What’s in a price?

Measuring the value of exchange data fees

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Abstract

This paper presents empirical estimates of the value of data-feeds from individual marketplaces trading in Canadian equities using a variety of pre- and post-trade metrics. We analyse how different metrics which are used by organisations such as the US Securities Information Processor can be manipulated to alter the distribution of revenues, as well as the sensitivity of the estimated market share to changes in the construction of the metrics. These estimates of market share are used in conjunction with the actual fees charged by the marketplaces to assess the value of their data feeds. We then compare the prices charged for data in Canada to a variety of comparable markets to come up with an internationally “fair fee” for each of our exchanges. We find that some marketplaces charge in excess of the “fair” fee representing their contribution to price discovery, with the overall cost to Canadian data consumers much higher than in comparable international markets. The results of our analysis are useful not only to exchanges participating within a revenue sharing model but also to regulators requiring a methodology by which to assess the value of the data sold by their national exchanges. These results also shed light on what kind of metrics should be used when introducing a regulatory regime, and allows market participants concerned about the fees they are charged for access to such data to assess any level of overcharging.

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1 Introduction

In the course of their functioning as marketplaces, stock exchanges generate valuable proprietary data, namely the prices and quotes available on their exchanges. As the latency associated with trading has reduced, the timeliness of this information has become both important and valuable. Boulatov and Dierker (2007) consider this data as providing a private benefit to individual traders, likening it to access to analyst coverage.

Unsurprisingly, exchanges have recognised the value of this data, and have begun to charge for low-latency access to this information. In the US, this has led to providers such as NYSE and NASDAQ charging for access to their price and quote data that is faster than that provided by the government-mandated Securities Information Processor (SIP). This high-speed access to the “true” state of the market is documented by Hasbrouck and Saar (2011) as providing advantages to low-latency algorithmic traders. In such an environment, the access to high-speed data has the capacity to generate two classes of investors, those “with” and “without” paid access to high-speed data. A recent theoretical paper by Easley, O’Hara and Yang (2011) analyses the welfare effects of data fees, finding that charging for trade and quote data reduces both price efficiency and market quality as it discourages traders from searching for non-price fundamental data and can increase the cost of capital and reduce liquidity. They recommend that the practice of charging for market data should be regulated.

Under US regulations, the SIP charges one fee to market participants desiring the National Best Bid and Offer (NBBO), distributing this fee amongst the marketplaces that contribute to price discovery, based on a formula which considers both pre- and post-trade metrics. In this way, data fees are essentially self-regulated by an industry association with little room for marketplaces’ themselves to force market participants to pay separate fees. This is not the case in Canada, where there is no single provider of the combined best bid and offer, with little obvious regulation of the fees charged by marketplaces, leading to a situation where individual marketplaces charge independently for their data-feeds. The cost of these data-feeds has become a particularly pressing issue in the Canadian marketplace due to the rapid fragmentation of the market for securities. Since 2007, the Toronto Stock Exchange’s (TSX) virtual monopoly in equities trading has been broken by the addition of 4 Alternative Trading Systems (ATS’s), namely Chi-X, Omega, Alpha and Pure. With each of these new trading venues has come an additional source of data that must be bought by market participants. Whilst this fragmentation has introduced competition for trading fees, it has also introduced additional search costs, with the TSX data-fee remaining static, despite losing market share, and each additional exchange also charging a fee for their data.

There is a perception in the industry\(^2\) that many of these marketplaces, especially at the smaller end, are relying almost solely on their data-fees charge to generate revenues. A report commissioned by the Investment Industry Association of Canada (IIAC) examining the contribution of data fees to the total revenues of publically listed exchanges found that the TSX derived almost 25% of total revenues from data, much higher than any of its’ international industry peers.\(^3\) If the TSX, which has significant trading revenues, derives such a large portion of its’ revenues from data fees, this proportion must be significantly higher for some of the smaller exchanges. If the viability of trading venues with less than 5% of market share would be at risk without the revenues provided by the requirement that participants purchase data-feeds from them, the value of the data feeds and the regulations requiring their purchase could be an

\(^3\) Ibid.
example of regulatory failure leading to a prevalence of small exchanges that contribute very little to the liquidity or price discovery of the overall trading landscape.

The magnitude of the increase in data fees in Canada is non-trivial, and imposes a significant barrier to entry to broker-dealers, especially at the smaller end, as it acts as a fixed fee of providing broking services. Figure 1 details the price of order-book data for all marketplaces in Canada since 2005. The fragmentation of the Canadian equities market, beginning in 2007, coincides with an increase in data fees that has totalled more than 100% in the four years to 2011; increasing from $114 per user per month to over $250 for the same data. A report by the IIAC (2011)\(^4\) conducted a survey of Canadian brokers, finding that there are in excess of 10,000 subscribers currently paying for this data. This constitutes yearly revenues potentially exceeding $30 million.

**Figure 1**

*Monthly Data Fees per User for all Canadian Marketplaces*

This figure documents the cost per user per month of two different data products, top of book, consisting only of last trades and the best-bid and offer, and full limit orderbook, displaying all levels of the limit orderbook, as well as allowing the size and identity of individual orders to be identified. Prices are in $C and are for all markets that have at any point charged a fee for data. This analysis includes the TSX, Alpha, Omega, Pure, Chi-X and Tri-Act MatchNow from January 2005 to September 2011.

This paper identifies if the charge for data in Canada is justified by the value of the information generated by each marketplace, and documents the ways in which different constructions of the “value” of data can be manipulated to alter the perceived contribution of each marketplace to price discovery.

This analysis is of potential benefit to regulators both in Canada and more widely around the world. If a central information processor (IP) such as the US SIP is to be administered, it is necessary to identify how the price discovery of each marketplace should be measured in order to distribute revenues, to avoid potential distortions such as quote stuffing or the excessive high-frequency trading documented by Arnuk and Saluzzi (2010). It also identifies a way that the data fees charged within Canada, and more generally in any country, can be evaluated in terms of their domestic and international competitiveness. This analysis has interest for market participants also, as it sheds light on how appropriate the data fees charged are, and how marketplaces could manipulate the metrics used to analyse their contribution to price discovery to increase their share of data-fee revenue.

The remainder of this paper is structured as follows; Section 2 provides a brief description of the institutional framework with regard to data fees in Canada. Section 3 describes the data used. Section 4 outlines the metrics used to determine contribution to price discovery. Section 5 provides international comparisons in order to establish a “fair” fee. Section 6 presents the results of the analyses and Section 7 concludes.

2 Institutional details

From 1999 the TSX held a monopoly on the trading of senior equities. In 2001 the TSX bought the Canadian Venture Exchange (CDNX) and in 2007 the TSX merged with the Montreal exchange, creating the TMX group. This group controlled over 98% of stock trading in Canada as at January 2007, with the remaining volume traded by the TMX competitor the Canadian National Stock Exchange (CNSX), launched in 2003. In 2007 several new competitors entered the Canadian equities space, with the introduction of four ATS’s, Pure, Alpha, Omega and Chi-X along with two dark-pools, Match Now and Liquidnet. By late 2011, the fragmentation in the Canadian marketplace had seen the market share of the TMX group fall to around 60%.

The primary consumers of marketplace data are broker-dealers, who in turn provide market data to their customers through access points such as online trading sites, as well as for inputs into their own trading engines. Brokers are also subject to both best execution and order protection (or trade-through) obligations. National Instrument 23-101 (also known as the “Trading Rules”) outlines both the best execution and trade-through requirements. Part 4 outlines the best execution requirements, which ensure that brokers optimise a combination of best price, fastest execution, highest certainty of execution whilst minimising the overall cost of the transaction. The requirements of best price and highest certainty of execution are usually considered to require full limit-order book data from all of the marketplaces, leading to industry insistence that data fees are “mandatory”. Specifically, part 4.1(5) requires broker-dealers to “consider information from all appropriate marketplaces” or “to ensure procedures exist to take into account order and/or trade information from all appropriate marketplaces”. Whilst this section specifically states that “This does not mean that a dealer must have access to real-time data feeds from each

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5 The venture exchange (TSX-V) provides a listing venue for smaller-capitalisation stocks in the early stage of their growth cycle, typically mining exploration companies, and has less strict requirements for entry than the TSX.
6 Measured using traded dollar-volume, data provided by the Investment Industry Regulatory Organization of Canada (IIROC) in their monthly “Marketplace Statistics”.
7 Ibid.
marketplace.” This section is viewed by market participants⁸ as requiring them to subscribe to data feeds from each of the marketplaces.

**Figure 2**

This figure provides fictional limit order books for two markets, Market A and Market B, where an incoming market sell order cannot be satisfied on Market A but not on Market B. According to the trade-through prohibition, the 100 shares available at the better price on Market B must be “traded through” before the rest of the order may be sent to Market A.

<table>
<thead>
<tr>
<th>Market A</th>
<th></th>
<th>Market B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bid</td>
<td>Volume</td>
<td>Ask</td>
<td>Volume</td>
</tr>
<tr>
<td>$10.00</td>
<td>10,000</td>
<td>$10.10</td>
<td>10,000</td>
</tr>
<tr>
<td>$9.99</td>
<td>5,000</td>
<td>$10.11</td>
<td>10,000</td>
</tr>
<tr>
<td>$10.01</td>
<td>100</td>
<td>$10.10</td>
<td>100</td>
</tr>
<tr>
<td>$10.00</td>
<td>200</td>
<td>$10.11</td>
<td>200</td>
</tr>
</tbody>
</table>

The trade-through prohibitions outlined in Part 6 of the trading rules requires broker-dealers to ensure that the price that they trade at is the best available in any market. Figure 2 provides an example of a limit order book situation in which the trade-through prohibition would apply. If a market sell order for 10,000 shares is entered in this hypothetical market, only Market A has the liquidity to fill this order, at a price of $10.00. However, the 100 shares available on Market B at $10.01 must be “traded through” prior to the remaining 9,900 shares executing on Market A at $10.00.

It is possible for brokers to meet their trade-through requirements using so-called “Smart Order Routers” provided by individual marketplaces. These routers ensure that orders do not trade through better prices on other markets, however most participants retain access to all markets in order to ensure compliance with this regulation, as it is unclear if such reliance complies with the legislation. These best execution and trade-through regulations are frequently cited⁹ by brokers as requirements that they purchase all data feeds provided in the marketplace. Their main concern, then, is that the price they pay for data does not reflect the value of the information being generated by these marketplaces. Many (including the IIAC) have called for regulation of the data fees, either under the model used by the SIP in the US or through price controls. In the US, the SIP aggregates the data feeds from each marketplace in order to generate the National Best Bid and Offer (NBBO), which is then purchased by market participants. Whilst individual exchanges do sell data products separately which provide data with lower latency than the SIP, participants are only required to purchase the SIP feed in order to meet their regulatory requirements. Whilst Canada does have an information processor (TMX Datalinx, a wholly owned subsidiary of the TMX Group), it is responsible only for the aggregation of data. The pricing of this data is up to each individual marketplace, with the “feed” itself distributed by Datalinx for a small fee. It is then up to the market participants to construct the NBBO from the information provided.

### 3 Data

In order to conduct our empirical analysis of the relative contributions of each marketplace to price discovery, all trade and quote data for the four Canadian marketplaces¹⁰ was obtained from the Securities

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⁸ See the results of a survey conducted by the IIAC, pp. 29.
⁹ See forthcoming 2012 OSC report on surveys conducted with market participants re: Data fees.
¹⁰ The marketplaces examined are TSX, Alpha, Chi-X and Pure. At the time of writing the data for Omega was unavailable and hence they are not included in the current study.
Industry Research Centre of Australasia (SIRCA) for the month of July 2011. This included all securities listed on both the TSX and TSX-V during that time, over 4,000 in total. The fees charged by each marketplace were obtained from their websites. The international fees charged by each of the peer markets were also obtained from their respective websites.

4 The measurements of pre- and post-trade contributions to price discovery

In order to measure the relative contributions of each marketplace to price discovery, a number of pre- and post-trade metrics are utilised. A number of these are utilised by the SIP, with others proposed by market participants as effective ways to capture the contribution of each marketplace to price discovery. In analysing the value of data feeds, it is important to consider both the pre- and post-trade contributions. Whilst the two will be inextricably linked, marketplaces that contribute to price discovery by posting aggressive quotes should be rewarded, even if these quotes are never filled. Similarly, if a marketplace does not post quotes aggressively, but is the main source of traded liquidity, this should also be rewarded.

The overarching principle of each of these metrics is that the execution of trades should be rewarded, as should quoted-price innovation. The following 9 metrics aim to meet these goals and to avoid, as far as is possible, potential distortions in their construction. Each metric will be explained both in words and in notation. This will be followed by a brief discussion of how each metric may be manipulated, or which market characteristics it would tend to value.

4.1 Post-Trade Metrics

1. **Percent of Volume** for exchange \( i \) is the volume traded on an exchange divided by the total volume traded on all exchanges in the period.

\[
\%\text{Volume}_i = \frac{\text{Volume}_i}{\sum_{i=1}^{4} \text{Volume}_i} \times 100
\]

This metric is very easy to construct, and is commonly reported in publications such as the monthly IIROC “Marketplace Statistics”. This metric rewards traded volume and will tend to favour those exchanges that trade in relatively small shares, as it takes into consideration only the number of shares traded, not their value. In the extreme, if an exchange targeted itself to very small stocks, by offering significant per-share rebates, for example, this metric would tend to inflate their market share.

2. **Percent of Number** of trades for exchange \( i \) is the number of trades on an exchange divided by the total number of trades on all exchanges in the period.

\[
\%\text{Number}_i = \frac{\text{Number}_i}{\sum_{i=1}^{4} \text{Number}_i} \times 100
\]

The number of trades is also readily available, and tends to reward those exchanges that have a larger number of trades. It is conceivable that this metric could be manipulated by encouraging traders to break their orders up into smaller pieces. In this way, neither the volume nor the dollar volume traded would
change, but the number of trades would increase significantly. Such conduct could be encouraged by charging a fee based on the amount of liquidity removed from the market in a single trade, or by providing rebates based on trades, regardless of size.

3. **Percent of Dollar Volume** for exchange $i$ is the dollar volume traded on an exchange divided by the total dollar volume traded on all exchanges in the period. Dollar volume is the product of the price and volume of each trade.

$$\% \text{Volume}_i = \frac{\text{Volume}_i}{\sum_{i=1}^{4} \text{Volume}_i} \times 100$$

$\text{Volume} = \text{Price} \times \text{Volume}$

The dollar volume of each trade is also readily constructed, and has the advantage of taking the value of the transactions into account. This will tend to avoid the biases that may be present in the Volume or Trades metrics. However, due to the requirement that internal crossings are reported to a marketplace, it is possible that a marketplace being measured on this metric could provide incentives (such as trading rebates) to brokers to ensure that crosses are reported on their exchange. In this way, the exchange would seem to have a much larger share of dollar volume without actually contributing to price discovery.

4. **Percent of Square-Root Dollar Volume** for exchange $i$ is the square-root of the dollar volume of each trade $t$ on exchange $i$ divided by the sum of the square-root dollar volume traded on all exchanges in the period.

$$\% \sqrt{\text{Volume}_i} = \frac{\sqrt{\text{Volume}_{it}}}{\sum_{i=1}^{n} \sum_{t=1}^{4} \sqrt{\text{Volume}_{i}} \times 100}$$

The square-root of dollar volume needs to be individually constructed for each transaction. This metric, whilst not being widely published, is easily constructed from trade reports. It has the advantage of reducing the importance of larger trades proportional to smaller trades. This can help alleviate the problem of very large crosses or trades inflating the price discovery of a reporting exchange. This metric does have the potential disadvantage that very small trades (on the order of $1-2$) will not be reduced at all, and will consequently be disproportionately represented. If an exchange were to trade very frequently at these very low dollar values, their contribution to price discovery could be inflated. An exchange that wanted to increase their share of this metric could provide liquidity rebates for very small stocks, resulting in a larger proportion of very small value trades.

5. **Scope of trading** is the average over the month of the number of symbols with greater than 1 trade on exchange $i$ on day $d$, divided by the number of symbols actively traded on that day.

$$\text{Scope}_i = \frac{1}{D} \sum_{t=1}^{T} \frac{\text{Number of symbols traded}_{i,t}}{\text{MAX}[\text{Number of symbols traded}_{i,t}]} \quad i = [1 - 4]$$

Scope of trading provides a metric that measures the number of symbols an exchange trades. Whilst this is relatively easily constructed from trade reports, it has the disadvantage of “double penalising” exchanges for not trading all securities. This metric, by construction, will be very high for incumbent exchanges (such as the TSX) and will be lower for newer exchanges that are yet to gain volume in very small stocks. Whilst it does measure the “activity” of firms, an exchange that only trades in half of the listed symbols is already, by definition, penalised for not trading those symbols. Thus, if Scope is used on
its own, it can be a valuable indicator of the activity levels of exchanges, however if it is applied in conjunction with other metrics, this would seem to disproportionately favour incumbent exchanges. The evaluation of marketplaces based on the scope metric could be open to significant manipulation. If a marketplace wanted to achieve a scope as close as possible to one, traders could be incentivised to become the “first” trader of the day in any given security. In this way, marketplaces could ensure at least one trade in every security without providing any meaningful liquidity or price discovery.

4.2 Pre-Trade Metrics

6. Percent of Best Bid and Offer (BBO) is the percent of the day for which market $i$ had a quote alive at the national best bid or best ask for stock $j$. Note, this metric is scaled to sum to one.

$$\%BBO_i = \frac{BBO_i}{\sum_{i=1}^{4} BBO_i}$$

$$BBO_i = \frac{1}{J} \sum_{j=1}^{J} \frac{\text{Seconds at BB}_j + \text{Seconds at BA}_j}{2 \times (6.5 \times 60 \times 60)} \times 100$$

This metric rewards exchanges the longer they spend at the at the BBO. Whilst this metric is not as easy to compute, it can be constructed from standard quote data. In order to ensure that the addition of each marketplace sums to one, the individual metrics for each marketplace are summed to come up with a market-wide daily percent at the BBO, and each individual marketplaces’ percentage is then divided by this total to scale the metric to one. One potential problem with this metric is that an exchange, knowing that its’ performance will be assessed using this metric, may choose to “quote stuff”, that is to incentivise marketplace participants to post small lots at prices equivalent to the current NBBO. This behaviour will be rewarded, whilst not contributing to price discovery. This metric could also be manipulated by introducing “pegged orders”. Such limit orders would not be entered at a fixed price, but rather be “pegged” to the current NBBO. If an order were pegged to the NBBO (rather than offset from it), this would ensure that the exchange remained at the NBBO for a majority of the day by simply “following” the price innovators.

7. Percent of Best Spread is the percent of the day that each market $i$ spent at the narrowest spread for stock $j$. Note, this metric is scaled to sum to one.

$$\%\text{Spread}_i = \frac{\text{Spread}_i}{\sum_{i=1}^{4} \text{Spread}_i}$$

$$\%\text{Spread}_i = \frac{1}{J} \sum_{j=1}^{J} \frac{\text{Seconds at tightest spread}_j}{6.5 \times 60 \times 60} \times 100$$

The construction of this metric also requires quote level data. It aims to reward marketplaces for providing liquidity at both the best bid and best ask, establishing the narrowest spread on the market. In order to ensure that the addition of each marketplace sums to one, the individual metrics for each marketplace are summed to come up with a market-wide daily percent at the narrowest spread, and each
individual marketplaces’ percentage is then divided by this total to scale the metric to one. Like metric 7, this metric could be manipulated using either quote-stuffing or pegged orders. The advantage of this metric is that it rewards only those exchanges that quote at both the best bid and best ask. One potential flaw of this metric, especially in illiquid stocks, is that it could reward two marketplaces that both had the same sized spread at different quotes, though this situation is relatively unlikely, especially in the presence of trade through prohibitions.

8. $Time$ is the percent of quoted time-dollar-volume for each market $i$, out of the total time-dollar-volume for the entire market for the analysed period, when only the best bid and ask are considered.

$$
$Time_i = \frac{\sum_{j=1}^{l} Price_j \times Volume_j \times seconds at BB + Price_j \times Volume_j \times seconds at BA}{\sum_{j=1}^{l} \sum_{i=1}^{4} (Price_j \times Volume_j \times seconds at BB + Price_j \times Volume_j \times seconds at BA)} \times 100
$$

$Time$ aims to reward marketplaces not only for providing liquidity at the best bid and ask, but for the depth of liquidity available at each level. In order to construct this metric, both quoted prices and volumes are required. This metric has an advantage over Percent of BBO in that marketplaces “stuffing” quotes will not be well rewarded for the marginal liquidity they provide at the NBBO. One potential disadvantage of this metric is that it does not necessarily reward marketplaces for providing liquidity at levels away from the BBO. With relatively wide quotes, it is possible that a marketplace wishing to manipulate this measure could provide very shallow improvements to the BBO without providing any real capacity to trade at depth at that price level.

9. 5-level $Time$ is the percent of quoted time dollar volume for each market, out of the total quoted time dollar volume for the entire market for the period, when all 5 levels of volume are considered, with the following weightings:

<table>
<thead>
<tr>
<th>Order Book Level</th>
<th>Weighting ($w$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16x</td>
</tr>
<tr>
<td>2</td>
<td>8x</td>
</tr>
<tr>
<td>3</td>
<td>4x</td>
</tr>
<tr>
<td>4</td>
<td>2x</td>
</tr>
<tr>
<td>5</td>
<td>1x</td>
</tr>
</tbody>
</table>

$$
5-level\ Time_i = \frac{\sum_{l=1}^{5} w_i \times Time_i}{31} \times 100
$$

5-level $Time$ is the most data intensive of our metrics, requiring not only the price and volume available at the best bid and offer, but also up to 5 levels away from the BBO. This measure has the advantage of
rewarding exchanges for providing liquidity at the BBO and also at levels away from it, weighting the BBO most highly. In the case of wide quotes, an exchange that provides very shallow improvement solely to become the “holder” of the NBBO would be rewarded for narrowing the quotes, but the metric would also recognise the depth provided by other markets outside of the NBBO, unlike $Time.

4.3 Indices

In order to combine the elements of the pre- and post-trade contributions to price discovery, three indices are constructed from the component metrics. The first of these is based on the revenue distribution model used by the US SIP. The other two are models that combine different elements of the metrics.

- **SIP calculations**

\[
\left[ \frac{\%\sqrt{\text{Volume}_i} + \%\text{Number}_i}{2} \right] \ast 0.5 + \text{$Time}_i \ast 0.5
\]

This model incorporates the metrics used by the US SIP to distribute revenue amongst participating marketplaces. The post-trade metrics used are equally weighted, and are composed of the share of square-root dollar volume and the share of the number of trades. These post-trade metrics together are assigned a weighting of 50% of the value of the index. The pre-trade metric used is the percent of quoted dollar time, which is also given a 50% weighting in the final index.

- **Model 2**

\[
\left[ \frac{\%\sqrt{\text{Volume}_i} + \%\text{Number}_i}{2} \right] \ast 0.5 + \text{5level}$Time_i \ast 0.5
\]

Model 2 is very similar to that used by the SIP, however instead of using $Time, 5-level $Time is used, which captures a broader cross-section of the liquidity provided at different depth levels.

- **Model 3**

\[
\left[ \frac{\%\text{Volume}_i + \%\text{Number}_i + \%\$\text{Volume}_i}{3} \right] \ast \text{Scope}_i \ast 0.5 + \left[ \frac{\%\text{Spread}_i + \%\text{BBO}_i}{2} \right] \ast \text{Scope}_i \ast 0.5
\]

Model 3 is quite different from the previous two. For the post-trade element, this index considers each marketplace’s share of traded volume, share of trades and share of dollar-volume. These three elements are given equal weighting in this index. The pre-trade metrics considered are the percent of the day spent at the best spread and the percent of the day spent at the NBBO. The average of both the pre- and post-trade metrics is multiplied by the Scope of the marketplace, weighting the outcome for each marketplace by the number of symbols in which it actively trades. The resulting pre- and post-trade metrics are then equally weighted to come up with the final index.

Whilst each of these indices is constructed placing equal importance on the pre- and post-trade metrics, this is an arbitrary decision. Given that each individual component of the indices are constructed separately it is possible to construct each metric with different weightings ranging from zero to one,
providing a test of the robustness of these indices to the assumption of equal pre- and post-trade weightings. The results of this robustness test are reported in Section 6.2.

5 Establishing a “fair” fee

Having established methodologies by which to rank the relative contributions of each of the marketplaces to price discovery, the second challenge in determining if any particular marketplaces data fee is “fair” is establishing an appropriate market-wide price for Canadian securities market data as a whole. Once this fee is determined, it can be split by marketplace using the metrics established in section 4. There are several difficulties associated with establishing this fair fee, including the inability to directly observe the true “value” placed on these feeds by market participants, as well as the need to establish either internal or external comparisons. Two approaches were used to arrive at estimates for the “fair” data fee per marketplace. The first takes the data fees charged by each marketplace and aggregates them into a single “pool”. This is then considered to be the appropriate fee for the Canadian marketplace, and is then divided between the marketplaces based on the indices developed in Section 4. The current fees charged by each marketplace can be found in Table 1.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>TSX</th>
<th>TSX-V</th>
<th>Alpha</th>
<th>Chi-X</th>
<th>Pure</th>
<th>Omega</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>$32.00</td>
<td>$25.00</td>
<td>$15.00</td>
<td>$12.00</td>
<td>$12.00</td>
<td>$2.85</td>
</tr>
<tr>
<td>Level 2</td>
<td>$50.00</td>
<td>$26.00</td>
<td>$48.00</td>
<td>$30.00</td>
<td>$13.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>Combined</td>
<td>$82.00</td>
<td>$51.00</td>
<td>$48.00</td>
<td>$30.00</td>
<td>$25.00</td>
<td>$2.85</td>
</tr>
</tbody>
</table>

The difficulty with employing this measure is that it does not provide an external evaluation of Canadian securities data. If, as claimed by the IIAC report (2011), data fees in Canada are overpriced, this method will not provide an unbiased measure of the true value of marketplaces’ data fees. Rather, it will provide an indication as to whether any one market is charging relatively more or less than “average” for its data. The second approach attempts to overcome this limitation by using international comparisons to determine an average data fee per $100 million traded. This approach assumes that the value of the international peers’ data is relatively comparable to that of the Canadian exchanges’, and that the value of this data is relative to the value of securities traded on the exchanges. In order to ensure accurate comparisons, the seven peer markets were chosen due to their comparable size, turnover, level of development and technological sophistication. Table 2 documents the fees charged by each of these comparison exchanges, as well as their average monthly number of trades and value traded.
Table 2
This table provides information on the Level 1 (Top of book / NBBO) and Level 2 (Full orderbook depth) data fees charged by the TSX and seven of its international peer markets. The markets, in order of appearance, are the Toronto Stock Exchange, London Stock Exchange, Borsa Italiana, Euronext, NASDAQ OMX Nordic Exchange, the New York Stock Exchange and the National Association of Securities Dealers Automated Quotations. These statistics are gathered as the monthly average of the period January 2009 – June 2010 and have been converted into SCAD at exchange rates prevailing as at the 1st of January, 2010. These statistics have been gathered either from the websites of the respective exchanges, or from their annual reports.

<table>
<thead>
<tr>
<th>Jan 2009-Jun 2010 (monthly average)</th>
<th>TSX</th>
<th>LSE</th>
<th>ASX</th>
<th>Borsa Italiana</th>
<th>Euronext</th>
<th>OMX Nordic Exchange</th>
<th>NYSE</th>
<th>NASDAQ</th>
<th>Average (incl. TSX)</th>
<th>Average (excl. TSX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Trades (million)</td>
<td>16.2</td>
<td>12.8</td>
<td>10</td>
<td>5.4</td>
<td>14.3</td>
<td>4.8</td>
<td>209.3</td>
<td>179.4</td>
<td>56.5</td>
<td>62.3</td>
</tr>
<tr>
<td>Total Value Traded (billion)</td>
<td>$106.50</td>
<td>$151.70</td>
<td>$73.22</td>
<td>$83.00</td>
<td>$168.40</td>
<td>$60.80</td>
<td>$1,499.50</td>
<td>$1,150.30</td>
<td>$411.68</td>
<td>$455.27</td>
</tr>
</tbody>
</table>

**Professional - Level 1**

| Monthly Fee | $38.00 | $45.08 | $42.51 | $18.11 | $89.06 | $28.69 | $31.56 | $21.04 | $39.26 | $39.44 |
| Per 10,000 trades | $0.024 | $0.035 | $0.043 | $0.034 | $0.062 | $0.060 | $0.002 | $0.001 | $0.032 | $0.034 |
| Per $100 million value | $0.036 | $0.030 | $0.058 | $0.022 | $0.053 | $0.047 | $0.002 | $0.002 | $0.031 | $0.031 |

**Professional - Level 1 & 2**

| Monthly Fee | $88.00 | $178.60 | $42.51 | $60.38 | $135.86 | $107.18 | $94.68 | $100.99 | $101.03 | $102.89 |
| Per 10,000 trades | $0.054 | $0.140 | $0.043 | $0.112 | $0.095 | $0.223 | $0.003 | $0.005 | 0.084 | 0.089 |
| Per $100 million value | $0.083 | $0.118 | $0.058 | $0.073 | $0.081 | $0.176 | $0.004 | $0.007 | 0.075 | $0.074 |

6 Results
The following results sections are split into four separate components; the first provides the results for each of the individual metrics; the second presents the robustness of the constructed metrics to the assumption of equal pre- and post-trade weights; the third section provides the results of combining the indices with the estimated “fair fees” to come up with a final valuation of the data fees for each marketplace. The final section provides evidence of cross-subsidisation of TSX data fees by the fees charged for TSX-Venture listed securities. The estimations have been made using data for the month of July, 2011.

6.1 Individual Metrics
Table 3 documents the construction of each of the post-trade metrics. A cursory glance reveals that whilst significant differences exist between the measures, the rankings of each marketplace remain unchanged regardless of metric. As posited in Section 4, Scope appears to significantly favour the incumbent marketplace, TSX, with the remaining marketplaces’ Scopes reflecting their relative trading volumes. Analysing each marketplace in turn, the characteristics of trading on each marketplace is revealed by their relative share of each measure. Alpha retains a relatively consistent market share regardless of which metric is used, with the exception of dollar-volume, which at 17.46% is slightly lower than the other metrics which are range between 19% and 20%.
Table 3

This table presents the results of the post-trade metrics constructed using data for July 2011 for each of the Canadian marketplaces assessed. Scope represents the number of symbols actively traded on each marketplace. % Volume shows each marketplaces’ portion of traded shares, % Trades shows each marketplaces’ portion of trades, %$Volume shows each marketplaces’ portion of dollar volume, and % Sqrt $Volume shows the marketplaces’ percentage of aggregated $Volume when the square root is taken at the individual trade level.

<table>
<thead>
<tr>
<th></th>
<th>Scope</th>
<th>% Volume</th>
<th>% Trades</th>
<th>% $Volume</th>
<th>% Sqrt $Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>75.97%</td>
<td>20.86%</td>
<td>19.80%</td>
<td>17.46%</td>
<td>19.35%</td>
</tr>
<tr>
<td>Chi-X</td>
<td>54.85%</td>
<td>8.79%</td>
<td>19.55%</td>
<td>10.42%</td>
<td>16.64%</td>
</tr>
<tr>
<td>Pure</td>
<td>50.33%</td>
<td>3.58%</td>
<td>4.33%</td>
<td>3.14%</td>
<td>3.73%</td>
</tr>
<tr>
<td>TSX</td>
<td>100.00%</td>
<td>66.77%</td>
<td>56.31%</td>
<td>68.98%</td>
<td>60.28%</td>
</tr>
<tr>
<td>Sum</td>
<td>281.15%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Chi-X has a significant variability in each of the metrics. Its’ share of trades and square-root volume are much larger, at 19.8% and 16.64% respectively, than its share of total volume and dollar-volume, at 8.79% and 10.42% respectively. This is reflective of a large number of small orders executed on Chi-X and likely reflects small average order-sizes. The perceived size of trading on Chi-X is therefore very sensitive to the measurement metric used.

Pure forms a very small portion of the Canadian market regardless of which metric is used. Whilst there is no significant absolute variation in the four metrics, ranging between 3-4%, if these metrics were used to distribute revenue the difference of 1% could mean a 33% increase in share of data revenue. The tendency of Pure to score highest in %Trades and %Sqrt $Volume reflects, as with Chi-X, a relatively lower average trade size, with more frequent, smaller trades executing on this platform.

The dominance of the TSX in the Canadian landscape is reflected in these post-trade metrics. There is, however, very significant variation in the metrics used to assess the magnitude of this dominance. Unlike Chi-X and Pure, the TSX appears to have much larger average trade sizes, with almost 69% of dollar-volume, and only 56.31% and 60.28% of Trades and Sqrt $Volume respectively. There are two factors that could drive this result. As the historically dominant exchange, orders demanding large liquidity are likely to execute the bulk of their trading on the TSX, leading to larger overall trade sizes. The second reason is the requirement for brokers to report crosses to an exchange, which will add to the reporting exchanges’ traded volume, without representing any real contribution to price discovery. Historically all brokers reported internal crosses to the TSX, and there is little incentive for them to change this practice and report to other exchanges, since the marketplaces neither charge nor provide a rebate for this service.

Table 4 documents the construction of the pre-trade metrics for each exchange. Unlike the post-trade metrics, which do not exhibit significant variation, these metrics vary by magnitudes of 2-3 times depending on which measure is employed, demonstrating both the potential for manipulation and the importance of choosing pre-trade metrics carefully. Analysing each of the marketplaces separately provides significant insights into the operation of both the marketplaces’ and the metrics themselves.
Table 4

This table presents the results of the pre-trade metrics constructed using data for July 2011 for each of the Canadian marketplaces assessed. %BBO shows the scaled percentage of the day for which the marketplace was at the NBBO. % Best Spread shows the scaled percent of the day that the marketplace maintained the narrowest observed spread. $Time shows the percentage of total quoted dollar-volume at the NBBO attributable to that marketplace. 5-level $Time shows the percentage of total quoted dollar volume, weighted by the best 5-levels of the orderbook, attributable to each marketplace.

<table>
<thead>
<tr>
<th></th>
<th>% BBO</th>
<th>% Best Spread</th>
<th>$Time</th>
<th>5-Level $Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>25.49%</td>
<td>22.45%</td>
<td>19.10%</td>
<td>15.61%</td>
</tr>
<tr>
<td>Chi-X</td>
<td>20.12%</td>
<td>18.14%</td>
<td>9.50%</td>
<td>7.87%</td>
</tr>
<tr>
<td>Pure</td>
<td>11.12%</td>
<td>7.61%</td>
<td>5.16%</td>
<td>4.05%</td>
</tr>
<tr>
<td>TSX</td>
<td>43.27%</td>
<td>51.81%</td>
<td>66.24%</td>
<td>72.47%</td>
</tr>
<tr>
<td>Sum</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Alpha retains a relatively stable set of pre-trade metrics, despite a range of 15-25%. The outperformance of Alpha in %BBO and %Spread is likely related to its’ ownership structure. Alpha is owned by a collection of 9 brokers, including the largest 5 Canadian bank owned broker-dealers. Given the trade-through prohibition detailed in Section 2, and Alpha’s owners/participants preference for trading on Alpha where possible, there is an understanding from market participants that when Alpha is not at the NBBO, it is in its’ owners interests to post a small quote (often as small as one board lot) equivalent to the NBBO in order to ensure that small orders do not need to be routed away from Alpha to be executed, giving revenue to competing marketplaces. The impact of such a strategy, if in existence, would be to emphasize the frequency with which Alpha appeared at the NBBO (and hence at the best spread) without adding significant liquidity to the market. This hypothesis is supported by Alphas underperformance in the metrics which consider the depth provided at the NBBO, namely $Time and 5-level $Volume.

Like Alpha, Chi-X scores significantly higher when compared using %BBO or %Spread. In fact, the metrics, at 20% and 18% respectively, are more than double Chi-X’s share of the pre-trade price discovery when measured using $Time or 5-Level $Time. The reason for this is likely the existence of Chi-X’s pegged orders. Unlike any of the other exchanges considered, Chi-X allows subscribers to peg orders to the NBBO. These orders could be pegged below the NBBO (eg. NBBO – 1 tick) or they could be pegged directly to the NBBO. The existence of these order types appears to drive the significantly higher performance of Chi-X on %BBO and %Best Spread, providing evidence of the impact of potentially manipulative pricing strategies.

Like Alpha and Chi-X, Pure performs much higher on %BBO and %Spread than on the metrics that consider the depth available at the NBBO. This is likely reflective of Pure having low-latency arbitrageurs and market makers operating on very shallow liquidity around the NBBO, without significant depth ever residing on their marketplace.

Unlike the other marketplaces in this analysis, the TSX performs much better on $Time and 5-Level $Time than on %BBO or %Spread. As the main source of liquidity historically, it is likely that traders bring larger orders to the TSX for execution. As the existence of liquidity breeds more liquidity, this would reflect the dominant position of the TSX. The fact that the TSX is the only marketplace for whom

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5-Level $Time exceeds $Time indicates that the TSX not only has significant amounts of liquidity at the NBBO, but that this is augmented by greater depth than any of the other exchanges.

In order to minimise the impact of any one of these metrics, the indices outlined in Section 4 provide weightings to each of the pre- and post-trade metrics. Table 5 documents the results of averaging each of the pre- and post-trade metrics according to the indices formula. Note that the weights in Model 3 do not sum to one hundred due to the impact of the multiplication by the Scope variable.

Table 5 presents the weighted pre- and post-trade components of each of the three models. The SIP model uses the average of % Sqrt Volume and % Trades for the post-trade metric, and the $Time metric as the pre-trade metric. Model 2 uses the average of % Sqrt Volume and % Trades for the post-trade metric, and the 5-level $Time metric as the pre-trade metric. Model 3 uses average of % Volume, %Trades and %$Volume for the post-trade metrics and uses the average of %BBO and %Spread for the pre-trade metrics. Due to the multiplication by the Scope metric, the weights in Model 3 do not sum to one. Each of the indices attaches a 50% weighting to both pre- and post-trade metrics.

<table>
<thead>
<tr>
<th>Post-Trade</th>
<th>50% of weighting</th>
<th>Pre-Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>19.58%</td>
<td>Alpha</td>
</tr>
<tr>
<td>Chi-X</td>
<td>18.09%</td>
<td>Chi-X</td>
</tr>
<tr>
<td>Pure</td>
<td>4.03%</td>
<td>Pure</td>
</tr>
<tr>
<td>TSX</td>
<td>58.30%</td>
<td>TSX</td>
</tr>
<tr>
<td>Sum</td>
<td>100.00%</td>
<td>Sum</td>
</tr>
</tbody>
</table>

In each of the models, an equal weighting is placed on the pre- and post-trade metrics. The aggregation of these metrics into the final index is documented in Table 6. Note that due to the impact of the Scope metric, Model 3 in the panel labelled “Final Weights” does not sum to one-hundred. The panel labelled “Final – Scaled” has re-based Model 3 to sum to one-hundred percent.

Table 6 presents the final indices constructed using the aggregation of each of the metrics. The first panel – Final Weights – does not sum to one for Model 3 due to the inclusion of the Scope variable. In the second panel – Final Scaled – Model 3 has been re-weighted to sum to one. The SIP model uses the average of % Sqrt Volume and % Trades for the post-trade metric, and the $Time metric as the pre-trade metric. Model 2 uses the average of % Sqrt Volume and % Trades for the post-trade metric, and the 5-level $Time metric as the pre-trade metric. Model 3 uses average of % Volume, %Trades and %$Volume for the post-trade metrics and uses the average of %BBO and %Spread for the pre-trade metrics. Each of the indices attaches a 50% weighting to both pre- and post-trade metrics.

<table>
<thead>
<tr>
<th>Final Weights</th>
<th>SIP</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>19.34%</td>
<td>17.59%</td>
<td>16.46%</td>
</tr>
<tr>
<td>Chi-X</td>
<td>13.80%</td>
<td>12.98%</td>
<td>8.79%</td>
</tr>
<tr>
<td>Pure</td>
<td>4.60%</td>
<td>4.04%</td>
<td>3.28%</td>
</tr>
<tr>
<td>TSX</td>
<td>62.27%</td>
<td>65.38%</td>
<td>55.78%</td>
</tr>
<tr>
<td>Sum</td>
<td>100.00%</td>
<td>100.00%</td>
<td>84.32%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final - Scaled</th>
<th>SIP</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>19.34%</td>
<td>17.59%</td>
<td>19.52%</td>
</tr>
<tr>
<td>Chi-X</td>
<td>13.80%</td>
<td>12.98%</td>
<td>10.43%</td>
</tr>
<tr>
<td>Pure</td>
<td>4.60%</td>
<td>4.04%</td>
<td>3.89%</td>
</tr>
<tr>
<td>TSX</td>
<td>62.27%</td>
<td>65.38%</td>
<td>66.16%</td>
</tr>
<tr>
<td>Sum</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
Looking at the “Final – Scaled” panel, despite the significant variation in the construction of each of the indices, overall the results are quantitatively very similar. The largest variance occurs for Chi-X, which is due to their significantly smaller average trade size as reported using the inputs of %Volume and %$Volume in the construction of Model 3, combined with the 50% additional penalty imposed by the Scope variable. As anticipated, the addition of this scope variable provides the highest estimate of the TSX’s contribution to price discovery.

### 6.2 Sensitivity to the assumption of equal pre- and post-trade weights

In constructing the above indices, it was necessary to make a determination regarding the relative contribution of pre- and post-trade metrics to eventual price discovery. The equal weighting chosen for the majority of the index construction has intuitive appeal. It does not require an explanation as to why one is more important than the other, as both are undoubtedly important. In order to test the sensitivity of this model to the assumption of equal weights, the three panels of Figure 3 demonstrate the relative market shares of each marketplace when the pre- and post-trade weights are varied between 0 and 100%.

**Figure 3**

This figure plots the estimates of each markets Level 1 (Top of book) data fee based on its’ market share against the actual price currently charged for the data. The vertical axis displays the cost per user per month in Canadian dollars of each marketplaces data feed. The horizontal axis displays the contribution to price discovery of each marketplace in percent as constructed using the indices explained in Section 4. The squares represent the actual fee charged by each marketplace, and use an average of each of the three indices for their contribution to price discovery. The diamonds represent the six estimates constructed using each of the three indices estimate for market share and each of the two estimates of total fees. The solid line indicates the average of the actual fee charged, whilst the dashed line shows the average of the estimates.
The results of the sensitivity analysis presented in Figure 3 indicate that under the SIP model and Model 2 Chi-X would experience a doubling of its’ market share from 10% to 20% should post-trade be used in favour of pre-trade. Similarly, in these two models TSX suffers a reduction of 10-15% based on using post-trade metrics alone. Interestingly, TSX benefits from the use of pre-trade metrics under Model 3. Despite these slight variances at either extreme end of the spectrum, it appears that the metrics are not significantly vulnerable to choices of weights, assuming that both pre- and post-trade metrics are included in the analysis.
6.3 Overall Market Fees

In order to establish estimates of “fair” data fees for each marketplace, the three indices constructed in Table 6 are combined with the two estimates of the total Canadian marketplace fee reported in Tables 1 and 2. Each of the three indices is combined with the two methods of determining the fair fee for the entire Canadian marketplace to provide six estimates of the “fair fee” for each marketplaces’ data. Figures 4 and 5 report these six estimates for each of the markets, and plot them alongside the actual fee charged by that marketplace. The estimate of the contribution to price discovery for the actual fee charged uses an arithmetic average of the three indices. The solid line indicates the average of the actual fee charged, with the dashed line identifying the average of the estimated fees.

Figure 4

This figure plots the estimates of each markets Level 1 (Top of book) data fee based on its’ market share against the actual price currently charged for the data. The vertical axis displays the cost per user per month in Canadian dollars of each marketplaces data feed. The horizontal axis displays the contribution to price discovery of each marketplace in percent as constructed using the indices explained in Section 4. The squares represent the actual fee charged by each marketplace, and use an average of each of the three indices for their contribution to price discovery. The diamonds represent the six estimates constructed using each of the three indices estimate for market share and each of the two estimates of total fees. The solid line indicates the average of the actual fee charged, whilst the dashed line shows the average of the estimates.
Figure 4 shows that regardless of the estimation method for either the contribution to market share or the fair value of the total data fees, the TSX charges slightly less than fair, Chi-X charges very in line with the fair fee, and both Pure and Alpha charge significantly more than the fair fee. This provides empirical evidence that it is the fragmentation of the Canadian marketplaces that has led to the significant increase in per-user data fees. Due to the relative dominance of the TSX, a slight increase could be possible in their Level 1 fee without being considered “unfair” according to our metrics.

**Figure 5**

This figure plots the estimates of each market's Level 2 (Full Orderbook) data fee based on its market share against the actual price currently charged for the data. The vertical axis displays the cost per user per month in Canadian dollars of each marketplace's data feed. The horizontal axis displays the contribution to price discovery of each marketplace in percent as constructed using the indices explained in Section 4. The squares represent the actual fee charged by each marketplace, and use an average of each of the three indices for their contribution to price discovery. The diamonds represent the six estimates constructed using each of the three indices estimate for market share and each of the two estimates of total fees. The solid line indicates the average of the actual fee charged, whilst the dashed line shows the average of the estimates.
An examination of Figure 5 shows that the fee charged by the TSX for full orderbook data of $88 is $10-$20 below the estimate for their “fair fee” according to the constructed metrics. Both Pure and Chi-X appear to be charging very close to the estimated fair fees. Alpha, however, stands as an outlier in charging $48, $16 higher than the highest estimate.

6.4 Results for TSX-Venture listed securities

The Canadian market is somewhat unusual, having separated its’ listed securities into either the “Venture” exchange, being predominantly for early-stage mining and extraction companies, and the “Main” exchange, to which these companies may migrate once they reach appropriate size and cashflow. Table 7 reports the results of an analysis identical to that conducted for the TSX. For brevity, we have not analysed each component, but rather presented the final results.

Table 7 presents the final indices for the TSX-V, constructed using the aggregation of each of the metrics. Similarly to Table 7, Model 3 has been re-weighted to sum to one. The SIP model uses the average of % Sqrt Volume and % Trades for the post-trade metric, and the $Time metric as the pre-trade metric. Model 2 uses the average of % Sqrt Volume and % Trades for the post-trade metric, and the 5-level $Time metric as the pre-trade metric. Model 3 uses average of % Volume, %Trades and %$Volume for the post-trade metrics and uses the average of %BBO and %Spread for the pre-trade metrics. Each of the indices attaches a 50% weighting to both pre- and post-trade metrics.

<table>
<thead>
<tr>
<th></th>
<th>Final - Scaled</th>
<th>SIP</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>15.56%</td>
<td>14.21%</td>
<td>10.71%</td>
<td></td>
</tr>
<tr>
<td>Chi-X</td>
<td>6.48%</td>
<td>6.34%</td>
<td>4.64%</td>
<td></td>
</tr>
<tr>
<td>Pure</td>
<td>3.25%</td>
<td>2.94%</td>
<td>0.91%</td>
<td></td>
</tr>
<tr>
<td>TSX</td>
<td>74.71%</td>
<td>76.51%</td>
<td>83.74%</td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>100.00%</td>
<td>100.00%</td>
<td>100.00%</td>
<td></td>
</tr>
</tbody>
</table>

Given the relatively less liquid nature of these securities it is unsurprising that the TSX stands out as the main supplier of market activity for the TSX-V listed securities. The relative trading turnover for the TSX-V is approximately 6% of the main exchange. The small contribution of Chi-X and Pure in particular to the price discovery of TSX-V stocks has led them to “bundle” their TSX-V and TSX data feeds into one product, so that TSX-V prices are effectively “free”. In order to conduct a price analysis of these marketplaces that do not explicitly charge for TSX-V data, the average of the ratio of the price charged by TSX and Alpha for TSX and TSX-V listed securities is used to divide the fee charged by Chi-X and Pure between the two listing venues. The results of these analysis are presented in Figure 6.

This figure plots the estimates of each market’s combined TSX-Venture Level 1 and Level 2 data fee based on its’ market share against the actual price currently charged for the data. The vertical axis displays the cost per user per month in Canadian dollars of each marketplace’s data feed. The horizontal axis displays the contribution to price discovery of each marketplace in percent as constructed using the indices explained in Section 4. The squares represent the actual fee charged by each marketplace, and use an average of each of the three indices for their contribution to price discovery. The diamonds represent the six estimates constructed using each of the three indices with market share and each of the two estimates of total fees. The solid line indicates the average of the actual fee charged, whilst the dashed line shows the average of the estimates.

Figure 6 shows that apart from the TSX, the other three marketplaces appear to significantly overcharge for the provision of TSX-V data, regardless of the metric or comparison method used. Whilst this result could in part be driven by the relatively small nature of the TSX-V, methods considering a “pot” of fees charged by each participant will not be sensitive to this shock. It seems plausible that marketplaces, seeing an opportunity to charge two separate fees for two “separate” markets, may be cross subsidising the provision of TSX services with charges for TSX-V securities.

7 Discussion

Canadian market participants have expressed concern that the fees charged by the marketplaces are significantly higher than the value provided by those data feeds. Others have expressed concern that the monopolistic power of the TSX has allowed it to retain the same fee structure it had prior to fragmentation, despite reducing its’ market share from 99% to roughly 65%. It would appear that the concern that these concerns regarding the TSX are ill founded, with their fees in line with both domestic and international comparisons. The concern that data fees in aggregate are too high does, however, have some merit, with Alpha standing out as an especially egregious offender.
This analysis has designed and tested several methods for estimating the value of data fees in a fragmented market. In the case that regulation of the data fees in the Canadian marketplace, or indeed elsewhere, was considered desirable, this paper provides a testing of different methods for valuing the data feeds of each marketplace and identifies the ways in which different metrics could be “gamed”. The potential to game such metrics also has applications for revenue sharing models, such as that employed by the Securities Information Provider in the US markets. This regime, which was established in 1975 may benefit from an update in the way it is constructed with reference to the metrics employed in this study.

Given the potential for manipulation of these metrics by marketplaces, their participants and potentially their owners, it would appear that thought should be given not only to the construction of each individual metric but also to the relative weights assigned to pre- and post- trade contributions to price discovery. Metrics such as the square-root of dollar volume and the 5-level time-weighted quoted dollar volume appear to be the metrics that best reward the desired provision of price discovery whilst also being the least sensitive to attempts to game such metrics.
References


