
AN ECONOMIC STUDY OF SECURITIES MARKET DATA PRICING BY CANADIAN TRADING VENUES

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¹ The first completed draft of this study was dated January 31, 2011. The study was presented on February 4, 2011 to a group of IIAC members and employees of the TMX Group. The study has been updated to reflect the May 30, 2011 TMX announcement of changes in its pricing schedule.

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Executive Summary

This study reports an economic analysis of securities market data pricing in Canada. Broker-dealers are required by regulation to provide investors with best execution, which effectively requires firms to purchase a minimum of securities market data from exchanges and non-exchange trading venues. Financial market participants that are not bound by the best execution and best price obligations must also subscribe to securities market data for customer service considerations. Historically, when governments require a good or service be purchased from a sole or dominant vendor, they typically regulate prices to reduce the impact of monopoly power. Although in the context of Canadian securities market data each marketplace² is the sole producer of its data and the Toronto Stock Exchange (TSX) stands out as the dominant vendor, Canadian regulators have failed to set limits to the pricing of these data products.

Our key finding is that financial market participants appear to pay excessive fees for securities market data. In light of the regulatory structure, the reason for the high fees is twofold: 1) the TSX has taken advantage of its monopoly power by increasing its fees for market data products and 2) the fragmentation of trading has also led to escalating costs of compliance with the best execution and best price obligations as all of the new marketplaces have also begun charging for market data.

Regarding the use of monopoly power in the pricing of market data products for TSX-listed securities, we find that market shares and concentration indexes are well in excess of standards set by the Bureau of Competition and other standards frequently used by antitrust economists. The TMX Group enjoys a dominant market for securities listed on the TSX. Second, we find empirical support for the belief that the TMX Group is exploiting its monopoly power in a manner predicted by economic theory, with increases in fees for market data in a setting in which there is no evidence of increasing technology costs. This conclusion holds even when considering the May 30, 2011 announcement of upcoming price reductions in one of the TMX data products. Second, in a comparison of ten major international exchange companies, we find the TMX Group to be one of the exchange companies that relies the most on market data revenue. In fact, the proportion of revenues earned from market data at the TMX as a share of total revenue exceeds the corresponding percentage at other major international stock exchanges. Third, we compare professional user fees charged for market data by international exchanges. Level 1 data for TSX-listed securities is more expensive than the analogous data for eight of the fourteen exchanges analyzed.

Fragmentation of trading has led to increasing costs of market data for Canadian financial market participants. All of the new marketplaces –Alpha, Chi-X, Omega, and Pure- have started charging subscription fees for market data in the last two years. Cushioned by the best execution and best price obligations, some of these trading venues are able to generate market data revenue despite negligible trading volume.

Combined, these findings suggest that the Canadian Securities Administrators (CSA) cannot rely on competitive market forces to provide securities market data to investors on fair and reasonable terms.

² We will use the terms “marketplace” and “trading venue” interchangeably throughout the report.

1. INTRODUCTION

Trading activity in securities marketplaces generates a stream of data reflecting orders and executed transactions. Broker-dealers provide trading venues with market information (i.e., bids, offers, and limit orders) produced in conjunction with their clients, the investing public. The marketplaces then package this stream of data and sell it to financial market participants as securities market data. The primary objective of this study is to provide an economic analysis of the pricing of securities market data by trading venues in Canada.

Broker-dealers are subject to the best price and best execution obligations,³ which effectively require firms to purchase a minimum of market data. Moreover, other financial market participants often face competitive forces that urge them to buy market data products. The regulatory requirements for broker-dealers and the competitive pressures for other market participants result in an inelastic demand for data products, particularly for those products sold by the dominant trading venue. On the supply side, each marketplace is the sole producer of its data and there are no close substitutes for the dominant trading venue's market data products.

Historically, when a good or service is purchased from a sole or dominant vendor, governments typically regulate prices to reduce the impact of monopoly power. Examples of regulation include the utilities industry (telecommunications, water, electricity, gas, oil), transportation industry (trucking, airlines, railways), wholesale and retail distribution (groceries, software), and information services (securities data, Yellow/White pages). This rationale has been behind the regulation of top-of-book securities market data in the United States since 1975 and current proposals for regulation in Europe and extending regulation for depth-of-book data in the US. So far, securities market data has remained unregulated in Canada.

³ National Instrument 23-101, Rule 4(a)(iv). Available at http://www.osc.gov.on.ca/documents/en/Securities-Category2/rule_20091113_21-101_new-noa-21-101and23-101.pdf. Retrieved October 1, 2010.

The implications of high market data fees are not limited to a transfer of wealth from financial market participants to shareholders of exchanges and other trading venues. High market data fees make trading more expensive, preventing investors from making better informed decisions as they consume a lower quantity of market data products due to the high prices. This report concludes that the negative consequences of high securities market data fees should be addressed by regulation that establishes limits to the fees.

The remaining parts of this study proceed as follows. Section 2 provides an analysis of the supply-side conditions, highlighting how the presence of network externalities leads to concentration of trading activity. It explains why the competition for order flow among trading venues does not preclude highly concentrated markets and, therefore, provides no assurance of competitive pricing for market data by those trading venues. Section 3 describes the data products in question, listing in detail the factors that lead to a relatively inelastic demand for both top-of-book and depth-of-book data. Section 4 explains how the supply-side and demand-side conditions for market data combine to form a market in which the dominant trading venue exploits its opportunity to assert monopoly pricing power. The structure and methodology of sections 2 to 4 of this paper borrow heavily from a similar study also produced by Securities Litigation and Consulting Group (SLCG) and commissioned by the Securities Industry and Financial Markets Association (SIFMA) in 2008. The earlier study titled “An Economic Study of Securities Market Data Pricing by the Exchanges” focused on securities market data pricing in the United States. Section 5 studies fees and market data revenues for Canadian and international trading venues. The international comparison provides further evidence that investors pay relatively high fees for market data for Canadian-listed securities, and that the TMX Group heavily relies on market data revenue. Section 6 discusses the implications of the high fees and argues in favor of regulation. The first subsection of Section 6 describes the

theory of regulation of natural monopolies. The second subsection lists and describes international regulatory efforts in the context of securities market data pricing. Finally, Section 7 concludes that quantitative and qualitative evidence demonstrates that the Canadian Securities Administrators (CSA) cannot reasonably rely on competitive forces to ensure that the exclusive market data sold by the dominant trading venues is made available on fair and reasonable terms.

2. SUPPLY-SIDE CONDITIONS

The competition for order flow among trading venues provides no assurance of competitive pricing for data of which a trading venue has exclusive possession. This simple statement is the most important and perhaps the most misunderstood fact when it comes to the underlying economics of securities market data pricing by trading venues, especially in the Canadian case where the last few years have been characterized by several new trading venues. Thus, we begin explaining why fierce competition among trading platforms is not likely to result in competitively priced market data when significant “network externalities” are present in the market for order flow.

2.1 ORDER FLOW EXTERNALITIES LEAD TO A DOMINANT EXCHANGE

Competition does not preclude an outcome in which a dominant firm emerges, particularly in the presence of network externalities. A network externality arises when the value of access to a system or facility system increases as the number of individuals who use it increases.

Network externalities arise in a number of markets, such as the computer software market. For example, the success of Microsoft Windows operating system is widely attributed to network externalities. Hardware manufacturers and software providers make their products compatible with Windows to ensure that they have access to the large existing market of Windows users. In turn, Microsoft continues to be successful by publicizing that its operating system is supported by the

ever-growing number of Windows-compatible computers and programs. Similarly, Microsoft's success in its office suite product, Microsoft Office, may also be largely attributable to network externalities. Many individuals choose to use Microsoft Office because it offers the benefit of being able to easily share documents with the large existing market of Microsoft Office users.

In the securities markets, the competition for order flow among trading venues involves a network externality. An order flow externality arises because trading venues are essentially network platforms that link potential buyers and sellers. The more orders for a particular security that traders submit to a particular trading venue, the faster the trade will be executed without generating a significant impact on the security price. This ability to execute trades quickly and without considerable price impact is generally referred to as liquidity. The more liquidity increases, the more valuable the trading venue is to everyone who uses it. At the individual security level, the order flow externality makes it highly likely that a dominant liquidity-providing market center will emerge.

2.1.1 HISTORICAL DOMINANCE OF THE TORONTO STOCK EXCHANGE AND RECENT EMERGENCE OF NEW PLAYERS

The Toronto Stock Exchange (TSX), the seventh-largest stock exchange in the world, has had a long history as the dominant marketplace in Canadian capital markets. From its origin in the mid-1800s, the TSX has gone through several mergers and acquisitions. In 1934, during the Great Depression, the TSX merged with its main competitor, the Standard Stock and Mining Exchange. In 1999, as part of a major restructuring of Canadian exchanges, the TSX became the only exchange for trading senior equities.⁴ The Montréal Exchange became the exchange for derivatives trading. Finally, the Vancouver and Alberta Stock Exchanges merged to form the Canadian Venture Exchange (CDNX), which was responsible for trades in junior equities. In 2001 the TSX acquired

⁴ The classification of "senior" versus "junior" equities refers to the stage of growth of the company. Specifically, the TSX has stricter listing requirements than the TSXV (i.e. higher requirements for net tangible assets and pre-tax earnings).

the CDNX, renaming it TSX Venture Exchange (TSXV) in 2002. In 2007, the Montréal Exchange and TSX Group merged to form the TMX Group.

The first new Canadian stock exchange in 75 years, the Canadian National Stock Exchange (CNSX), was launched in 2003 as the Canadian Trading & Quotation System, achieving full stock exchange recognition within a year, allowing it to compete with the TMX Group on the listing of securities. The CNSX is also the operator of Pure Trading, an alternative trading system that trades securities listed on both the TSX and the TSXV. Since then, the Canadian capital markets have been bustling with new players providing alternative trading systems for both retail and institutional investors. These new platforms are referred to as Alternative Trading Systems (ATs) or non-exchange trading venues. These ATs handle cash equity trading of securities listed on both the TSX and the TSXV. The four lit⁵ ATs that are currently in operation are Alpha Trading Systems, Omega, Chi-X Canada, and the aforementioned Pure Trading. In turn, Liquidnet Canada and TriAct Canada are dark pool operators that complete the myriad trading platforms available in Canada.

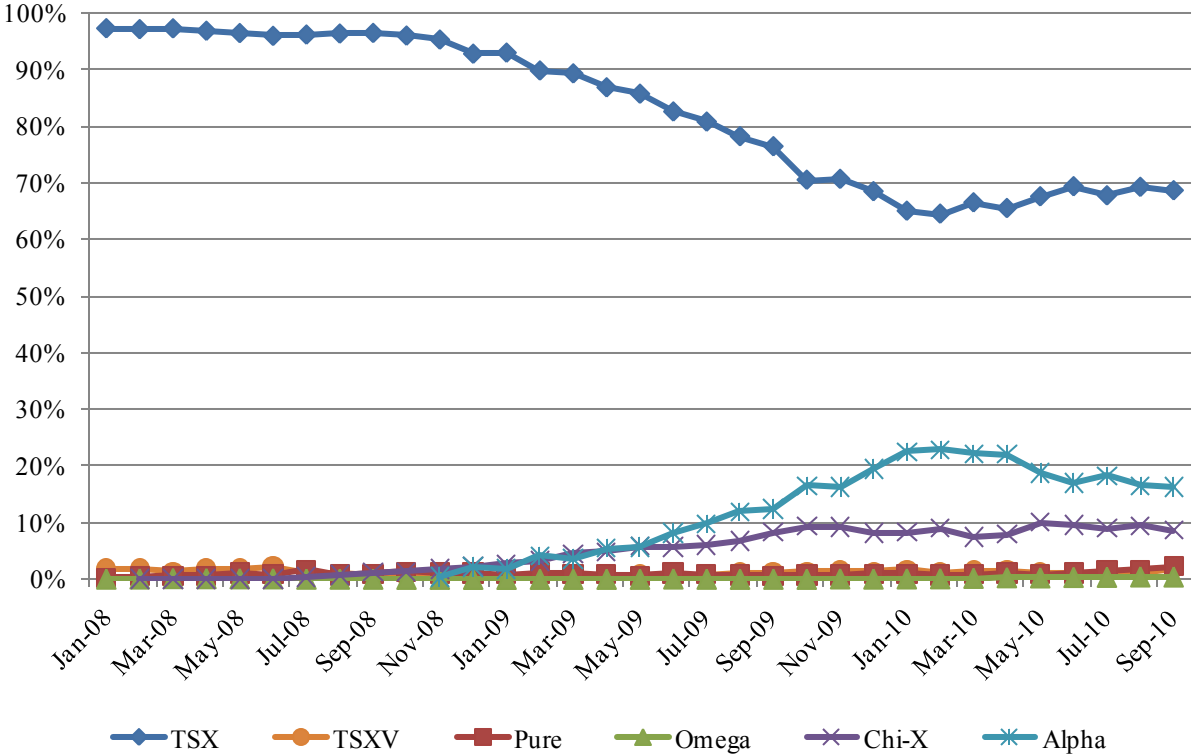
2.1.2 MARKET SHARE BY TRADING VENUE

In January 2008 the TSX handled over 97% of cash equity trading by dollar value on all Canadian marketplaces, with almost 2% handled by the TSXV, another institution under the TMX Group umbrella. The only other listing exchange, the CNSX, accounted for less than 1 basis point of dollar value traded in January 2008. The remaining 1% of trades was performed on non-exchange trading venues. About half of the remaining 1% was handled by Blockbook, Liquidnet, and MatchNow, which allowed institutional investors to execute large block trades; the rest was accounted for by Pure and Omega, two ATs that had recently began operations.

⁵ Palmer (2010) defines a market as a “lit” or “visible” market if its orders and quotes are viewable by the general public, as opposed to a “dark” marketplace in which orders and quotes are not viewable. Dark pools allow investors to anonymously trade large blocks of stocks without revealing their actions to other market participants. With the exception of the first two paragraphs of the next sub-section, we will focus on the lit marketplaces on this report as there is limited information on the dark pool operators. We do provide information on the relative sizes of the Canadian dark pool operators in the first two paragraphs of the next subsection.

Competition from the ATSS has resulted in major declines in the TSX market share since January 2008. By September 2010, the cash equity transaction share of the TSX had fallen to 69% of value traded. With less than two years in operation, Alpha had captured over 16% of the market; Chi-X, over 8%; Pure, over 2%; and Omega, half of 1%. The market shares of CNSX and the TSXV have remained relatively constant, whereas block-trade forums have had a mixed performance: BlockBook went out of business in 2009, Liquidnet’s market share has decreased, and MatchNow has gained market share and is now close to 2% market share.

Figure 1
Monthly market share by dollar value traded of cash equity securities handled by the TSX, TSXV, and the ATSS (January 2008-September 2010).⁶

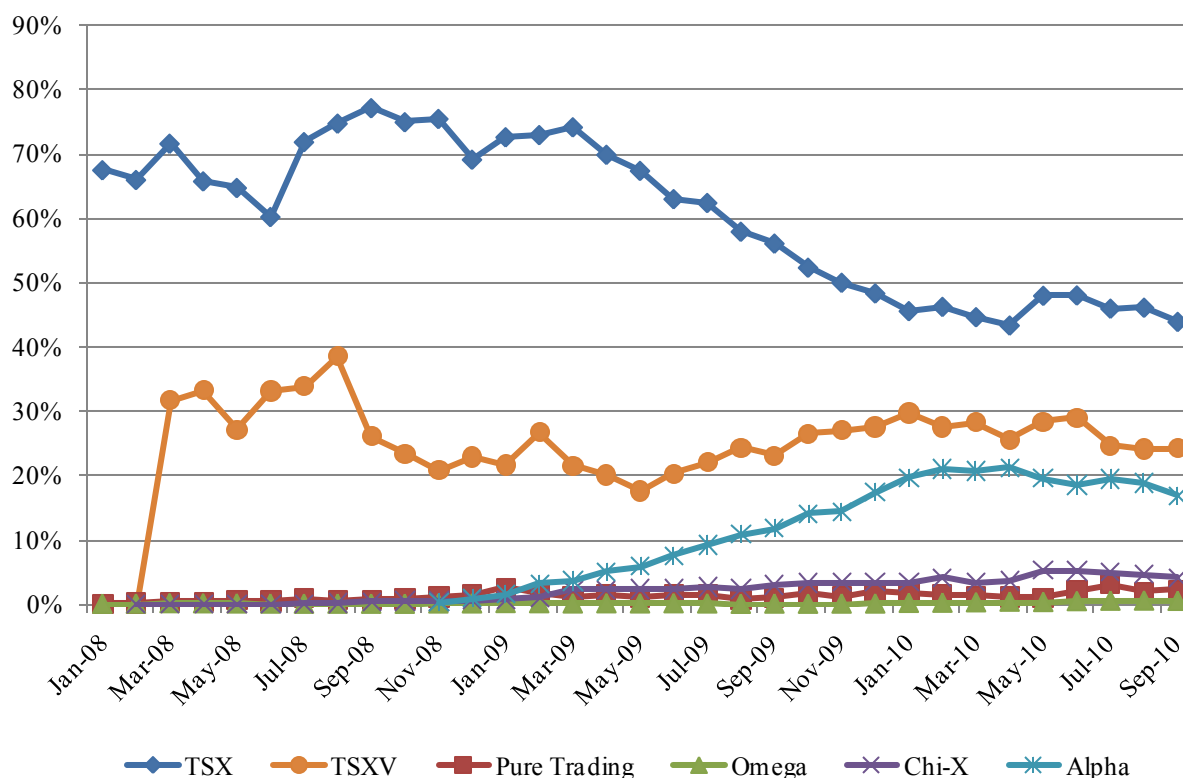


Source: IIROC. http://www.iroc.ca/English/Documents/MarketplaceStatisticsReport_en.pdf. Retrieved October 18, 2010.

⁶ The market shares in Figures 1 through 3 are close to 100% but do not sum to 100% in any given month because the figures do not include trades on the CNSX, Liquidnet, and Match Now.

Figures 1 through 3 present monthly market share for the TSX, the TSXV, and the lit ATs that compete with the TSX for order flow, from January 2008 until September 2010. Figure 1 presents market share by dollar value traded; Figure 2, share volume; and Figure 3, number of trades. By all three measures, the TSX market share has declined by about 30% in the last two and a half years, with Alpha emerging as the top competitor. Chi-X follows closely on number of trades although its market share is about half of that of Alpha when measured by dollar value.

Figure 2
Monthly market share by volume traded of cash equity securities handled by the TSX, TSXV, and the ATs (January 2008-September 2010).⁷

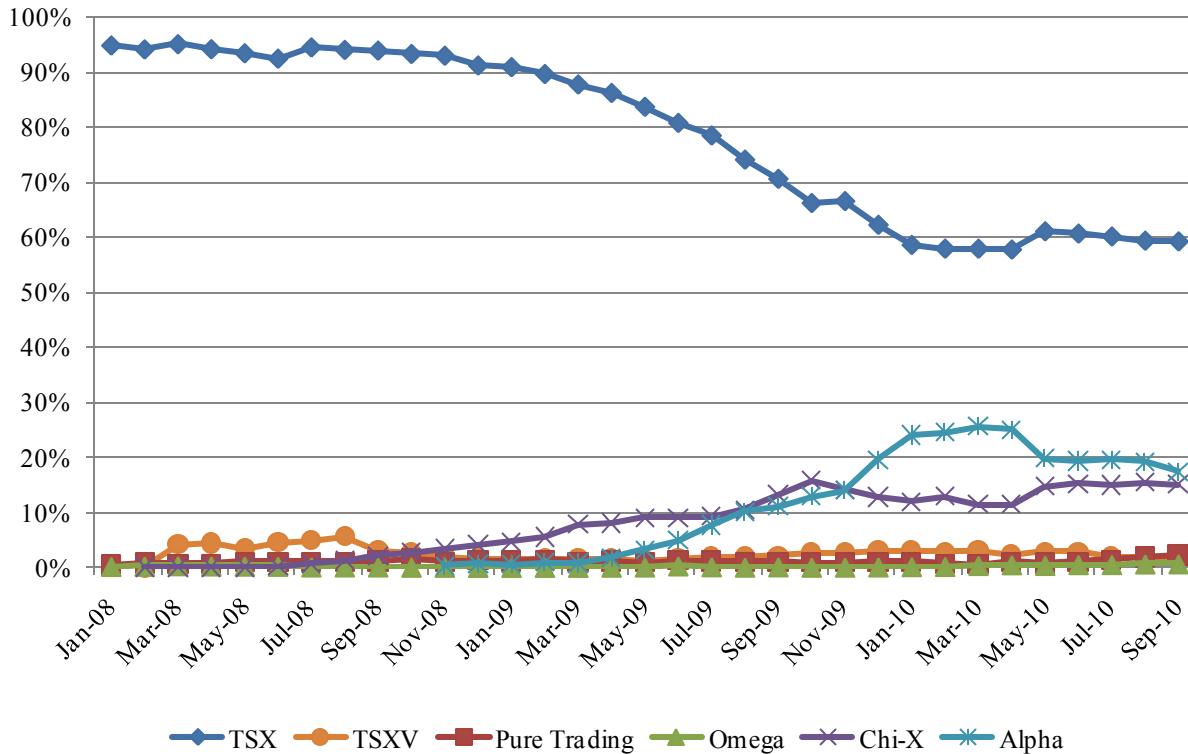


Source: IIROC. http://www.iiroc.ca/English/Documents/MarketplaceStatisticsReport_en.pdf. Retrieved October 18, 2010.

⁷ In September 2010, although the TSXV handled about 2% of all value traded in cash equity securities, it handled over 30% of trades when measured by volume of trades. The high activity and relatively low value of trades handled by the TSXV, stands out in Figure 2.

Figure 3

Monthly market share by number of trades of cash equity securities handled by the TSX, TSXV, and the ATSS (January 2008-September 2010).



Source: IIROC. http://www.iroc.ca/English/Documents/MarketplaceStatisticsReport_en.pdf. Retrieved October 18, 2010.

Despite the TSX’s recent decline in market share, it still holds a dominant position, with over 50% market share by value and number of orders, and is aggressively responding to competition from the ATSS. In early October 2010, the TMX Group announced that it had completed regulatory filings for TMX Select, a new ATS which is a wholly-owned subsidiary of the TMX Group and is expected to launch in the second quarter of 2011.⁸

2.1.2 MARKET SHARE ON TSX-LISTED SECURITIES BY TRADING VENUE

While the previous section presented information on market shares for all cash equity securities traded in Canada, this section focuses on TSX-listed securities. Hence, this section

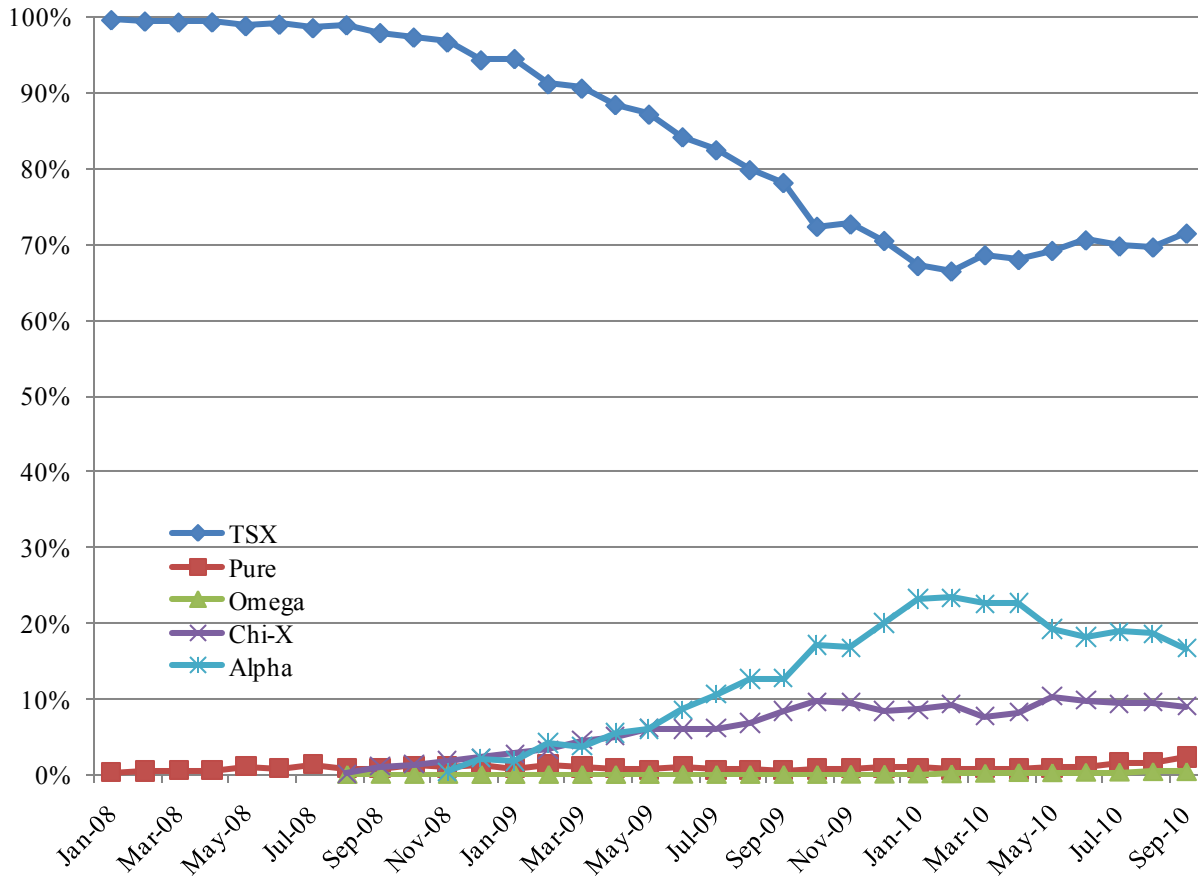
⁸ TMX Group News Release. http://www.tmx.com/en/news_events/news_releases/10-4-2010_TMGroup-TMXSelect.html. Retrieved October 19, 2010.

compares the market share on TSX-listed securities for the TSX and the ATs. As in the previous section, our findings show that although the TSX has lost market share to the ATs, the TSX still holds a dominant position of over 63% market share in TSX-listed securities.

Figures 4 through 6 are analogous to Figures 1 through 3, but include only TSX-listed securities. These figures show market share by dollar value traded, by share volume, and by number of trades for TSX-listed securities. A comparison of Figures 1 and 4, show that from January 2008 to September 2010 the TSX's market share by value on all Canadian cash equity securities dropped from 97 to 68%, whereas the TSX's market share by value when considering only TSX-listed securities went from virtually 100 to 72%.

Figure 4

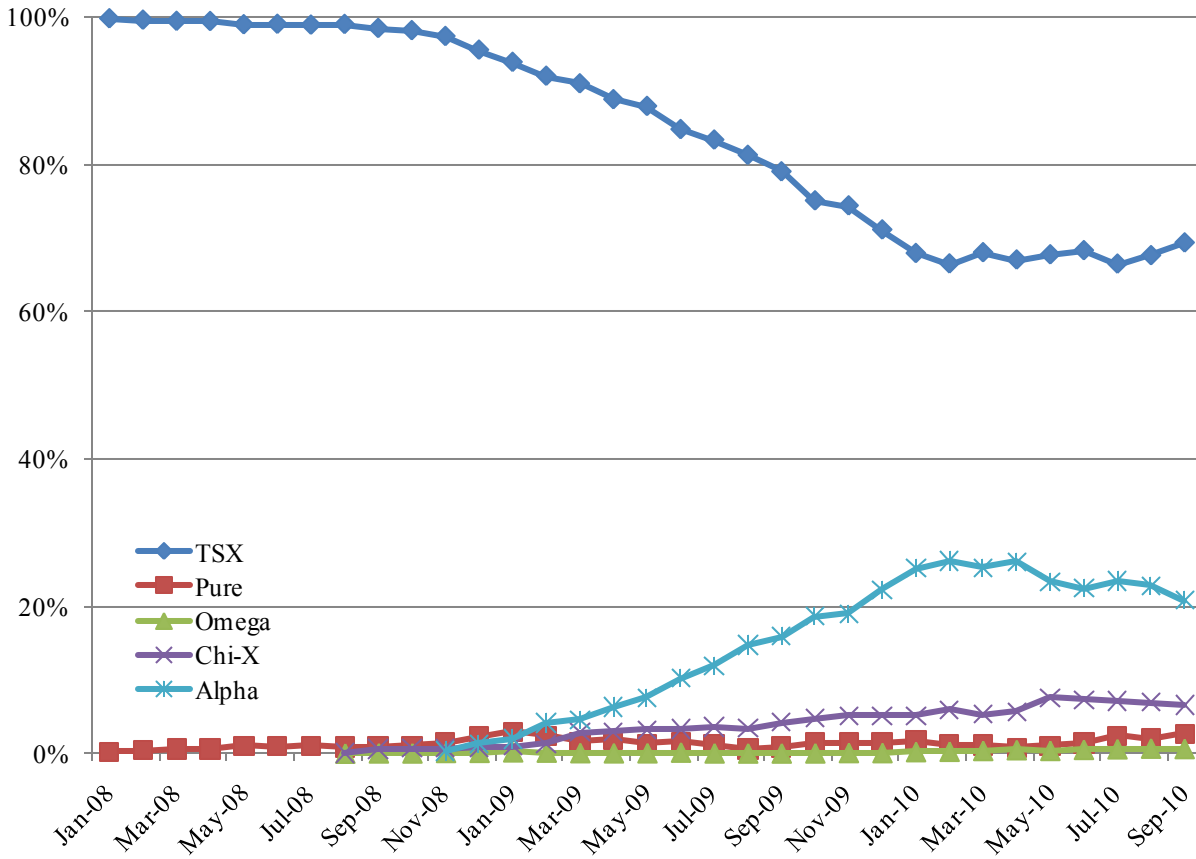
Monthly market share by dollar value traded for the TSX and ATs on TSX-listed securities (January 2008-September 2010).



Source: IRESS market data workstation.

Figure 5

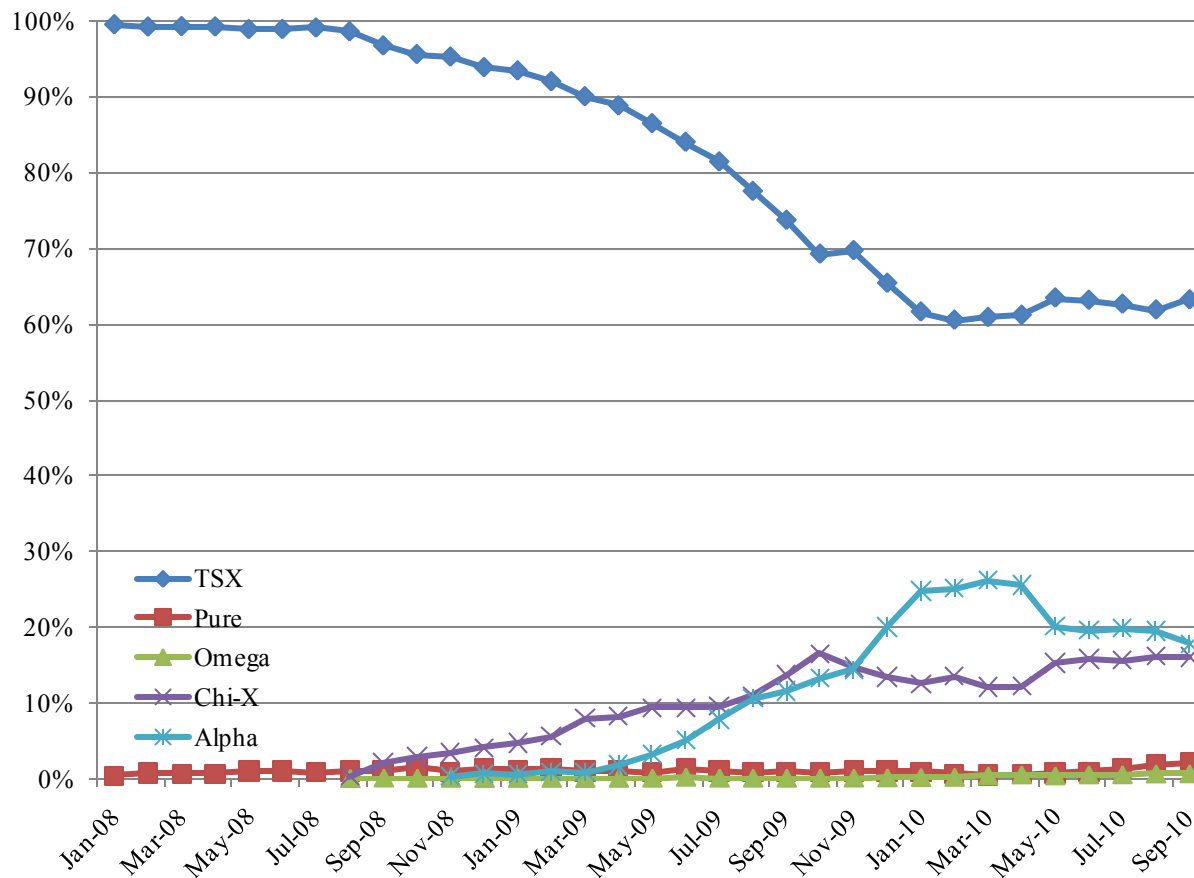
Monthly market share by volume traded for the TSX and ATs on TSX-listed securities (January 2008-September 2010).



Source: IRESS market data workstation.

Figure 6

Monthly market share by number of trades for the TSX and ATs on TSX-listed securities (January 2008-September 2010).



Source: IRESS market data workstation.

2.2 NO SUPPLY-SIDE SUBSTITUTION

Economics textbooks typically provide three general examples of possible supply-side substitution for various markets. First, competitors currently producing the product may have the ability to increase output from existing facilities. In the context of securities markets, however, no other market participant is able to reproduce a trading venue’s real-time market data. Furthermore, no other trading venue can produce data comparable to that of a marketplace with a dominant position in a particular security.

The second kind of possible supply-side substitution proposed by economic theory is the

entry of new competitors to the market. However, in the context of securities markets, the network externalities provide a high barrier to entry that makes it extremely difficult for new competitors to succeed.

Finally, the third type of supply-side substitution comes from producers of products not considered comparable substitutes in consumption but that may be easily converted into close substitutes for the products in question. For example, commercial construction firms can easily convert to residential construction, and vice versa. In the context of the securities markets, however, each trading venue has exclusive possession of its own market data and, as predicted by economic theory and further addressed below in Sections 4 and 5, trading venues maximize their exclusive data revenues.

As will be explained further in Section 3, financial market dealers are required to purchase market data to satisfy their best execution and best price obligations. Other market participants not bound by the regulatory requirements may still find themselves obliged to buy detailed data packages, especially in light of lower liquidity at market price after the 1996 adoption of decimal price quotes⁹ and the 2001 introduction of the penny tick size by the TSX¹⁰. Since those developments, the depth at prices close to the inside quotes became even more useful in assessing market depth.

Furthermore, it is impossible for a trading venue to produce other trading venues' market data. In addition, it is equally impossible for another trading venue to produce TMX depth-of-book data on a scale approaching TMX's own depth-of-book data product for TSX-listed stocks.

⁹ Huson, Mark, Youngsoo Kim, and Vikas Mehrotra (1997). "Did Decimalization Benefit Members of the Toronto Stock Exchange?" *Quarterly Journal of Business & Economics*, Vol. 45, Nos. 3 and 4, 49-67.

¹⁰ Smith, Brian, D. Alasdair Turnbull, and Robert White (2006). "The Impact of Pennies on the Market Quality of the Toronto Stock Exchange." *The Financial Review*, Vol. 41, 273-288.

2.3. ORDER FLOW EXTERNALITIES LEAD TO CONCENTRATION OF TRADING AT THE SECURITIES LEVEL

Trading venues, including listing exchanges, compete for order flow on a security-by-security basis. An order flow externality arises for each security separately. From the broker-dealers' perspectives, customer service concerns and best execution considerations are security-specific. Consequently, we will follow the academic literature's use of individual securities as the relevant units of economic analysis in the context of securities market data pricing, as in Shultz (2003) and Bennett and We (2006).

2.3.1 MARKET SHARES OF TRADING ACTIVITY FOR THE MOST ACTIVELY TRADED STOCKS

We calculate the market shares of the trading activity of several different securities for a recent time period. Table 1 presents the market share results for the ten most active TSX-listed securities for the week of September 20, 2010. We use three common measures of trading activity – dollar value, share volume, and number of trades.

Table 1 shows that over 60% of trading for 9 of the 10 most actively traded TSX-listed securities occurs on the TSX. The one exception is HNU, an exchange-traded fund, in which Alpha has a dominant position with about 50% market share. Hence, for all three measures of trading activity and for nine out of the ten most traded securities, the listing exchange is the dominant trading venue. Even in HNU's case, Alpha emerged as the clearly dominant trading venue with over 50% market share when measured by dollar value and share volume.

Tables 2 and 3 present analogous results of market share for each individual security for trading activity of block and non-block trades, respectively. As Table 2 shows block trading is even more concentrated than non-block trading.

Table 1
Market share of trading activity of top 10 TSX-listed securities by dollar value traded on the week of September 20-24, 2010.

	<u>Dollar value</u>					<u>Share volume</u>					<u>Number of trades</u>				
	TSX	Alpha	Chi-X	Omega	Pure	TSX	Alpha	Chi-X	Omega	Pure	TSX	Alpha	Chi-X	Omega	Pure
K	68.7%	18.2%	9.8%	0.8%	2.4%	68.7%	18.3%	9.9%	0.8%	2.4%	51.6%	25.4%	18.5%	1.2%	3.3%
XIU	69.3%	19.4%	6.8%	1.9%	2.6%	69.3%	19.4%	6.8%	1.9%	2.6%	51.9%	27.4%	13.4%	3.1%	4.2%
ABX	65.5%	19.8%	12.8%	0.0%	2.0%	65.5%	19.8%	12.8%	0.0%	2.0%	62.3%	18.3%	17.9%	0.0%	1.6%
RY	68.8%	20.5%	7.5%	0.0%	3.2%	68.8%	20.5%	7.5%	0.0%	3.2%	63.6%	21.5%	13.5%	0.0%	1.4%
SU	64.1%	23.2%	10.3%	0.4%	1.9%	64.1%	23.3%	10.3%	0.4%	1.9%	58.1%	24.3%	15.8%	0.3%	1.5%
TCK.B	67.2%	20.6%	11.6%	0.0%	0.7%	67.2%	20.5%	11.5%	0.0%	0.7%	61.5%	22.0%	15.9%	0.0%	0.6%
RIM	78.3%	5.3%	14.1%	0.1%	2.1%	78.3%	5.3%	14.1%	0.1%	2.1%	76.9%	3.7%	17.6%	0.1%	1.6%
POT	76.8%	4.5%	15.2%	0.0%	3.6%	76.8%	4.5%	15.1%	0.0%	3.6%	73.0%	4.5%	18.6%	0.0%	4.0%
HNU	32.9%	54.0%	10.0%	0.6%	2.6%	32.9%	53.9%	10.0%	0.6%	2.6%	36.4%	46.7%	13.7%	0.5%	2.8%
TD	78.3%	9.1%	10.1%	0.2%	2.4%	78.3%	9.1%	10.1%	0.2%	2.4%	73.7%	9.2%	15.3%	0.2%	1.6%

Source: IRESS market data workstation.

Table 2

Market share of trading activity of top 10 block-traded (trades of 10,000 shares or more) TSX-listed securities by dollar value traded on the week of September 20-24, 2010.

	<u>Dollar value</u>					<u>Share volume</u>					<u>Number of trades</u>				
	TSX	Alpha	Chi-X	Omega	Pure	TSX	Alpha	Chi-X	Omega	Pure	TSX	Alpha	Chi-X	Omega	Pure
XIU	79.7%	13.8%	3.6%	0.7%	2.2%	79.7%	13.9%	3.5%	0.7%	2.2%	69.0%	21.0%	6.8%	0.9%	2.3%
K	90.3%	7.6%	0.0%	0.0%	2.2%	90.2%	7.6%	0.0%	0.0%	2.2%	87.6%	9.0%	0.0%	0.0%	3.4%
CM	76.7%	16.1%	0.0%	0.0%	7.2%	76.7%	16.2%	0.0%	0.0%	7.2%	73.1%	15.4%	0.0%	0.0%	11.5%
RBI	82.2%	14.2%	0.0%	0.0%	3.6%	82.2%	14.2%	0.0%	0.0%	3.6%	80.0%	14.3%	0.0%	0.0%	5.7%
LEG	12.0%	9.2%	0.0%	0.0%	78.8%	11.8%	9.0%	0.0%	0.0%	79.3%	90.4%	5.8%	0.0%	0.0%	3.8%
RY	67.9%	20.8%	0.0%	0.0%	11.3%	67.9%	20.9%	0.0%	0.0%	11.2%	78.4%	11.8%	0.0%	0.0%	9.8%
POT	92.1%	5.0%	0.0%	0.0%	2.9%	92.1%	5.0%	0.0%	0.0%	2.9%	78.6%	14.3%	0.0%	0.0%	7.1%
BNS	74.4%	15.0%	0.0%	0.0%	10.7%	74.4%	14.9%	0.0%	0.0%	10.7%	76.7%	11.6%	0.0%	0.0%	11.6%
MFC	76.4%	10.7%	0.3%	0.0%	12.7%	76.3%	10.6%	0.3%	0.0%	12.8%	80.9%	13.6%	0.9%	0.0%	4.7%
TRP	88.1%	10.3%	0.0%	0.0%	1.5%	88.1%	10.4%	0.0%	0.0%	1.5%	91.7%	5.6%	0.0%	0.0%	2.8%

Source: IRESS market data workstation.

Table 3

Market share of trading activity of top 10 TSX-listed securities by dollar value traded, excluding all block-trades (trades of 10,000 shares or more) TSX-listed securities by dollar value traded on the week of September 20-24, 2010.

	<u>Dollar value</u>					<u>Share volume</u>					<u>Number of trades</u>				
	TSX	Alpha	Chi-X	Omega	Pure	TSX	Alpha	Chi-X	Omega	Pure	TSX	Alpha	Chi-X	Omega	Pure
K	58.9%	23.1%	14.3%	1.1%	2.5%	41.1%	16.1%	10.0%	0.8%	1.7%	51.5%	25.5%	18.5%	1.2%	3.3%
ABX	65.1%	19.1%	14.0%	0.0%	1.7%	65.2%	19.1%	14.0%	0.0%	1.7%	62.3%	18.3%	17.9%	0.0%	1.6%
RIM	78.1%	5.3%	14.5%	0.1%	1.9%	78.2%	5.3%	14.5%	0.1%	1.9%	76.9%	3.7%	17.6%	0.1%	1.6%
TCK.B	66.4%	20.6%	12.5%	0.0%	0.5%	66.4%	20.6%	12.5%	0.0%	0.5%	61.4%	22.0%	15.9%	0.0%	0.6%
SU	62.0%	24.2%	11.7%	0.5%	1.6%	61.9%	24.2%	11.7%	0.5%	1.6%	58.0%	24.3%	15.8%	0.3%	1.5%
HNU	33.6%	52.8%	10.3%	0.6%	2.7%	33.7%	52.8%	10.3%	0.6%	2.7%	36.4%	46.6%	13.7%	0.5%	2.8%
RY	69.1%	20.4%	9.2%	0.0%	1.3%	69.1%	20.4%	9.2%	0.0%	1.3%	63.6%	21.5%	13.5%	0.0%	1.4%
POT	74.0%	4.4%	17.9%	0.0%	3.7%	74.0%	4.4%	17.9%	0.0%	3.7%	73.0%	4.5%	18.6%	0.0%	4.0%
G	72.2%	14.0%	12.0%	0.2%	1.5%	72.2%	14.0%	12.1%	0.2%	1.5%	69.4%	13.3%	15.6%	0.1%	1.6%
TD	77.5%	9.3%	11.6%	0.2%	1.5%	77.5%	9.3%	11.6%	0.2%	1.5%	73.7%	9.2%	15.3%	0.2%	1.6%

Source: IRESS market data workstation.

As a benchmark of comparison, the Bureau of Competition's Merger Enforcement Guidelines establishes concentration thresholds to identify markets in which anti-competitive practices may occur in the context of mergers. Such thresholds are: 1) for unilateral exercise of market power: a firm with a market share above 35% and 2) for coordinated exercise of market power: a four-firm concentration ratio -cumulative market share of the four largest firms- above 65% or whenever any individual firm has more than 10% of market share. According to the Bureau of Competition, mergers that exceed these thresholds are not necessarily anti-competitive but warrant special scrutiny. Even though we are not studying mergers, we will use the Bureau of Competition's merger guidelines as reference. The market shares for the trading activity of securities listed on the TSX are well beyond the Bureau of Competition's thresholds.

2.3.2 HERFINDAHL INDEXES

In addition to the market share of the dominant firms, economists are also interested in the number of firms competing in the market and the distribution of market shares across those firms. Antitrust economists summarize the distribution of market shares in aggregate indices, called market concentration indices, for use in quantitative antitrust analysis. Accordingly, we investigate the concentration of reported trading activity for a sample of securities.

To investigate the concentration of reported trading activity, we use one of the most widely used market concentration indices by antitrust economists – the Herfindahl Index¹¹. It simultaneously takes into account the number of firms in a particular market and the distribution of market shares across those firms.

The Herfindahl Index is calculated by summing the squared market shares, expressed on a 0 to 100 scale, of each firm competing in the market. The Herfindahl Index is higher for markets that consist of a smaller number of firms and have greater disparities in the market

¹¹ The Herfindahl Index is also known as the Herfindahl-Hirschman-Index (HHI).

shares among those firms.

Table 4

Herfindahl index.

Panel A: Example of Herfindahl Calculations for 10 firms

Competitive		Duopoly		Monopoly	
Firms	Market Share (%)	Firms	Market Share (%)	Firms	Market Share (%)
Firm 1	10	Firm 1	50	Firm 1	95
Firm 2	10	Firm 2	40	Firm 2	5
Firm 3	10	Firm 3	5	Firm 3	<1
Firm 4	10	Firm 4	4	Firm 4	<1
Firms 5-10	10	Firms 5-10	1	Firms 5-10	<1
Herfindahl	1000	Herfindahl	4147	Herfindahl	9050

Panel B: Example of Herfindahl Calculations for 5 firms

Most competitive		Intermediate competition		Least competitive	
Firms	Market Share (%)	Firms	Market Share (%)	Firms	Market Share (%)
Firm 1	20	Firm 1	50	Firm 1	90
Firm 2	20	Firm 2	40	Firm 2	2.5
Firm 3	20	Firm 3	5	Firm 3	2.5
Firm 4	20	Firm 4	4	Firm 4	2.5
Firm 5	20	Firm 5	1	Firm 5	2.5
Herfindahl	2000	Herfindahl	4142	Herfindahl	8125

For example, suppose we have three markets consisting of ten (10) firms with the market shares listed in Table 4 Panel A. While all three market examples have the same number of firms (ten), the distribution of market shares varies greatly. In the competitive market example (the first two columns of Table 4 Panel A), the market shares are equal. In the duopoly market example (the middle two columns), two dominant firms account for 90% of the total market share. In the monopoly market example (the last two columns), 95% of the total market share is concentrated within one firm. In Panel A, the Herfindahl index goes from 1,000, for the competitive market, to over 9,000 for the monopoly.¹²

¹² The Department of Justice (DOJ) of the United States is a regulatory agency that uses the Herfindahl index in evaluating horizontal mergers. The DOJ considers an industry with a Herfindahl Index of less than 1,000 to be

Given that we analyze data from five trading venues, in Table 4 Panel B we present the Herfindahl index for markets with five firms. The lowest possible Herfindahl index in a market with five firms is 2,000 as shown in the first two columns of Panel B—that is when all firms have the same market share. As we move along to the right of the table, a smaller number of firms dominate the market, generating increases in the Herfindahl index.

Next, we turn to computing the Herfindahl index for a list of top ten securities. We compute the Herfindahl Index as the sum of the squared market shares for all the marketplaces. Table 5 presents three panels with information on the concentration of trades of TSX-listed securities. Panel A lists the top ten securities by value traded. Panel B considers only block trades and lists the top 10 securities by value traded in block trades (which are trades of 10,000 or more). Lastly, Panel C refers to non-block trading activity and lists the top 10 securities by value traded excluding all block trades. Each of the panels presents results based on three different measures of trading activity – value, share volume, and number of trades.

“unconcentrated,” an industry with a Herfindahl Index between 1,000 and 1,800 to be “moderately concentrated,” and an industry with a Herfindahl Index greater than 1,800 to be “highly concentrated.”

Table 5

Herfindahl index of trading activity of top 10 TSX-listed securities by dollar value traded on the week of September 20-24, 2010.

<u>Panel A: All trades</u>					<u>Panel B: Block trades</u>					<u>Panel C: Non-block trades</u>				
Herfindahl					Herfindahl					Herfindahl				
Symbol	Number of trading venues	Value	Share volume	Number of trades	Symbol	Number of trading venues	Value	Share volume	Number of trades	Symbol	Number of trading venues	Value	Share volume	Number of trades
	K					5					5,159			
XIU	5	5,242	5,242	3,652	K	3	8,209	8,198	7,763	ABX	3	4,810	4,811	4,533
ABX	4	4,843	4,845	4,534	CM	3	6,194	6,191	5,710	RIM	5	6,345	6,350	6,248
RY	5	5,223	5,226	4,693	RBI	3	6,977	6,968	6,637	TCK.B	5	4,988	4,994	4,515
SU	5	4,760	4,760	4,214	LEG	3	6,437	6,500	8,217	SU	5	4,565	4,564	4,213
TCK.B	5	5,069	5,078	4,516	RY	3	5,166	5,169	6,386	HNU	5	4,036	4,032	3,695
RIM	5	6,367	6,371	6,249	POT	3	8,508	8,509	6,429	RY	5	5,272	5,274	4,692
POT	4	6,157	6,162	5,710	BNS	3	5,867	5,877	6,160	POT	4	5,829	5,832	5,710
HNU	5	4,103	4,097	3,698	MFC	4	6,111	6,102	6,745	G	5	5,563	5,563	5,243
TD	5	6,318	6,319	5,755	TRP	3	7,876	7,865	8,441	TD	5	6,225	6,226	5,754

Source: IRESS market data workstation.

Comparing Panels B and C, block-trades are more concentrated than non-block trades. Nevertheless, the Herfindahl results range from 2,050 to 6,350 for non-block trades. For block trades, the index ranges from 5,166 to 8,509. The Herfindahl indexes computed in Table 5 are closer in value to those in the “intermediate competition” and “least competitive” blocks of Table 4 Panel B.

The calculations of the Herfindahl index and the concentration measures used by the Competition Bureau of Canada, and discussed in the previous subsection, show that, even with the new competition for order flow from the ATs, the trade of TSX-listed securities remains highly concentrated. Market concentration in order flow may lead to a monopolistic pricing for market data products by the dominant trading venue. Hence, both economic theory and Canadian regulation provide enough motivation to study the pricing of services related to cash equity securities, such as market data.

2.4 ORDER FLOW EXTERNALITIES LEAD TO CONCENTRATION IN THE PROVISION OF LIQUIDITY AT THE SECURITIES LEVEL

We complete the picture of the nature of competition for order flow, and the resulting concentration in reported trading activity, by doing a market microstructure analysis of depth-of-book data for individual securities.

Depth-of-book data allows economists to view the demand and supply curves of all active market participants. We obtained depth-of book data from four sources – TSX, Alpha, Chi-X, and Pure– for a sample of eight TSX-listed securities. Our analysis focuses on three separate snapshots of data during one day, October 18, 2010: one snapshot in the morning (9:40:00 AM), one at mid-day (12:00:00 PM), and one in the afternoon (3:40:00 PM) to take into account the well-known fact that liquidity provision can change throughout the day. Evidence of changes in liquidity throughout the day for TSX-listed securities is documented in Vo (2003).

Table 6**Concentration of liquidity by number of orders for eight TSX-listed securities on October 18, 2010.¹³**

Panel A: Cumulative depth on the bid side.

	Symbol	TSX	Alpha	Chi-X	Pure	Herfindahl
TSX 60 Index	BBD.B	61.0%	25.9%	8.3%	4.8%	4,487
	MFC	74.5%	11.6%	9.3%	4.6%	5,788
TSX Composite less TSX 60	NGD	59.5%	18.0%	14.5%	8.0%	4,141
	UUU	58.6%	17.7%	14.5%	9.2%	4,038
Exchange Traded Funds	XIU	51.1%	29.5%	12.2%	7.3%	3,679
	HNU	43.4%	41.5%	11.3%	3.8%	3,749
Remainder	AND	37.8%	24.9%	23.7%	13.6%	2,796
	MAI	75.2%	14.8%	7.5%	2.5%	5,930

Panel B: Cumulative depth on the ask side.

	Symbol	TSX	Alpha	Chi-X	Pure	Herfindahl
TSX 60 Index	BBD.B	64.7%	27.0%	5.3%	3.0%	4,956
	MFC	80.0%	11.4%	5.5%	3.1%	6,570
TSX Composite less TSX 60	NGD	56.7%	17.9%	16.8%	8.6%	3,893
	UUU	63.1%	16.9%	12.5%	7.5%	4,478
Exchange Traded Funds	XIU	56.7%	17.9%	16.8%	8.6%	3,893
	HNU	63.1%	16.9%	12.5%	7.5%	4,478
Remainder	AND	39.2%	23.4%	23.8%	13.7%	2,832
	MAI	50.6%	37.8%	8.2%	3.4%	4,066

Source: IRESS market data workstation.

¹³ Liquidity concentration on the bid side is measured as the total number of orders down to each stock's low price of the day. Liquidity concentration on the ask side is measured as the total number of orders up to each stock's high price of the day. The reported percentages reflect averages across three different snapshots taken throughout the trading day – 9:40:00AM, 12:00:00PM, and 3:40:00PM. The percentages reflect the concentration of liquidity among our four sources of depth-of-book data only and, therefore, do not necessarily reflect the overall concentration of liquidity among all books. Row percentages may not sum to exactly 100.0% due to rounding.

Table 7

This table shows the concentration of liquidity by volume of orders for eight TSX-listed securities on October 18, 2010.¹⁴

Panel A: Cumulative depth on the bid side.

	Symbol	TSX	Alpha	Chi-X	Pure	Herfindahl
TSX 60 Index	BBD.B	66.6%	25.3%	4.7%	3.4%	5,114
	MFC	78.0%	10.3%	8.6%	3.1%	6,274
TSX Composite less TSX 60	NGD	78.4%	11.3%	6.4%	3.9%	6,329
	UUU	72.9%	13.9%	7.8%	5.5%	5,591
Exchange Traded Funds	XIU	48.0%	27.4%	14.0%	10.6%	3,365
	HNU	37.6%	36.8%	16.6%	9.1%	3,120
Remainder	AND	47.3%	19.5%	20.3%	12.9%	3,197
	MAI	90.2%	6.3%	2.2%	1.4%	8,176

Panel B: Cumulative depth on the ask side.

	Symbol	TSX	Alpha	Chi-X	Pure	Herfindahl
TSX 60 Index	BBD.B	65.6%	30.1%	2.5%	1.7%	5,225
	MFC	85.7%	8.0%	4.5%	1.8%	7,430
TSX Composite less TSX 60	NGD	73.7%	11.9%	8.8%	5.6%	5,684
	UUU	81.5%	11.2%	4.4%	2.9%	6,793
Exchange Traded Funds	XIU	46.3%	27.9%	14.9%	10.9%	3,263
	HNU	48.3%	37.3%	9.1%	5.3%	3,836
Remainder	AND	57.3%	15.8%	17.3%	9.6%	3,925
	MAI	66.2%	29.5%	2.7%	1.6%	5,266

Source: IRESS market data workstation.

¹⁴ Liquidity concentration on the bid side is measured as the volume of orders down to each stock's low price of the day. Liquidity concentration on the ask side is measured as the volume of orders up to each stock's high price of the day. The reported percentages reflect averages across three different snapshots taken throughout the trading day – 9:40:00AM, 12:00:00PM, and 3:40:00PM. The percentages reflect the concentration of liquidity among our four sources of depth-of-book data only and, therefore, do not necessarily reflect the overall concentration of liquidity among all books. Row percentages may not sum to exactly 100.0% due to rounding.

We study concentration of liquidity by cumulative number of orders and volume of orders in Tables 6 and 7, respectively. Each of these tables provides two panels, Panel A for the bid side and Panel B for the ask side. The percentage market shares and the Herfindahl indexes reported in Tables 6 and 7 reflect the concentration of liquidity for each security among our four sources of depth-of-book data only and, therefore, do not necessarily reflect the overall concentration of liquidity among all books. However, as the evidence on overall market share shows, Omega, which is the only other marketplace and for which we don't have depth-of-book data, has less than 0.5% market share.

Our microstructure analysis covers a set of diverse TSX-listed securities. We analyze two securities from the TSX 60, which is a list of the 60 largest companies in the TSX measured by market capitalization; two securities from companies that are included in the TSX Composite Index¹⁵ but that are not part of the TSX 60 index, that is companies with a mid-size market capitalization; two exchange-traded funds; and securities from the remainder of the TSX, that is from firms with a small market capitalization.

Tables 6 to 7 show that liquidity, like trading activity, is highly concentrated on the listing exchange. Comparing the results from Tables 6 and 7 to Tables 4 and 5, we can see that the concentration in reported trading activity across exchanges is indeed related to the concentration of liquidity on a security-by-security basis. In the eight analyzed securities, the liquidity on the TSX is larger than in any other trading venue. For the securities included in the TSX Composite Index –that is the first four rows of each of the tables–, well over 50% of liquidity is concentrated in the TSX, regardless of whether liquidity is measured by number or volume of orders. For the exchange-traded funds and the securities issued by firms with small market size, liquidity is generally still larger for the TSX than for the other trading venues but the

¹⁵ On December 1, 2010 The TSX Composite index included securities issued by 433 firms.

extent of the TSX dominance must be assessed individually. In particular, for HNU Alpha's fraction of liquidity on the bid side –both for number and volume of orders- and on the ask side – when measured by volume of orders- is similar to the TSX's. On average, for these eight securities, a 58% of liquidity is concentrated on the TSX when measured by number of orders. A 65% of liquidity is concentrated on the TSX when measured by volume of orders. The concentration of liquidity at the TMX for all of these securities is well above the 35% market share threshold used by the Bureau of Competition for identifying markets at risk of unilateral exercise of market power.

Furthermore, the average Herfindahl index for liquidity measured by the number of orders is 4,345, and 5,162 for liquidity measured by volume of orders. If liquidity were allocated evenly across the four trading venues the Herfindahl index would be 2,500, whereas if 90% of liquidity were concentrated in one venue and the remaining 10% were split evenly among the rest the resulting Herfindahl index would be 8,133. The average concentration of liquidity for the eight securities shown in Tables 6 and 7 is in between these two extremes, with the highest Herfindahl index reaching 8,176 and the lowest one at 2,822.

Thus, the depth-of-book analysis completes the picture. Even in the presence of fierce competition for order flow among market centers, network externalities (explained in subsection 2.1) are such powerful forces that the TSX is able to retain an important fraction of liquidity. The results of the depth-of-book analysis, combined with the results of the trading activity analysis, confirm the link between the concentration of liquidity and the concentration of trading activity. The order flow externality is so strong that the concentration of trading in the most active securities (and many others) is well-above the standard thresholds for identifying a highly concentrated industry warranting regulatory scrutiny.

3. DEMAND-SIDE CONDITIONS

3.1 DESCRIPTION OF MARKET DATA CONSUMERS AND PRODUCTS

The demand for market data is driven by several factors. Broker-dealers must purchase market data in order to satisfy their best execution and best price (also known as trade-through) obligations. Retail and institutional investors alike need access to market data in order to value their portfolios, inform their trading decisions by reviewing the price they may receive for a buy or sell order, and monitor and compare the executed price they have received. Accordingly, many broker-dealers and other market data vendors seek to meet these demands by making market data available to their customers directly on their websites as well as via inputs to their trading engines. While retail investors may not pay directly for this access, their broker-dealers pay fees to the marketplaces to cover such access. These fees raise the costs of doing business, and are ultimately borne by investors.

National Instrument 23-101 and the Companion Policy 23-101 (together, the *Trading Rules*) set out general requirements respecting the best execution and best price obligations imposed on dealers and advisers. The *Trading Rules* have general application for dealers and advisers that handle client orders, and also contain provisions requiring that best price be obtained for the client. Prior to February 1st, 2011, Rule 5.1 –regarding the best execution of client orders- and Rule 5.2 –regarding the best price obligation- of the Universal Market Integrity Rules (UMIR) published by the Investment Industry Regulatory Organization of Canada (IIROC), applied specifically to the handling of client orders by dealers with trading access to a Canadian marketplace. After February 1st, Rule 5.2 is to be replaced by the Order Protection Rule in section 6.7 of the *Trading Rules*. Dealers with access to a marketplace are referred to as *participants* under UMIR. In the context of a multiple marketplace environment, UMIR 5.1 and

the *Trading Rules* state that a participant will consider order and trade information from all appropriate marketplaces. According to UMIR 5.1 and the *Trading Rules*, participants are not required to maintain access to real-time data feeds from each marketplace. Rather, to the extent that a particular marketplace has demonstrated a “reasonable likelihood” of liquidity (relative to the size of the client order), a dealer is expected to “make arrangements with a participant of a particular marketplace or will directly route an order to a particular marketplace, where appropriate.”¹⁶ UMIR 5.1 and the *Trading Rules* require firms to purchase a minimum of securities market data from exchanges and non-exchange trading venues. In fact, most of the members of the Investment Industry Association of Canada (IIAC) we communicated with were of the opinion that, in all practicality, financial market participants executing orders must purchase data from all marketplaces in order to comply with the best execution and best price obligations.

Furthermore, while other regulatory frameworks (i.e. Regulation NMS in the United States) require market participants to access top-of-book data, in Canada the requirement extends to depth-of-book data, as the best price rule applies to all visible orders and all visible parts of orders in the full depth-of-book.

The advent of new trading venues has made trading a more competitive business, but market data costs have not benefited from the new competition for order flow. Market fragmentation under the Canadian regulatory structure necessarily leads to increasing costs of market data for financial market participants, given that they are required to obtain data from all the trading venues or redirect orders to satisfy their best execution and best price obligations.

¹⁶ Investment Industry Regulatory Organization of Canada in the Universal Market Integrity Rule (UMIR) 5.1 and 5.2. Available at <http://www.iiroc.ca/English/ComplianceSurveillance/RuleBook/Pages/UMIR.aspx>. Retrieved October 1, 2010.

3.1.1 SOURCES OF ACCESS TO SECURITIES MARKET DATA AND DESCRIPTION OF THE MAIN DATA PRODUCTS

Currently, financial market participants in Canada can access market data from a variety of sources. Securities market data can be obtained through international data distributors, such as Bloomberg or Thomson Reuters, or direct data feeds from each of the individual marketplaces. Most recently, a consolidated information processor has evolved as well. In 2006, the Canadian Securities Administrator (CSA) published an invitation for applications to become an information processor for exchange-traded securities other than options. In June 2009, the CSA announced that the TSX Inc., a wholly owned subsidiary of the TMX Group, will act as an information processor for a period of five years starting July 1, 2009. The information processor system works as a pass-through model in which TMX charges a distribution fee and the data fees for the contributing marketplaces are passed through to the client.

The TMX Information Processor data products currently offered are: 1) the Consolidated Data Feed (CDF) which allows access to pre- and post-trade market data from each contributing marketplace, 2) the Canadian Best Bid and Offer (CBBO) which provides real-time access to the consolidated Canadian best bid and offer for exchange-traded securities, as specified in NI 21-101, 3) Consolidated Last Sale (CLS) which provides real-time last sale from contributing marketplaces, and 4) Consolidated Depth-of-book (CDB) which provides the aggregate orders at each price for each contributing marketplace. Each of these data products involves a monthly distribution fee plus additional market data fees from each of the contributing marketplaces.

The data division of TMX Group provides a broad range of real-time and historical data products and services. Real-time and delayed service is available for the Toronto Stock Exchange (TSX), the TSX Venture Exchange (TSXV), the Montréal Exchange (MX), CanDeal

and the TSX Foreign Exchange (FX). Users of TMX data must pay subscription and distribution fees. Subscription rates are different for professional and non-professional, as well as Canadian and international subscribers.

Using the TSX and the TSXV as an example, there are subscriptions available for Level 1 and Level 2 data. Level 1 provides the last sale, bid/ask, earnings, dividend and bulletins for Canadian senior and junior equities. In addition, subscriptions to Level 1 provide access to index data. Subscribers can choose between two options for Level 2 data: *Market-by-Price* and *Marketbook*. *Market-by-Price* gives traders a real-time view of the market by aggregating the order book at each price. In turn, the *Marketbook* suite includes *Market-by-Order*, *Market-by-Broker*, and the *Market-by-Price* product as described in the previous sentence. *Market-by-Order* may improve trading decisions and minimize market impact. In turn, *Market-by-Broker* allows users to identify sources of liquidity. As Table 8 shows, professional user monthly prices for these products currently range from \$38 for TSX Level 1 data to \$50 for TSX's *Marketbook*.¹⁷ The same products for TSXV range from \$25 to \$26, respectively. For TMX data, Level 2 subscribers must subscribe to Level 1 data, for data on both TSX and TSXV-listed securities.

On May 30, 2011, after several months of negotiations with the IIAC, the TMX issued a letter to its subscribers saying that effective October 1, 2011 the price for professional subscribers to TSX Level 1 data would decrease from \$38 to \$32. In addition, the letter also announced that effective April 1, 2012, the price of TSX Level 1 data will be \$30 per month. Also, from that date onward real-time index data will not be bundled with Level 1 data, as it is now, and will be offered at a price of \$1.50 a month for professional subscribers.

¹⁷ Prices are in Canadian dollars unless otherwise stated.

We note that the TMX's schedule of data rates reveals that subscribers may enter into an “enterprise arrangement as an alternative to standard subscriber fees.”¹⁸ In effect, this suggests large data consumers can enter into special arrangements with the TMX Group on market data fees. It is not an uncommon practice to reward large data customers with more favorable pricing. In fact, NYSE and NASDAQ also offer enterprise licensing agreements. However, both of these exchanges disclose the qualification criteria for enterprise licensing.¹⁹ While standard market data fees are disclosed on the TMX Group’s public web site, there are no disclosures for how enterprise arrangements are agreed upon, qualification criteria needed, or what commitments are required to ensure fair and equal access to TMX Group’s market data across all consumers. Due to this lack of transparency, an analysis of the data costs following these arrangements is not possible.

On top of subscriber fees, there are market data distribution fees which depend on the use the data will be given: whether it is for internal or external distribution, whether quotes will be displayed externally (on a website, for example), whether the data will be used for analysis programs or applications, and whether these applications lead to automated or semi-automated orders.

In addition to real-time and delayed service data products, the TMX also offers historical and corporate data products. Finally, the TMX also offers several equity index data products.

¹⁸ TMX subscriber data rates. Available at <http://www.tmx.com/en/pdf/SubscriberDataRates-withinCanada.pdf>. Footnote 13.

¹⁹ NASDAQ OMX Global Data Policies. Enterprise Data License Policy. Available at <http://www.nasdaqtrader.com/content/AdministrationSupport/AgreementsData/datapolicies.pdf>. NYSE Technologies Market Data. Plans. Network A Rate Schedule. (Broker-Dealer Enterprise - Maximum monthly charge). <http://www.nyxdata.com/cta>. Retrieved December 17, 2010.

The remaining Canadian trading venues that currently charge fees for market data on TSX and TSXV-listed securities are: Alpha, Chi-X,²⁰ Omega, and Pure.

Table 8

Professional per-user monthly fees for market data products from Canadian trading venues.²¹

Trading venue	Product name	Fees	
		TSX	TSXV
TMX ²²	TL1/CL1	currently \$38 (will drop to \$30)	\$25
	Market-by-Price	30	16
	MarketBook	50	26
Alpha ²³	Top-of-Book	15	7.5
	Top Five	18	9.5
	Price Depth	28	14.5
	Full Book	48	24.5
Pure ^{24,25}	Level 1	10-12	
	Level 2	14-18	
Omega	Top-of-Book	2.85	
	Depth-of-Book ²⁶	2.85	
Chi-X Canada ²⁷	Level 1	15	
	Level 2	30	
CNSX ²⁸	Levels 1 and 2	9-10	

²⁰ Chi-X Canada, which was the last lit marketplace providing market data free of charge, has recently announced that effective February 1, 2011 it will start charging fees for its market data.

²¹ The fee schedule reproduces the fees advertised by each of these trading venues. Nevertheless, for the TMX subscription to Level 2 data requires prior subscription to Level 1 data. This is not the case for Alpha, Chi-X, Pure or Omega. A subscription to Alpha, Chi-X Canada, and Pure Level 2 data includes Level 1 data and there is no requirement to subscribe/pay for the Level 1 product. In turn, Omega currently has a fee for Level 1 data and provides Level 2 data at no cost to everybody that purchases Level 1 data.

²² Data distribution, license, connectivity, and real-time usage-based fees apply. For the TSX Level 1 Data (TL1/CL1 product) the table shows the current price and the price effective April 1, 2012 as announced by a letter from TMX Datalinx to its subscribers.

²³ Alpha currently has a discount on its subscriber fees. The discounted fee is on the table. Feed fees for data users and distributors apply.

²⁴ TSX and TSXV data is bundled by Chi-X, Omega, and Pure.

²⁵ Pure works on a suggested price schedule where Pure charges its redistributors a price that's not made public and redistributors, in turn, decide how much they charge their users. The ranges provided in the table are the ranges that distributors are currently charging their consumers.

²⁶ Depth-of-book data for Omega is currently subject to a fee holiday.

²⁷ Chi-X Canada currently provides its market data at no cost. However, on December 20, 2010 it announced to its trading participants that it would start charging for market data according to the price schedule above which will be effective on February 1, 2011.

²⁸ CNSX, as Pure, work on a suggested price schedule. The ranges provided in the table are the ranges that distributors are currently charging their consumers.

Sources: TMX Group: <http://www.tmx.com/en/pdf/SubscriberDataRates-withinCanada.pdf>; Alpha Trading: <http://www.alphatradingsystems.ca/alphaportal/tabid/532/Default.aspx>; Pure: Phone conversation with Pina De Santis, Corporate Development Advisor, CNSX markets fee schedule and Bloomberg information on market data product pricing; Omega: <http://omegaats.com/fees>. The Chi-X Canada fees were announced by email correspondence to their trading participants on December 20, 2010. The rest of the fees were retrieved on November 1, 2010.

Alpha has several types of market data fees. First, there is a fee per user, although non-professional users can currently access for free. Second, there are feed fees for data users and data distributors, including a primary feed fee and a discount for each additional feed. Alpha provides data coverage for all securities listed on the TSX and TSXV at the following four levels of aggregation: 1) *Alpha Top-of-book*, which has the best bid/ask price and aggregate volume; 2) *Alpha Top Five*, which provides top 5 price levels with volumes aggregated by price; 3) *Alpha Price Depth*, which aggregates depth-of-book volumes by price; and 4) *Alpha Full Book*, which provides all public order and trade information. Alpha's prices for professional users range from \$15 for top-of-book data to \$48 for their *Full Book* product for trades on TSX-listed securities.²⁹ For securities listed on the TSXV, the product prices range from \$7.5 to \$24.5, respectively. Alpha's Level 2 data products include Level 1 data at no cost.

Chi-X, Omega, and Pure have a simplified fee structure that consists solely of user fees (no distribution or feed access fees). Pure charges a monthly user fee for Level 1 and Level 2 data, for both trades on securities listed on both the TSX and TSXV. The prices for these products are \$12 for Level 1 and \$18 for Level 2. Pure's Level 2 pricing includes access to Level 1 market data. Pure also charges fees for its non-professional users. In turn, Omega charges a monthly fee for Level 1 of \$2.85 per user but its full depth-of-book is currently subject to a fee holiday. Omega offers no separate pricing for non-professional users. Chi-X Canada has also announced a simplified fee structure, of a Level 1 fee for professional users of \$15 and a Level 2

²⁹ Alpha offers their market data products at a discount at least for the year 2010.

fee of \$30 (Level 2 users would receive Level 1 data at no cost). Chi-X Canada's market data product will remain free for non-professional users.

Table 9

Non-professional per-user monthly fees for market data products from Canadian trading venues (December 2010).

Trading venue	Product name	Fees	
		TSX	TSXV
TMX ³⁰	TL1/CL1	\$6	\$25
Alpha	Top-of-Book	free	free
	Top Five	free	free
	Price Depth	free	free
	Full Book	free	free
Pure	Level 1	2.42 ³¹	
	Level 2	18	
Omega ³²	Top-of-Book	2.85	
	Depth-of-Book	2.85	
Chi-X Canada	Level 1	free	
	Level 2	free	
CNSX	Levels 1 and 2	2.02 ³³	

Sources: TMX Group: <http://www.tmx.com/en/pdf/SubscriberDataRates-withinCanada.pdf>; Alpha Trading: <http://www.alphatradingsystems.ca/alphaportal/tabid/532/Default.aspx>; CNSX markets fee schedule and Bloomberg information on market data product pricing. Retrieved December 17, 2010.

Finally, CNSX also charges for market data for CNSX-listed securities. It bundles Level 1 and Level 2 data into one data product, charging professional users \$10 per month. Non-professional users of their market data product are also charged a fee.

³⁰ The TMX Group only provides top-of-book data at non-professional user prices.

³¹ The fee for non-professional is \$2.40 US. It was converted to Canadian dollars using an exchange rate of 1.01 CAD/USD.

³² Omega's website does not list separate fees for professional and non-professional users, but rather lists one flat fee of \$2.85. Omega's Raymond Tung and Michael Bignell say that as far as they know they have no non-professional users.

³³ The fee for non-professional is \$2 US. We used the same exchange rate as in the footnote above.

3.1.2 SUBSCRIPTION RATES TO THE DATA PRODUCTS

Subscription rates to these data products vary. Table 10 presents a summary of results on subscription rates for a sample of financial industry participants that are members of the IIAC. We surveyed all 183 financial firms that are members of the IIAC. We received responses from 19 financial firms regarding detailed subscriptions to each of the data products. Although the response rate of the survey was about 10%, the institutions that provided information on subscriptions spanned all the subcategories of IIAC membership: small, mid-size, and large firms and banks. Table 10 presents the sum of all interrogation devices or access points³⁴ that receive each of the data products in the firms that responded to our survey. One must exercise caution in using the survey results to make inference on general subscription rates for Canadian securities data products, since our sample might not be a representative sample of all users of these products. Nevertheless, in light of the scarcity of public data on subscription rates to each of the data products, our survey is a first attempt in analyzing subscription patterns.

Our survey reveals that while all firms subscribe to data from the TMX Group, some firms subscribe both to data from the TMX Group and from the ATs. Typically, investment advisors rely heavily on TMX Group data, whereas data products from the ATs are mostly used at the point of execution of trades.

³⁴The interrogation device or access point definition can be broadly interpreted as meaning a subscriber (person). However, trading venues charge a person for multiple subscriptions if he or she is viewing the data in different applications. That is, the same subscriber viewing data in a quotation system, an order management system, and a risk management system would be required to pay for the same information three times.

Table 10

Survey results on subscription information from IIAC members. Total number of access points by data product for the 19 firms that responded the survey.

Trading Venue	Product	Total number of access points
TMX: TSX data	TL1/CL1	9864
	Market-by-Price	2309
	MarketBook	1940
TMX: TSXV data	TL1/CL1	7042
	Market-by-Price	1588
	MarketBook	1063
Alpha: TSX data	Top-of-Book	1953
	Top Five	54
	Price Depth	869
	Full Book	530
Alpha: TSXV data	Top-of-Book	665
	Top Five	36
	Price Depth	46
	Full Book	246
Pure: TSX and TSXV data	Level 1	1054
	Level 2	780
Omega: TSX and TSXV data	Top-of-Book	754
TMX: Outside Canada ³⁵	CEG	1033
	TSX Market-by-Price	7
	TSX MarketBook	66
	TSXV Market-by-Price	12
	TSXV MarketBook	45

Source: Survey on subscriptions for IIA C members

In summary, several Canadian marketplaces charge fees for their market data products. Out of all firms that responded, if a firm purchases equity market data at all it purchases data from the TMX Group.³⁶ Some purchase data from the ATs as well. A single user subject to the best execution and best price obligations currently spends a minimum of \$182.85 dollars a month

³⁵ One of the firms that responded provided information regarding its subscriptions from abroad for data from the TMX Group. Since TSX and TSXV top-of-book data is bundled for non-Canadian subscribers and there are pricing differences for Canadian and non-Canadian subscribers, this disaggregation is preserved in the summary table above. The last five rows on the table refer to subscriptions outside of Canada.

³⁶ One firm that answered the survey was a commodities firm and therefore did not receive any equity market data.

on market data to trade TSX-listed securities and \$122.35 for TSXV-listed securities.³⁷ With the \$8 price reduction on TSX Level 1 data scheduled for April 1, 2012, a single user subject to the best execution and best price obligations would spend a minimum of \$174.85 for market data on TSX-listed securities.

3.2 FURTHER EVIDENCE OF INELASTIC DEMAND FOR DATA

Broker-dealers are required by regulation to purchase market data, but other financial market participants, not bound by the best execution and best price obligations, may also have a need for detailed data products. Top-of-book data, for example, may not be sufficient for some investors because decimalization of the TSX has led to smaller depth at the NBBO, as found by Huson, Kim, and Mehrotra (2006). Consequently, investors may wish to have access to depth-of-book data. We examine how often retail order sizes exceed the NBBO size and whether retail investors adjust their order submission strategies based on market conditions.

Table 11 compares the sizes of all Canadian retail orders, market orders and marketable limit orders.³⁸ Panel A shows that there were 927 market orders and 27,304 marketable limit orders submitted between 9:30 AM and 4:00 PM on October 26, 2010. The overall average (median) order size was 4,066 (785) shares. Marketable limit order sizes are, on average, larger than market order sizes. This result is consistent with Peterson and Sirri (2002) who find that marketable limit orders are used proportionally more often for larger orders.

Panel B shows that about 20% of retail orders (market and marketable limit) encounter insufficient NBBO size when they are submitted. Panel B also shows that marketable limit

³⁷ For TSX data, the \$182.85 is obtained by summing the prices for TL1/CL1 and Markebook by the TMX Group to the price of the depth-of-book products produced by Alpha, Pure, Omega, and Chi-X Canada. The analogous calculation is used for TSXV data.

³⁸ Whereas market orders are to be executed immediately at current market prices, limit orders specify prices at which a security should be bought or sold. For example, a limit order may instruct the broker to buy a stock if the share price falls below a given threshold.

orders encounter insufficient NBBO size more often (19.5%) than market orders (11.3%). This result is also consistent with Peterson and Sirri (2002) who find that marketable limit orders are used more often when the order size exceeds the quoted depth. In other words, some retail customers are actively monitoring market conditions to optimize their order submission strategies.

Table 11

Comparison of retail order sizes to NBBO sizes for October 26, 2010³⁹.

Panel A: Summary statistics for retail orders

Order type	Number of orders	Order size (shares)	
		Median	Average
Market orders	927	300	1,369
Marketable limit orders	27,304	800	4,157
Market and marketable limit orders	28,231	785	4,066

Panel B: Retail order sizes compares to NBBO sizes

Order type	Percent of orders encountering: Sufficient NBBO Size		
	Order size < NBBO size	Order size = NBBO size	Order size > NBBO size
	Market orders	4.6%	84.0%
Market limit orders	2.1%	78.4%	19.5%
Market and marketable limit orders	2.2%	78.6%	19.2%

Source: FIDESSA order management system platform.

If retail customers who are not actively monitoring market conditions submit orders larger than the quoted size in the NBBO, they are not receiving a quoted price for their entire order. Typically, these retail customers receive multiple trade confirmations for their original order, reflecting the executing broker's need to divide up retail orders to execute against the

³⁹ The numbers in the table reflect market orders and marketable limit orders submitted between 9:30:00 AM and 4:00:00 PM. The size of a buy order is compared to the size of the NBBO ask (offer) at the time the order was submitted. The size of a sell order is compared to the size of the NBBO bid.

smaller and changing NBBO. For retail investors who choose to monitor for best execution, depth-of-book data is necessary to see the price they are likely to receive for about 20% of their orders. Consequently, access to depth-of-book data is a necessity for an important fraction of retail investors.

Combining all of the factors –i.e. the TMX Group’s dominant position which translates into across-the-board subscriptions to the TMX Group’s data and the sophisticated investors’ need for depth-of-book data- yields a situation in which the demand for proprietary market data sold by the TMX Group is “inelastic.” The regulators’ best execution and best price obligations are further reasons why market data produced by fringe ATSS may also enjoy the benefits of an “inelastic” demand curve. Price elasticity of demand is an economic measure of how much the quantity demanded responds to a change in price. Economists say that demand is “inelastic” when the quantity demanded responds only slightly to changes in the price. Inelastic demand is common in markets with no comparable substitutes under the conditions described in Section 2 above.

If producers know the demand elasticities of their customers, producers can engage in monopoly pricing power that allows them to charge prices equal to their customers’ “willingness to pay.” In the case of market data, many broker-dealers have an inelastic demand curve. The inelastic demand for market data, combined with the lack of comparable substitutes, suggests that the TMX Group has the ability to engage in monopoly pricing for market data covering TSX-listed securities. A similar detailed economic analysis would be needed to arrive to similar conclusions for the TSXV. We have focused on the TSX since it is the major exchange in Canada.

4. MONOPOLY PRICING POWER

Economists looking for real-world examples of firms with considerable monopoly pricing power find they are not typical. Because few goods are truly unique and the demand for most goods is somewhat elastic, at least in the long-run, it is usually quite difficult to find evidence of substantial monopoly power. However, the previous two sections have shown that there are no comparable substitutes for the exclusive market data products and that the demand for this data is relatively inelastic. In general, firms have no choice but to subscribe to data products from the TMX Group, given the concentration of trading activity on the TMX. The new ATs also benefit from inelastic demand at the point of execution of trades given the best execution and best price obligations.

Taken together, these conditions provide an excellent opportunity for marketplaces to exploit their monopoly pricing power. In this section, we appeal to economic theory to establish the trading venues' ability to exert this power, and then we provide direct evidence of their monopoly pricing behavior.

4.1 MONOPOLY PRICING POWER BEHAVIOR BY THE DOMINANT EXCHANGES — ECONOMIC THEORY

In perfectly competitive markets firms compete with each other by decreasing their prices until price equals marginal cost. That is, in theory, in a perfectly competitive equilibrium, firms break-even and do not make a profit. On the other extreme, a monopolist is able to keep prices above marginal costs. Hence, a simple definition of monopoly power is the ability to set price above marginal cost. One well-known measure of monopoly power is the Lerner Index, L , which measures the difference between the price of a good or service and its marginal cost, expressed as a proportion of the price:

$$L = \frac{P - MC}{P}$$

where P is price and MC is marginal cost. The Lerner Index ranges in value from 0 to 1. A high value of the Lerner Index indicates a high degree of monopoly power.

Under the assumption that a firm (e.i. a marketplace) is a profit-maximizer, it can be shown that the Lerner Index yields the following useful relationship:

$$L = \frac{P - MC}{P} = \frac{1}{\eta}$$

where η is the absolute value of the elasticity of demand. Markets characterized by large demand elasticities result in a low value for the Lerner Index, which implies little monopoly power.⁴⁰ Relatively inelastic demand results in a high value for the Lerner Index, which implies large monopoly power.⁴¹

In the previous section, we established the fact that the demand for market data is inelastic. Thus, exchanges can, in theory, exert monopoly power over the price of their exclusive market data by charging a high mark-up in price over marginal cost. We now move from theory to evidence.

4.2 MONOPOLY PRICING POWER BEHAVIOR BY THE MARKETPLACES — EVIDENCE

In practice, obtaining accurate and precise data on the marginal costs of producing a particular good or service (i.e. securities market data) is extremely difficult. Hence, calculating the Lerner Index is usually an impossible task. In theory, there are reasonable alternatives for assessing levels and trends of marginal costs, such as average variable costs or long-run incremental costs. Nevertheless, the financial data available for the TMX is not disaggregated

⁴⁰ The larger the value of η , the smaller the value $1/\eta$, and therefore the lower the value of L .

⁴¹ The smaller the value of η , the larger the value $1/\eta$, and therefore the higher the value of L .

enough to single out the costs associated to market data products. Furthermore, we do not have access to detailed financial information for the remaining marketplaces in Canada, as they are not publicly listed and do not make their income statements public.

However, a comparison of market data fees and information on profit margins for a market that is likely to experience similar trends in technology costs, provides evidence that the TMX Group is in fact using its monopoly power to its advantage.

Table 12 presents historical professional user monthly fees for data products produced by the TMX Group from 2003 onwards. The table shows that TSX-Level 1 or top-of-book data has increased in price by about 27% in the past eight years for the largest data consumers as is explained in detail in the following paragraph. Similarly, in the same time period the fees for Marketbook, which provides depth-of-book data, have increased 11% and 8% for data on the TSX and TSXV, respectively.

It is important to note that until recently, the TMX's Level 1 data for TSX-listed securities was based on interrogation device tiers. Historically, the larger the number of interrogation devices, the lower the per-device fee due to volume discounting. These pricing tiers were eliminated in 2010, when the consumers with the lowest number of access points experienced a drop in fees. Hence, smaller consumers of TMX data (less than 1,000 interrogation devices) now pay the same monthly fee as the largest consumers. Up until then and at least since 2003, each interrogation device tier experienced increases in prices year after year. The history of pricing by tier is such that if we compare the 2003 and 2010 pricing schedules, only those consumers with 1-9 interrogation devices experienced a drop in fees (\$40 in 2003 and \$38 in 2010). All of the remaining customers experienced an increase in fees of up to \$8 (those with 500+ interrogation devices paid \$30 in 2003 and \$38 in 2010). For purposes of the comparison in

Table 12, we reviewed the lowest price for TSX-Level 1 in effect at the time –that is the price charged for the largest customers.

After months of negotiation with the IIAC, the TMX Group has announced two consecutive reductions in prices for TSX Level 1 data. The prices and their effective dates are on Table 12. However, there have been no announced reductions for other market data products such as depth-of-book data for TSX-listed securities or market data for TSXV-listed securities.

The other Canadian trading venues started their operations in the past couple of years and either they started charging fees in the past year or the fees for their data products have remained static during their two years in operation. Hence, there is no historical data for other Canadian marketplaces. Fees will be further analyzed in the next section, which compares current fees across Canadian and international markets.

Table 12

Historical fees for TMX Group’s market data products⁴².

	TSX Level 1	TSX MarketBook	TSXV Level 1	TSXV Marketbook
2003	\$30	\$45	\$25	\$24
2004	30	45	25	24
2005	32	48	25	25
2006	34	48	25	25
2007	36	50	25	26
2008	37	50	25	26
2009	38	50	25	26
2010	38	50	25	26
2011	32 (effective October 1)	50	25	26
2012	30 (effective April 1)	NA	NA	NA

Source: TMX Group Subscriber Data Rates Announcements. Note that to purchase depth-of-book data from the TMX one must also subscribe (and pay) for Level 1 data.

Panels A, B, and C of Table 13 show that fees paid for top-of-book data for US-listed securities have remained constant since 1994 until today.⁴³ Furthermore, Panel D uses information cited on several Securities and Exchange Commission (SEC) to show that, even

⁴² As explained in detail in the text before 2010, the TSX Level 1 data had a tiered fee schedule. The numbers in the table refer to the lowest price at each of the time periods.

⁴³ Later sections of this study describe the market for US-listed securities in more detail.

holding prices of top-of-book data constant, the networks' gross profit margins have been increasing since 1994 until 2004. If we focus on network revenue in the decade from 1994 to 2004, we can conclude that revenues are increasing due to increases in the number of subscribers, since professional user fees remained constant and non-professional user fees and per-query fees were substantially reduced.⁴⁴ The increase in the number of subscribers has not triggered an increase in network expenses. In fact, expenses for Networks A and B dropped from 1994 to 2004. Expenses for Network C increased less than 3% from 2003 to 2004 (we don't have access to more data on Network C's expenses). In any case, revenues have increased at a faster pace than expenses for each of the networks. Gross profit margins, calculated as

$$\text{Gross profit margins} = \frac{\text{Revenues} - \text{Expenses}}{\text{Revenues}}$$

have increased by 8.2% for Network A. Market top-of-book data revenues in the United States were US \$434 million dollars while network expenses were a mere US \$40 million in 2004. Network revenues were roughly ten times expenses. Although these network expenses do not include the technology costs incurred by the individual exchanges in reporting their information to the network processors, it is plausible that the technology costs incurred by the exchanges have followed a similar path as network expenses. Hence, while it is impossible to compute profit margins for the US given that full cost data is not public, there is evidence that gross profit margins for the networks has been increasing and this may extend to overall data costs.

With regards to historical prices for depth-of-book products in the US, Table 14 shows that fees for four out of five depth-of-book products for the major exchanges have also remained constant. The only exception is NYSE's OpenBook which covers NYSE-listed securities. OpenBook was introduced in 2001 at a price of US \$50. In 2006, NYSE increased the price of

⁴⁴ SEC. Regulation of market information fees and revenues. Release No. 34-42208. File No. S7-28-99. Available at <http://www.sec.gov/rules/concept/34-42208.htm> . Retrieved November 9, 2010.

Openbook from \$50 to \$60. The document presenting the increase in fee for SEC review states that in 2005 NASDAQ had introduced its TotalView product for NASDAQ-listed securities at US\$ 70. The NYSE argued that its OpenBook product was in many ways similar to NASDAQ's TotalView.⁴⁵ In any case, the main finding of the earlier SLCG study on securities market data pricing in the US is that the NYSE has monopoly pricing power over market data products covering NYSE-listed securities, while NASDAQ has monopoly pricing power over market data products for NASDAQ-listed securities. Hence, it is not particularly surprising that the NYSE increased the price of its OpenBook product by 20% without any evidence of increasing costs.

⁴⁵ SEC. Release No. 34-53585; File Nos. SR-NYSE-2004-43 and SR-NYSE-2005-32. Available at <http://www.sec.gov/rules/sro/nyse/2006/34-53585.pdf>. Retrieved January 6, 2011.

Table 13

Historical fees and financial information for Networks A, B, and C for top-of-book data for US-listed securities. Values are in US dollars.

Panels A and B are from the Consolidated Tape Association (CTA), which oversees the dissemination of real-time trade and quote information in the New York Stock Exchange and American Stock Exchange-listed securities. The current participants include the BATS Exchange, NASDAQ OMX BX, Chicago Board Options Exchange, Chicago Stock Exchange, EDGA Exchange Inc., EDGX Exchange Inc. Financial Industry Regulatory Authority, International Securities Exchange, NASDAQ Stock Market, National Stock Exchange, New York Stock Exchange, NYSE AMEX, NYSE ARCA, NASDAQ OMX PSX.

Panel A: Professional user per-device monthly fee for Network A (NYSE-listed securities)

No. of devices	1994	2010
1	\$ 127.25	unchanged
2	79.50	unchanged
3	58.25	unchanged
4	53.00	unchanged
5	47.75	unchanged
6 to 9	39.75	unchanged
10 to 19	31.75	unchanged
20 to 29	30.25	unchanged
30 to 99	27.50	unchanged
100 to 249	26.50	unchanged
250 to 749	23.75	unchanged
750 to 4999	20.75	unchanged
5000 to 9999	19.75	unchanged
10,000 and up	18.75	unchanged

Panel B: Professional user per-device monthly fee for Network B (AMEX-listed securities)

		1994	2010
Members	Last Sale	\$ 13.60	unchanged
	Bid-Ask	13.65	unchanged
Non-Members	Last Sale	14.60	unchanged
	Bid-Ask	15.60	unchanged

Panel C is from the UTP plan which oversees the dissemination of real-time trade and quote information in NASDAQ-listed securities. The current participants include American Stock Exchange, NYSE Area, BATS Exchange, Boston Stock Exchange, Chicago Board Options Exchange, Chicago Stock Exchange, International Securities Exchange, FINRA, National Stock Exchange, NASDAQ Stock Market, New York Stock Exchange and NASDAQ OMX PHLX.

Panel C: Professional user per-device monthly fee for Network C—also known as “unlisted trading privileges” UTP Plan (NASDAQ-listed securities).

	1994	1998	2010
Level1/Last sale	\$19.00	20.00	unchanged

Panel D: Financial information for Networks A, B, and C

		Network A	Network B	Network C
1994	Revenues	88,961,000	72,351,000	62,046,000
	Expenses	12,796,000	4,180,000	- ⁴⁶
	Gross profit margin	85.6%	94.2%	-
1998	Revenues	143,729,000	99,248,000	128,500,000
	Expenses	18,494,000	5,013,000	-
	Gross profit margin	87.1%	94.9%	-
2003	Revenues	171,462,000	99,179,000	153,686,000
	Expenses	9,322,000	3,508,000	25,470,000
	Gross profit margin	94.6%	96.5%	83.4%
2004	Revenues	165,588,000	103,901,000	164,565,000
	Expenses	10,317,000	3,921,000	26,196,000
	Gross profit margin	93.8%	96.2%	84.1%

Sources: Historical data on fees for 1994, 1998, and 1999 from the SEC's Concept Release No. 34-42208 available at <http://www.sec.gov/rules/concept/34-42208.htm>. Current data on fees from the CTA September 1, 2010 plan available at <http://www.nyxddata.com/CTA> and from the UTP available at <http://www.nasdaqtrader.com/Trader.aspx?id=level1>. Financial information for 1994 and 1998 is from <http://www.sec.gov/rules/concept/34-42208.htm>. Financial information for 2003 is from <http://www.sec.gov/rules/proposed/34-49325.htm>. Financial information for 2004 is from <http://www.sec.gov/rules/final/34-51808.pdf>. Retrieved November 9, 2010.

Table 14

Historical fees for depth-of-book data for US-listed securities. Prices are in US dollars.

Exchange and product name	Coverage	Year of introduction	Price at introduction	Year of price change	Current price
NASDAQ TotalView	NASDAQ	2005	\$70	-	unchanged
NASDAQ OpenView	NYSE/AMEX	2004	\$6	-	unchanged
NYSE OpenBook	NYSE	2001	\$50	2006	\$60
NYSE Arcabook	CTA Plan and ETF	2006	\$15	-	unchanged
NYSE Arcabook	NASDAQ UTP Plan	2006	\$15	-	unchanged

Sources: The historical data was obtained from the SEC's Proposed Rule Changes available at <http://www.sec.gov/rules/sro/nasd/34-51869.pdf>, <http://www.sec.gov/rules/sro/nasd/34-50304.pdf>, <http://www.sec.gov/rules/sro/34-45138.htm>, <http://www.sec.gov/rules/sro/nyse/2006/34-53585.pdf>, <http://www.sec.gov/rules/sro/nysearca/2006/34-53952.pdf>. Retrieved on January 14, 2011. Current data fees come from the exchanges websites.

⁴⁶ The financial information for Network C included only network revenues and distributions but not network expenses. This may be because in both 1994 and 1998 there was only one non-NASD participant in the Nasdaq/UTP plan that received a distribution, the Chicago Stock Exchange (CHX). The distribution to CHX was of US \$100,000 in 1994 and US \$412,000 in 1998. Although we could not confirm it, perhaps NASDAQ absorbed all the network expenses.

If we assume that technology costs of compiling and distributing data feeds in the US and Canada have followed a similar trend, we can conclude that the TMX gross profit margins on market data products have been increasing (market data revenue numbers in Figure 8 show that in fact the increases in TMX market data fees have come with increases in market data revenue). Furthermore, if we assume that the technology costs incurred by the US exchanges in reporting their market data to the networks is similar in size to the networks' expenses of compiling and distributing the market data, then we can conclude that the business for top-of-book data in the US has large profit margins. In summary, if the per-user costs of distributing market data in Canada and the US are similar, then data on subscription fees for both countries and financial information for the US networks suggest that TMX's margins in the data business are significant and have been widening. There is legitimate concern to question whether the escalating fees charged for TMX market data are fair and reasonable to market participants and whether a similar increase in prices would have occurred if the TMX did not hold a dominant position in the trading of Canadian securities.

The historical comparison shows that while the vast majority of market data product fees have remained constant in the US with the exception of only one product (Tables 13 and 14), market data costs in Canada have been rising. First, TMX data products have experienced increases in fees from 2003 until 2010 (Table 12), even considering the recent announcement of a price reduction in the Level 1 data product for TSX-listed securities. Second, the emergence of new trading platforms, all of which are charging for market data, has also increased the burden of market data costs for Canadian financial market participants.

Recently the TMX has announced a two-step drop in prices for Level 1 data on securities traded on the TSX (Table 2). The announcement comes after months of negotiation with the

IIAC, further highlighting that the \$30 to \$38 increase in price that occurred from 2003 to 2010 was not a consequence of rising technology costs. Instead, the TMX Group's historical pricing, as well as the analysis that follows, suggests that the TMX Group is using its monopoly power to set prices.

The recent reduction in price for TSX Level 1 data is a step in the right direction as it sets the price for the TSX Level 1 product back to its 2003 level. Nevertheless, setting the price back to its 2003 level does not account for the reduction in market share that the TSX has experienced since then. Subscribers that need to observe market data from all marketplaces to comply with best execution and best price obligations would still be paying multiple times what they paid in 2003 for market data. Even with the TMX price reduction scheduled for 2012, \$174.85 a month provides professional data subscriptions from all marketplaces for TSX-listed securities, \$80 paid to the TMX Group while the rest goes to the ATs. Back in 2003, the new ATs did not exist. Hence, professional subscribers spent a total of \$75 on market data for TSX-listed securities, all of which was paid to the TMX Group. Similarly, subscribers to market data for TSXV-listed securities currently pay \$122.35 a month to comply with best execution and best price obligations, out of which \$51 is paid to the TMX Group. In 2003, the total cost of subscribing to market data on TSXV-listed securities was \$49 a month, all of which was paid to the TMX Group.

In summary, the costs of complying with best price and best execution obligations have more than doubled since 2003. This is due in part to the TMX Group raising its market data prices, despite its shrinking market share. The remaining portion of the increasing burden of complying with regulation is due to the ability of the new ATs to charge for market data.

5. CANADIAN AND INTERNATIONAL EXCHANGE'S MARKET DATA

REVENUES AND FEES

This section provides a comparison of Canadian and other world exchanges. Specifically, we compare revenues and fees for market data first within Canada and then we extend the analysis to foreign exchanges. It would have been ideal to compare costs related to the production of market data, but international exchanges do not disaggregate costs in such a way that allows identifying which costs are related to the consolidation and distribution of market data, and which costs correspond to other aspects of their operations.

5.1 MARKET DATA REVENUES AND COSTS IN CANADA

Financial reports are not publicly available for Canadian ATs. Hence, this section will focus on statistics of the TMX Group. Toward the end of this section, we will exploit the results of our survey on subscriptions to obtain an estimate of total market data revenue for Canada under some assumptions.

5.1.1 EVIDENCE FROM THE TMX GROUP'S ANNUAL REPORTS

The TMX Group's 2009 annual report reveals that its revenues from "market data" amount to \$146 million, which is about 26% of yearly revenue. The remaining sources of revenue are "listing fee revenue and other issuer services" accounting for 26%; "trading, clearing, and related revenues", 42%; and "technology solutions" to market participants and "other business services", 6%.

Figure 7 shows the reliance of the TMX on market data revenue. In the first semester of 2010 market data accounted for about 27% of total TMX revenues, up from 23% in 2005. This increase in the fraction of revenues from market data occurred despite a contraction of about 6% in the number of professional and equivalent real-time market data subscribers from 2008 until

2009. The reduction in subscription rates was due to the decreased employment in the financial services given the harsh economic conditions following the global effects of the United States financial crisis that started in 2007.⁴⁷ In the meantime, annual growth rate of market data revenues was still about 8% from 2008 to 2009, contributing to an average growth rate just under 22% for the last four years.

The TMX was able to sustain positive growth in its market data revenues despite lower subscription rates by diversifying its market data business to include additional services and by imposing repetitive hikes in the prices charged for market data, as shown earlier in Table 12.

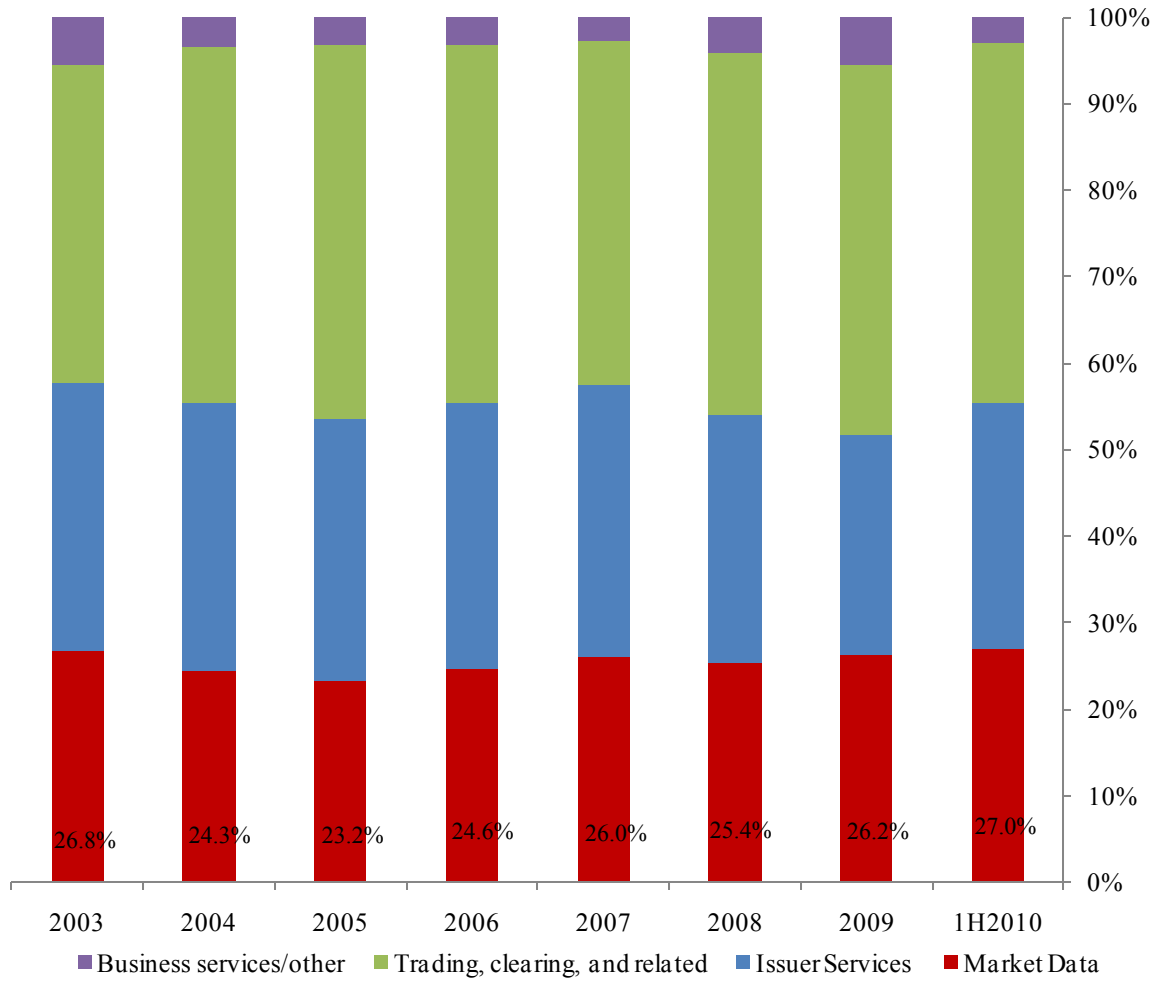
Figure 8 compares market data revenue and number of professional user subscriptions from 2004 to 2009 for the TMX. The left axis measures market data revenue (plotted on the bars), while the right axis measures the number of professional and equivalent real-time users (plotted on the line). The TMX's strategy to maintain positive growth in market data revenue despite a contraction in its subscription rates was documented in the TMX Group's annual reports. In recent years, the TMX has diversified outside of core market data, offering additional information products such as foreign exchange and fixed income feeds, Canadian Press News, and co-location offerings available at an additional cost. These sources of revenue are also included in the TMX Group's market data revenue aggregate. In addition, four consecutive annual reports issued from 2006 to 2009, announced changes in the price structure of market data fees that would lead to increases in market data revenues.⁴⁸

⁴⁷ TMX Group Inc. 2009 Annual Report <http://www.tmx.com/en/pdf/TMXGroup2009AnnualReport.pdf>, p. 29. Retrieved October 26, 2010.

⁴⁸ TMX Group Inc 2006-2009 Annual Reports. <http://www.tsx-group.ca/AnnualReport06/EN/analysis/3e.html>, p. 15; <http://www.tsx-group.ca/AnnualReport07/pdfs/TSX-2007-AR-ENG.pdf>, p. 19; http://www.tsx-group.ca/AnnualReport08/pdfs/TMX_ANNUAL_08_ENG.pdf, p. 23; <http://www.tmx.com/en/pdf/TMXGroup2009AnnualReport.pdf>, p. 29. Retrieved October 26, 2010.

Figure 7

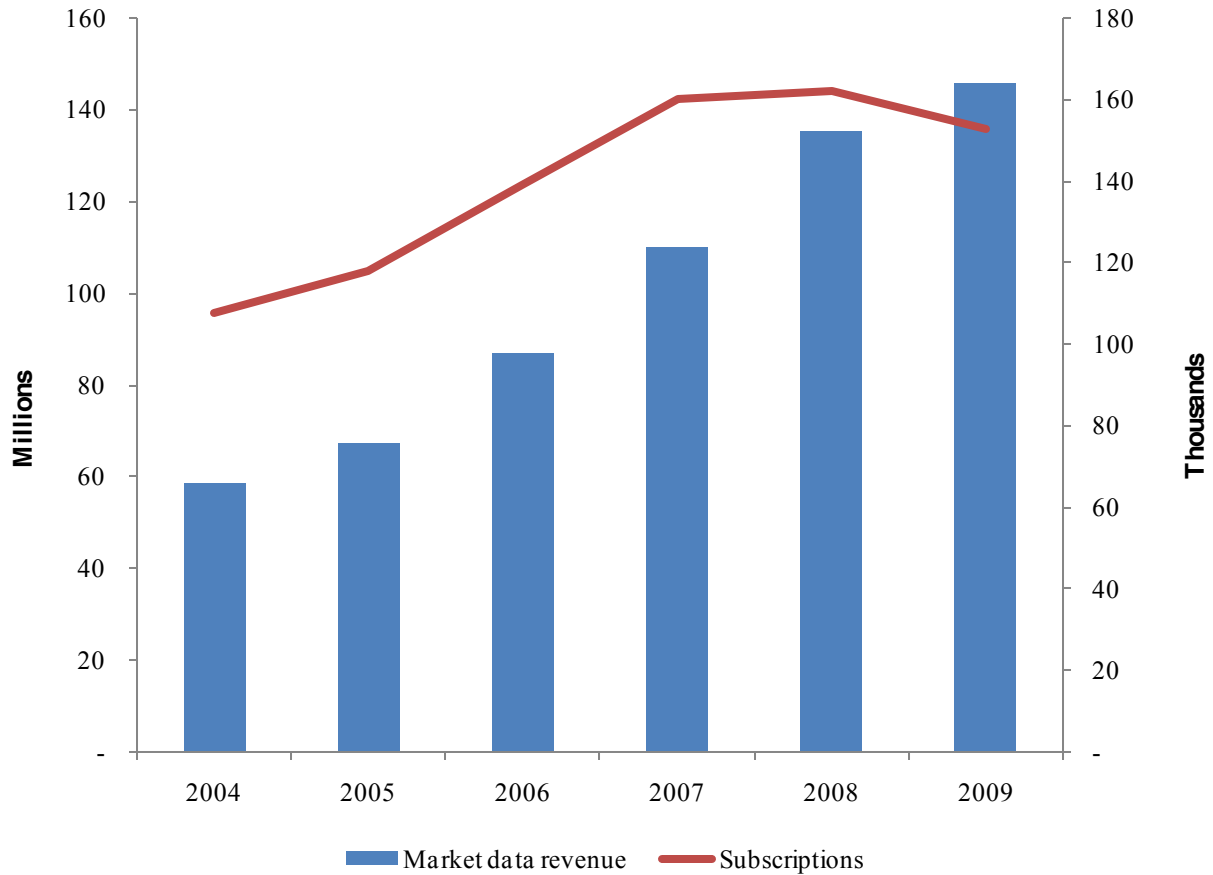
Break-down of Revenues for the TMX (2003- first half of 2010).



Source: TMX Quarterly and Annual Reports, available at http://www.tmx.com/en/investor_relations/financials/annual_reports.html. Retrieved October 26, 2010.

Figure 8

Market data revenue and professional subscriptions for the TMX Group (2004-2009)



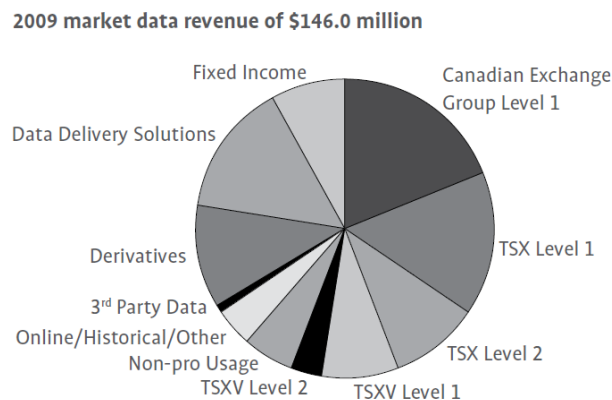
Source: TMX Quarterly and Annual Reports, available at http://www.tmx.com/en/investor_relations/financials/annual_reports.html. Retrieved October 26, 2010.

Figure 9 is a chart of market data revenue for the TMX Group in 2009. The chart was taken directly from the annual report as the TMX Group does not publicly disclose the underlying numbers. A brief explanation of each of the components is as follows. Canadian Exchange Group Level 1 corresponds to revenue obtained from equity market data users outside of Canada. TSX Level 1, TSX Level 2, TSXV Level 1, and TSX Level 2 correspond to revenue obtained from Canadian users of equity market data. The TMX also provides market data on fixed income securities and derivatives. Data Delivery Solutions refers to the revenues from co-location services as well as TMX-Net which provides connectivity to financial market participants in Chicago and New York. The remaining revenues come from non-professional

users, third party data which corresponds to revenue from the TMX’s Information Processor, and the online portal where people can access historical data.

Figure 9

Break-down for market data revenue of the TMX Group in 2009



Source: Figure from the TMX 2009 Annual Report. http://www.tmx.com/en/investor_relations/financials/annual_reports.html. Retrieved October 26, 2010.

Equity data-feeds usage and subscription revenues for 2009 were \$102 million or 18.3% of TMX Group revenues of \$556 million. The \$102 million in equity market data corresponds to the sum of Canadian Exchange Group Level 1, TSX Level 1, TSX Level 2, TSXV Level 1, and TSXV Level 2, from Figure 9, as well as the data feed revenues captured as part of the Data Delivery Solutions. In total, market data revenue that spans all security types (cash equity, derivatives, and fixed income) but still excludes co-location and network services (which are bundled in the raw number provided in the TMX annual report) added to \$137 million or 24.6% of TMX Group revenues of \$556 million.⁴⁹

5.1.2 EVIDENCE FROM THE SURVEY ON SUBSCRIPTIONS

We can use our survey results to estimate total market data revenue in Canada by multiplying the total number of subscribers for each of the data products (from Table 10) by the

⁴⁹ The information on this paragraph was provided through email correspondence by Eric Sinclair from the TMX.

product fee (from Table 8) to arrive at the total amount spent on securities market data by the 19 firms that responded to our survey. About 88% of the total amount spent on market data by our sample of firms goes to the TMX Group, while the remaining 12% goes to the ATSS. If these percentages hold, not only for our 19 firm sample but for the universe of all consumers of securities market products from Canadian trading venues, then we could conclude that the market for equity market data is about \$116 million, with \$102 million going to the TMX Group and about \$14 million to the ATSS.⁵⁰ If we add the TMX Group's \$35 million in market data revenue for derivatives and fixed income securities, we arrive at a total of \$151 million dollars in market data revenue, \$137 million going to the TMX Group and about \$14 million to the ATSS.⁵¹

5.2 INTERNATIONAL COMPARISON OF MARKET DATA REVENUES

An international comparison of the reliance of exchange companies on market data revenue provides further evidence that the TMX is charging high fees for its market data products. Unfortunately, the lack of financial information for the ATSS does not allow us to extend our analysis to the ATSS.

Table 15 lists information on the reliance on market data revenues for the TMX and nine major publicly-traded international exchange companies. The reliance on market data revenue is measured in two ways: 1) the fraction of revenue coming from market data to the total revenue of each of the international exchange groups and 2) the ratio of market data revenues to trading

⁵⁰ In this argument we are abstracting from the fact that the \$102 million in revenues for equity market data for the TMX Group is for 2009 whereas the information on IIAC members' subscription rates was on the survey date which took place in November-December 2010. There may have been changes in subscription rates from 2009 to 2010. It is likely that financial market participants may have increased their number of subscriptions to the ATSS during this time period given the ATSS's rapid increase in market share.

⁵¹ The ATSS business is different than the TMX's in the sense that they trade cash equity securities only. Hence, the ATSS market data is on cash equity securities.

and clearing revenue.⁵² One potential problem of focusing only on market data revenue as a fraction of total revenue is that different exchanges have different business areas. Exchanges that diversify into areas of business that the TMX Group is not active are likely to have lower ratios of market data revenue to total revenue, solely because their revenues include more business areas. For example, some exchanges offer more software and technology services than others. Such services may result in higher total revenues and decrease the ratio of market data revenues to total revenue. Our second measure of reliance on market data revenue, the ratio of market data revenues to trading and clearing revenues, is designed to get around this issue. Nevertheless, this second measure of reliance on market data revenue has an important caveat: the TMX, NASDAQ and NYSE do not provide clearing in cash markets. The rest of the exchanges provide trading and clearing for all their securities and, in most cases, public financial information does not disaggregate between trading and clearing revenues for each of the security classes. Hence, this measure may exaggerate the reliance on market data revenue of the TMX Group, NASDAQ OMX Group, and NYSE Euronext. Hence, we present both measures as two alternative ways of assessing reliance on market data.

The TMX Group is one of the international exchange companies that relies the most on market data revenues. We find that 24.6% of the TMX revenue in 2009 comes from market data, when we exclude revenue from co-location and network connectivity services from the raw market data numbers provided in the TMX Group's annual report. The NASDAQ OMX Group comes in second in our ranking with 22.2% of its revenue coming from market data. The remaining exchange groups' reliance on market data is considerably lower. The Singapore Exchange has the lowest reliance on market data with only 5.1% of its revenue coming from data products.

⁵² We thank the staff of the Ontario Securities Commission for suggesting this measure.

Table 15

Reliance on market data revenues by the major exchange companies. Market capitalization and daily value traded is also presented to better describe the exchange companies on the table. Data is for 2009 unless otherwise stated.

Exchange Company	Market data revenue as a % of total revenue	Market data revenue as a % of trading and clearing revenue	In US\$ millions	
			Domestic market capitalization	Annual value traded
TMX Group ⁵³	24.6%	57.6%	\$1,676,814.2	\$1,239,945
NASDAQ OMX Group ⁵⁴	22.2%	68.2%	4,056,714.9	29,684,736
London Stock Exchange ⁵⁵	17.5%	48.1%	2,796,444.3	3,391,103
CME Group ⁵⁶	12.8%	15.3%	-	-
NYSE Euronext ⁵⁷	14.7%	36.4%	14,707,186.4	19,766,106
Australian Securities Exchange ⁵⁸	11.5%	20.4%	1,261,909.3	931,555
Hong Kong Exchange ⁵⁹	9.9%	17.3%	2,305,142.8	1,501,639
Intercontinental Exchange ⁶⁰	9.5%	11.5%	-	-
Deutsche Börse AG ⁶¹	9.1%	19.2%	1,292,355.3	2,186,433
Singapore Exchange ⁶²	5.1%	7.6%	481,246.7	245,425

Sources: The first two columns are ratios computed by the authors using financial data from the exchange

⁵³ TMX Group 2009 Annual Report, pp. 32 and 94. The ratio in the first column of data for the TMX is “market data” revenue (\$137 million, which excludes co-location, network connectivity services, and other revenue that make up a portion of the raw revenue numbers for the TMX but that are not strictly market data) as a fraction of “total revenues” (\$556 million). The second column of data for the TMX is total “market data” revenue (\$137 million) to total “trading and clearing” revenue (\$237 million).

⁵⁴ NASDAQ OMX 2009 Annual Report, p. 54. The income statement items used in our calculations are “cash equity trading” revenue both in the US and Europe, “liquidity rebates,” “brokerage, clearance and exchange fees,” “derivative trading & clearing” both in the US and Europe, “market data” revenues and “total revenues.” The domestic market capitalization and the annual value traded is the sum of these figures for NASDAQ OMX and NASDAQ OMX Nordic Exchange.

⁵⁵ London Stock Exchange 2010 Annual Report, pp. 26-28 (first two columns of data on Table 14 are for the year that ended on March 31, 2010). The financial statement items used in our calculations are “secondary markets” trading and clearing revenue and “real-time data” revenues, as well as “total revenues.”

⁵⁶ CME Group 2009 Annual Review, p. 23. The financial statement items used in our calculations are “clearing and transactions fees,” “quotation data fees,” and “total revenues.”

⁵⁷ NYSE Euronext 2009 Annual Report, p. 74. The items used are “cash trading” and “derivatives” trading and clearing revenue, “market data” revenue, “total revenues,” “Section 31 fees,” and “liquidity payments.” The domestic market capitalization and the annual value traded are the sum of these figures for NYSE Euronext (US) and NYSE Euronext (Europe).

⁵⁸ ASX 2010 Annual Report, p. 83 (first two columns of data on Table 14 are for the year that ended on June 30, 2010). The financial statement items used in our calculations are “cash market” and “derivatives” trading and clearing revenue, “information services,” and “operating revenue.”

⁵⁹ Hong Kong Exchange 2009 Annual Report, p. 117. The income statement items used in our calculations are “trading fees and tariff,” “clearing and settlement,” “information services,” and “total revenues.”

⁶⁰ Intercontinental Exchange 2009 Annual Report, p. 98. The income statement items used in our calculations are “transaction and clearing fees,” “market data,” and “total” revenues.

⁶¹ Deutsche Börse Group 2009 Annual Report, p. 143. The income statement items used in our calculations are “Xetra trading fees,” Xetra “clearing and settlement fees,” Xetra “floor trading fees,” revenues from “Eurex” derivatives, “market data & analytics,” and “total revenues.”

⁶² Singapore Exchange 2010 Annual Report, p. 92 (first two columns of data on Table 14 are for the year that ended on June 30, 2010) The income statement items used in our calculations are “securities,” “derivatives,” “market data,” and “operating revenue.”

companies' annual reports. The information on market capitalization and daily value traded is from the World Federation of Exchanges available at <http://www.world-exchanges.org/statistics/annual/2009> . Retrieved on January 14, 2011.

Using our second measure of reliance on market data, we find that market data revenue is 57.6% of total trading and clearing revenue for the TMX. By this measure, the TMX Group's reliance on market data comes in second to that of the NASDAQ OMX Group. The last exchange group in the ranking according to this measure is again the Singapore Exchange with market data revenue being 7.6% of its trading and clearing revenue.

It is interesting to note that if we focus on equity market data feeds, usage, and subscriptions (\$102 million) as a fraction of equity markets trading revenues⁶³ (\$119 million) we arrive at an outstanding 85.4% (this number is not on Table 15), which means that the TMX collects almost as much revenue from selling market information as it collects on trading cash equity securities. Comparing the TMX's ratio on cash equity securities to the ratios of other exchange group companies for all securities, the ratio of market data revenue to trading and clearing revenue is considerably higher for the TMX Group than for any other international exchange company.⁶⁴

The last of the ten exchange companies listed in our rankings is the Singapore Exchange, with 5.1% of its revenue coming from market data, and market data revenue as a fraction of trading and clearing revenue being 7.6%.

⁶³ The TMX does not do clearing of cash equity markets.

⁶⁴ It is unlikely that the high reliance of the TMX on market data revenue using our second measure is entirely due to the TMX not clearing equity markets. If the TMX Group provided clearing for cash equity securities, its revenues from clearing would have to be about 25% of revenues from clearing and trading cash equity securities for its reliance on market data revenue to decrease to the level of NASDAQ OMX Group's 68.2%, which places second in our ranking. Available evidence suggests that 25% is a high ratio for clearing revenue over total clearing and trading revenue. Two exchange companies provide detailed public information on trading and clearing revenue: the London Stock Exchange and the Deutsche Börse Group. In the London Stock Exchange, clearing revenue is about 15% of total trading and clearing revenue. In the Deutsche Börse, clearing in cash markets is about 21% of total trading and clearing revenue in cash equity securities.

One qualification to bear in mind is that for both NYSE Euronext and NASDAQ OMX Group, the comparison is complicated by the US segments of these exchange companies which disaggregate liquidity rebates and SEC fees in their financial statements. Both NYSE and NASDAQ provide liquidity rebates to market participants to attract order flow and collect and remit to the SEC fees designed to cover costs of supervision and regulation of securities markets. If we did not consider liquidity rebates and SEC fees these exchanges' trading and clearing revenues as well as total revenue numbers would be inflated. The measures of reliance on market data revenues would decrease if we did not net liquidity rebates and SEC fees from the revenue numbers. In our measures of reliance on market data revenue shown in Table 15 we have considered trading and clearing revenue and total revenue net of liquidity payments and SEC fees.

The fact that the TMX Group relies heavily on market data revenues when compared to other major international exchanges implies that market data revenue evaluation and potential regulation may be more valuable in Canada than in the rest of the exchanges analyzed.

5.3 INTERNATIONAL COMPARISON OF MARKET DATA FEES

A comparison of fees for Canadian marketplaces and major international exchanges places the TMX at the middle-of-the-pack. We have data on Level 1 fees for thirteen exchanges. The TMX Level 1 data for TSX-listed securities is more expensive than the analogous data for eight of the thirteen exchanges. Similarly, for Level 2 data, six out of ten exchanges provide data at a lower subscription fee than the TMX. Lastly, for depth-of-book data, two out of four international exchanges provide data at lower fees than the TMX. These rankings hold for the current prices and the prices that will be effective starting April 1, 2012.

The TMX's fees are higher than those charged by large exchanges like the US portions of NYSE Euronext and NASDAQ OMX across the different data products. Nevertheless, the relationship between price of market data product and size of the exchange is not a uniform one, as several exchanges that are smaller than the TMX charge lower fees. The NASDAQ OMX-Nordic exchange's fee schedule matches the TMX's fee schedule for TSX-listed securities the closest out of the major international exchange companies on Table 16.

One potential source of complication in comparing fees as in Table 16 is heterogeneity in the data provided by each of the exchanges. For example, the TMX Level 1 product for TSX-listed securities includes index data. Some international exchanges provide their indexes at no extra cost bundled with their Level 1 data, as the TMX currently does, others charge their vendors a license fee that gives them the right to calculate indexes from real-time information at no per end-user cost, and yet another set of exchanges charge per end-user subscription fees for their index data products.

Table 16

International comparison of market data fees by exchanges. All data in this table is in US dollars.⁶⁵

	Type of data product (monthly fee per professional user)			Domestic market capitalization (Dec 2009)	Annual value traded (Jan-Dec 2009) (Millions)
	Level 1	Level 2	Depth-of-Book		
TMX Group: TSX-listed ⁶⁶	37.5	67.1	86.8	\$1,642,190	\$1,225,776
TMX Group: TSXV-listed	24.7	40.4	40.4	34,624	14,170
Alpha: TSX-listed ⁶⁷	14.8	27.6	47.3	-	153,931
Alpha: TSXV-listed	7.4	14.3	24.2	-	-
Pure: TSX and TSXV-listed	9.9	13.8	-	-	12,688
Omega: TSX and TSXV-listed	2.8	2.8	-	-	458
Chi-X Canada: TSX and TSXV-listed	14.8	29.6	-	-	110,057
CNSX: CNSX-listed securities	-	9.9	-	618	59
NYSE Euronext (US) ⁶⁸	23.8	-	60.0	11,837,793	17,784,586
NASDAQ OMX (US) ⁶⁹	20.0	30.0	76.0	3,239,492	28,951,349
NYSE Euronext (Europe) ⁷⁰	82.0	101.5	125.1	2,869,393	1,981,519
NASDAQ OMX-Nordic ⁷¹	40.3	77.9	97.3	817,223	733,388
London Stock Exchange ⁷²	42.6	168.8	-	2,796,444	3,391,103
Irish Stock Exchange ⁷³	20.0	29.0	-	61,291	35,077
Deutsche Börse ⁷⁴	77.9	94.6	-	1,292,355	2,186,433
Australian Securities Exchange	44.4	-	-	1,261,909	931,555
Bolsa Mexicana	25.0	33.0	-	352,045	84,255
AMEX ⁷⁵	27.3	-	-	-	-
Swiss Exchange ⁷⁶	15.1	50.4	-	1,064,687	759,369
Borsa Italiana	16.7	55.6	-	655,848	885,576
Hong Kong Securities Exchange	15.5	25.8	-	2,305,143	1,416,450

Sources: Data on fees comes from the exchanges' websites, phone conversations with market data representatives from these exchanges, and Bloomberg pricing schedule for market data products. The domestic market capitalization and dollar value traded come from the World Federation of Exchanges and from IROC available at http://www.iroc.ca/English/Documents/MarketplaceStatisticsReport_en.pdf. Retrieved on January 12, 2010.

⁶⁵ The exchange rates used to convert the data product fees into dollars were: USD/CAD 0.99, USD/EUR 1.39, USD/GBP 1.61, USD/CHF 1.01, USD/AUD 0.99, USD/HKD 0.13.

⁶⁶ The subscriptions fees for Level 2 and depth-of-book TMX products take into account that to subscribe to these products one must subscribe to Level 1 market data as well. The data on the table uses the \$38 CAD fee for Level 1 data for TSX-listed securities charged by the TMX Group. Updating the table with the \$30 CAD fee for Level 1 data that will be effective on April 1, 2012, the first three cells on the first row would be US \$29.6, US \$59.2, and US \$78.9.

⁶⁷ The annual value traded for Alpha on the table is for both TSX and TSXV securities.

⁶⁸ Level 1 data fee based on user tier of 250-749 users. NYSE *Openbook* is the depth-of-book product and it includes Level 1 data access at no extra cost.

⁶⁹ NASDAQ *TotalView* is the depth-of-book product. Access to Totalview includes access to Level 2 data at no extra cost and Table 15 shows that subscription to NASDAQ's Totalview (NASDAQ-listed) at \$70 requires a subscription to Openview (NYSE and AMEX-listed) at \$6.

⁷⁰ *Cash market* data product. Level 2 data includes access to Level 1 data at no extra cost.

⁷¹ Level 2 data includes access to Level 1 data at no extra cost.

⁷² Fees for UK equity market service (member price).

⁷³ Level 2 data includes access to Level 1 data at no extra cost.

⁷⁴ *Spot market* data product. Pricing based on user ID, not physical user.

⁷⁵ Member rates used, includes AMEX "Last Sale" and "Bid/Asks" products.

⁷⁶ Based on user tiers of 1-500 (L1) and 1-50 (L2) users. Level 2 data includes access to Level 1 data at no extra cost.

The TMX announcement made on May 30, 2011 states that from April 1, 2012 index data will not be bundled with Level 1 data for TSX-listed securities; a \$1.50 CAD monthly fee will be charged instead for index data. The \$1.50 CAD monthly fee provides an estimate of the value of index data. The rankings in Table 16 do not change if we subtract \$1.50 CAD for index data from the monthly fees of TMX data for TSX-listed securities.

5.4 A MEASURE OF VALUE FOR MARKET DATA PRODUCTS

Table 8, presented earlier, shows market data fees for all marketplaces in Canada. Similarly, Table 16 presents market data fees for several international exchanges. Although it might be tempting to compare the prices across marketplaces, Level 1 data for the TMX Group is not directly comparable to Level 1 data for Omega, for example. The most notable reason is that the TMX Group holds a dominant position in the trades of securities listed on its exchanges, as shown in Section 2. Therefore, abstracting from price considerations, TMX market data is more valuable for investors interested in TSX-listed and TSXV-listed securities than market data from any other marketplace.

Similarly, we could say that the NYSE Level 1 data product is, in a sense, more valuable for the world investor than the Bolsa Mexicana Level 1 data product even though their fees are about the same (USD\$23.75 and USD\$25, respectively), given that the dollar value traded in the NYSE was about 200 times that of the Bolsa Mexicana in 2009. To better compare data products, we are proposing ways to measure the value of market data products.

For the first measure of value we use dollar value of trades for each of the trading venues and divide that by the subscription fees for data products. That is, in Table 17, the first element in the first row is the dollar value of trades handled by the TSX in the last year divided by 12 times the TSX Level 1 professional user monthly fee.

The results of our measure of value are shown in Table 17 and can be interpreted in the following way: \$1 spent in 2009 on TSX's top-of-book data provided information regarding trades with a total dollar value of over \$3 billion. A higher ratio signifies a more valuable data product.

Using this measure, the most valuable data products in Canada are the TMX data products for TSX-listed securities, followed by Alpha's products on TSX-listed securities. Next in the ranking for Canadian trading venues are Chi-X's data products which bundle information on trades in TSX and TSXV-listed securities in one feed. Pure and Omega follow in the ranking. On one hand, a dollar spent on Pure's Level 1 data product provides information on more trades than a dollar spent on Omega's Level 1 data product. On the other hand, buying Level 1 data for Omega currently allows free access to depth-of-book data. Consequently, while buying data from Pure may be a better bargain for those just interested in Level 1 data, depth-of-book data for Omega is more valuable than Level 2 data for Pure. Data products regarding TSXV-listed securities occupy the next two spots in the ranking. Data products produced by the TMX Group for TSXV-listed securities occupy the next position, while data products produced by Alpha regarding Alpha's handling of TSXV-listed securities are in the next-to-last position. The Canadian product that provides the least value is produced by the CNSX exchange.

Next, we compare Canadian market data products to those produced by international exchanges. Out of a list of 13 international exchanges, TMX Level 1 market data for TSX-listed securities is more valuable than Level 1 market data for six of the international exchanges analyzed, and less valuable than the data produced by the remaining six. NASDAQ OMX (US) provides the most value. A dollar spent on NASDAQ's Level 1 data product will provide information regarding \$120 billion in trades. Similarly, a dollar spent on NYSE's Level 1 data

will provide information regarding \$62 billion in trades. A dollar spent on TMX's Level 1 data for TSX-listed securities provides information regarding \$3 billion in trades. The Irish Stock Exchange's Level 1 data provides the least value among international exchanges. A dollar spent on the Irish Stock Exchange's Level 1 data product provides information regarding \$146 million in trades. Using this measure, the value of the Irish Stock Exchange's data products are close to that of Omega in Canada.

Table 17 also provides information for the value of Level 2 and depth-of-book data products. Three of the international exchanges produce more valuable Level 2 data, two produce data that is of more or less equal value than the TMX on TSX-listed securities, and five produce market data with less value than the TMX on TSX-listed securities. Regarding depth-of-book data products, three international exchanges produce market data that is more valuable than the TMX on TSX-listed securities and one exchange produces market data that is lower in value to that of the TMX on TSX-listed securities. For the most part, these rankings hold using the current TMX price for Level 1 data as well as the price announced for April 1, 2012. With the upcoming price change, TMX depth-of-book data for TSX-listed securities will be more valuable than similar data produced by two out of four major international exchanges. In general, the TMX's market data products regarding TSX-listed securities are close in value to the data products produced by the Swiss Exchange, Borsa Italiana, and Deutsche Börse .

As Alpha's market data on TSX-listed securities is similar in value to that of the TMX's on TSX-listed securities, the comparison of Alpha with international exchanges is close to what was described above. Out of the remaining Canadian data products, TMX products on TSXV-listed, Alpha's products on TSXV-listed, Omega, Pure, and CNSX's data products provide low

value to the investor according to our measure, and the value of the their data products is close to or below that of Bolsa Mexicana and the Irish Stock Exchange.

Table 17

Comparison of value of the data products based on dollar value traded. This measure of value is calculated as the ratio of dollar value traded to professional user fees of each of the marketplaces for a 12-month period.⁷⁷

	Level 1	Level 2	Depth-of-Book
TMX Group: TSX-listed ⁷⁸	3,006,151,625	1,679,908,261	1,298,110,929
TMX Group: TSXV-listed	106,082,076	64,684,193	52,001,018
Alpha: TSX-listed ⁷⁹	2,136,521,215	1,144,564,937	667,662,880
Alpha: TSXV-listed	40,971,953	21,192,389	12,542,434
Pure: TSX and TSXV-listed	233,649,463	155,766,309	
Omega: TSX and TSXV-listed	176,572,362		176,572,362
Chi-X Canada: TSX and TSXV-listed	1,010,531,898	505,265,949	
CNSX: CNSX-listed securities		1,185,008	
NYSE Euronext (US)	62,402,056,842		24,700,814,167
NASDAQ OMX (US)	120,630,618,750	80,420,412,500	31,744,899,671
NYSE Euronext (Europe)	2,012,722,554	1,626,720,969	1,319,451,452
NASDAQ OMX-Nordic	1,515,560,506	784,843,834	627,875,067
London Stock Exchange	6,633,828,070	1,674,251,846	
Irish Stock Exchange	146,152,917	100,795,115	
Deutsche Börse	2,339,837,426	1,926,924,939	
Australian Securities Exchange	1,749,253,090		
Bolsa Mexicana	280,848,667	212,764,141	
Swiss Exchange	4,185,690,688	1,255,707,206	
Borsa Italiana	4,422,647,098	1,326,794,129	
Hong Kong Securities Exchange	7,613,866,951	4,568,320,170	

Sources: Value traded in Canada is from IIROC, available at http://www.iroc.ca/English/Documents/MarketplaceStatisticsReport_en.pdf. Retrieved December 16, 2010. For Alpha, we needed value trade on TSX and TSXV-listed securities separately. We used Alpha's monthly newsletters available at <http://www.alphatradingsystems.ca/NEWSEVENTS/Newsletter/tabid/70/Default.aspx>. Retrieved January 20, 2010. Market data fees are from the trading venues website as explained in Table 8. Data on fees for the international exchanges comes from the exchanges' websites or phone conversations with market data representatives from these exchanges. Dollar value traded for international exchanges comes from the World Federation of Exchanges.

⁷⁷ The dollar value traded for Canadian trading venues is for the last 12 months of available data: December 2009-November 2010 for all but Alpha; for Alpha our data is from November 2009-October 2010. Since the competition for order flow is quickly changing the landscape in the trading of Canadian securities, we used the latest data possible. However, data on dollar value traded for the international exchanges is for calendar year 2009. The market data product fees used in the denominator of the measure of value are the current fees for 2010 for all trading venues except for Chi-X Canada for which we use the fees that will become effective on February 1, 2011.

⁷⁸ The data on the table uses the \$38 CAD fee for Level 1 data for TSX-listed securities charged by the TMX Group. Updating the table with the \$30 CAD fee for Level 1 data that will be effective on April 1, 2012, the first row would be 3,807,792,058; 1,903,896,029; and 1,427,922,022.

⁷⁹ The data on trades handled by Alpha disaggregates for 1) trade on the TSX, 2) trade on the TSXV, and 3) debentures and notes. In the calculation on Table 16 the value of trade in debentures and notes has been omitted, biasing the measures of value of Alpha's market data products slightly downward. If we were to group the value traded in debentures and notes with the value traded in the TSXV our measures of value of market data products would increase by less than 12%. Hence, the rankings of value of market data products would not be affected.

For completeness, we also present an alternative measure of value of market data products based on volume of shares traded, instead of dollar value traded. As before, this measure of value is computed by dividing volume of shares traded in the last year by the US\$ professional-user subscription fees paid over that time period.

Within Canada, the rankings are very sensitive to the changes in the definition of our measure of value. As presented in Table 18, the TMX products for TSXV-listed rank as most valuable when using a measure of value based on volume of shares traded. This is a consequence of the TSXV having a relatively high volume of trades while these trades are relatively low in value. Also using the measure of value based on volume of trades, CNSX's data product comes in last in the rankings.

In the international comparison, the TMX data products for TSX-listed securities remain in the middle of the pack when using the measure based on volume of shares traded. The value of products from NYSE and NASDAQ are about 10-times the value of the TMX products for TSX-listed securities when looking at the calculations based on volume of shares traded.

The rankings in the international comparison are not affected if we consider the \$30 CAD fee for Level 1 data for TSX-listed securities that has been announced by the TMX Group. Within Canada, the price change would make TMX data for TSX-listed securities more valuable than TMX data for TSXV-listed securities using a measure based on volume of trades to market data fees.

One important shortcoming to our method of evaluating market data products is that each of these measures of value hinges on a key assumption. The measure based on dollar value traded relies on the assumption that all trades of the same dollar value are equally as valuable in terms of price discovery –that is, each dollar value traded is equally as valuable in uncovering

the intrinsic value of a security. To the extent that this assumption does not hold –block-trades, pre-market trades, or post-market trades may have differing impact on price discovery- our rankings could be biased. If some of these types of trading are more common in some of the trading venues as opposed to others, then our rankings of value would have to be corrected for these issues. The second measure of value, the one using volume of shares traded, relies on assuming that trades of the same volume of shares are equally as valuable for price discovery.⁸⁰ Even though our measures of value rely on important assumptions, we believe they are a good first attempt to quantify how much value market data consumers derive from purchasing data products on these trading venues.

⁸⁰ Following the logic of Section 2 it may seem like there is a third potential measure of value for market data products: one based on number of trades. Nevertheless, the assumption for this measure of value would be that each trade would be considered equally as valuable for price discovery. This assumption would imply that a trade of 100 shares would be as valuable as a 100,000 share trade. This is of course an impractical assumption. Hence, we are not considering this a valid measure of value.

Table 18

Comparison of value of the data products based on volume of shares traded. This measure of value is calculated as the ratio of volume of shares traded to US\$ professional user fees of each of the marketplaces for a 12-month period.⁸¹

	Level 1	Level 2	Depth-of-Book
TMX Group: TSX-listed ⁸²	210,953,673	117,885,876	91,093,632
TMX Group: TSXV-listed	217,770,020	132,786,598	132,786,598
Alpha: TSX-listed ⁸³	187,388,186	100,386,528	58,558,808
Alpha: TSXV-listed	71,389,234	36,925,466	21,853,847
Pure: TSX and TSXV-listed	41,539,472	29,671,051	
Omega: TSX and TSXV-listed	26,837,093		26,837,093
Chi-X: TSX and TSXV-listed	54,757,064	27,378,532	
CNSX: CNSX-listed securities		4,861,203	
NYSE Euronext (US)	2,589,639,649		1,025,065,694
NASDAQ OMX (US)	2,186,895,833	1,457,930,556	575,498,904
NYSE Euronext (Europe)	119,133,928	96,286,326	78,098,909
NASDAQ OMX-Nordic	208,370,511	107,906,158	86,324,926
London Stock Exchange	1,619,505,931	408,732,449	
Irish Stock Exchange	36,750,417	25,345,115	
Deutsche Börse	127,780,673	105,231,143	
Australian Securities Exchange	1,030,206,537		
Bolsa Mexicana	163,296,333	123,709,343	
Swiss Exchange	122,661,699	36,798,510	
Borsa Italiana	1,158,593,883	347,578,165	
Hong Kong Securities Exchange	20,971,066,479	12,582,639,887	

Sources: Volume of shares traded in Canada is from IIROC, available at http://www.iiroc.ca/English/Documents/MarketplaceStatisticsReport_en.pdf. Retrieved December 16, 2010. For Alpha, we needed volume traded on TSX and TSXV-listed securities separately. We used Alpha's monthly newsletters available at <http://www.alphatradingsystems.ca/NEWSEVENTS/Newsletter/tabid/70/Default.aspx>. Retrieved January 20, 2010. Market data fees are from the trading venues website as explained in Table 8. Data on fees for the international exchanges comes from the exchanges' websites or phone conversations with market data representatives from these exchanges. Volume of shares traded on international exchanges comes from the World Federation of Exchanges.

⁸¹ The dollar value traded for Canadian trading venues is for the last 12 months of available data: December 2009-November 2010. Since the competition for order flow is quickly changing the landscape in the trading of Canadian securities, we used the latest data possible. However, data on dollar value traded for the international exchanges is for calendar year 2009. The market data product fees used in the denominator of the measure of value are the current fees for 2010 for all trading venues except for Chi-X Canada for which we use the fees that will become effective on February 1, 2011 as it currently does not charge for market data.

⁸² The data on the table uses the \$38 CAD fee for Level 1 data for TSX-listed securities charged by the TMX Group. Updating the table with the \$30 CAD fee for Level 1 data that will be effective on April 1, 2012, the first row would be 267,207,986; 133,603,993; and 100,202,995 shares traded to US\$.

⁸³ The data on trades handled by Alpha disaggregates for 1) trade on the TSX, 2) trade on the TSXV, and 3) debentures and notes. In the calculation on Table 17 the volume of trade in debentures and notes has been omitted, biasing the measures of value of Alpha's market data products slightly downward. If we were to group the volume traded in debentures and notes with the volume traded in the TSXV our measures of value of market data products would increase by 7%. Hence, the rankings of value of market data products would not be affected.

6. IMPLICATIONS OF OUR RESULTS AND POSSIBLE RESOLUTIONS

This paper has shown that financial market participants appear to pay Canadian trading venues excessive fees for securities market data. After summarizing the reasons for the high fees, this Section discusses the implications of excessive fees. The individual investor may be making poorer decisions because high market data costs lead to a lower demand for market data. In addition, high market data costs are passed on to some degree to the investors. In summary, high data costs translate into excessive execution costs, discourage trading, weaken the price discovery process, and decrease the competitiveness of Canadian marketplaces. For these reasons, regulation of market data fees would be beneficial to those investing in Canadian-listed securities. This Section of the report also discusses some possible regulatory solutions to the problem of high market data costs.

There are two important reasons for the high market data fees. The first reason is that the TMX holds a dominant position over data products covering securities listed on the TSX,⁸⁴ and it has used its monopoly power to increase its prices and collect revenue from market data products. The second reason is an unintended consequence of the best execution and best price requirements which mandate that dealers must purchase a minimum of market data products. Many members from the IIAC are of the opinion that the best price and best execution obligations give dealers no option but to purchase full depth-of-book products from all marketplaces. The behavioral implications of the Canadian securities regulation include an inefficient proliferation of trading venues. New ATs may be emerging or may stay in business solely because they are able to generate market data revenue despite negligible trading volume.

⁸⁴ It may be that this also holds for the TSXV, but we have not done the necessary analysis to back such a statement. We have focused on the TSX because it is, by all measures, Canada's major stock exchange.

Furthermore, it is questionable whether some of the ATSS are in fact providing value to the market in terms of the quality of their quotes.

An important component of quote quality is price leadership or the provision of value in the process of price discovery which is measured by the timely dissemination of information on the intrinsic value a security, as was briefly touched upon in the previous section. Other aspects of quote quality include: 1) whether quotes submitted by different trading venues are based on common information –that is, whether quotes on the same stock submitted to different trading venues are linked to each other, 2) how often a trading venue’s quote is inside the NBBO, and 3) a trading venue’s market liquidity since there is evidence that at least for the American electronic communication networks (ECNs), which are very much like the Canadian ATSS, price discovery is positively related to trading volume.⁸⁵ Whether Canadian ATSS are posting valuable quotes is an interesting topic for future research. Our report limits itself to pointing out that the current regulatory structure in Canada is unintentionally providing incentives for new ATSS to emerge and existing ATSS to remain in business without regard to their contribution to trading efficiency or price discovery. The resulting market fragmentation leads to increasing costs of market data for financial market participants.

One solution to the inefficient proliferation of trading venues is to modify the regulatory structure to eliminate the subsidy to new ATSS. Following the strict wording on the IIROC’s guidance on UMIR 5.1, “neither UMIR nor the ATS Rules requires a [financial market] participant to maintain trading access to every Canadian marketplace on which a security may trade. However... the CSA expects that a participant will make arrangements with another dealer who is a participant of a particular marketplace or will directly route an order to a particular

⁸⁵ Huang, Roger (2002). “The Quality of ECN and NASDAQ Market Maker Quotes” *Journal of Finance*. 57 (3). June pp. 1285-1319.

marketplace, where appropriate.”⁸⁶ Nevertheless, according to anecdotal remarks from IIAC members, brokers must in fact have access to data from all marketplaces to be certain they are satisfying their regulatory obligations because brokers must be in possession of market data from a trading venue in order to know whether a marketplace has enough liquidity for a given order.

A better regulatory structure could exercise more caution in preventing the best execution obligation from becoming a large subsidy to marginal trading venues. An example of such a regulation could state that only a representative view of the market is necessary. Such reliance on a representative view of the market, as opposed to data on all marketplaces, need not sacrifice execution quality. The regulators may frequently exercise reviews of execution quality to update which set of competing marketplaces constitute a representative market. The analysis of execution quality would entail comparing the quality of execution arrangements to the quality that could be obtained from having access to all marketplaces. New marketplaces would be added to the representative group when their market data provides statistically significant improvements in execution.

A second alternative regulatory structure could keep the best execution and best obligation requirements intact while still curbing the inefficient proliferation of ATSS. Such a regulatory framework would ensure that the pricing of market data products would be closely related to the value of each of the products. The regulators could define a set of criteria such as market share or relative quality of quotes and split market data revenue accordingly.⁸⁷

Even if the proliferation of inefficient ATSS is resolved, the problem of the high level of fees would remain. High costs of securities market data have obvious distributional

⁸⁶ Investment Industry Regulatory Organization of Canada in the Universal Market Integrity Rule (UMIR) 5.1 Available at <http://www.iiroc.ca/English/ComplianceSurveillance/RuleBook/Pages/UMIR.aspx>. Retrieved October 1, 2010.

⁸⁷ See Section 6.2.1.2 for an example of how market data revenue is distributed across the exchanges in the US.

consequences. There is a transfer of wealth from investors to shareholders of exchanges and ATSS. At least some of the high fees that brokers have to pay are passed on to the investing public. According to Paul Joskow (2005), a renowned industrial organization economist, these distributional consequences have been the motivation for regulation for many markets (i.e. electricity, telephone, clean water). Moreover, there are additional behavioral implications of the high market data fees. The first behavioral implications coincide with what economists term as “efficiency losses” from market power. In the case of high market data fees, high fees make trading more expensive, therefore reducing both the total number of investors and the total number of trades each of these investors is willing to make. The gap between trading activity under perfect competition and trading activity in the current situation is an efficiency loss.

Furthermore, for those market participants that are not subject to the best price and best execution obligations and need not purchase data from all marketplaces, there is an additional efficiency loss stemming from them having access to less data because it is too costly.⁸⁸ Each decision may only be marginally affected. However, in aggregate, many investors are making poorer decisions because they do not have access to all the relevant data. Finally, high market data fees increase the cost of trading in Canada, decreasing the competitiveness of Canadian marketplaces, especially for foreign financial market participants who may decide to list their companies in other exchanges or reduce their trade in Canadian-listed securities.

The negative consequences of high securities market data fees can be addressed by regulation that establishes limits to the fees. The following parts of this section discuss the theory of monopoly regulation and international examples of regulation of market data fees.

⁸⁸ The high fees also imply a lower number of market data interrogation devices at large brokerage firms. Hence, even large brokerage firms are making investment decisions with less information than is socially efficient.

6.1 THEORY OF MONOPOLY REGULATION

Given that trading venues have complete control over their market data and face no external competition for it, they have monopoly power over the fees they charge for their exclusive data products. In addition, the TSX stands out as the clearly dominant vendor of market data products in Canada according to our survey on subscriptions, financial disclosures by the TMX, and countless anecdotal remarks. As such, much of the rationale of the economic theory of regulating natural monopolies is applicable to the context of regulating the fees charged for market data products. This subsection of the paper closely follows Paul Joskow's chapter on the "Regulation of Natural Monopolies." This is a valuable reference for a more comprehensive review of both the theoretical and empirical aspects of regulating monopolies.

6.1.1 DEFINITION OF NATURAL MONOPOLY

Joskow cites Carlton and Perloff's (2004) definition of a natural monopoly, as a setting where "total production costs would rise if two or more firms produced instead of one." In a firm producing a single product, the technological definition of natural monopoly implies that there are economies of scale in production, that is, average cost of production declines as output increases. In multiproduct firms, like trading venues that produce top-of-book data and depth-of-book data, production technologies of natural monopolies are characterized by economies of scope, which means that it is cheaper to produce two or more products within the same firm than in two or more firms.

Perhaps the most notable feature characterizing a monopoly is the presence of high barriers to entry. Typically, these barriers to entry can be easily identified as sizeable sunk costs or long-lived investments that cannot be easily recovered. An important barrier to entry in the

context of trading venues stems from the difficulty in competing for order flow in the presence of network externalities, as described in Section 2.

6.1.2 MONOPOLY REGULATION

After identifying that a market has the characteristics of a monopoly, the next step would be to explore the possibility of regulation. As summarized in Joskow's chapter, "cost-of-service" regulation has been the basic framework for monopoly regulation in the 20th century. More recent academic work has led to the explicit modeling of incentives and the application of "incentive regulation" to traditional "cost-of-service" regimes.

The traditional "cost-of-service" regulation involves two phases. The first phase determines the firm's total revenue requirement or "cost-of-service". The second phase consists of the rate design or tariff structure phase. In practice, "cost-of-service" regulation entails many important challenges. For example, it may prove difficult for the regulator to assess whether the regulated firm's costs are reasonable. Furthermore, a fixed fee covering the "cost-of-service" may distort the firm's managers' incentives to work hard at achieving efficiencies for the regulated firm as explained in Laffont and Tirole (1986). The manager's loss of incentive to exert effort in this example is known as the "moral hazard" problem.

Alternatively, as explained in Laffont and Tirole (1993) the regulator may set a fixed price for the regulated product and allow the firm's managers to be the residual claimants. With this type of regulatory contract, it would be in the firm's managers' best advantage to exert the optimal amount of effort. However, since the regulator must satisfy the regulated firm's viability constraint while having imperfect information on the firm's cost structure, this regulation mechanism is not free from informational problems although it does eliminate the "moral hazard" problem. The price cap must be high enough to cover the firm's costs or the firm will

cease to operate. Therefore, low cost firms will try to convince the regulator they are high-cost firms in order to receive a more favorable price-cap. This is known as the “adverse selection” problem.

Following Joskow (2007), the “cost-of-service” and the “price-cap” mechanisms can be thought as polar opposites. While the first eliminates the adverse selection problem incurring in the full costs of the moral hazard problem, the second eliminates the moral hazard problem incurring in the adverse selection problem. The optimal regulatory mechanism will lie in between these two extremes, providing the regulated firm with a price that is partially responsive to changes in realized costs and partially fixed ex ante. Furthermore, Laffont and Tirole (1993) add that the best results can be obtained by offering a menu of contracts with differing degrees of profit sharing. A menu of options may be designed such that firms with high cost opportunities would strategically choose a low-powered incentive scheme to ensure their viability constraint is satisfied, while firms with low cost opportunities would choose high-powered schemes and reap more of the benefits of their effort in achieving efficiencies.

6.2 REGULATION OF MARKET DATA IN PRACTICE. INTERNATIONAL EVIDENCE.

While the previous section documents the theory behind the regulation of monopolies and briefly discusses its application to market data providers, this section will focus on international examples of regulation. Regulators in the US have historically paid close attention to market data fees. Both European and US regulators are currently performing reviews related to market data pricing.

6.2.1 UNITED STATES

The US Congress paved down the foundation for the current market structure for market data with the Securities Acts Amendments of 1975. The legislation enabled the SEC to set up

central network processors from which investors would have access to information from all markets. Prior to the 1970s, various exchanges, also called self regulated organizations (SROs) acted independently to determine who would receive their market data and under what terms. In the early 1970s, the SEC took initial steps toward creating a central system which would allow investors to have access to information from all markets. The Consolidated Tape Association (CTA) was created in 1975 (implemented in 1978) to oversee the dissemination of real-time trade/quote information in NYSE and AMEX securities. A similar structure was also created for market data on NASDAQ securities. SROs contribute their last sale report and best price quotations, also known as top-of-book or “core data”⁸⁹, as stated in the regulation, which is then consolidated and distributed by the central processors.

Under Section 11A of the Securities Exchange Act of 1934 and Rule 608 (Regulation NMS), two or more exchanges may jointly develop, operate, and administer a national market system plan under supervision from the Securities and Exchange Commission (SEC). Several national market system plans govern the process by which market data on stocks are collected, consolidated, and disseminated in the US. These plans are:

1. “Network/Tape A” – for securities listed on the NYSE (governed by CTA);
2. “Network/Tape B” – for securities listed on the AMEX (governed by CTA);
3. “Network/Tape C” – for securities listed on the NASDAQ (governed by the NASDAQ Unlisted Trading Privileges Plan or NASDAQ UTP plan).

6.2.1.1 GOVERNANCE OF MARKET DATA NMS PLANS

The CTA and UTP plans have similar governance structures. The plans are primarily policy-making bodies. Decisions made or actions taken by the plans are binding on each of the plan participants. For most decisions, including policy changes and amendments to contracts, a

⁸⁹ As described in footnote 574 of SEC release No. 34-51808.

majority vote is required to ratify proposals. For items relating to the establishment of new fees or increases in fees, an affirmative vote of two-thirds (or more) of the participants eligible to vote is required.

Plan affairs are governed by a committee, composed of one representative from each of their respective participants (mainly exchanges that contribute their market data to each of the plans). An advisory committee, selected by majority vote by CTA/UTP participants, is also elected to include at least one representative from each of the following categories:

- A broker-dealer with a substantial retail investor customer base,
- A broker-dealer with a substantial institutional investor customer base,
- An alternative trading system,
- A data vendor, and
- An investor

6.2.1.2 FINANCIAL MATTERS

Market data revenues referring to top-of-book data are accumulated in a single pool for each of the networks. Each network's operating expenses are paid directly out of revenues. These operating expenses consist primarily of processing costs and do not include costs incurred by the individual SROs in reporting their information to the network processors. Network operating expenses include items such as telecommunication costs of supporting participant lines into the processor's facilities; telecommunication costs of supporting the external market data vendor network; data products account management and auditing functions; market operations costs to support symbol maintenance and other data integrity issues; and overhead costs including management support (such as HR, Finance, Legal and Administrative services). All revenues, expenses, allocations and payments are reported annually by an independent public accountant.

After paying for network expenses, the rest of the network revenue is distributed among the marketplaces depending on their contribution to liquidity. The formulas for calculating the allocation of network net income were recently modified by Regulation NMS which became effective in 2005. The new formula first allocates the network's distributable net income among the many individual securities based on the dollar value of trading in each security.⁹⁰ Then, the income for each security is allocated among the SROs based on how valuable the trades and quotes are in the security. The utility of an SRO's trades and quotes is measured in three main ways: 1) The SRO's proportion of trading in each security, 2) the SRO's proportion of quotes with prices equal the NBBO, and 3) the SRO's proportion of quotes that improve the price of the NBBO in each security. More detailed information on the current formulas can be found in Regulation NMS cited above and in the Proposed Rule Release for the same regulation.

6.2.1.3 SETTING OF MARKET DATA FEES

Individual SROs must file for SEC approval of market data fee changes, according to Section 19(b)(1) of the Securities Exchange Act of 1934 and rule 19b-4. The proposed changes are subject to public commentary. In turn, two or more SROs, through the structures of the CTA and the UTP, may establish fees for "core" market data. The changes in market data fees for market data consolidated and disseminated by the network processors must also be filed for SEC approval and are subject to a period of public commentary according to the Exchange Act Rule 11Aa3-2(c)(1) and Rule 608 (Regulation NMS).

Congress granted the SEC broad flexibility to determine whether the fees charged for market information are "fair and reasonable," "not unreasonably discriminatory," and that an

⁹⁰ Net income is distributed proportionally to the square root of the dollar value of trade in each security. The allocation to individual securities is not based directly on the dollar trading volume, because there is a highly disproportionate level of trading in the very top tier of network securities. Hence, an allocation solely based on trading volume would not adequately compensate for the price discovery in the majority of securities.

“equitable allocation” of reasonable fees amongst the persons using an SRO’s facilities takes place. The SEC, through the governance of the CTA and public commentary requirements has relied on negotiations between the SROs and interested parties to ensure fees are acceptable to all interested parties. In essence, vendors or subscribers who believe a proposed fee change constitutes an unjustifiable limitation of their access to market information may apply to the SEC, under section 11A(b)(5) of the Securities Act, to institute proceedings to review the fee.

While this set-up exists for “core data,” more in-depth market data is provided on a voluntary basis by the exchanges. Nevertheless, the process for fees approval, even in the case of depth-of-book data, includes a public notice and the possibility of a fee review by the SEC.

In its regulation of market data fees, the SEC has had some experience with cost-based approaches. Most notably, in 1984 the SEC disallowed a proposed NASD fee for unwarranted denial of access, primarily because the “NASD had failed to submit an adequate cost-based justification for the fee.”⁹¹ However, as stated in the concept release, the SEC also emphasized that it was the peculiar competitive context of the proceedings that led to its decision to require a strict cost-based justification. The situation at hand was one in which the NASD sold market data to Instinet, which in turn sold it to its own subscribers. The NASD charged Instinet a fee and charged Instinet’s subscribers an additional fee, while at the same time providing an enhanced version of the product to direct NASD’s subscribers. The SEC stated in a 1984 release that NASD’s fees to its vendors would impact the vendor’s ability to compete.

In the aforementioned Concept Release, the SEC outlined a possible conceptual approach to calculating a cost-based limit on market information revenues, made a request for comment on the issue, and set up an Advisory Committee on the matter. Nevertheless, the Advisory

⁹¹SEC. “Concept Release: Regulation of Market Information Fees and Revenues.” Release No. 34-42208; File No. S7-28-99. Available at <http://www.sec.gov/rules/concept/34-42208.htm>. Retrieved 10/29/2009.

Committee members disfavored the cost-of-service approach because it would “involve arbitrary judgments on appropriate costs”⁹² and it may distort economic incentives. In any case, according to a 2004 SEC release, the 1999 review of market data fees did result in a 75% reduction in the fees paid by retail investors for “core data.”

More recently, lobby groups have convinced the SEC to conduct a review of “non-core” data revenues. In 2006, NYSE Arca Inc, a subsidiary of NYSE Euronext, filed with the SEC a proposed rule change to begin charging fees for the use of its already available depth-of-book market data products. The SEC’s approval of the rule change sparked opposition. NetCoalition, the public policy voice of approximately 20 internet companies (including Google, Yahoo, CNET Networks, and Bloomberg L.P.), submitted a petition requesting that the SEC review and annul the rule change. The Securities Industry and Financial Markets Association (SIFMA) also challenged the SEC order by releasing a comment letter alongside a market data study performed by Securities Litigation and Consulting Group (SLCG) on the subject. The earlier SLCG study argues that NASDAQ and NYSE have monopoly power over their depth-of-book data products. Consequently, the paper concludes that regulators should curb the exchanges’ ability to charge high fees for their proprietary data. NetCoalition and SIFMA both petitioned for review of the approved order by the United States Court of Appeals in January 2009. In August 2010, the Court of Appeals reversed the approved order and remanded to the SEC concluding that the SEC had insufficient evidence that the depth-of-book data product in question was fairly priced.⁹³

⁹² SEC. Report of the Advisory Committee on Market Information: A Blueprint for Responsible Change. September 14, 2001. Available at <http://www.sec.gov/divisions/marketreg/marketinfo/finalreport.htm> . Retrieved October 29, 2010.

⁹³ US Court of Appeals, DC Circuit. Netcoalition v. Securities and Exchanges Commission NYSE NASDAQ LLC. Nos. 09-1042, 09-1045. Argued Feb. 16, 2010 – August 06, 2010. Available <http://caselaw.findlaw.com/us-dc-circuit/1534173.html>. Retrieved October 1, 2010.

6.2.3 EUROPE

The foundation for the market structure of market data in Europe is laid out in the Markets in Financial Instruments Directive (MiFID), which is the most important piece of legislation for the investment services industry across the 30 member states of the European Economic Area – that is, the 27 member states of the European Union plus Iceland, Norway, and Lichtenstein. As described by Marenzi (2006), MiFID is considered to be the European analogue to Regulation NMS in the US. Nevertheless, MiFID is widely regarded as relying more on market forces to determine many aspects of the structure of equity markets, whereas Regulation NMS describes the SEC’s remedial plans on how to regulate problematic aspects of the US equity markets.

An important change introduced by MiFID that directly affects the market for market data is the abolition of what was known as the “concentration rule.” Before the implementation of MiFID on November 1, 2007, equity trading was traditionally concentrated in each of the member state’s exchange. In fact, when trading was permitted outside of the exchange, it was necessary to report the trade to a regulated market (i.e. in most cases a national exchange). Consequently, trade data on a particular security was concentrated on one or a few places. In an effort to promote competition, MiFID gave investment firms the choice of where to publish their trade information, when trading as systemic internalisers⁹⁴ or trading over the counter. Consequently, there are more sources of European equity trade data than ever before. As an example, Markit Boat (also known as Project Boat) emerged as a competitor to the traditional exchanges in providing market data for off-market trades. As described by Davies (2008), Markit Boat was formed by a consortium of leading investment banks who later sold their ownership to

⁹⁴ A systemic internaliser matches buy and sell orders from their clients in-house, instead of sending orders to an exchange.

Markit (Project Boat's managing firm). Davies (2008) documents how in an attempt to preserve market share, the London Stock Exchange (LSE), which competes directly with Markit BOAT, announced average price reductions of more than 80% for firms that report their off-exchanges trades to the LSE.

MiFID requires that market data be available at a non-discriminatory basis at a reasonable cost. It, however, does not give more specific guidelines on how market data fees should be set. Nevertheless, the Committee of European Securities Regulators (CESR) is debating the issue of market data in the context of the European Commission's broad review of MiFID that is currently underway. On October 13, 2010, the CESR's standing committee on secondary markets issued its advice for the review of MiFID's guidelines on equity markets. The CESR statement documents that a majority of the financial market participants attending its hearings on the subject considered costs for market data currently to be too high. In the same vein, the CESR made two proposals to lower market data costs: First, the unbundling of pre-trade and post-trade data, which is currently provided solely in a bundled format by market data suppliers and second, the requirement for post-trade data to be available for free 15 minutes after the initial reporting of the trade. Furthermore, the CESR recommends the development of a mandatory consolidated tape which would provide quality data at a reasonable cost.

In summary, while current European legislation relies on market data forces for the pricing of market data, it is plausible that this may change in the near future given the generalized critique of market data fees being too high and the European regulator's desire to keep market data fees in check.

6.2.4 RELATED INTERNATIONAL REGULATORY EFFORTS

In 2008, the US Department of Justice and the European Commission closely cooperated in the analysis of the competitive effects of the proposed merger of Thomson and Reuters, two of the largest financial data vendors. Their research suggested that the merger would raise competition concerns in several areas of the new firm's data products. The antitrust units of these regulatory entities joined forces to establish a list of remedies for the proposed merger to move forward. The remedies involved the sale of four proprietary, non-real-time/archival databases: aftermarket broker research reports that are produced by broker companies and used to gain insight into a firm or sector prior to long-term investment decisions, earnings estimates performed by brokerage firms forecasting the performance of companies, company-specific fundamentals obtained from financial reports, and time-series economic data on macroeconomic variables. The analysis extended to databases disseminating real-time market data. However, both the US Department of Justice and the European Commission found that the merger did not raise any competition concerns in the market for real-time data, mainly because of Thomson's limited presence in this market.

In addition to selling copies of the four databases to existing providers of financial data, the merger approval was conditional on, among other things, allowing purchasers to recruit key personnel currently operating these databases at the merged entity and providing transitional technical support on these databases.⁹⁵

More recently, a November 10, 2009 press release confirmed that the European Commission opened formal antitrust proceedings against Thomson Reuters in the area of real-time market data. The issue at hand is whether customers or competitors are prevented from

⁹⁵ Baccaro, Vincenzo (2008). "The Thomson/Reuters merger investigation: a search for the relevant markets in the world of financial data." European Commission Competition Policy Newsletter. Available at http://ec.europa.eu/competition/publications/cpn/2008_2_61.pdf. Retrieved on January 23, 2011.

mapping Reuters Instrument Codes (RICs), alphanumeric codes that identify securities, to codes from alternative data suppliers. Such a set-up would have harmful effects on competition since Thomson Reuters' customers may be forced to remain customers for longer than they would like simply because of high costs of conversion from one set of security identifiers to another.

Similarly, on November 16, 2009 the European Commission sent a statement of objection to Standard & Poor's (S&P) for requiring financial institutions and data vendors to pay licensing fees for the use of its International Securities Identification Numbers (ISIN) when S&P stands as the only National Numbering Agency for US securities. The European Commission views the licensing fees as an abusive of monopoly power.

Although the firms subject to regulation in these last set of examples are not exchanges or trading venues, they also provide securities market data. Just like in the Canadian market for equity data products, there is a clearly dominant vendor which, without regulation, could use its monopoly power to charge excessive fees for its data products.

7. CONCLUSIONS

Part of the CSA's mission is to protect investors from unfair and improper practices. So far, Canadian regulators have relied on the marketplaces to freely set the fees they charge for securities market data. This study shows, however, that reliance on competitive forces is inappropriate in the Canadian setting. First, the TMX Group's dominant position in the trading of equity securities allows it to have monopoly pricing power over its market data products. Second, the emergence of new ATSS has increased the burden of market data costs for broker-dealers as they have had to purchase market data from additional marketplaces to satisfy their best execution and best price obligations. The TMX Group's dominant position in trading

coupled with the emergence of the ATSS has more than doubled the cost of purchasing market data for complying with best execution and best price obligations from 2003 until today. Even considering the price reductions recently announced by the TMX Group, professional subscribers will need to pay a minimum of \$174.85 a month per user for access to data on TSX-listed securities. In 2003, the total cost was \$75. Similarly, for TSXV-listed securities, the current price is \$122.35, whereas the 2003 price was \$49.

Prices of TMX Group data products increased across the board from 2003 to the first half 2011, excluding a \$2 reduction in the fees charged to the smallest consumers (1-9 interrogation devices) of TSX Level 1. On May 30, 2011, after months of negotiation with the IIAC, the TMX Group announced a two-step price reduction for one data product, the Level 1 product for TSX-listed securities. However, there have been no announced reductions for other market data products such as depth-of-book data for TSX-listed securities or market data for TSXV-listed securities. We interpret the recently announced price reduction as further evidence that the pricing of TMX market data products is unrelated to the costs of compiling and disseminating data, as the price reduction came after months of negotiation and without any indication of changes in the costs of producing and distributing market data. Although the negotiated price reduction is a step in the right direction as it sets the price of one data product back to its 2003 level, the price reduction does not span all of the TMX data products and it does not correct for the loss in market share that the TMX Group has experienced since 2003.

While market data products in Canada have become more expensive since 2003, market data products in the US have had a constant price since 1994 or since the introduction of the more recent depth-of-book products with only one exception, NYSE's OpenBook product. If the costs of disseminating market data follow a similar trend in the US and Canada, then the TMX

Group has increased its profit margin (the main measure of monopoly power) for market data products relatively more than US exchanges. In addition, all of the new visible marketplaces – Alpha, Chi-X, Omega, and Pure- have started charging fees for their market data products, regardless of their trading volume.

Further international comparisons reveal that the TMX Group is one of the international exchange companies that relies most heavily on market data revenue. In fact, the proportion of revenues earned from market data by the TMX Group, measured as a share of total revenue, exceeds the corresponding percentage at other major international stock exchange companies. The TSX-Level 1 data is more expensive than comparable data for eight out of thirteen major international exchanges, even after accounting for the TMX's current bundling of index data with Level 1 data as well as the recently announced price reduction.

We propose two measures of value of market data products based on the ratio of value or volume traded that the market data product reports to the product's per-user subscription fee. Focusing first on the rankings within Canada, we find that, although the rankings are sensitive to whether we use value traded or volume traded as the key determinant of value of a market data product, the most valuable data products are produced by the TMX and the least valuable data products are produced by Pure, Omega, and CNSX, the last of which comes last in the ranking. Nevertheless, the international comparison reveals that NASDAQ OMX's Level 1 data is 10 to 40 times more valuable than the TMX product Level 1 product for TSX-listed securities.

High market data fees result in lower demand for market data. Hence, Canadian investors are making poorer decisions, leading to a weakening of the price discovery process. Furthermore, high market data fees are, to some degree, passed on to investors, discouraging trading and decreasing the competitiveness of Canadian marketplaces.

A solution to the problem of excessively high fees would entail curbing the monopoly power of the largest market data producer, the TSX, and preventing the best execution and best price obligations from inadvertently subsidizing marginal ATs. Some forms of regulation that would achieve the second of these two goals are: 1) modifying the best execution and best price obligations such that only a representative view of the market is needed and 2) splitting market data revenue among trading venues according to the value each of the products provides consumers, which could be measured by criteria such as market share or relative quality of quotes.

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