IIROC OCRCVM

Investment Industry Regulatory Organization of Canada

Organisme canadien de réglementation du commerce des valeurs mobilières

Failed Trade Study

Analytics
Investment Industry Regulatory Organization of Canada

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Failed Trade Study

1. Introduction

IIROC initiated a study of failed trades to examine settlement failure of trades executed on Canadian equity marketplaces. Market Regulation Services Inc. (RS) originally published a study of failed trades in 2007. This study was based on a sample of failed trades provided to us by a group of dealers. Since that time, IIROC has dramatically improved our ability to conduct large-scale data analysis. We felt it time to refresh our review to ensure our understanding is current and that our regulatory and compliance framework remains effective.

Our goal was to provide high-level observations and update our understanding of this important topic. For this study, we used settlement data provided by CDS Clearing and Depository Services Inc. (CDS), and internal IIROC data. In this report we discuss:

- Prevalence of settlement failure
- How long transactions take to settle
- Relationship between settlement failure and short selling and short positions
- Dealer outliers
- Security outliers

A. Previous Failed Trade Study

As noted, in April 2007, RS published a statistical study based on a sample of failed trades from a selection of dealers (RS Study). The goal of the RS Study was to further our understanding of the prevalence of failed trades and explore the relationship between short sales and trade fails. For the purposes of the RS Study, a failed trade was defined to mean a trade which did not settle on settlement date. The study considered:

- Reason for fails (51% due to administrative delay or error)
- Retail vs. institutional (no difference in rate of fails)
- Type of equity (those listed on marketplaces that list junior securities experienced more fails)
- Fails related to short selling (less than 6% of fails were due to short sales)
- Timing of ultimate settlement (88% of failed trades settled within 5 days and 98% within 15 days of the expected settlement date)
- Frequency of buy-ins (used in only 4% of failed trades)

B. Background on the Canadian Settlement Process

CDS supports two main modes of settlement, continuous net settlement (CNS) and trade-for-trade settlement (TFT).

Continuous Net Settlement (CNS)

Canadian equity marketplaces send a daily report of all transactions directly to CDS. Most of these transactions will be designated to settle CNS. In CNS, through a process of novation[1] and netting, CDS stands between dealers as the central counterparty. This reduces the number of settlements and complexity of "who owes who".

Example of a typical transaction settled by CNS:

A retail client places an order through a dealer. The dealer executes the order on a marketplace. The execution appears as an "exchange trade" in CDS's record and is designated to settle via CNS. The trade is novated, netted with other trades in the same security with the same dealer, and ultimately settles between the dealer and CDS.

CNS Buy-in Activity

The CDS buy-in facility assists a dealer who is owed securities through the normal CNS system for trades that are past the settlement date. This is a multi-day process, and only a few of the positions will ultimately be bought-in on the marketplace. Most outstanding positions are rectified during the CDS buy-in process. Here is an overview of how the CDS buy-in process works:

1. The dealer that has failed-to-receive securities (the receiver) submits a buy-in request.
2. During a two-day window, the dealers who owe the securities to CDS are notified and have a chance to deliver the securities.
3. After the two-day period, the receiver must take action to request the buy-in. If they do not, the buy-in will expire.
4. Once the receiver has indicated that they will execute the buy-in, the deliverer or deliverers may ask for an extension, and the receiver may accept.
5. If the receiver does not accept the request for extension, or no extension request was made by the deliverer or deliverers, the buy-in will go to the marketplace and be executed if possible.

Trade-For-Trade Settlement (TFT)

Some IIROC dealers who are CDS participants can provide settlement instructions directly to CDS through back-office systems. Most of these transactions will be designated to settle TFT. In the TFT mode, settlement will occur directly between two CDS participants.

Example of a typical transaction settled through TFT:

An institutional client places an order through a dealer where an arrangement has been made that the payment of securities purchased or delivery of securities sold is to be made to or through the client's settlement agent. The dealer fills the order through one or more executions on one or more marketplaces over the course of the day. Two parallel settlement processes then occur:

- The executions appear as "exchange trades" in CDS's record. The trades are designated to settle via CNS. The trades are novated, netted, and ultimately settle against the dealer.

[1] Novation is the process by which a settlement transaction between two dealers is replaced by two transactions: one between each of the dealers and CDS.

- The dealer books the executions to the client's account. This initiates a "non-exchange" settlement instruction sent to CDS to settle with the client's settlement agent. The transaction is designated to settle TFT. The transaction ultimately settles between the dealer and the client.
- Settlement is complete when both the parallel settlement processes are successful[2].

2. Summary of Findings

Our findings for each of the study themes are summarized below:

Prevalence of Settlement Failure

- Observed more indications of settlement failure on securities listed on exchanges that list junior securities (both CNS and TFT)
- Relative to trading volumes, more CNS buy-ins are initiated in TSXV-listed and CSE-listed securities

Duration of Settlement Failure

- Observed that ~99% of all TFT transactions are settled within 10 days of the expected settlement date
- The remaining ~1% of TFT transactions fall under IIROC's EFTR regime
- Fewer TFT transactions on exchanges that list junior securities settle on value date, leaving a larger proportion of transactions settling with a longer duration

Reasons for Settlement Failure

- Dealers report that 33% of all CNS EFTRs are failing because of short selling
- Dealers report that 37% of all TFT EFTRs are failing because of short selling

Relationship between Short Selling and Settlement Failure

- Observed that increases in both overall trading and short selling are correlated with increases in CNS settlement failure for TSXV- and CSE-listed securities; this relationship is less true for TSX- and NEO-listed securities
- Observed no significant difference between exchanges that list junior securities and other exchanges in the relationship between short positions and either CNS volume or TFT V+10 volume
- Observed a strong correlation between deleted TFT volume and short selling for TSX-listed securities only

Dealer Outliers

- Several dealers with similar business models were identified as having disproportionate fails relative to the amount of their trading; further work by IIROC is required to better understand the causes of the disproportional fails.

Security Outliers

[2] Typical institutional trading volume would appear in the CDS data twice: once in CNS settlement with the client's dealer and once in TFT settlement with the client's settlement agent.

- More than 300 securities were, on a statistical basis, identified as outliers, split among the listing markets
- TSX-listed outliers were concentrated in the Metals & Mining, Energy and Basic Materials sectors
- TSXV-listed outliers were concentrated in the Basic Materials, Metals & Mining and Healthcare sectors
- CSE-listed outliers were concentrated in the Healthcare sector
- NEO-listed outliers were concentrated in the Financial (ETF) and Healthcare sectors

3. Data and Study Categorizations

A. Study Data

CDS provided IIROC with five report types for the five-year period between April 1, 2015, and March 31, 2020. In addition, IIROC has internal data sources that are relevant for the study.

The study uses the following datasets based on data provided by CDS. See the introduction for additional context:

1) Outstanding CNS Positions
2) Summary of Buy-in Activity
3) Summary of TFT Transactions

The study also uses the following datasets based on internal IIROC data sources:

Short Sale data
Dealers are required to mark orders as a short sale if the client or inventory account does not own the securities, and the account cannot use the short marking exempt marker.[3] Dealers are required to use the short sale marker on each order sent to a marketplace when the order meets the definition of short sale. While this marker is not available publicly it is included in IIROC regulatory data, providing IIROC with full visibility into short selling activity on Canadian equity marketplaces.

Short Position data
Since November 2018, IIROC has received short position data from each of our IIROC dealers[4]. Each dealer provides the aggregated short position for each security based on the short positions in the accounts held by the dealer. The reports are prepared as of the 15th and last day of each month using settlement date positions[5].

There are two limitations with the IIROC short position reporting. First, short positions held outside of IIROC dealers are not reported[6]; and second, reporting to IIROC began only in November 2018[7].

[3] Short sale is defined in the Universal Market Integrity Rules
[4] Prior to this date, the Exchanges were the recipients of this data.
[5] See IIROC Notice 18-0062 - Short Position Calculation and Reporting
[6] This includes short positions held at prime brokers and custodians used by clients of IIROC dealers.
[7] IIROC has some historical short positions as provided by the Exchanges. However, because these records are not consistent in their formatting and time ranges, we have excluded this information from the present analysis.

IIROC EFTR data

IIROC introduced rule amendments in 2008 that required dealers to report extended failed trades (EFTR). This reporting regime allowed us to monitor trends in extended failed trades, including the steps which a Participant or Access Person may be taking to rectify the default. EFTR was built to accommodate two types of extended failed trades reporting[8].

1) Dealers are required to self-report extended failed trades related to cash and long margin accounts. These trades were intended to settle by the CNS mode of settlement. We refer to these as CNS EFTRs (implemented in June 2011).
2) On behalf of IIROC dealers, CDS provides IIROC with information regarding extended failed trades that were intended to settle by the TFT mode of settlement. This custom report is called the "extended failed trade file"[9]. Dealers can also subscribe to this file and receive records related to their own TFT settlement. We refer to these as TFT EFTRs (implemented in April 2013).

In addition to monitoring trends, IIROC uses these reports to flag potential issues with manipulative short selling and to help detect if a security is becoming hard to borrow and may need to be designated as "short-sale ineligible"[10].

For both the CNS and TFT ETFRs, IIROC dealers are required to provide a reason to explain why the trade failed to settle. The dealers can choose one of 18 reasons or chose "other" and provide a text explanation.

Although there are some limitations to the EFTR data, the insight it provides into why trades fail to settle for extended periods of time is valuable, and not available from any other data source.

B. Security Categories

We categorize securities according to their listing exchange:

- TSX-listed – securities listed on the Toronto Stock Exchange
- TSXV-listed – securities listed on the TSX Venture Exchange
- CSE-listed – securities listed on the Canadian Securities Exchange
- NEO-listed – securities listed on the NEO Exchange

We categorize a security's liquidity using the IIROC definition[11]:

- Highly-Liquid – IIROC publishes a list of highly-liquid securities on our website – if a security was present in this list on a date, then we characterize the security as highly liquid for that date

[8] UMIR defines an extended failed trade as one which has failed to settle 10 or more days past the original settlement date.

[9] See section 3.24 of CDS' "CDS Batch and Interactive Services – Technical Information" for more details about the file.

[10] A Short Sale Ineligible Security is defined in UMIR to mean a security or a class of securities that has been designated by a Market Regulator to be a security in respect of which an order that on execution would be a short sale may not be entered on a marketplace for a particular trading day or trading days.

[11] See UMIR 1.1 for the definition of highly-liquid security.

- Non-Highly Liquid – All other securities not in the list are characterized as non-highly liquid for that date

Price categories are assessed by calculating a daily volume-weighted average price (VWAP) and include:

- Over a Dollar – security VWAP is one dollar or more
- Under a Dollar – security VWAP is 10 cents or more, but less than one dollar
- Penny – security VWAP is less than 10 cents

4. Findings

A. Prevalence of Settlement Failure

Continuous Net Settlement

The outstanding volume of CNS positions are reported daily for each security. Outstanding volumes will roll forward indefinitely, so a particular day's CNS volume will also include all failures to settle from all previous days. When we look at the metrics for CNS, we see that TSXV- and CSE-listed securities have a higher percentage of trade volume that do not settle on value date[12]. TSX-listed securities have the least CNS settlement issues.

The correlation of CNS failure to all trading shows us how strong the relationship is between CNS failure and the amount of trading. Correlation is measured between -1 and 1. The high correlation we see for TSXV- and CSE-listed securities shows us that as trading increases, CNS settlement failure increases. The lower numbers for TSX- and NEO-listed securities shows us that as trading increases, CNS settlement failures may not always increase simultaneously. This suggests but does not prove that failure to settle TSXV- and CSE-listed securities is closely related to the volume of trading or a related underlying factor, whereas failure to settle for TSX- and NEO-listed securities are related to other factors.

CNS Buy-In Intentions

CDS participants submit buy-in intentions related to CNS settlement. There is no buy-in facility for TFT trades. We observe the same pattern here, that TSXV- and CSE-listed securities have more buy-in activity than TSX- or NEO-listed securities.

Trade-For-Trade Settlement

When we review TFT settlement we can measure how old a particular failure to settle is. IIROC has defined an extended failed trade to be one that is 10 or more days past value date. Less than 1% of all TFT settlement volume fails past this defined date; however, we see that TSXV-, CSE- and NEO-listed securities have a higher percentage of volume in this category than TSX-listed securities.

[12] Value date is the date agreed to by all parties that a transaction is scheduled to settle. Value date is set at the time the trade is executed.

TFT settlement is reported in individual records. A record can be settled in full, or it can be deleted and replaced with another record. In no instance can a record be partially settled. However, in practice, CDS participants may wish to:

- Settle part of the TFT volume
- Cancel part of the TFT volume (for example, because of buy-ins initiated by the trading dealer that reduce the amount which needs to be settled)
- Net purchases and sales for the same client to reduce settlement requirements

In all circumstances above, the dealer must delete the existing TFT record, and replace it with a new TFT record with the new amount. We have measured the difference between what was intended to settle on value date, and what eventually settled any day thereafter. We observe that a relatively high percentage of TFT volume is deleted prior to settlement. TSX-listed stocks show the smallest percentage of this deletion volume; however, the difference is not as big as for other metrics discussed in this section.

Table 1: Prevalence of Settlement Failure Statistics

METRIC	TSX-listed securities	TSXV-listed securities	CSE-listed securities	NEO-listed securities
CNS failure as a % of traded volume	3.30%	13.26%	18.62%	7.73%
Correlation of CNS failure to all trading	0.45	0.75	0.82	0.46
CNS Buy-in intentions as % of traded volume	1.67%	5.77%	8.64%	0.23%
% of TFT volume that becomes an extended failed trade	0.11%	0.50%	0.61%	0.62%
% of TFT volume that is deleted prior to settlement	3.42%	4.28%	5.41%	6.05%

B. Duration of Settlement Failure

Continuous Net Settlement

As a result of netting and the cumulative nature of outstanding CNS positions, the data does not allow us to measure the duration of specific fails.

CNS Buy-In Executions

From the chart below, we can see that the largest number of buy-ins are executed on value date plus 2 (this reflects the 2-day waiting period built into CNS buy-in facility), and that the number of buy-in executions drops off over time. In contrast, the % of buy-in intents that are executed rises over time

until V+22. Colloquially, the longer the buy-in activity drags on, the more likely the buy-in is to be executed.

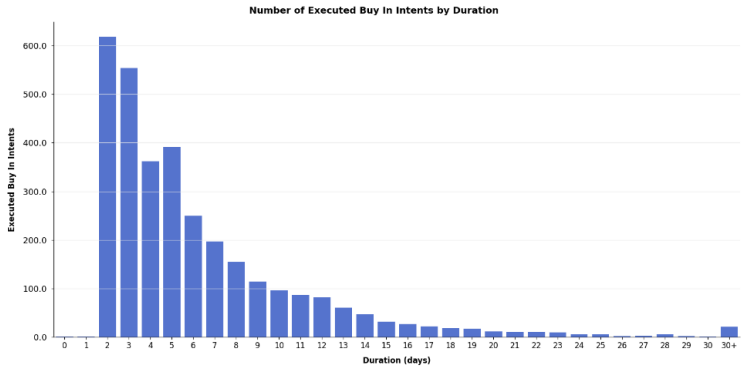

Figure 1: Number of Executed Buy-in Intents by Duration

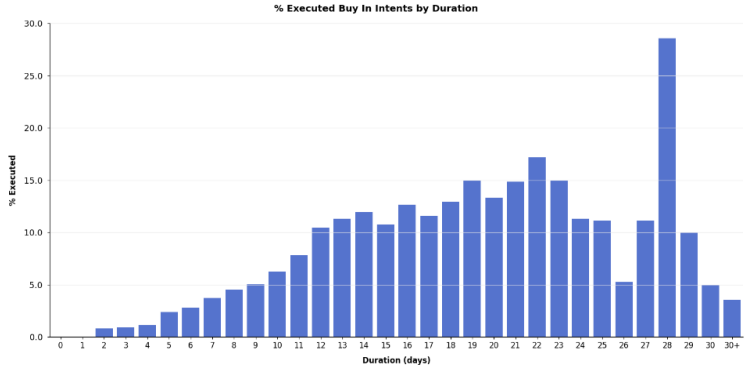

Figure 2: Percentage of Executed Buy-in Intents by Duration

Trade-For-Trade Settlement

By the end of day 0 (value date – not depicted in the chart below), the following percentage of all TFT volume settles:

- 92.19% (TSX-listed)
- 81.38% (TSXV-listed)
- 75.05% (CSE-listed)
- 75.28% (NEO-listed)

As we can see from the chart below, for all listed securities, the volume of TFT settlement drops off rapidly, with smaller and smaller volumes settling each day. As mentioned above, less than 1% of TFT settlement takes 10 days or longer.

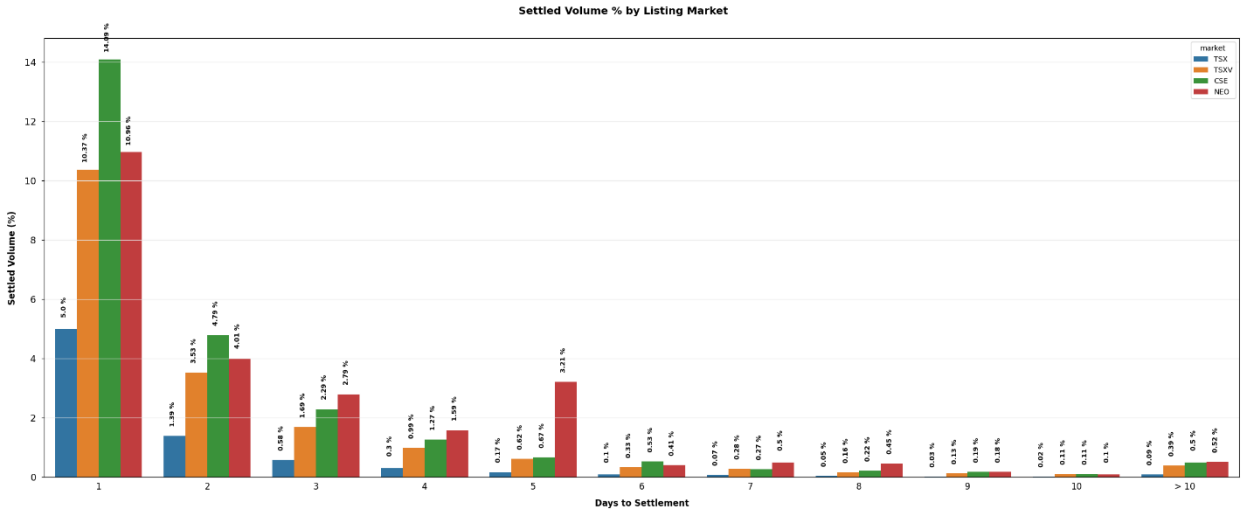

Figure 3: Days Until TFT Settlement by Listing Market

In the preceding section on prevalence of settlement failure, we showed the percentage of TFT volume that is deleted prior to settlement, split by listing market. In the table below, we show what percentage of TFT transactions are settled vs. deleted broken out by the age of the TFT transaction. We observe that as time passes, a larger proportion of TFT transactions are deleted. Extended failed trades are more likely to be deleted than settled (at 51% for the 11-30 days past value date).

Table 2: Number of Settled vs. Deleted TFT Transactions Relative to Value Date

Day	0-3	4-10	11-30	31-60	61-90	91+	Total
% Settled Txn	87.73%	60.67%	49.06%	30.50%	17.44%	17.36%	83.20%
% Deleted Txn	12.27%	39.33%	50.94%	69.50%	82.56%	82.64%	16.80%

C. Reasons for Settlement Failure

As part of the IIROC EFTR regime (described in the introduction to this report) IIROC dealers self-report extended failed trades for accounts that would normally settle CNS. On the TFT side, CDS reports extended failed trades directly to IIROC, and IIROC dealers augment this data with certain additional fields.

For both CNS and TFT, the IIROC Participant provides a reason for the fail from a selection of options.

Continuous Net Settlement

The following table shows the fail reasons provided to explain the failure of CNS EFTRs. The most commonly used fail reasons are “Counterparty short position” or “Short sale” (combined total of 33%) and “Other” (30%).

Table 3: Fail Reason for IIROC Extended Failed Trades (CNS)

IIROC EFTR Fail Reason (CNS)	% of Transactions
Other	30%
Counterparty short position	19%
Short sale	14%
Reorg, corporate action	12%
Security at the Transfer Agent	8%
Restricted security-removing legend (144A etc.)	4%
Pending account transfer	3%
Exercise/assignment of equity options	3%
Trade cancelled	1%
Certificate Deposit pending	1%
Position being moved between depositories/markets	1%
Employee stock options exercise	1%
Incorrect settlement instructions	1%
Counterparty no instructions	0%
New issue	0%
Security deposited to wrong account	0%
Insufficient funds (NSF)	0%
Certificate lost, being replaced	0%
Security frozen for settlement at depository	0%
Total	100%

Trade-For-Trade Settlement

The following table shows the fail reasons provided to explain the failure of TFT EFTRs. The most commonly used fail reasons are "Other" (39%) and "Counterparty short position" (37%)[13]. "Short sale" is used very rarely (0%).

Table 4: Fail Reason for IIROC Extended Failed Trades (TFT)

IIROC EFTR Fail Reason (TFT)	% of Transactions
Other	39%
Counterparty short position	37%
Trade cancelled	9%
Counterparty no instructions	7%
Pending account transfer	3%
Reorg, corporate action	1%

[13] The TFT data is provided to us from the point of view of the dealer who has failed to receive. From the dealer's perspective, the client's settlement agent (eg. prime broker or custodian) is the entity that is short and has failed to deliver to them.

Certificate Deposit pending	1%
Restricted security-removing legend (144A etc.)	1%
Incorrect settlement instructions	1%
Counterparty showing different details (price,Qty,etc.)	1%
Security at the Transfer Agent	0%
Position being moved between depositories/markets	0%
Short sale	0%
New issue	0%
Employee stock options exercise	0%
Insufficient funds (NSF)	0%
Exercise/assignment of equity options	0%
Security frozen for settlement at depository	0%
Security deposited to wrong account	0%
Total	**100.00%**

D. Relationship between Short Selling and Settlement Failure

Continuous Net Settlement

The correlation of CNS failure to short selling[14] shows us how strong the relationship is between CNS failure and the amount of short selling. Correlation is measured between -1 and 1. The higher correlation we see for TSXV- and CSE-listed securities shows us that as short selling increases, CNS settlement failure increases as well. The lower numbers for TSX- and NEO-listed securities shows us that as short selling increases, CNS settlement failures may not always increase simultaneously. This suggests but does not prove that failure to settle TSXV- and CSE-listed securities is more closely related to the volume of short selling or a related underlying factor (like the total amount of trading), whereas failure to settle TSX- and NEO-listed securities is related to other factors.

The percentage of securities with a strong positive correlation between CNS failure and short positions reported to IIROC is high (28% to 34%) for all listed securities. Recall that short positions are reported twice a month and represent the short interest in a security. Given this "point in time" reporting, this result suggests that, colloquially, "if CNS outstanding positions in a security are dragging on, then there are likely outstanding short positions" (though no statement of cause and effect can be made).

Trade-For-Trade Settlement

The correlation of V+10 TFT settled volume to short selling shows us the strength of the relationship between TFT failure and the amount of short selling. The correlations for all listing marketplaces are relatively low across the board (from -0.07 to 0.33).

The correlation of V+10 TFT deleted volume to short selling is relatively high for TSX-listed securities (0.60) and low (0.24 to 0.47) for all others. This result suggests that, colloquially, "for TSX-listed

[14] Over the study period, the percentage of total trade volume executed as a short sale was about 19% for TSX listed securities, 9% for TSXV listed securities, 12% for CSE listed securities and 7% for NEO listed securities.

securities in particular, there is some relationship between short selling activity and some combination of partial settlements, netting, or dealer-instigated buy-ins", (though no statement of cause and effect can be made).

Only a small percentage of securities (5% to 8%) have a strong positive correlation between V+10 TFT settled volume and short positions. The remainder show weak or negative correlations. This result is lower than for CNS (28% to 34%). It is worth mentioning that TFT transactions are often settling to a non-IIROC entity, and those same entities are not obligated to provide short positions to IIROC. The real relationship, if we had short position data for non-IIROC entities, could be different from our result here.

Table 5: Relationship Between Short Selling and Settlement Failure Statistics

METRIC	TSX-listed securities	TSXV-listed securities	CSE-listed securities	NEO-listed securities
Correlation of CNS failure to short selling	0.44	0.76	0.77	0.39
% of securities with a strong positive correlation between CNS failure and short position	28%	29%	34%	30%
Correlation of V+10 TFT settled volume to short selling	0.33	0.26	0.22	-0.07
Correlation of V+10 TFT deleted volume to short selling	0.60	0.31	0.47	0.24
% of securities with a strong positive correlation between V+10 TFT settled volume and short position	5%	6%	8%	8%

E. Dealer Outliers

We are interested in identifying dealers with more settlement issues relative to their peers to:

- Understand the breadth of settlement processes and challenges at the dealer level
- Address any systemic regulatory issues exhibited by IIROC dealers

We defined an outlier dealer as one that had a high amount of settlement issues relative to their own trading and compared to other dealers. We looked for outlier dealers along the following dimensions:

- Higher CNS settlement failure relative to trade volumes
- Higher V+10 TFT settled volume relative to TFT settled volume
- Higher V+10 TFT deleted volume relative to TFT settled volume
- Higher number of V+10 TFT transactions relative to TFT settled transactions

Several IIROC dealers were identified as outliers in their settlement of securities listed on three or more exchanges. The causes of the dealer's settlement issues have not been identified.

Carrying Brokers

A few of the outliers with large volumes of CNS settlement failure are carrying brokers. This is worth further review by IIROC to better understand if the introducing-carrying relationship adds some complexity to the CNS settlement process.

Brokers with Cross-Border Activities

The remaining few outliers with either relatively large amounts of TFT settlement failure or smaller amounts across all security listings are brokers with cross-border activities. This is also worth further review by IIROC to better understand if cross-border settlement adds complexity to the TFT settlement process.

F. Security Outliers

We are interested in identifying security outliers to:

- Identify if there are any patterns which can help guide regulatory initiatives
- Address any systemic regulatory issues related to individual securities

We identify security outliers where the following two conditions are both met; first, where there is more evidence of settlement issues relative to their peers; and second, where there is a significant amount of settlement. The first condition helps us to identify securities where there was a significant proportion of settlement issues. The second condition allows us to exclude securities that were very thinly traded.

We looked for outlier securities along the following dimensions:

- High CNS settlement failure relative to trade volumes
- High V+10 TFT settled volume relative to TFT settled volume
- High V+10 TFT deleted volume relative to TFT settled volume
- High number of V+10 TFT settled transactions relative to TFT settled transactions

To catch a wide variety of outliers, we searched using these metrics within each liquidity and price category. In total, more than 300 securities were identified as outliers by two or more metrics. Further work to determine impact of potential settlement issues will require IIROC to conduct case-by-case analysis outside the study. The number of outliers (identified by two or more metrics) are divided by listing market as follows:

Table 6: Number of Security Outliers by Listing Market

Listing Market	Number of Outlier Securities (2 or more metrics)
TSX	102
TSXV	114
CSE	68
NEO	35

TSX

TSX outliers are dominated by securities in the following sectors:

- Metals & Mining

- Energy
- Basic Materials

The TSX outliers were split with slightly more issues relating to TFT settlement, and slightly less for CNS settlement.

TSXV

TSXV outliers are dominated by securities in the following sectors:

- Basic Materials
- Metals & Mining
- Healthcare

The TSXV outliers in Basic Materials and Metals & Mining were split with more issues relating to TFT settlement and noticeably less for CNS settlement. This ratio is reversed for Healthcare, with slightly more issues relating to CNS settlement.

CSE

CSE outliers are dominated by securities in the following sector:

- Healthcare

The CSE outliers in Healthcare were split with more issues relating to TFT settlement and noticeably less for CNS settlement.

NEO

NEO outliers are dominated by securities in the following sectors:

- Financial Services (ETFs)
- Healthcare

The NEO outliers were split with less issues relating to TFT settlement and noticeably more for CNS settlement.

5. Conclusions

It is clear from the study that junior securities (as identified by their listing market) generally have more settlement issues than senior securities. This includes a higher percentage of failed trades, longer times before TFT failed trades are settled, and stronger correlations between measures of short selling and measures of CNS settlement issues.

The study shows that short selling is a factor in many extended failed trades reports. The most common reasons given by dealers for settlement failure (both CNS and TFT) were related to short selling. The second most common reason was “other”. The correlations between settlement issues and short selling were inconclusive with some strong and some weak. No work was conducted to establish any cause-and-effect relationships between them.

The study identified some dealers that exhibited increased settlement delays relative to their peers.

From the review of security outliers, the study showed that certain sectors had more outliers than others. Sectors with more outliers include Metals & Mining, Energy, Basic Materials, Healthcare and Financial services (ETFs). Anecdotally, we observed settlement issues follow some marijuana stocks as they graduated from one exchange to another.