regarding these companies. Both of these facts tend to decrease the spreads on stocks and increase their liquidity.

TABLE 3						
BID-ASK SPREADS (%) FOR PRICE GROUPS WITHIN LIQUIDITY QUINTILES						
Price Groups		p <= \$5	\$5 < p <= \$10	\$10 < p <= \$15	\$15 < p <= \$20	p > \$20
LIQUIDITY GROUPS		1	2	3	4	5
Least Liquid 1	Mean	19.3	8.1	5.9	5.9	5.5
	Median	12.5	5.6	4.0	3.9	3.0
	Std.Dev.	20.6	10.2	6.8	10.5	11.8
	Number	8,171	1,828	1,108	617	1,187
2	Mean	8.0	3.8	2.7	2.4	1.9
	Median	5.4	3.0	2.1	1.6	1.3
	Std.Dev.	8.8	3.4	2.0	3.1	2.3
	Number	2,354	968	694	503	1,060
3	Mean	8.2	3.5	2.2	1.7	1.5
	Median	5.1	2.7	1.8	1.4	1.1
	Std.Dev.	10.4	3.9	1.7	1.3	2.1
	Number	4,316	1,562	1,086	797	1,307
4	Mean	7.5	3.0	1.9	1.4	1.1
	Median	4.7	2.2	1.2	0.9	0.6
	Std.Dev.	9.1	2.9	1.7	1.2	1.5
	Number	4,757	1,482	968	687	1,273
Most Liquid 5	Mean	7.1	2.6	1.7	1.3	0.9
	Median	3.9	1.9	1.1	0.8	0.6
	Std.Dev.	9.8	2.3	1.7	1.3	1.1
	Number	4,687	1,443	981	719	1,307

Table 3 is similar to Table 2, but the matrix reveals the relationship between the price group and the liquidity groups. The effect of liquidity is very apparent, as one would expect, and the spreads decrease across all price groups and all liquidity groups. There are no exceptions to these rules. The median spreads range from 12.5 per cent in the lowest price and least liquid stock group, to 0.6 per cent for the highest-priced stocks in the two most liquid stock groups. The median spreads remain very high for even the highest-priced stocks (3.0 per cent) within the least liquid group of stocks. On the opposite side of the spectrum, median spreads within the most liquid group of stocks range from a low of 0.6 per cent for high-priced stocks, to a high of 3.9 per cent for low-priced stocks.⁴ As mentioned above, the Elkins/McSherry sample of institutional trades would, by nature, consist of a higher proportion of large, highly liquid stocks than the present one. This provides an explanation for the relatively low market impact costs they documented for their sample.

In order to provide a broad range of commission fees, we apply five commission fee schedules to each price group, although the results have not been reported here. We apply the 1992 and 1995 discount broker schedules, as well as the 1999 fee schedules for full-service brokerage trades, traditional discount brokerage trades, and Internet trades. The median commission costs as a percent of total trade value decline as the price group increases for all fee schedules without exception. For the total sample, the order from the least to most expensive commissions is as follows: 1999 Internet trading fees (1.0 per cent), 1995 and 1999 discount broker fees (1.6 per cent), 1992 discount broker fees (1.9 per cent); and, 1999 full service broker fees (3.3 per cent). This hierarchy is consistent across all of the price groups. The median commission costs range from a low of 0.2 per cent for a computer trade for a stock in the highest price range, to a high of 4.8 per cent for a full service broker trade of a stock in the lowest price range. The commission fees for Internet-based trades of high-priced stocks mimics the 0.22 per cent commission fee that Elkins/McSherry estimated for their sample of 1997 institutional trades on the TSE, which suggests that do-it-yourself retail investors face similar commission charges to institutional investors.

TABLE 4				
ONE-WAY TOTAL TRANSACTION COST ESTIMATES (%) FOR PRICE GROUPS				
		1999	1999	1999
		Internet	Discount	Full Service
		Trade	Broker	Broker
Price Group 1 p <= \$5	Mean	15.9	21.6	38.2
	Median	4.3	5.5	7.5
Price Group 2 \$5 < p <= \$10	Mean	3.5	4.5	7.6
	Median	1.7	2.3	4.2
Price Group 3 \$10 < p <= \$15	Mean	2.4	3.0	5.3
	Median	1.2	1.7	3.5
Price Group 4 \$15 < p <= \$20	Mean	2.1	2.6	4.9
	Median	1.0	1.3	3.0
Price Group 5 p > \$20	Mean	1.4	1.7	3.3
	Median	0.7	0.9	2.3

We conclude this section by adding one-half of the post-decimalization period bid-ask spread cost estimates presented in Table 1 to the 1999 commission cost estimates. This provides an approximation of the total transactions costs that today's investors face for trades executed through the internet, or through discount or full service brokers. Table 4 shows that the median total transactions costs range from 0.7 per cent for Internet trades of stocks with prices over \$20, to 7.5 per cent for full service broker trades of stocks with prices below \$5. This is a very wide range indeed, and this is only for the median trades, which means many trades may be executed with costs well above 7.5 per cent, while others may be executed at a cost below 0.7 per cent. The figure for Internet-based trades of high-priced stocks is approximately 20 basis points above the Elkins/McSherry estimate of 0.51 per cent for institutional trades on the TSE, with the difference being attributable to the lower market impact costs they estimated.

Similar to our analysis of bid-ask spread costs, we also broke down the total transaction cost results across the size and liquidity groups, although we only report a few of the highlights here. Across the size groups, the median total transactions costs range from 0.6 per cent for the largest-sized, highest-priced stocks traded by the Internet, to 11.3 per cent for full service broker trades of the smallest-sized, lowest-priced stocks. The range across liquidity categories is similar - from 0.5 per cent for the most liquid, highest-priced stocks traded electronically, to 11.1 per cent for the least liquid, lowest-priced stocks traded through a full service broker. Interestingly, the 0.5 per cent estimate for high-priced, highly liquid stocks mimics the 0.51 per cent estimate obtained by Elkins/McSherry for 1997 based on their sample, the characteristics of which closely resemble this sub-sample. In other words, trading costs are similar for retail investors and institutional investors, provided they are investing in similar stock universes, which will not always be the case.

The trends in transactions costs across price, size, and liquidity categories represent very important items for investors to consider when designing their investment strategies. For example, investors planning on using an investing approach that requires high portfolio turnover may want to consider focusing exclusively on larger, more liquid stocks in order to avoid the heavy burden associated with transactions costs.

Conclusions

The purpose of this study is to reveal the total transactions costs faced by Canadian equity investors. Our study of bid-ask spreads reveals a monotonically declining relationship between spreads and share price, market capitalization, and stock liquidity. While these results are to be expected, what is surprising is the size of the differences across the different price, size, and liquidity categories. For example, the median spreads range from a low of 0.6 per cent for the most liquid stocks with prices over \$20, to a high of 12.5 per cent for the least liquid stocks with prices below \$5. The range is similar across firm size categories: from 0.8 per cent for the largest stocks with prices over \$20, to 12.9 per cent for the smallest stocks with prices below \$5.

When commission costs are combined with the mid-point of our estimates for bid-ask spreads, we find that total transactions costs vary substantially, depending on the nature of the trade. For example, total transaction cost median estimates range from 0.5 per cent for Internet trades of the most liquid, highest-priced stocks, to 11.3 per cent for full service broker trades of stocks with the lowest market capitalization values, and the lowest-priced stocks. Successful investment strategies require investors to incorporate an understanding of these costs, as well as the differences in costs they face for different types of trades.

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References

Elkins/McSherry Co. Inc., (1998), "Transactions Costs in Canadian and U.S. Equity Markets: A Study of Institutional Trading in Cross-Listed Stocks," report published by the Toronto Stock Exchange.

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Endnotes

1 The use of end-of-day data may cause an upward bias in our bid-ask spread estimates, particularly for less liquid stocks.

2 Our subsequent discussion focuses on the median bid-ask spread percentage rather than the mean value since the means tend to be greatly influenced by the presence of outliers.

3 Refer to Chart 2 on page 9 of their report.

4 This is an interesting observation, in light of the recent dismissal of several members of RT Capital Management Inc. These individuals admitted to engaging in stock transactions designed to artificially inflate the prices of stocks held in various mutual funds or pension funds at the end of certain months. A large number of their trades were in relatively illiquid stocks. Given the large spreads associated with illiquid stocks reported in Table 3, one can see how easy it would be for investors to move the market price of these shares a significant amount, by purchasing at the higher price, or selling at the lower price.