Welcome
Scotiabank: Taking Market Risk and the Trading Floor digital with Tableau

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Job Title: Senior Manager
Company / Org Name: Scotia Bank
Agenda

Introduction

Goals of Tableau Integration

Implementation

  Tableau Server

  Training across teams and continents

Leveraging Tabcmd

What are we using Tableau for?
Introduction
Introduction

Oversight and Monitoring of Trading Floor
Proactive analysis and Market Risk Policy
Interacting with regulators
150+ employees
Across all regions

Trading Floor Risk Management (TFRM)

# Employees > 89,000
24 millions customers
CAD $915 billion in Assets
CAD 16.3 billion in Revenue (2017)
Headquarter - Toronto, Canada

Headquarter - Toronto, Canada

76.68 CAD +0.35 (0.46%) ↑
Aug. 16, 2:50 p.m. EDT · Disclaimer

1 day 5 days 1 month 1 year 5 years Max

51.00 CAD Jun 13, 2008
Financials Markets (FM) & Trading Floor

Impact of FM

- Ability to quickly answer any questions, otherwise lost of business
- Ability to quickly access to complete, granular data
- Ability to quickly do analysis or investigation

Role of TFRM

- One point of contact
- Jack of all trades: Self-sufficient + access to multiples data sets
Goals of Tableau Integration

TRFM’s Risk Management Value Chain

- **Access and reporting – automation candidates**
  - Standard Reports
    - What is the position?
  - Query/drill down
    - What is the position by book?
  - Alerts
    - Has a limit threshold been exceeded?
  - Adhoc Reports
    - What products make up position?
  - Statistical Analysis
    - Is this expected?
  - Forecasting / extrapolation
    - What if the trend continues?
  - Predictive modeling
    - What do we think will happen?
  - Optimization
    - How do we get the best outcome?

- **Analytics requiring interpretation**

- **Value**

- **Interpretation**

Adapted from “Creating a Data-Driven Organization”, Carl Anderson, O’Reilly Media, 2015
Implementation (How?)

- TFRM First project with Tableau
- Slalom PoC Presentation
- TFRM PoC Presentation
- TFRM gets his own Tableau Server
- Start of Phase 1
- Start of Phase 2
- RWH QA done in Tableau
- Start of Phase 3
- End of Tableau onboarding
- TFRM Moving to PROD

Tableau Server

Training through phases
Tableau Server - Usage

- PDF Reporting
  - Save space
  - Track actual usage
  - Find patterns in usage
  - Understand what tools and reports are useful

- Tableau Dynamic Reporting
  - Find patterns in usage
  - Understand what tools and reports are useful
Tableau Server – Server Data Sources

**Large extracts**
- Used for big data and slow back-end
- Multiples 150m+ rows X 300+ columns = 45b+ data points
  - Tableau is columnar-based storing: Limit the number of columns
- Incremental refreshed daily – trigger-based through `tabcmd`
  - Full refresh weekly/monthly - scheduled
  - Materialized calculations for performance

**Live query**
- Tableau joins: Data source filters to limit queries size
- Custom SQL or stored procedure
  - Embedded Parameters in SQL (single selection)
  - Limit the query to bare minimum
Tableau Server – Server Data Sources

Reporting Infrastructure
- 1 data source, 1 extract refresh, N reports
- Limit amount of queries on the back-end
- Aggregation in Tableau when possible

Analysis
- Allow to connect anytime, anywhere in <10sec
- Ad-hoc analysis becomes a report/tool
- Query caching

Leverage Tableau Server
Tableau Server – Server Data Sources

**Tableau Infrastructure**

- **Hard**
- **Time-Consuming**
- **Risky if user is not technical**

**Individual access to DB for business users**

- **Security - Hosting Data source with embedded DNC password**
- **Access**
- **Querying & Query caching**
- **Limited DB impact**
- **DATA for ALL**
Implementation - Training

Training in multiples sessions
Hands-on training
Documentation

Team by Team Integration

Tableau Support team (24h)

Collocation

Incentives
- Management support
- Clear objectives and deadlines
- Keep tension, weekly tips & tricks
Tabcmd

**Extract generation**
- Automatically generate PDF as soon as data is ready
- As soon as relevant data is loaded in the database
- Task prioritization
- Trigger based instead of schedule based
- Automatically generate PDF as soon as data is ready
- As soon as relevant data is loaded in the database
- Automated emails with PDF attached
- Archive PDFs for audit trail

**PDF Generation**
- Enable viz and query caching (refresh less often)
- Generate PDF of most used vizzes before peak hours to have cached version
- Change parameters through URL to cache users selection

**Faster viz. performance through query caching**
if [ $TAB_COMMAND = "refreshextracts" ]
then
  if [ ! -z "$TAB_DATASOURCE" ]
  then
    echo `date"$TABCMD refreshextracts $INCREMENTAL $SYNCHRONOUS --datasource "$TAB_DATASOURCE" $TEAM -project "$TAB_PROJECT" -s $TABSERVER --no-certcheck -u $TABUSER "$($TABCMD) refreshextracts $INCREMENTAL $SYNCHRONOUS --datasource "$TAB_DATASOURCE" $TEAM -project "$TAB_PROJECT" -s $TABSERVER --no-certcheck -u $TABUSER -p $TABPWD

    status=$?
    if [ $status == 0 ]
      then
        echo `date"$TAB_PROJECT/$TAB_DATASOURCE ran succesfully"
    else
        echo "ERROR while running $TAB_PROJECT/$TAB_DATASOURCE tabcmd"
        (echo "ERROR while running $TAB_PROJECT/$TAB_DATASOURCE tabcmd.");echo "Please check log $LOG") | unix2dos | mailx -s "ERROR while running $TAB_PROJECT/$TAB_DATASOURCE tabcmd for COB:${COB_DATE}" $EMAIL
  fi
) &
sleep 2
Tableau Used Cases – Data Quality

Tableau-RWH Data Layer Check
As of 8/2/2018, compared to 8/1/2018

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<th>Start Date</th>
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| Use Case | SHRR | SHRR Method | Rates | Rates Method | Credit | Usr | DAC | DAC Method | BIM | BIM Method | IE | IE Method | SED | SED Method | GED | GED Method | FX | FX Method | FM | FM Method | EM | EM Method | All/UB |
|----------|------|-------------|-------|--------------|--------|-----|-----|------------|-----|------------|----|------------|-----|------------|-----|------------|----|------------|----|------------|-----|------------|-----|------------|
| April    | 12   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| April_AK | 65   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| April_NY | 13   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| April_TOR | 33  | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| BII_Terms | 37  | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| CAMRA    | 75   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| COLVA     | 81   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| EU_RU_K2 | 83   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| EU_K2    | 51   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| EU_SL    | 77   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| EM_Manual | 30   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| IF_EMIS  | 45   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| IF_FIBRE  | 43   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| IF_FIBRE_M | 61   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| IF_K7    | 53   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| IF_SOFTER | 41   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| KZ_vary load | N   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| KZ_CT    | 34   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| KZ_CT_Mandel | 35 | ✔       | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| KZ_FL_LGH | 28   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| K2_FL_NV | 29   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| K2_FL_TOR | 31   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| MMI       | 11   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| MM_F_Jura | 63   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| MML_FL_TOR | 32  | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| MML_NV | 14   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| MUREX    | 15   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| MURED_FX | 72   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| MURED_FM | 67   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| RW       | 3    | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| SCOTS    | 4    | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| WSS_FX | 71    | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
| WSS_FIM | 79   | ✔           | ✔     | ✔            | ✔      | ✔   | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          | ✔  | ✔          | ✔  | ✔          | ✔   | ✔          | ✔   | ✔          |
# Tableau Used Cases – Data Loading Process (I)

## Risk Warehouse EoD and Tableau Extracts Summary - PROD

**Report Date:** August 2, 2018

Data Refreshed @8/3/2018 5:54:59 PM Please click “Refresh” icon for latest snapshot:

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<td>MML_FL_TOR</td>
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<tr>
<td></td>
<td></td>
<td>Risk_Calc_GFIRatesLondon+K2Fixings_Rolling</td>
<td>03/08/2018</td>
<td>Completed Friday</td>
<td>ANVIL</td>
<td></td>
<td></td>
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<td>MML_FL_TOR</td>
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</tr>
</tbody>
</table>
# Tableau Used Cases - Data Loading Process (II)

## How Have Extracts Performed on This Server?

<table>
<thead>
<tr>
<th>Extract</th>
<th>Task</th>
<th>Timeline</th>
<th>Backgrounder</th>
<th>Site</th>
<th>Runtime (sec)</th>
<th>Success</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>All</td>
<td>8/3/2018 12:00:00 AM to...</td>
<td>All</td>
<td>TFIR</td>
<td>All values</td>
<td>45</td>
<td>1</td>
</tr>
</tbody>
</table>

What Extracts Ran on this Server? (Includes all the extracts: Trigger based and Schedule based). Data Refreshed @8/3/2018 5:57:53 PM. Please click “Refresh” icon for latest snapshot.
Tableau Used Cases – Quality Assurance

QA done in Tableau

☑ Easy to share with users.
☑ Can join different environment (or Blend) to compare and find differences.
☑ Change environment on the server for large extract generation.
☑ Publish empty extract and regenerate them on the server.
Tableau Usage – Quality Assurance

Change environment easily on the server through aliases:
• Host an alias file on the server
• Enable the alias file through Advanced system settings
• Change the connection
• Regenerate the extract using the server

RWH_PROD =
    (DESCRIPTION =
      (LOAD_BALANCE = FALSE)
      (FAILOVER = TRUE)
      (ADDRESS = (PROTOCOL = TCP)(HOST = sgpxwa01-scan.bns)(PORT = 1535))
      (CONNECT_DATA =
        (SERVICE_NAME = RWH.bns)
    )
)

RWH_BCP =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = sgbxba01-scan.bns)(PORT = 1535))
      (CONNECT_DATA =
        (SERVER = DEDICATED)
        (SERVICE_NAME = RWH_sgbxba01.bns)
    )
)
# Tableau Usage - Reporting (I)

## US Prime Services - Funding Summary Page as of 3/5/2018

### Inflow Daily Balance

<table>
<thead>
<tr>
<th>Source</th>
<th>3/5/2018</th>
<th>Date</th>
<th>Inflow</th>
<th>Outflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding Inflow</td>
<td>3/5/2018</td>
<td>20.65B</td>
<td></td>
<td>20.65B</td>
</tr>
<tr>
<td>Funding Inflow</td>
<td>3/2/2018</td>
<td>29.35B</td>
<td></td>
<td>29.35B</td>
</tr>
<tr>
<td>Funding Inflow</td>
<td>DoD</td>
<td>▲ 0.165</td>
<td></td>
<td>▲ 0.165</td>
</tr>
</tbody>
</table>

### Historical WoW Balance

- Funding Inflow
- Funding Outflow

### Funding Inflow by Secured and Unsecured (in billions)

<table>
<thead>
<tr>
<th>Source</th>
<th>QN</th>
<th>1-34 days</th>
<th>35-89 days</th>
<th>90-179 days</th>
<th>180-299 days</th>
<th>300-365 days</th>
<th>365+ days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secured</td>
<td></td>
<td>11.57</td>
<td>0.01</td>
<td>0.10</td>
<td>0.01</td>
<td>12.29</td>
<td>0.01</td>
<td>22.40</td>
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<tr>
<td>Unsecured</td>
<td></td>
<td>15.53</td>
<td>0.51</td>
<td>0.10</td>
<td>0.42</td>
<td>16.39</td>
<td>0.42</td>
<td>29.24</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>26.10</td>
<td>0.51</td>
<td>0.10</td>
<td>0.42</td>
<td>28.68</td>
<td>0.43</td>
<td>51.64</td>
</tr>
</tbody>
</table>

### Funding Outflow by Secured and Unsecured (in billions)

<table>
<thead>
<tr>
<th>Source</th>
<th>QN</th>
<th>1-34 days</th>
<th>35-89 days</th>
<th>90-179 days</th>
<th>180-299 days</th>
<th>300-365 days</th>
<th>365+ days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secured</td>
<td></td>
<td>28.00</td>
<td>4.55</td>
<td>0.01</td>
<td>33.66</td>
<td>0.01</td>
<td>34.03</td>
<td>0.01</td>
</tr>
<tr>
<td>Unsecured</td>
<td></td>
<td>15.53</td>
<td>0.51</td>
<td>0.10</td>
<td>16.39</td>
<td>0.42</td>
<td>34.56</td>
<td>0.42</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>44.29</td>
<td>5.06</td>
<td>0.10</td>
<td>50.38</td>
<td>0.43</td>
<td>59.67</td>
<td>0.43</td>
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</tbody>
</table>

### Funding Inflow by Source and Maturity

#### Funding Source

- Cash PB Long Cash: 7.93
- Cash PB Funding (Non Purpose): 2.19
- SBL Funding (Non Purpose): 0.40
- SBL Borrowing (Purpose): 15.30
- SBL Funding (Purpose): 15.30
- TRS Short Proceeds: 0.21
- TRS Cash Collateral Received: 0.99
- Funding from Treasury: 1.34
- Repo Funding (CMT): 2.26
- Grand Total: 25.10

### Funding Outflow by Source and Maturity

#### Funding Usage

- Cash PB Short Cash: 12.16
- SBL Borrowing (Non Purpose): 0.35
- SBL Borrowing (Purpose): 18.15
- Long TRS Hedge: 0.01
- TRS Cash Collateral: 0.51
- Funding to Treasury: 2.00
- Grand Total: 29.49

### Funding Inflow by Source

- Cash PB Long Cash: 7.63
- Cash PB Funding (Non Purpose): 2.79
- SBL Funding (Non Purpose): 1.76
- SBL Borrowing (Non Purpose): 0.58
- SBL Borrowing (Purpose): 2.56
- TRS Short Proceeds: 0.40
- TRS Cash Collateral Received: 0.22

### Funding Outflow by Source

- Cash PB Short Cash: 12.16
- SBL Borrowing (Non Purpose): 0.17
- SBL Borrowing (Purpose): 18.35
- Long TRS Hedge: 0.01
- TRS Cash Collateral: 0.40
- Funding to Treasury: 20.65

### Funding Inflow by Maturity

- 1-34 days: 20.24
- 35-89 days: 4.01
- 90-179 days: 18.19
- 180-299 days: 16.19
- 300-365 days: 16.19
- 365+ days: 16.19

### Funding Outflow by Maturity

- 1-34 days: 20.10
- 35-89 days: 4.01
- 90-179 days: 18.19
- 180-299 days: 16.19
- 300-365 days: 16.19
- 365+ days: 16.19

---

All Balances are represented in Billions

Page 1
### GFI Rates Major Risk Summary

As of 8/3/2018, compared to 8/2/2018

#### Swap Spread DVD1 (in USD)

<table>
<thead>
<tr>
<th>Category</th>
<th>CAD</th>
<th>USD</th>
<th>EUR</th>
<th>GBP</th>
<th>Other</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5M</td>
<td>10K</td>
<td>10K</td>
<td></td>
<td></td>
<td>-10K</td>
<td>-15K</td>
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<tr>
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<tr>
<td>Parallel</td>
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<td>-15K</td>
</tr>
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</table>

#### Swap Spread DVD1 (in USD) - Daily Change

<table>
<thead>
<tr>
<th>Category</th>
<th>CAD</th>
<th>USD</th>
<th>EUR</th>
<th>GBP</th>
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<td>-15K</td>
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<tr>
<td>3M-2Y</td>
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<td>3-7Y</td>
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<tr>
<td>7-12Y</td>
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</tr>
</tbody>
</table>

#### Swap Spread DVD1 Chart (in USD)

#### Swap Spread DVD1 Chart (in USD) - Daily Change

<table>
<thead>
<tr>
<th>Category</th>
<th>CAD</th>
<th>USD</th>
<th>EUR</th>
<th>GBP</th>
<th>Other</th>
<th>Grand Total</th>
</tr>
</thead>
</table>

Legend:
- CAD
- USD
- EUR
- GBP
- Other
Tableau Usage – Analytic tool
Dashboard example
Tableau Usage – Investigative tool
Dashboard example
Please complete the session survey from the Session Details screen in your TC18 app.
Thank you!

Antoine.DesAulniersFavreau@Scotiabank.com
+1(514) 998-8004