

DATA DIRECT 5.0 USER GUIDE

June 23, 2019

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Data Direct is an interactive Microsoft Excel plug-in which retrieves information from various Northern Trust databases providing a streamlined approach to collect, integrate, analyse and report data in a way that works for you.

With Data Direct you can:

- Create custom reports dynamically populating data into your spreadsheet with the click of a button
- Integrate content from multiple sources in one report
- Utilize drag and drop functionality to easily select data elements
- Use preformatted, standard templates from the template library
- Collaborate with other Data Direct users in your organization

Installation Instructions

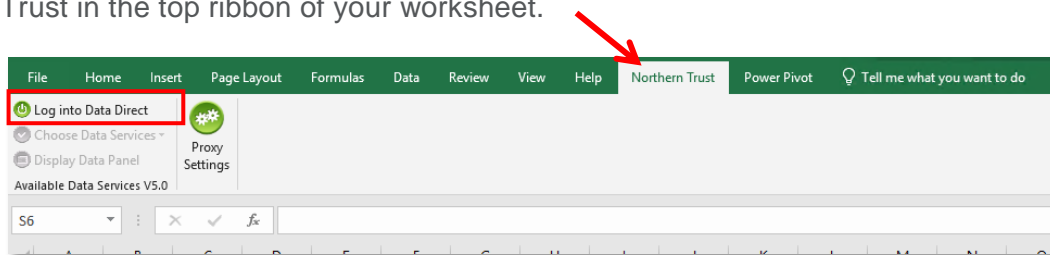
Existing Users: If you are a current user of Data Direct, you will need to uninstall your current version before installing a new version.

New Users: Once you have your ID access approved for use in Data Direct, you are ready to install.

Please refer the [Installation Guide](#) for step-by-step instructions and system requirements

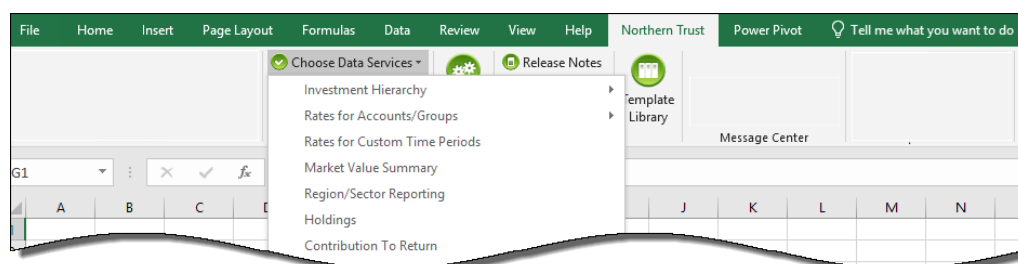
Getting Started

Once Data Direct has been installed, launch Excel. You will see the add-in for “Northern Trust” in the top ribbon of your worksheet.



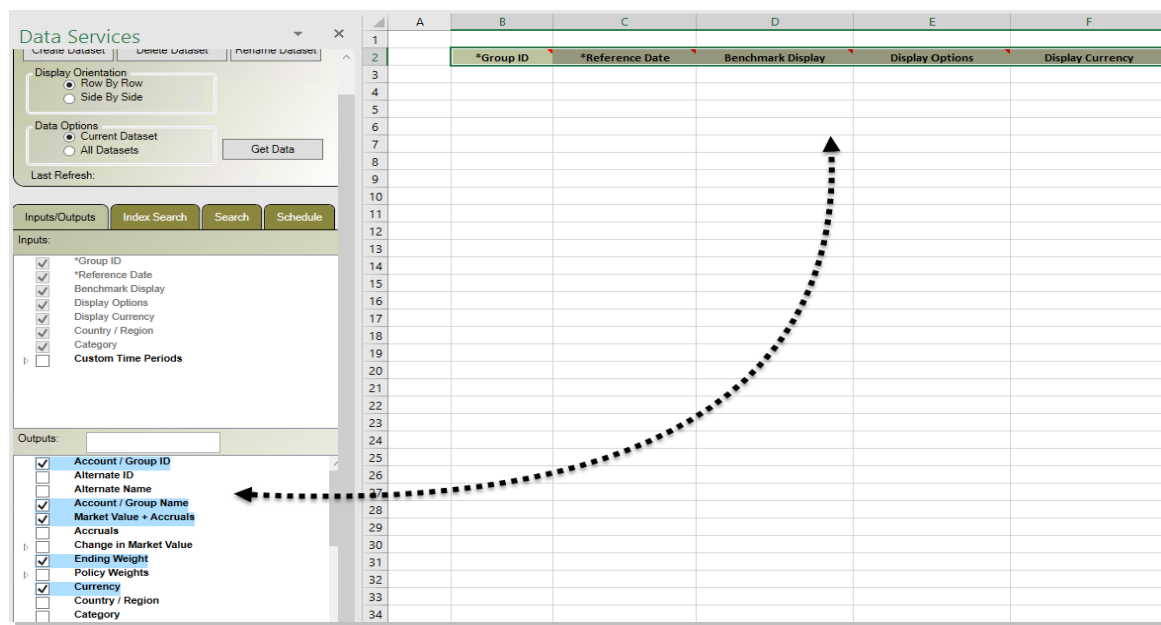
1. Click on the Northern Trust tab and click on **Log into Data Direct**.
2. Enter your User ID and password.
3. Choose your desired data service from the **Choose Data Services** drop down menu.

Each data service has a specific function and specific outputs. Please see the following pages for details and functionality for each data service.



4. Select desired inputs (filters) and outputs and drag them to your worksheet to build your template.

Please Note: inputs identified by an asterisk (*) are not required but recommended for all data calls.



5. Click **Get Data**.

The data extraction process will begin and once completed, the cells below your output headers will be populated.

For a detailed explanation of each input and output please see the Appendix at the end of this document.

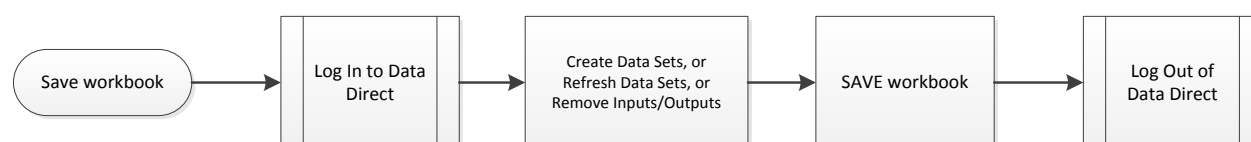
TIP: You can click and drag each input individually or select all the input options you desire and drag to your spreadsheet as an entire “block”. You can always go back to the data services window and add more inputs over time. The order in which you select the inputs is the order they will be displayed.

Caution: Inputs and outputs can only be used once per worksheet and once dropped, cannot be dragged to another cell into a worksheet. To place an input or output within another section of your worksheet or change the display order:

1. You must first be logged in to Data Direct
2. Delete the input/output (using the delete key)
3. Reselect from the Data Services window.

You can also delete the entire data service by selecting the “Delete Dataset” button in the Data Services window.

TIP: If you plan to re-use a template, save the workbook before logging out of or closing Data Direct worksheet. The preferred user workflow is:



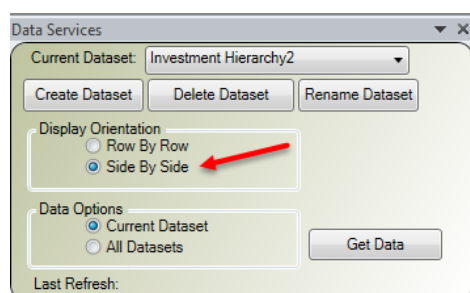
Investment Hierarchy Data Services Details:

Investment Hierarchy displays a hierarchy breakdown of all groups and accounts within a client trust.

There are two hierarchy options

1. Investment Hierarchy populates performance results for monthly valuated client trust hierarchies with predefined time period options (1 Mo, 3 Mos, 6 Mos, 9 Mos, YTD, 1Yr, through 10 Yrs, 15 Yrs and 20 Yrs)
2. Investment Hierarchy Daily provides the same hierarchy output with daily time period options (1 Day, 1 Week, MTD, QTD). The daily service is designed for Trusts on daily valuation or Trusts setup to report month to date/intra month reporting
Please see the FAQ document for more information on intra month reporting for monthly valuated trusts.

Additionally, choosing the **Side by Side** option allows you to display manager and benchmark performance in separate column format.



Inputs

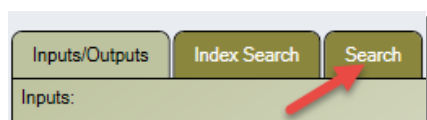
In general terms, inputs are used to define:

- The desired "client trust"
- "As of" or "Reference date" – defines the point in time in which to display outputs such as market values, weightings, and selected characteristics.

Please Note: Rates of returns and risk statistics have a number of time periods available in outputs. These selections –1-3-5 years are as of the reference date entered.

- Category level of display for output (i.e show all performance returns as net of fees)
- County or Region level – (i.e show market values invested in the United States (excluding all other countries))
- Preference to display or suppress associated benchmark for each account and group.
- Filtering option to display entire group hierarchy, groups only, or accounts only.

The Investment Hierarchy data service requires a "Group ID" associated with each Master Trust on the Northern Trust Performance Engine. This can be found through the **Acct/Group Search** tab within the data services window.



To perform a search:

1. Click the Search tab.
2. Select the **Group** radio button and enter text to search for the desired group name.
3. A minimum of three letters will trigger the search. Additional letters entered will narrow your search results.
4. A basic search will generate results that begin with the search letters or word you entered.
5. A “wildcard” option in the form of a %” can be used to populate all results that contain the search letters or word.
6. Once you have found your desired group, drag any portion of the results row to the cell below the input header **Group ID**. The group name will automatically convert to a numeric ID.

The screenshot shows the 'Data Services' window on the left and a spreadsheet on the right. In the 'Data Services' window, the 'Search' tab is active, and 'Sample Fund' is entered in the 'Enter Search Text' field. Below the search bar, a list of search results is displayed, with 'Sample Fund' selected. A dashed arrow points from this selected row to the spreadsheet. The spreadsheet has columns A through E. Row 2 contains headers: '*Group ID', '*Reference Date', 'Benchmark Display', and 'Display Options'. Row 3 shows the value '1073748188' under '*Group ID'. Row 4 contains headers: 'Account / Group ID', 'Account / Group Name', 'Market Value + Accruals', and 'Ending Weight'. Row 5 shows the value '1073748188' under 'Account / Group ID'.

By default Data Direct will always display results at the Total Fund Gross of Fees/World level (without selecting input parameters **Category** or **Country / Region**).

If you wish to display a different category other than **Total Fund Gross of Fees**:

1. Drag the input parameter “Category” to a cell in your spreadsheet.
2. Click on the cell below the input header.

A list of available system defined parameters will display.

The screenshot shows a spreadsheet with columns A through E. Row 2 contains headers: '*Group ID', '*Reference Date', 'Benchmark Display', and 'Category'. Row 3 shows the value '1073829020' under '*Group ID' and '5/31/2016 Primary' under '*Reference Date'. A dropdown menu is open for the 'Category' header, showing a list of available system defined parameters: 'Total Fund Gross of Fees', 'Total Fund - Equity', 'Total Fund Net of Fees', 'Total Fund Net of Mgr. Fees', 'Total Fund - Sec. Lending', 'Total Fund - Foreign Exchange', 'Total Fund - Private Equity', and 'TF Gross Derived from Fee Sche'.

If you select the input option **Display Currency**, you have two parameters options, **Base** or **Local** which will determine whether performance displayed is in base or local currency.

*Group ID	*Reference Date	Benchmark Display	Category	Display Currency
1073829020	5/31/2016	Primary	Total Fund Net of Fees	Base

The default output will generate base currency results regardless if the **Display Currency** input is represented in your spreadsheet.

- As is the case with all defaults, if your desire is to always display results in base currency, there will be no need to utilize the “Display Currency” option as an input.
- It is wise to include this input option if you plan to “toggle” between base/local output.

Once data elements have been defined, Input headers will have a grey or light green shade:

Outputs

In general terms, outputs are used to define:

- Available data elements which serve as report column “headers” (Based on your input definition, this is the information you elect to call for a client trust – i.e. Market values, ending weights, performance returns for 1,3,5 years).
- Other output parameters can be selected to display account/ group inception & lock (last performance signoff) dates, characteristics, rates of returns, cash flows and risk statistics.
- Data presented in row format mirrors the client trust hierarchy breakdown as defined by your Northern Trust representative. Adjoining columns of outputs can be added to suit your desired data needs.

Once defined Output headers will be a darker / olive green color. Below is a typical example of a policy tree setup using selected inputs and outputs.

*Group ID	*Reference Date	Benchmark Display	Category	Display Currency		
1073829020	5/31/2016	Primary	Total Fund Net of Fees	Base		
Account / Group ID	Account / Group Name	Market Value + Accruals	Ending Weight	3 Mos RoR	3 Mos Net Flows	Inception Date

- If your accounts are on monthly valuation, you can use our Investment Hierarchy Daily data service to generate “month to date” performance information for any given business day. This feature provides an unaudited/best available performance return for daily periods within a given month.
- If you are experiencing any issues calling data mid-month, your Northern Trust representative can confirm whether your accounts are setup to capture month to date/best available results.

TIP: You can easily add additional data parameters to your output by dragging and dropping any of the available “outputs” from the data service window. Simply drop new output header to your original output header row and submit a new call by clicking Get Data.

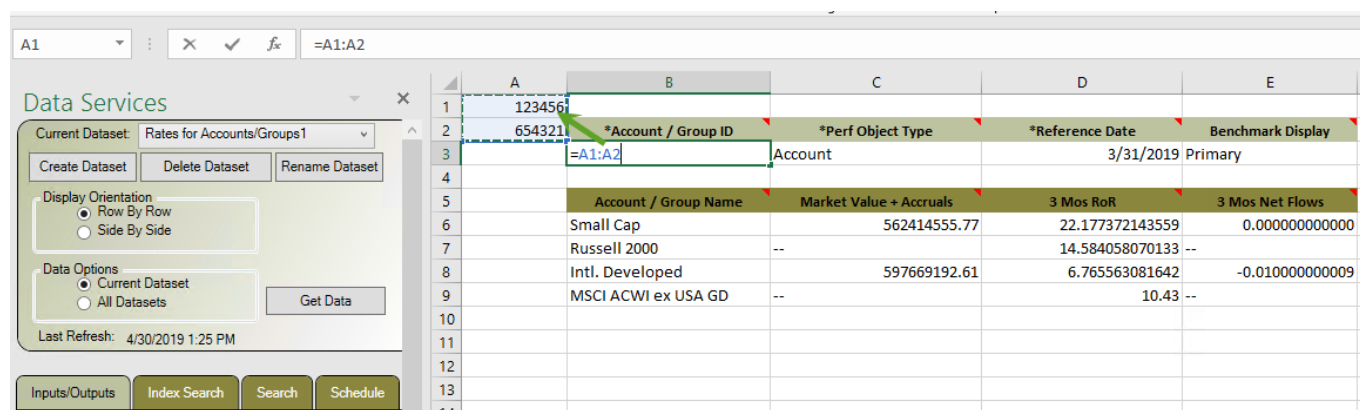
Rates for Accounts and Groups Data Services

Rates for Accounts and Groups provides similar output options as the Investment Hierarchy data service however, this data service is used to define individual accounts or groups.

- Unlike Investment Hierarchy which displays each associated account & group in a Trust, **Rates for Accounts / Groups** requires you to define each account or Group ID separately. In other words, parent/child relationships typically seen in a Trust hierarchy are not a feature of Rates for Accounts/Groups.
- The data service will allow you to define an array of accounts and groups however, you cannot define an array of multiple dates. This data service was designed to provide you with predefined “canned” time period options for data output.

You can define single or multiple accounts or groups through an array. This is accomplished by entering an = sign in the cell below the input “*Perf Object ID / Account ID” and linking to another set of cells within your workbook to identify your account or group ID’s.

In this example, a reference link is made to cells A1:A2 to identify two accounts:



The screenshot shows the 'Data Services' interface with a 'Current Dataset' of 'Rates for Accounts/Groups1'. The input field for '*Account / Group ID' contains the formula '=A1:A2', which is highlighted with a green box and a green arrow pointing to the formula bar. The output table displays data for various accounts and groups, including 'Small Cap', 'Russell 2000', 'Intl. Developed', and 'MSCI ACWI ex USA GD'.

*Account / Group ID	*Perf Object Type	*Reference Date	Benchmark Display
=A1:A2	Account	3/31/2019	Primary
Account / Group Name	Market Value + Accruals	3 Mos RoR	3 Mos Net Flows
Small Cap	562414555.77	22.177372143559	0.000000000000
Russell 2000	--	14.584058070133	--
Intl. Developed	597669192.61	6.765563081642	-0.010000000009
MSCI ACWI ex USA GD	--	10.43	--

PLEASE NOTE:

- You can identify either account IDs or group IDs however, a combined call of both account and group ID’s cannot be made through a single call. If there is a need to call both accounts and groups, it is recommended you setup a second **Rates for Accounts / Groups** query to define the two separately.
- Similar to other web services, you can define a single custom time period which you will find under the “custom time period” folder of the input section. The output for a defined custom time period (CTP) can be found under any available set of data output elements under the name “CTP1”.
- The **Custom Time Period** option available in the input section allows you to define a single time period for the available **CTP option** in Rates of Return and Risk Statistic folders. All other outputs such as Market Values, Ending Weights, & Characteristics will be reflected as of the **Reference Date**. All predefined time periods under rates of return and risk statistics folder will always be displayed as of the **Reference Date**.

All Northern Trust accounts are setup on the performance system using a defined base currency. If accounts have a secondary setup applied that provides performance in a different currency, the input **Performance View** will allow you to define which view you want to extract - **Primary Performance View** or **Country of Reference View(s)**.

- By default, performance is reflected using **Primary Performance View**.
- If you have secondary currency views applied to an account, the Performance View drop down selection = **Country of Reference View(s)** will display results in those secondary currencies.
- If more than one secondary (currency) view is on the Northern Trust performance system, you will automatically generate both in the output.

	A	B	C	D
1	*Account / Group ID	*Perf Object Type	*Reference Date	Performance View
2	2312345	Account	3/31/2019	Country of Reference View(s)
3	Account / Group Name	Market Value + Accruals	1 Mo RoR	Performance View
4	Global Equity Manager	108,264,051.53	1.329925648080	Multi-Reference USD View
5				

Rates for Custom Time Periods Data Service

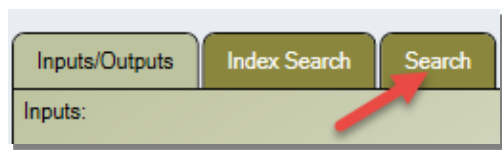
Rates for Custom Time Periods extracts data on a single or an array of account(s)/group(s). Additionally, you can define start and end dates to generate output for single or multiple time periods.

To define a single account/group for a single time period:

1. Enter the account number or Group ID along with a start/end date.
The **Perf Object Type** input defines whether the data you desire is for an account or group.
2. Select via the drop down **Account** or **Group**.



TIP You can search on an account number or Group ID within the data services window Search tab. Here you can look up an account number or backend ID associated with any manager account or group stored on the Northern Trust database.



3. Select a **Frequency** from the drop down menu to define how you want your output displayed. The level of output will change depending on your selected frequency.
 - Total Period
 - Calendar Annuals
 - Rolling Annuals
 - Calendar Quarters
 - Rolling 3 Mo Time Period
 - Calendar Months
 - Rolling Months
 - Rolling Days.

The **Total Period** option simply links periods between your defined start & end date.

*Account / Group ID	*Performance Object Type	*Start Date	*End Date	Frequency	Benchmark Display
2290090	Account	12/31/2014	5/31/2016	Total Period	None
*Account / Group ID	*Account / Group Name	*Start Date	*End Date	Market Value + Accruals	Total Period RoR

Example: below the frequency “Calendar Months” was selected displaying all calendar months that fall between the defined start/end dates.

*Account / Group ID	*Performance Object Type	*Start Date	*End Date	Frequency	Benchmark Display
2290090	Account	12/31/2014	5/31/2016	Calendar Months	None
*Account / Group ID	*Account / Group Name	*Start Date	*End Date	Market Value + Accruals	Total Period RoR
2290090	Small Cap	12/31/2014	1/31/2015	780,641,905.64	-2.022824172170
2290090	Small Cap	1/31/2015	2/28/2015	841,610,099.62	7.810007833235
2290090	Small Cap	2/28/2015	3/31/2015	856,269,615.68	1.741841746745
2290090	Small Cap	3/31/2015	4/30/2015	827,996,208.25	-3.301928144157
2290090	Small Cap	4/30/2015	5/31/2015	851,038,068.55	2.782846113354
2290090	Small Cap	5/31/2015	6/30/2015	858,974,945.92	0.932611320610
2290090	Small Cap	6/30/2015	7/31/2015	851,941,068.82	-0.818868714787
2290090	Small Cap	7/31/2015	8/31/2015	777,209,280.48	-8.771943397858
2290090	Small Cap	8/31/2015	9/30/2015	613,725,207.03	-5.390041502548
2290090	Small Cap	9/30/2015	10/31/2015	627,917,463.65	2.312252318652
2290090	Small Cap	10/31/2015	11/30/2015	657,944,191.00	4.781954490557
2290090	Small Cap	11/30/2015	12/31/2015	632,277,387.09	-3.901060950320
2290090	Small Cap	12/31/2015	1/31/2016	561,393,116.98	-11.210944999352
2290090	Small Cap	1/31/2016	2/29/2016	552,188,495.28	-1.639603589997
2290090	Small Cap	2/29/2016	3/31/2016	586,585,394.62	6.229195217579
2290090	Small Cap	3/31/2016	4/30/2016	589,278,352.64	0.459090533910
2290090	Small Cap	4/30/2016	5/31/2016	604,760,168.76	2.627250101865

To generate results for multiple accounts or groups:

1. Set your array off to the side of the inputs and link to the string. {=A3:A5}.
2. Once highlighted, define array by holding Ctrl +Shift + Enter. You will see the {} braces appear within your formula.

*Account / Group ID	*Performance Object Type	*Start Date	*End Date	Frequency	Benchmark Display
2290090	Account	12/31/2015	5/31/2016	Calendar Months	None
*Account / Group ID	*Account / Group Name	*Start Date	*End Date	Market Value + Accruals	Total Period RoR
2290090	Small Cap	12/31/2015	1/31/2016	561,393,116.98	-11.210944999352
2290090	Small Cap	1/31/2016	2/29/2016	552,188,495.28	-1.639603589997
2290090	Small Cap	2/29/2016	3/31/2016	586,585,394.62	6.229195217579
2290090	Small Cap	3/31/2016	4/30/2016	589,278,352.64	0.459090533910
2290090	Small Cap	4/30/2016	5/31/2016	604,760,168.76	2.627250101865
IRE12	Intl. Developed	12/31/2015	1/31/2016	457,212,656.20	-5.570425914986
IRE12	Intl. Developed	1/31/2016	2/29/2016	452,905,812.00	-0.941978342375
IRE12	Intl. Developed	2/29/2016	3/31/2016	488,119,875.61	7.775140587068
IRE12	Intl. Developed	3/31/2016	4/30/2016	505,065,261.43	3.471562349069
IRE12	Intl. Developed	4/30/2016	5/31/2016	492,837,867.71	-2.420953222041
2219072	Core Fixed Income Manag	12/31/2015	1/31/2016	834,206,033.81	0.551526063524
2219072	Core Fixed Income Manag	1/31/2016	2/29/2016	839,215,164.38	0.671726044712
2219072	Core Fixed Income Manag	2/29/2016	3/31/2016	854,644,441.30	1.838536477281
2219072	Core Fixed Income Manag	3/31/2016	4/30/2016	867,076,275.43	1.729591130461
2219072	Core Fixed Income Manag	4/30/2016	5/31/2016	864,485,943.29	-0.022113333160

You can also customize different variations of desired time periods by linking to start and end dates you define in another area of your spreadsheet.

To generate results for customized time periods:

1. Define your start and end dates off to the side of your input parameters and link to the string of start and end dates.

NOTE To use this option, you do not want the “Frequency” input defined as an input.

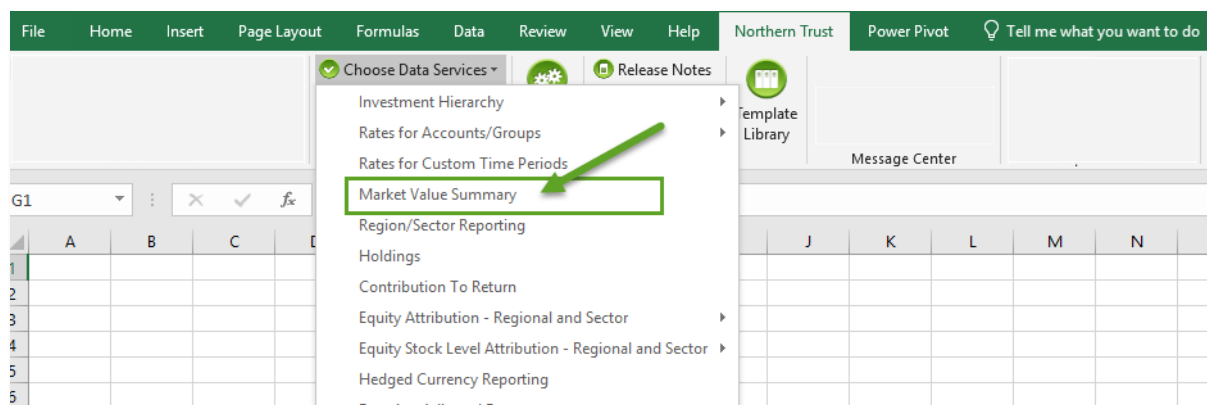
*Account / Group ID	*Performance Object Type	*Start Date	*End Date			4/30/2016	5/31/2016
2290090	Account	4/30/2016	=J3:J7			5/31/2015	5/31/2016
*Account / Group ID	*Account / Group Name	*Start Date	*End Date	Market Value + Accruals	Total Period RoR	12/31/2014	12/31/2015
2290090	Small Cap	4/30/2016	5/31/2016	604,760,168.76	2.627250101865	12/31/2015	5/31/2016
2290090	Small Cap	5/31/2015	5/31/2016	604,760,168.76	-14.859909881657		
2290090	Small Cap	12/31/2014	5/31/2016	604,760,168.76	-6.483833987673		
2290090	Small Cap	12/31/2014	12/31/2015	632,277,387.09	-4.921872694276		
2290090	Small Cap	12/31/2015	5/31/2016	604,760,168.76	-1.552080098364		

2. After choosing the cells identified in array, simultaneous selection of the Control+Shift+Enter keys will automatically place braces around your array definition {}.
3. Once all your inputs and outputs are defined, click **Get Data**.
Results will generate for your defined array of accounts/groups and dates.

The screenshot displays the Northern Trust Power Pivot interface. On the left, the 'Data Services' pane is open, showing the 'Current Dataset' as 'Rates for Custom Time Periods1'. It includes options for 'Display Orientation' (Row By Row, Side By Side), 'Data Options' (Current Dataset, All Datasets), and a 'Get Data' button. Below this, the 'Inputs/Outputs' section lists various parameters with checkboxes, including 'Account / Group ID', 'Performance Object Type', 'Start Date', 'End Date', 'Frequency', 'Benchmark Display', 'Performance View', 'Performance View Currency', 'Display Currency', 'Country / Region', 'Category', 'Growth Over Time Unit Base Value', 'Country / Region', 'Category', 'Inception Date', 'Performance Start Date', 'Performance View', 'Locked Date', 'Characteristics', 'Rates of Return', and 'Total Period RoR'. On the right, a data table is shown with columns for 'Account / Group ID', 'Performance Object Type', 'Start Date', 'End Date', 'Market Value + Accruals', and 'Total Period RoR'. The table contains data for various accounts and groups, with dates ranging from 10/31/2018 to 3/31/2019. Red arrows indicate the flow of data from the input parameters to the resulting data table.

Market Value Summary Data Service

The Market Value Summary data service can be run for Master trusts, sub groups, and accounts. You will now be able to show a top line summary row for sub group or explode to display all sub nodes within the sub group. This includes component groups and accounts within the sub node.



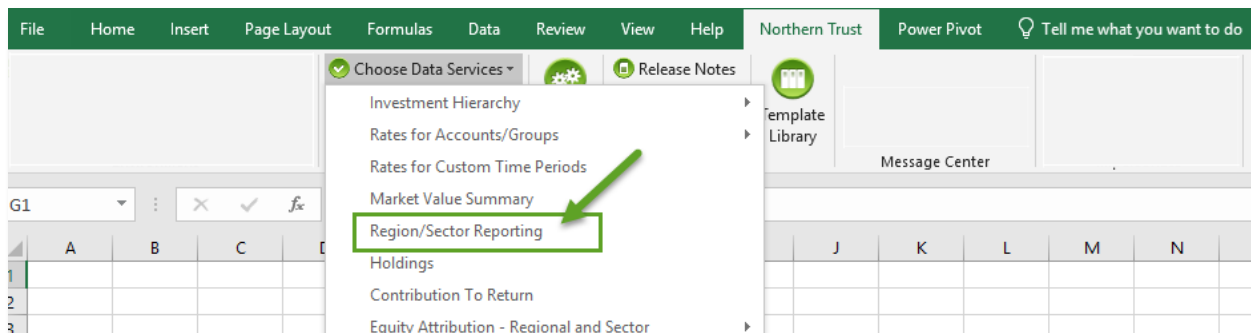
Outputs include the following:

- Beginning Market Value – beginning of period market value plus accruals.
- Net Contributions – net flows for the period of concentration.
- Income – income derived from interest payments, dividends and capital gains for the period of concentration.
- Fees - such as management fees incurred during the reporting period.
- Appreciation/Depreciation - positive cash flows/ negative cash flows incurred during the reporting period.
- Ending Market Value – end of period market value including accruals.

*Account / Group ID	*Performance Object Type	*Reference Date	Group Display Options	FYTD	1 Year		
1073748188	Group	6/30/2014	Investment Hierarchy (Open A Y	Y			
Account/Group Name	Beginning Market Value	Net Contributions	Income	Fees	Appreciation / Depreciation	Ending Market Value	Time Period
Sample Fund	11,166,870,808.96	-212,255,829.48	130,247,638.31	9,206,112.91	1,207,379,829.16	12,292,242,446.95	FYTD
Total Equity	7,645,166,906.54	-149,331,602.70	46,224,251.63	5,694,193.47	1,098,163,701.46	8,640,223,256.93	FYTD
Domestic Equity	4,847,776,073.02	-149,326,974.84	32,605,379.72	4,427,572.02	790,155,356.92	5,521,209,834.82	FYTD
Large Value	924,455,072.41	-3,378.94	16,392,244.74	1,565,086.32	166,962,071.65	1,107,806,009.86	FYTD
Marketcap Fund	2,508,533,575.00	-50,000,000.00	0.00	143,135.07	443,530,033.87	2,902,063,608.87	FYTD
S&P Value Index Fund	729,603,588.39	-99,322,954.29	13,247,338.36	43,243.18	103,933,391.81	747,461,364.27	FYTD
Small Cap	685,183,837.22	-641.61	2,965,796.62	2,676,107.45	75,723,859.59	763,878,851.82	FYTD
International Equity	2,797,390,833.52	-4,627.86	13,618,871.91	1,268,621.45	308,008,344.54	3,119,013,422.11	FYTD
EAFE Index Fund	2,308,955,798.53	0.00	0.00	127,945.59	256,671,732.97	2,565,527,531.50	FYTD
Intl. Developed	488,535,033.71	-4,627.86	13,618,871.91	1,138,775.86	51,336,551.53	553,485,829.29	FYTD
Intl. Developed III	1.28	0.00	0.00	0.00	0.04	1.32	FYTD
Total Fixed Income	3,241,371,843.93	49,837,250.00	70,045,077.34	3,119,313.19	109,309,535.90	3,470,563,707.17	FYTD
BC Aggregate Bond Index	1,379,348,113.93	0.00	0.00	77,425.74	52,810,817.42	1,432,758,331.35	FYTD
Core Fixed Income Manag	525,940,999.77	0.00	16,544,832.28	825,272.35	5,295,460.20	551,871,292.25	FYTD
Core Fixed Income Manag	806,045,658.74	-162,750.00	25,884,577.20	804,189.61	33,725,532.64	865,493,078.58	FYTD
Global High Yield Manage	525,437,071.49	50,000,000.00	27,615,687.86	1,412,425.49	17,477,665.64	620,530,404.99	FYTD
Cash	280,001,522.49	-112,761,476.78	13,978,309.34	392,606.25	82,936.80	181,301,291.85	FYTD
Cash Account	280,001,522.49	-112,761,476.78	13,978,309.34	392,606.25	82,936.80	181,301,291.85	FYTD
Real Estate	330,536.00	0.00	0.00	0.00	-176,345.00	154,191.00	FYTD
Real Estate Manager - A	0.00	0.00	0.00	0.00	0.00	0.00	FYTD
Real Estate Manager - B	330,536.00	0.00	0.00	0.00	-176,345.00	154,191.00	FYTD
Sample Fund	10,597,302,023.72	-286,378,552.40	169,306,223.41	11,948,329.87	1,812,012,752.22	12,292,242,446.95	1 Year
Total Equity	7,153,688,764.54	-274,447,821.46	58,686,193.75	7,343,269.94	1,702,296,120.10	8,640,223,256.93	1 Year
Domestic Equity	4,654,124,209.30	-274,326,974.84	41,948,958.49	5,690,569.82	1,099,463,641.87	5,521,209,834.82	1 Year
Large Value	865,967,051.72	-3,378.94	20,461,500.68	2,023,688.48	221,380,836.40	1,107,806,009.86	1 Year
Marketcap Fund	2,362,752,250.90	-50,000,000.00	0.00	187,110.69	589,311,357.97	2,902,063,608.87	1 Year
S&P Value Index Fund	821,310,058.24	-224,322,954.29	17,781,771.45	58,121.12	132,692,488.87	747,461,364.27	1 Year
Small Cap	604,094,848.44	-641.61	3,705,686.36	3,421,649.53	156,078,958.63	763,878,851.82	1 Year
International Equity	2,498,564,555.24	-120,846.62	16,737,235.26	1,652,700.12	602,832,478.23	3,119,013,422.11	1 Year
EAFE Index Fund	2,068,612,724.25	0.00	0.00	166,917.89	496,914,867.25	2,565,527,531.50	1 Year
Intl. Developed	430,942,914.63	-111,953.24	16,737,264.37	1,485,782.23	105,917,603.53	553,485,829.29	1 Year
Intl. Developed III	8,916.36	-8,993.38	-29.11	0.00	7.45	1.32	1 Year
Total Fixed Income	3,217,837,807.11	49,837,250.00	93,072,026.46	4,149,903.43	109,816,623.60	3,470,563,707.17	1 Year
BC Aggregate Bond Index	1,372,153,062.70	0.00	0.00	103,778.99	60,605,868.65	1,432,758,331.35	1 Year
Core Fixed Income Manag	525,421,266.45	0.00	21,967,523.33	1,103,003.15	392,501.87	551,871,292.25	1 Year
Core Fixed Income Manag	801,843,591.52	-162,750.00	34,382,872.47	1,073,532.33	29,429,364.59	865,493,078.58	1 Year
Global High Yield Manage	514,419,886.44	50,000,000.00	36,721,630.06	1,869,588.96	19,388,888.49	620,530,404.99	1 Year
Cash	225,444,916.07	-61,767,980.94	17,548,003.20	455,156.50	76,353.52	181,301,291.85	1 Year
Cash Account	225,444,916.07	-61,767,980.94	17,548,003.20	455,156.50	76,353.52	181,301,291.85	1 Year
Real Estate	330,536.00	0.00	0.00	0.00	-176,345.00	154,191.00	1 Year
Real Estate Manager - A	0.00	0.00	0.00	0.00	0.00	0.00	1 Year
Real Estate Manager - B	330,536.00	0.00	0.00	0.00	-176,345.00	154,191.00	1 Year

Region/Sector Reporting Data Service

The Region/Sector Reporting data service provides more comprehensive data coverage and adds the flexibility to create performance reports with regional and sector level returns.

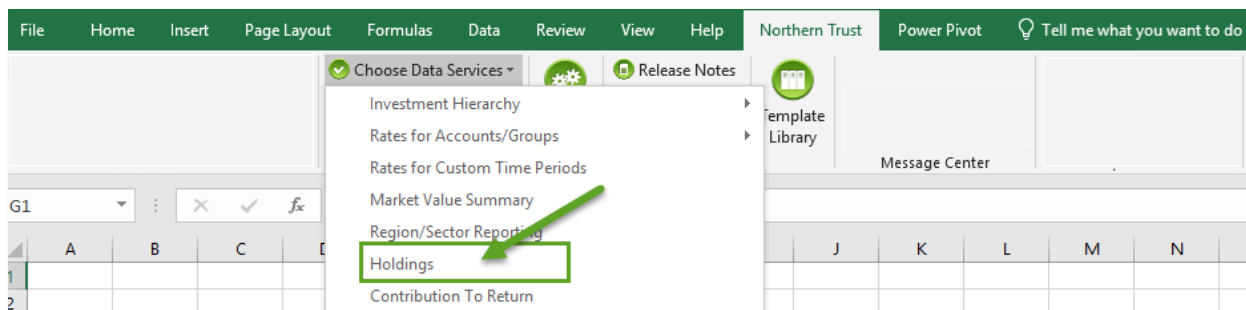


Region/Sector reporting displays the region and sector level details and performance for daily or monthly accounts/groups and templates.

*Account / Group / Template ID	Performance Object ID	*Reference Date	*Sector / Regional Display	Display Currency	CTPI.StartDate	CTPI.EndDate			
IRE12	Account	31/12/2012	Region/Sector Summary	Base	31/05/2010	31/12/2012			
Should Allow Arrays - No limit		Can be non month end	Region/Sector Detail						
Account / Group ID	Alternate ID	Alternate Name	Account / Group Name	Benchmark Name	Market Value - Accruals	Account/Group Weight	Benchmark Weight	1 Mo RoR: Ac	
IRE12	IDSF66	International Developed - Sample Fun	Non U.S. Developed Manager	MSCI EAFE GD	451,684,846	100.00000000000000	100.00000000000000	-0.1851	
IRE12	IDSF66	International Developed - Sample Fun	Total Fund - Foreign Exchange	MSCI EAFE GD	451,686,642	100.00261612968000	100.00000000000000	-0.1831	
IRE12	IDSF66	International Developed - Sample Fun	Equity	MSCI EAFE GD	429,680,007	95.1282760169330000	100.00000000000000	-0.1623	
IRE12	IDSF66	International Developed - Sample Fun	MSCI Europe	MSCI Europe GD	259,518,540	57.4596669278459000	65.3612591385375000	0.3008	
IRE12	IDSF66	International Developed - Sample Fun	Austria	MSCI Austria GD	0	0.0000000000000000	0.2916163573497900	--	
IRE12	IDSF66	International Developed - Sample Fun	Belgium	MSCI Belgium GD	0	0.0000000000000000	1.163919019032564000	--	
IRE12	IDSF66	International Developed - Sample Fun	Switzerland	MSCI Switzerland GD	14,784,206	3.2731242800532500	9.0958779006020000	-2.54393	
IRE12	IDSF66	International Developed - Sample Fun	Germany	MSCI Germany GD	14,419,627	3.1924088445969500	8.6535232316455200	2.0600	
IRE12	IDSF66	International Developed - Sample Fun	Denmark	MSCI Denmark GD	0	0.0000000000000000	1.1681479243870100	--	
IRE12	IDSF66	International Developed - Sample Fun	Spain	MSCI Spain GD	3,771,352	0.8349520394374260	2.9806242250717000	-4.7744	
IRE12	IDSF66	International Developed - Sample Fun	Finland	MSCI Finland GD	0	0.0000000000000000	0.8049773146840820	--	
IRE12	IDSF66	International Developed - Sample Fun	France	MSCI France GD	74,849,231	16.5711848503300000	9.7075963730149000	0.8125	
IRE12	IDSF66	International Developed - Sample Fun	United Kingdom	MSCI United Kingdom GD	69,708,415	15.4329763157072000	22.0013162842174000	0.5250	
IRE12	IDSF66	International Developed - Sample Fun	Greece	MSCI Greece GD	0	0.0000000000000000	0.0377760574432273	--	
IRE12	IDSF66	International Developed - Sample Fun	Ireland	MSCI Ireland GD	10,803,403	2.3918009837428900	0.3405267604120520	2.3872	
IRE12	IDSF66	International Developed - Sample Fun	Italy	MSCI Italy GD	31,441,142	6.9608583855918000	2.1170850904947900	3.9622	
IRE12	IDSF66	International Developed - Sample Fun	Netherlands	MSCI Netherlands GD	29,278,962	6.4821662132664000	2.7583913673143700	-4.1863	
IRE12	IDSF66	International Developed - Sample Fun	Norway	MSCI Norway GD	0	0.0000000000000000	0.8443801829374730	--	
IRE12	IDSF66	International Developed - Sample Fun	Portugal	MSCI Portugal GD	3,395,160	0.7516657340230970	0.1773261628789500	-1.1804	
IRE12	IDSF66	International Developed - Sample Fun	Sweden	MSCI Sweden GD	7,067,041	1.5649594653433000	3.2288977162559500	-0.454	
IRE12	IDSF66	International Developed - Sample Fun	MSCI Pacific	MSCI Pacific GD	100,230,691	22.1904037894598000	34.1776942570100000	-0.8092	
IRE12	IDSF66	International Developed - Sample Fun	Japan	MSCI Japan GD	100,230,691	22.1904037894598000	21.4909019978606000	-0.8092	
IRE12	IDSF66	International Developed - Sample Fun	New Zealand	MSCI New Zealand GD	0	0.0000000000000000	0.1162596590020700	--	
IRE12	IDSF66	International Developed - Sample Fun	Singapore	MSCI Singapore GD	0	0.0000000000000000	1.5556059196813900	--	
IRE12	IDSF66	International Developed - Sample Fun	Australia	MSCI Australia GD	0	0.0000000000000000	8.0168351357708400	--	
IRE12	IDSF66	International Developed - Sample Fun	Hong Kong	MSCI Hong Kong GD	0	0.0000000000000000	2.9808015476895300	--	
IRE12	IDSF66	International Developed - Sample Fun	MSCI North America	--	12,667,495	2.8044986175557700	0.0000000000000000	-0.3400	
IRE12	IDSF66	International Developed - Sample Fun	Canada	--	0	0.0000000000000000	0.0000000000000000	--	
IRE12	IDSF66	International Developed - Sample Fun	United States	--	12,667,495	2.8044986175557700	0.0000000000000000	-0.3400	
IRE12	IDSF66	International Developed - Sample Fun	MSCI Emerging Markets	--	57,263,280	12.6777066820715000	0.0000000000000000	-1.1137	
IRE12	IDSF66	International Developed - Sample Fun	Brazil	--	23,762,297	5.2608135257421000	0.0000000000000000	-0.3605	
IRE12	IDSF66	International Developed - Sample Fun	Korea	--	13,345,979	2.9547102777030000	0.0000000000000000	2.1197	
IRE12	IDSF66	International Developed - Sample Fun	Mexico	--	13,244,045	2.9321428003619600	0.0000000000000000	-5.4528	
IRE12	IDSF66	International Developed - Sample Fun	Taiwan	--	0	0.0000000000000000	0.0000000000000000	--	
IRE12	IDSF66	International Developed - Sample Fun	Venezuela	--	0	0.0000000000000000	0.0000000000000000	--	
IRE12	IDSF66	International Developed - Sample Fun	Other Equity	--	6,819,839	1.5098663748764000	0.0000000000000000	-0.7398	
IRE12	IDSF66	International Developed - Sample Fun	Cash & Short Term Deriv.	--	19,427,209	4.3016538716876400	0.0000000000000000	-0.5128	
IRE12	IDSF66	International Developed - Sample Fun	Pending Cash	--	2,569,427	0.5912327244696980	0.0000000000000000	-7.1419	
IRE12	IDSF66	International Developed - Sample Fun	Foreign Exchange	--	-11,736	-0.002616129676328	0.0000000000000000	579.8807	

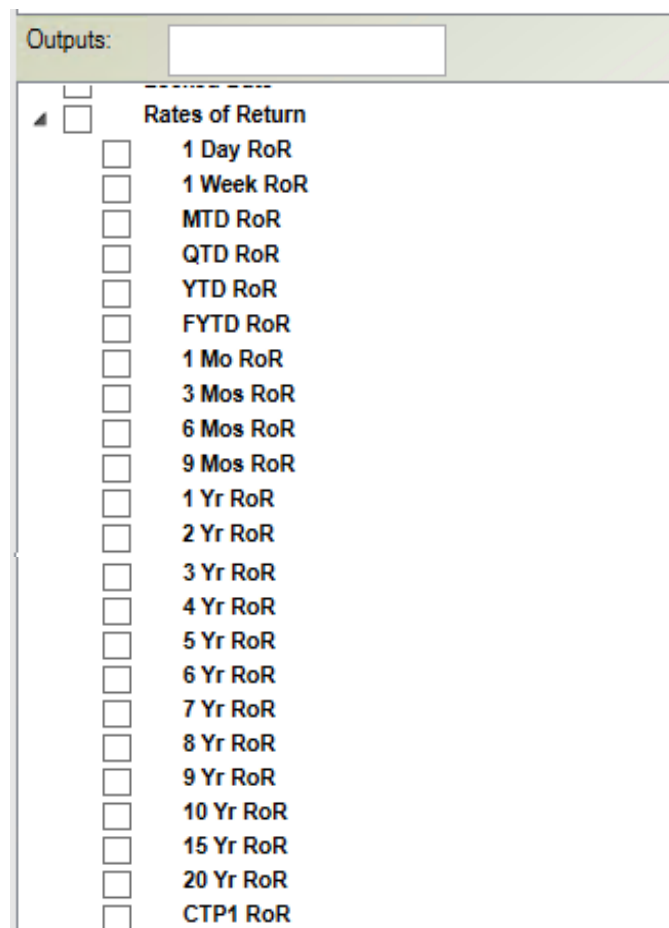
Holdings Data Service

The holdings data service provides security level performance and details for accounts and groups. This particular data service provides a user access to annualized or cumulative rates of returns as well as security based standard deviations/volatility for single accounts or groups.



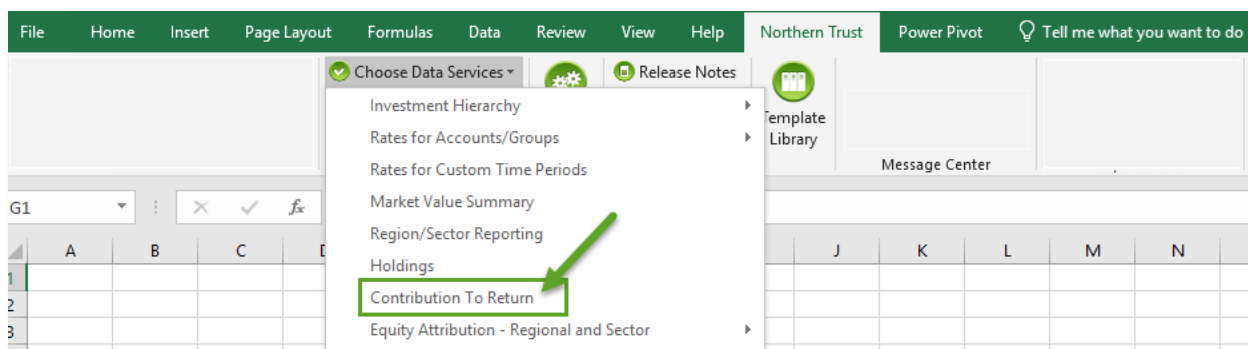
Please note that one distinctive difference between the Holdings Data Service and other data services is that daily and monthly time periods are now integrated into a single data service. The Holdings Data Service was developed as a single web service to call either daily or monthly accounts / groups.

Investment Hierarchy, Rates for Accounts/Groups, and the Attribution web services have separate services to inherently call daily or monthly accounts/groups.



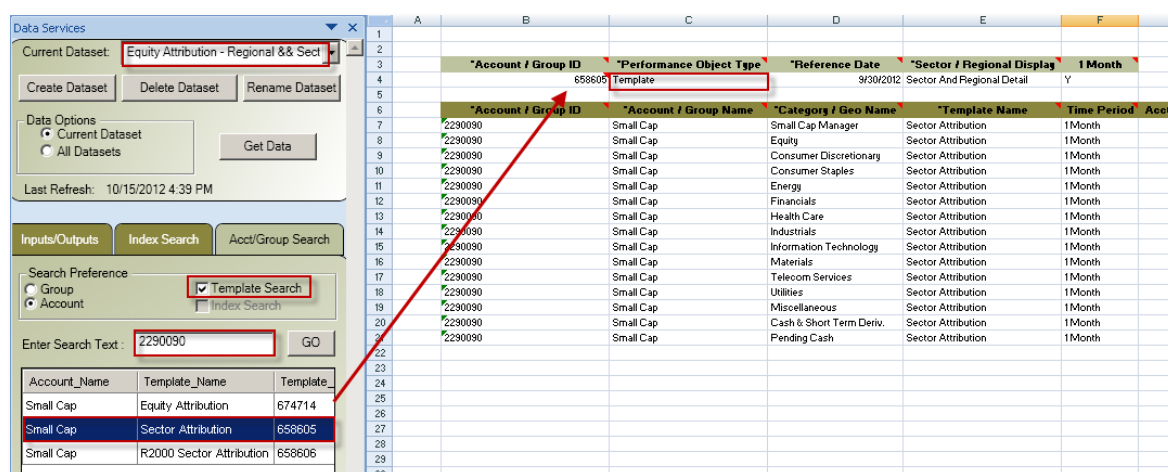
Contribution to Return Data Service

The Contribution to Return data service offers you output to analyze the components of a performance return. Data Direct you can easily interpret the key drivers of performance broken down by sectors, regions or security level return analysis. Similar to the Rates for Custom Time Periods data service, the Contribution data service can be run for multiple time periods by selecting the 'Frequency' input.



Our contribution data service requires a special setup which needs to be applied to each account/group. If you are interested in using our contribution service, please contact your Northern Trust representative so they can verify whether this setup has been applied to your accounts/groups.

If your accounts or groups have more than one of these special setups applied, you can access one of the available “templates” through the Account/Group Search tab in the dataservices window. The check box for “Template Search” will become enabled if you first select any dataservice requiring this setup (Contribution, Class & Stock Level Attribution, Duration Adjusted Exposure, and Hedged Currency Reporting).



Your contribution to overall returns can be analyzed either by sector or regional levels. Your Northern Trust representative has the flexibility to assign a hierarchy breakdown specific to your detailed needs. Once enabled, the contribution to return data service provides the option to display contribution right down to the individual security level providing you the level of detail necessary to complete a comprehensive analysis for key drivers/detractors in overall performance.

It is recommended you select all the available input parameters from the “inputs” section of the data services window.

Please note a key difference between the contribution data service and other available data services is your time periods are defined as an input.

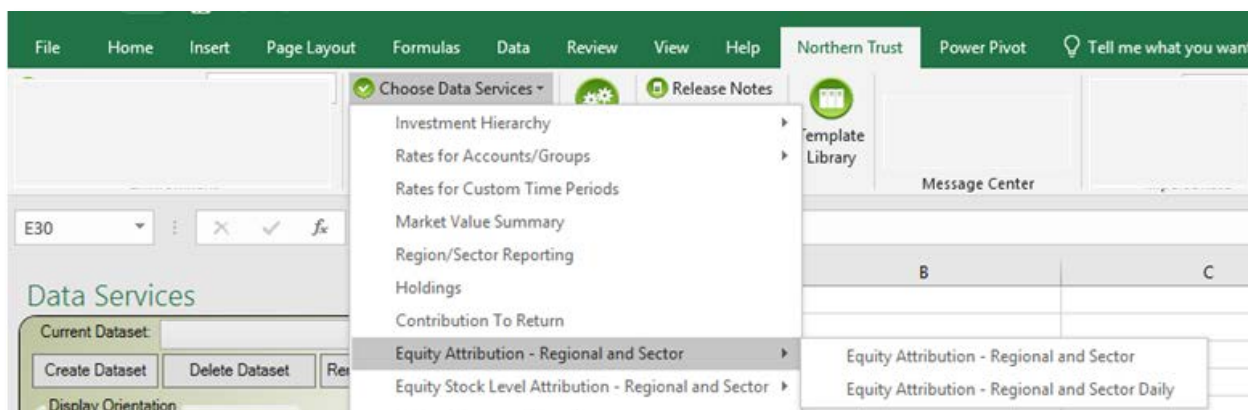
If you expand the input folder “Time Periods”, you will see a number of available reference periods. Here you select the time period(s) you wish to display and drag them to your spreadsheet as part of your inputs.

If you select more than one reference period (i.e. 3 Months, 1 Year), the first periods will be represented in your output followed by the second time period. Data output for various time periods will be displayed vertically in row format.

The screenshot shows the 'Data Services' window on the left and a spreadsheet on the right. The 'Data Services' window has a 'Current Dataset' dropdown set to 'Contribution To Return2'. Below this are buttons for 'Create Dataset', 'Delete Dataset', and 'Edit Dataset'. The 'Data Options' section has two radio buttons: 'Current Dataset' (selected) and 'All Datasets'. A 'Get Data' button is also present. The 'Last Refresh:' field is empty. The 'Inputs/Outputs' tab is active, showing a list of inputs under the 'Inputs:' section. The 'Time Periods' folder is expanded, showing a list of time periods: '1 Day', '1 Week', 'Month To Date', '1 Month', '3 Months', 'Qtr to Date', 'YTD', 'FYTD', 'ITD', '1 Year', '2 Years', and '3 Years'. The '3 Months' and '1 Year' options are selected and highlighted with red boxes. Red arrows point from these selected options to the spreadsheet. The spreadsheet has columns H, I, and J. Column H is labeled 'Template Type' and contains 'Primary Active'. Column I is labeled '3 Months' and contains 'Y'. Column J is labeled '1 Year' and contains 'Y'. The spreadsheet also has a 'Base RoR' column and a 'Category Description' column. The 'Category Description' column contains various fund categories like 'Total Fund Gross of Fees', 'Equity', 'Consumer Discretionary', 'Consumer Staples', and 'Energy'. The 'Base RoR' column contains numerical values. The '3 Months' and '1 Year' columns contain 'Y' for Yes. A red arrow points from the '3 Months' input in the 'Data Services' window to the '3 Months' column in the spreadsheet. Another red arrow points from the '1 Year' input in the 'Data Services' window to the '1 Year' column in the spreadsheet. A third red arrow points from the 'Time Periods' folder in the 'Data Services' window to the '3 Months' and '1 Year' columns in the spreadsheet. A fourth red arrow points from the '3 Months' and '1 Year' columns in the spreadsheet to the 'Base RoR' column. A fifth red arrow points from the 'Base RoR' column to the 'Category Description' column. A sixth red arrow points from the 'Category Description' column to the 'Time Period' column. The 'Time Period' column contains '3 Months' and '1 Year' for the first two rows, and '1 Year' for the remaining rows. The 'Time Period' column is highlighted with a red box.

Equity Attribution – Regional & Sector Data Services

There are two forms of equity attribution available through Data Direct, Regional and Sector analysis. The Data Service, “Equity Attribution – Regional & Sector” is for accounts and groups using monthly valuations. A second option called “Equity Attribution – Regional & Sector Daily” is for those accounts and groups with valuations calculated daily.



Please Note: Our attribution data service requires a special setup which needs to be applied to each account/group. If you are interested in using our equity attribution service, please contact your Northern Trust representative so they can verify whether this setup has been applied to your accounts/groups.

If your accounts or groups have more than one of these special setups applied, you can access one of the available “templates” through the Account/Group Search tab in the data services window. The check box for “Template Search” will become enabled if you first select any data service requiring this setup (Contribution, Class & Stock Level Attribution, Duration Adjusted Exposure, and Hedged Currency Reporting).

*Account / Group ID	*Performance Object Type	*Reference Date	*Sector / Regional Display	1 Month
658605	Template	9/30/2012	Sector And Regional Detail	Y

*Account / Group ID	*Account / Group Name	*Category / Geo Name	*Template Name	Time Period	Acct /
2290090	Small Cap	Small Cap Manager	Sector Attribution	1Month	
2290090	Small Cap	Equity	Sector Attribution	1Month	
2290090	Small Cap	Consumer Discretionary	Sector Attribution	1Month	
2290090	Small Cap	Consumer Staples	Sector Attribution	1Month	
2290090	Small Cap	Energy	Sector Attribution	1Month	
2290090	Small Cap	Financials	Sector Attribution	1Month	
2290090	Small Cap	Health Care	Sector Attribution	1Month	
2290090	Small Cap	Industrials	Sector Attribution	1Month	
2290090	Small Cap	Information Technology	Sector Attribution	1Month	
2290090	Small Cap	Materials	Sector Attribution	1Month	
2290090	Small Cap	Telecom Services	Sector Attribution	1Month	
2290090	Small Cap	Utilities	Sector Attribution	1Month	
2290090	Small Cap	Miscellaneous	Sector Attribution	1Month	
2290090	Small Cap	Cash & Short Term Deriv.	Sector Attribution	1Month	
2290090	Small Cap	Pending Cash	Sector Attribution	1Month	

Account_Name	Template_Name	Template
Small Cap	Equity Attribution	674714
Small Cap	Sector Attribution	658605
Small Cap	R2000 Sector Attribution	658606

Similar to our other data services, you begin by selecting one of the available Equity Attribution data services. Once selected, you will see a series of inputs and outputs available in the Data Service window.

The screenshot shows a software interface with three tabs at the top: 'Inputs/Outputs', 'Details', and 'Acct/Group Search'. The 'Inputs/Outputs' tab is active, displaying two columns: 'Inputs' and 'Outputs'. Each column has a list of items with checkboxes to the left. In the 'Inputs' column, the first four items are marked with an asterisk (*): '*Account / Group ID', '*Performance Object Type', '*Reference Date', and '*Sector / Regional Display'. The 'Outputs' column lists various data points, including '*Account / Group ID', '*Account / Group Name', '*Category / Geo Name', and '*Template Name'. The interface has a light green header and a white background.

Note: Inputs identified by an asterisk (*) are not required but recommended for all data calls.

To begin the process of calling attribution data by selecting your input parameters and dragging them to a location within your spreadsheet.

You will note there is a slightly different workflow for our attribution data service when defining your time periods.

1. Rather than defining the desired time period(s) from our output section, select either a predefined or custom time period from the input window.

This screenshot shows a close-up of the 'Inputs' section of the 'Inputs/Outputs' tab. It features a list of time period options, each preceded by a checkbox. The first item is '*Time Periods', which is expanded to show a sub-list of options: '1 Month', '3 Months', '6 Months', '9 Months', 'Qtr to Date', 'Year to Date', 'FYTD', 'ITD', 'Performance Start Date', '1 Year', and '2 Years'. The interface includes a light green header with tabs for 'Inputs/Outputs', 'Index Search', 'Search', and 'Schedule'.

2. Define Equity (Class Level) Attribution Inputs

- **Account Group ID:** Enter an account number for accounts, a “Performance Object ID” for groups.
- **Performance Object Type:** User drop down selection based on whether your account / group ID is an “Account” or “Group”

	A	B
1		
2	*Account / Group ID	*Performance Object Type
3	2207806	
4		
5		

- **Reference Date:** This is the “as of” date for all market values, and attribution effects for predefined time periods. The “Custom Time Period” option will generate information as of the “End Date”.
- **Sector / Regional Display:** Provides options for the displaying of equity sector or regional display. Selecting any of the “summary” options will display single line / “rollup” results. Any of the “Detail” options will break down your attribution results in hierarchy mode. The detailed options will display results as defined through the account/group (custom hierarchy) setup assigned by your Northern Trust representative.

- **Template Type:** Presently there is only one option to select, “Primary Active”. This input parameter is a filtering mechanism when an account or group has multiple template setups assigned. By default any data call will automatically generate results against the primary template assigned to each account / group, all without defining “Template Type” as one of your input parameters.
- **Time Periods:** There are a number of different predefined time period options. A custom time period option is also available should you elect to define a period not represented through our defined time period options. A “Y” (Yes) will automatically be displayed for any predefined time period selected. If you want to deactivate one of these time periods for future runs, you can simply enter an “N” for No.

3 Months	Year to Date	1 Year	Start Date	End Date
Y	Y	N	8/31/2015	5/31/2016

Note: Defining multiple dates using an array function is not available for custom dates. The end date for the custom time period option must not exceed the inputted “Reference Date”. In other words, the start and end dates for the custom date’s option should be periods occurring prior to the “Reference Date”.

Outputs

Define the type of attribution data to display in your spreadsheet by dragging a dropping in desired cells.

Note:

Outputs identified by an asterisk () are not required but recommended for all data calls.*

If multiple dates are selected, the display will be in row form segmented by time period.

If multiple accounts or groups are selected, the sort order will be by account/group, then date.

*Account / Group Name	*Category / Geo / Secty Name	Benchmark Name	Acct/Grp End Weight	Benchmark End Weight	Acct / Grp Base RoR
Large Cap Core	Large Cap Core	Russell 1000	100.000000000000	100.000000000000	0.965684792112
Large Cap Core	Total Fund - Foreign Exchange	Russell 1000	100.000000000000	100.000000000000	0.965684792112
Large Cap Core	Equity	Russell 1000	97.089825131048	100.000000000000	0.971320201558
Large Cap Core	Common Stock	Russell 1000	97.089825131048	100.000000000000	0.971320201558
Large Cap Core	Common Stock Investments	Russell 1000	35.565617488483	100.000000000000	0.869062600826
Large Cap Core	Communication Services	Communication Services	1.153445563292	2.861949604185	-0.523205045682
Large Cap Core	Consumer Discretionary	Consumer Discretionary	4.957787465238	12.386934959001	0.609524084302
Large Cap Core	Consumer Staples	Consumer Staples	3.070863470087	9.764202703736	-2.219947117720
Large Cap Core	Energy	Energy	3.682990206189	10.259959272183	0.962547106390
Large Cap Core	Financials	Financials	5.647034919726	16.347711985688	3.489014324093
Large Cap Core	Health Care	Health Care	4.272519827461	11.751067160766	-0.489868235425
Large Cap Core	Industrials	Industrials	3.521263024258	10.887121834539	2.387758465686
Large Cap Core	Information Technology	Information Technology	6.432473916876	18.316721072253	-0.183128821342
Large Cap Core	Materials	Materials	1.579410753163	3.969113809195	4.464597516348
Large Cap Core	Utilities	Utilities	1.245415211335	3.455217598453	0.624540152654
Large Cap Core	Miscellaneous	-	0.002413130858	0.000000000000	4.868472185182
Large Cap Core	Common Funds	-	61.524207642565	0.000000000000	1.028446460710
Large Cap Core	Cash & Short Term Deriv.	-	0.259461389295	0.000000000000	0.010192914026

Defining Stock Level Equity Attribution Inputs

Begin the process of calling stock level attribution data by selecting your input parameters and dragging these data elements to a location within your spreadsheet.

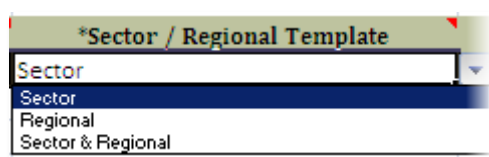
The stock level attribution provides the option to display single/top level information (Summary) or more granular levels of output consisting of sectors and / or holdings display. The desired level of output is managed through a variety of input selections as highlighted below.

Define the account or group (Performance Object) ID as well as a reference date.

*Perf Object ID / Account ID	*Performance Object Type	*Reference Date
2290090	Account	6/30/2010

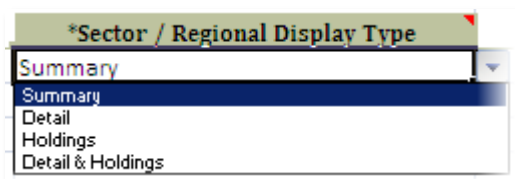
***Sector / Regional Template** defines whether the desired output is for sector or regional level or both.

Ability to view this information at the sector or regional level is dependent on whether a special setup is applied to your account or group. If unsure, your Northern Trust representative can assist with this prerequisite for viewing stock level attribution results.

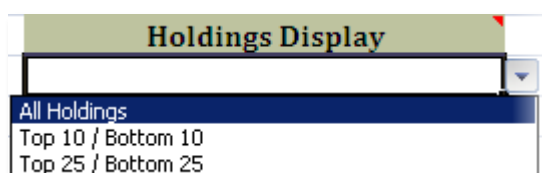


***Sector / Regional Display Type** input parameter defines the level of detail you wish to display.

- The **"Summary"** option will display a single row / top level information.
- The **"Details"** option displays top level and sector/regional components.
- The **"Holdings"** option will only display holdings results.
- **"Detail & Holdings"** will display top level and regional/sector breakdown with holdings details.



You may also elect to filter on Top 10 /Bottom 10 or Top 25 / Bottom 25 by choosing the input option "Holdings Display".



Note: Any user selected option under “Holdings Display” will be bypassed if “Sector / Regional Display Type” is set to Summary or Detail. This filtering option applies when “Sector / Regional Display Type” is set to one of the following: “Holdings” or “Detail & Holdings”.

With this data service, you are required to define time period(s) from our input section; therefore, you will select either a predefined or custom time period from the dataservices input window.

The screenshot shows the 'Inputs/Outputs' window with the following parameters and their selection status (checked/unchecked):

- ☐ *Account / Group / Template ID
- ☐ *Performance Object Type
- ☐ *Reference Date
- ☐ Performance View
- ☐ Performance View Currency
- ☐ *Sector / Regional Display
- ☐ Template Type
- ☒ *Time Periods
 - ☐ 1 Month
 - ☐ 3 Months
 - ☐ Qtr to Date
 - ☐ Year to Date
 - ☐ FYTD
 - ☐ ITD
 - ☐ 1 Year
 - ☐ 2 Years
 - ☐ 3 Years
 - ☐ 4 Years
 - ☐ 5 Years
 - ☐ 6 Years
 - ☐ 7 Years
 - ☐ 8 Years
 - ☐ 9 Years
 - ☐ 10 Years
- ☒ Custom Time Periods
 - ☐ Start Date
 - ☐ End Date

Outputs

Define the type of attribution data to display in your spreadsheet by dragging a dropping in desired cells. Output parameters marked with an asterisk (*) are not required but recommended selections.

*Account / Group Name	*Category / Geo / Secty Name	Benchmark Name	Acct/Grp End Weight	Benchmark End Weight	Acct / Grp Base RoI
Large Cap Core	Large Cap Core	Russell 1000	100.000000000000	100.000000000000	0.965684792112
Large Cap Core	Total Fund - Foreign Exchange	Russell 1000	100.000000000000	100.000000000000	0.965684792112
Large Cap Core	Equity	Russell 1000	97.089825131048	100.000000000000	0.971320201558
Large Cap Core	Common Stock	Russell 1000	97.089825131048	100.000000000000	0.971320201558
Large Cap Core	Common Stock Investments	Russell 1000	35.565617488483	100.000000000000	0.869062600826
Large Cap Core	Communication Services	Communication Services	1.153445563292	2.861949604185	-0.523205045682
Large Cap Core	Consumer Discretionary	Consumer Discretionary	4.957787465238	12.386934959001	0.609524084302
Large Cap Core	Consumer Staples	Consumer Staples	3.070863470087	9.764202703736	-2.219947117720
Large Cap Core	Energy	Energy	3.682990206189	10.259959272183	0.962547106390
Large Cap Core	Financials	Financials	5.647034919726	16.347711985688	3.489014324093
Large Cap Core	Health Care	Health Care	4.272519827461	11.751067160766	-0.489868235425
Large Cap Core	Industrials	Industrials	3.521263024258	10.887121834539	2.387758465686
Large Cap Core	Information Technology	Information Technology	6.432473916876	18.316721072253	-0.183128821342
Large Cap Core	Materials	Materials	1.579410753163	3.969113809195	4.464597516348
Large Cap Core	Utilities	Utilities	1.245415211335	3.455217598453	0.624540152654
Large Cap Core	Miscellaneous	-	0.002413130858	0.000000000000	4.868472185182
Large Cap Core	Common Funds	-	61.524207642565	0.000000000000	1.028446460710
Large Cap Core	Cash & Short Term Deriv.	-	0.259461389295	0.000000000000	0.010192914026

Note: Depending on the level of detail you wish to display there may be limitations on the number of accounts or groups permitted per each data call. If account or group arrays exceed the maximum permitted, you will note a pop up message will alert you of the limitations.

Report Type	Summary	Details	Holdings
Ad-hoc	200	100	20

Hedged Currency Reporting Data Service

Hedged currency reporting depicts returns that would have been achieved had the investor been fully hedged back to their base currency. A good example of how HCR's may be used in practice would be an Asset Owner hiring a number of global equity managers to outperform the MSCI World Index and a single currency overlay manager to hedge positions back to the base currency. The combined Currency hedged return of the global managers is then compared to the total base returns plus the actual currency overlay return to determine whether the currency overlay manager was hedging effectively. There may be many reasons for mismatches such as volatile equity markets with monthly starting hedges, which this type of reporting helps quantify.

Note: The hedged currency reporting data service requires a special setup which needs to be applied to each account/group. If you are interested in using our hedged currency service, please contact your Northern Trust representative so they can verify whether this setup has been applied to your accounts/groups.

If your accounts or groups have more than one of these special setups applied, you can access one of the available "templates" through the Account/Group Search tab in the dataservices window. The check box for "Template Search" will become enabled if you first select any dataservice requiring this setup (Contribution, Class & Stock Level Attribution, Duration Adjusted Exposure, and Hedged Currency Reporting).

The screenshot shows the 'Data Services' window with the 'Account/Group Search' tab selected. The 'Current Dataset' is 'Equity Attribution - Regional & Sect'. The 'Template Search' checkbox is checked. A red arrow points from the 'Template Search' checkbox to the 'Template' column in the data table.

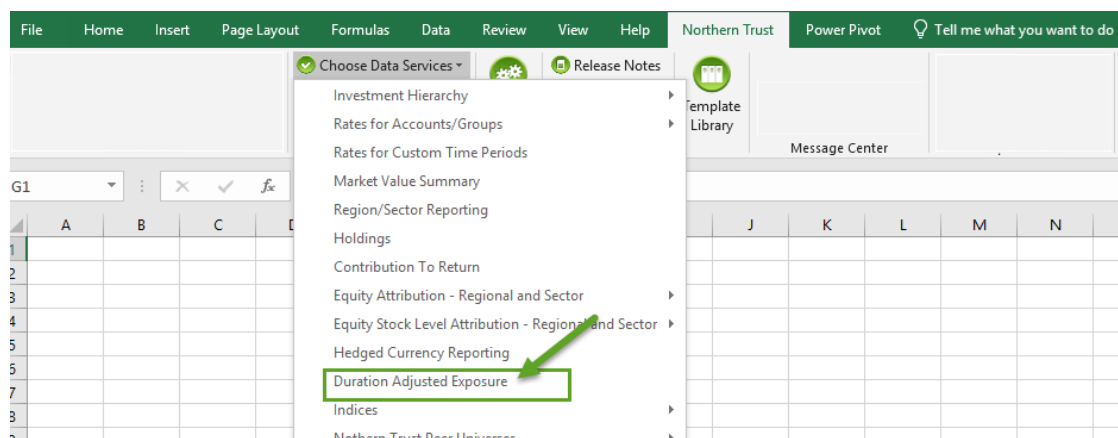
*Account / Group ID	*Performance Object Type	*Reference Date	*Sector / Regional Display	1 Month
658605	Template	9/30/2012	Sector And Regional Detail	Y

*Account / Group ID	*Account / Group Name	*Category / Geo Name	*Template Name	Time Period	Acct /
2290090	Small Cap	Small Cap Manager	Sector Attribution	1Month	
2290090	Small Cap	Equity	Sector Attribution	1Month	
2290090	Small Cap	Consumer Discretionary	Sector Attribution	1Month	
2290090	Small Cap	Consumer Staples	Sector Attribution	1Month	
2290090	Small Cap	Energy	Sector Attribution	1Month	
2290090	Small Cap	Financials	Sector Attribution	1Month	
2290090	Small Cap	Health Care	Sector Attribution	1Month	
2290090	Small Cap	Industrials	Sector Attribution	1Month	
2290090	Small Cap	Information Technology	Sector Attribution	1Month	
2290090	Small Cap	Materials	Sector Attribution	1Month	
2290090	Small Cap	Telecom Services	Sector Attribution	1Month	
2290090	Small Cap	Utilities	Sector Attribution	1Month	
2290090	Small Cap	Miscellaneous	Sector Attribution	1Month	
2290090	Small Cap	Cash & Short Term Deriv.	Sector Attribution	1Month	
2290090	Small Cap	Pending Cash	Sector Attribution	1Month	

Account_Name	Template_Name	Template_
Small Cap	Equity Attribution	674714
Small Cap	Sector Attribution	658605
Small Cap	R2000 Sector Attribution	658606

Duration Adjusted Exposure Data Service

The Duration Adjusted Exposure data service defines output to analyze fixed income mandates managed against liability driven benchmarks. This holdings' based output displays market values of all securities held in the accounts adjusted by a duration ratio. Output is expressed as the duration of the security divided by total account duration.



*Account / Group ID	Performance Object Type	*Reference Date		
123456	Account	3/30/2012		
*Account / Group ID	*Account / Group Name	*Security Name	MarketValue+Accruals	Duration Adjusted Market Value
123456	Liability Hedged Acct	RPI AUD UBSWGB2L 15/06/2022 BQIH88WN0	13,761,636.00	17,174,110.54
123456	Liability Hedged Acct	IRS EUR 6MEURIB/ZERO 4.022% GSILGB2X 11/10/2016 BR342HA68	274,744,067.06	124,883,666.85
123456	Liability Hedged Acct	RPI 15/12/2021 BQIH47C1	-50,000,000.00	-42,136,363.64
123456	Liability Hedged Acct	IRS AUD BBSW/6M 5.31% RBOSGB2RTCM 14/03/2013 BQI0S1BQ1	230,481,400.00	121,317,027.82
123456	Liability Hedged Acct	RPI EUR 2.4617%EUR CPI X-TOB BARCGB22 26/07/2037 BQI04B145	38,370,763.36	230,724,154.06
123456	Liability Hedged Acct	IRS AUD BBSW/6M 6.8575% NATAAU3303T 16/07/2022 BR34D4318	101,782,576.00	68,334,562.84
123456	Liability Hedged Acct	IRS AUD BBSW/6M 4.41% CITIAU2X 23/02/2034 BQI0JL2W4	90,206,029.20	113,577,591.31
123456	Liability Hedged Acct	IRS 03-02-2042 BQIHMTBM1	-39,800,144.25	-193,793,734.65
123456	Liability Hedged Acct	INF SWAP 01/12/2043 BR34LEY43	-122,164,608.31	-345,947,958.99
123456	Liability Hedged Acct	IRS EUR 6MEURIB/12M 4.547% UBSWGB2L 18/05/2017 BR3UXXY8	89,098,954.34	35,477,583.64
123456	Liability Hedged Acct	RPI EUR 2.3975%EUR CPI X-TOB GSILGB2X 26/07/2022 BQI04B0N4	231,039,671.06	212,136,425.25
123456	Liability Hedged Acct	RPI AUD 2.475%AU CPI MACQAU2S 15/03/2030 BQI0K0SP5	63,489,708.00	100,660,046.14
123456	Liability Hedged Acct	RPI AUD 2.5%AU CPI DEUTAU2S 15/03/2019 BQI0JW2X8	363,642,556.10	209,590,345.97
123456	Liability Hedged Acct	RPI AUD BOFAAUSX 15/06/2022 BQIHKG50	148,430,235.00	128,864,431.30
123456	Liability Hedged Acct	RPI AUD 3.075%AU CPI RBOSGB2RTCM 15/06/2021 BQI1AW3D8	35,353,990.00	74,202,741.31
123456	Liability Hedged Acct	RPI AUD 2.0%AU CPI ABNAU2B 15/12/2028 BQI0GEB7	112,053,770.00	161,357,428.80

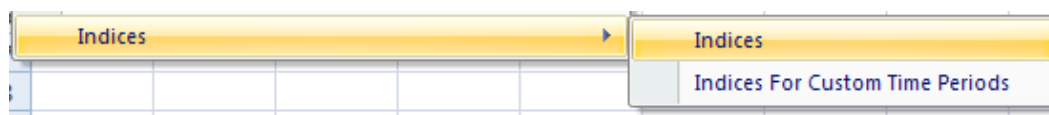
Note: The duration adjusted exposure data service requires a special setup which needs to be applied to each account/group. If you are interested in using our duration adjusted exposure service, please contact your Northern Trust representative so they can verify whether this setup has been applied to your accounts/groups.

Indices Data Services

The Indices data service provides performance returns, characteristics, and risk statistics on various indices you define through the index search tab in the data services window.

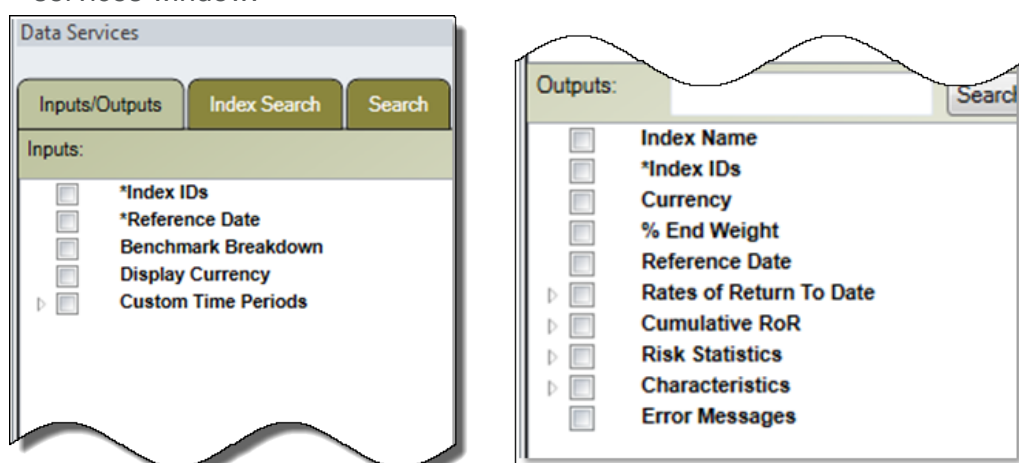
There are two data service offerings for indices.

1. **Indices:** Typically used if you simply want to retrieve performance results for predefined time periods (i.e. 1 month, 3 months, YTD, 1-3-5 Years) as of a particular “reference date”.
2. **Indices for Custom Time Periods:** generally used to call a historical stream of daily, monthly, or annual time periods defined by the end user through a “start & end date”.

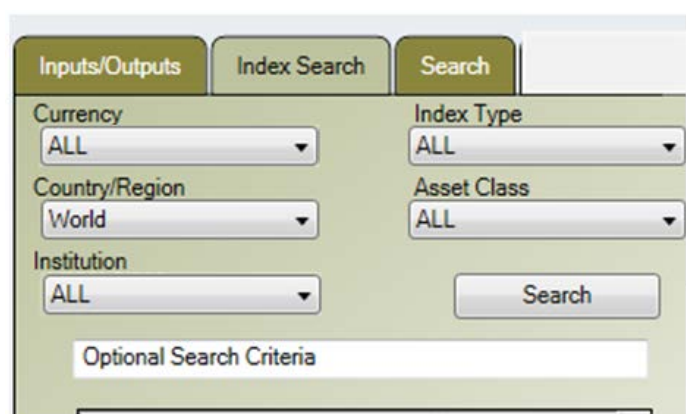


Indices data service:

1. After selecting the “Indices” option, select desired inputs/outputs from the data services window.



2. Click on the **Index Search** tab to search on the indices you wish to call. A series of drop down options will display in the Search tab. These options are used to filter on the indices you elect to call.



3. Use the filtering options to identify your desired index needs. Additionally, there is a key word search function when you know some or all of the index name.

In the below example, we are looking for the S&P 500 index in USD. A simple setting of USD in the “Currency” option along with a change in “Institution” to “Standard & Poor’s” yields search results which meet selected filtering criteria.

The screenshot shows the 'Index Search' window with the following settings:

- Currency:** USD - United States dol
- Index Type:** ALL
- Country/Region:** World
- Asset Class:** ALL
- Institution:** Standard & Poor's

The 'Optional Search Criteria' table lists the following results:

Index_Name	Category
30% S&P 500 Net Dividend	Total Fund Gross
Allianz PHSA S&P Benchmark	Total Fund Gross
BSE Mid-Cap (USD) Index-Net	Total Fund Gross
CG EPAC Net	Total Fund Gross
Consumer Staples ex Tobacco	GIC Consumer Sta
DO NOT USE S&P 600	Total Fund Gross
DO NOT USE***S&P 400 MidCap	Total Fund Gross
EAM S&P 500	Total Fund Gross
HighClerc Custom Index	Total Fund Gross
Industrial Select SPDR	Total Fund Gross
S&P 100	Total Fund Gross
S&P 100 EQUAL WEIGHT INDEX	Total Fund Gross
S&P 1000 Index	Total Fund Gross

- Once a desired index is found in the search window, drag to a location in your spreadsheet. You will note, doing so will convert cell to a Northern Trust Index ID.

The screenshot shows the 'Index Search' window on the left and a spreadsheet on the right. The spreadsheet has columns A through F. In cell A4, the value '1073759394_303_1' has been dragged from the search results. A red arrow points from the 'S&P 100' entry in the search results to cell A4. The spreadsheet also shows headers for columns C, D, E, and F: '*Index IDs', '*Reference Date', 'Display Currency', and '1 Mo RoR'.

You can define a single index or multiple indices through a series of drag and drops. In this example, four indices have been defined through the index search tab and dropped in column A. An array was defined in cell C4 to link to the ID's in column A.

The screenshot shows a spreadsheet with columns A through F. In column A, four index IDs have been entered:

- 1073753860_303_1
- 1073757211_303_1
- 11084_303_6319
- 1073765263_303_1

In cell C4, the formula '=A7:A10' is entered, linking to the four index IDs in column A. The spreadsheet also shows headers for columns C, D, E, and F: '*Index IDs', '*Reference Date', 'Display Currency', and '1 Mo RoR'.

- Once you have defined your index/indices and dragged them to your spreadsheet, click the **Get Data** button in the dataservices window.

A call will be made to the NT servers and your indices data will be represented in the output.

In our example an array; **Reference Date**; and **Display Currency** was defined, and the indices data represented in the output.

	A	B	C	D	E	F	G	H
1								
2								
3			*Index IDs	*Reference Date	Display Currency			
4			1073753860_303_1	9/30/2012	Base			
5								
6			Index Name	*Index IDs	Currency	1 Mo RoR	3 Mos RoR	1 Yr RoR
7			S&P 500	1073753860_303_1	USD	2.584169067082	6.351536510517	30.202013657435
8			Russell 2000	1073757211_303_1	USD	3.283812136743	5.253151360640	31.908042620879
9			ML US Treasury 1-10	10979_303_6590	USD	-0.044520068994	0.647546177858	2.599915303373
10			CG 3 Month US T Bill	1073765263_303_1	USD	0.007783088539	0.021792484086	0.053975874152
11								
12								
13								

Indices for Custom Periods data service:

The Indices for Custom Periods data service can be used in place of the Indices dataservice if you want to call a string of historical data on defined indices.

A highlighted feature of this dataservice is that you can define a start / end date and retrieve rolling days, months, quarters, or annual periods simply by selecting the appropriate option in the “Frequency” input.

In the example below, a start and end date have been defined along with the Frequency option “Calendar Quarters”. By simply selecting the desired frequency option, you can easily define historical results according to your preference.

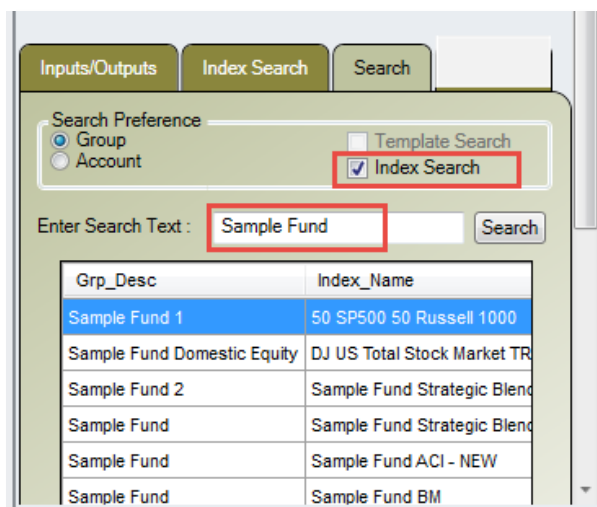
	A	B	C	D	E	F	G
1							
2		*Index IDs	*Start Date	*End Date	Frequency		
3		1073750811_303_1	12/31/2014	5/31/2016			
4	1073750811_303_1						
5	1073759394_303_1	Index Name	*Index IDs	*Start Date		Currency	Rates of Return
6	14102_303_8744						
7	1073753860_303_8804						
8							
9							
10							
11							
12							
13							

	A	B	C	D	E	F	G
1							
2		*Index IDs	*Start Date	*End Date	Frequency	Display Currency	
3		1073759394_303_1	12/31/2014	5/31/2016	Calendar Quarters	Base	
4	1073759394_303_1						
5	1073757211_303_1	Index Name	*Index IDs	*Start Date	*End Date	Currency	Rates of Return
6	10979_303_8978	S&P 100	1073759394_303_1	12/31/2014	3/31/2015	USD	-0.703439166807
7	1073768738_303_1	S&P 100	1073759394_303_1	3/31/2015	6/30/2015	USD	0.695295956718
8		S&P 100	1073759394_303_1	6/30/2015	9/30/2015	USD	-6.606489430632
9		S&P 100	1073759394_303_1	9/30/2015	12/31/2015	USD	7.447516219430
10		S&P 100	1073759394_303_1	12/31/2015	3/31/2016	USD	0.164016732362
11		Russell 2000	1073757211_303_1	12/31/2014	3/31/2015	USD	4.315261736205
12		Russell 2000	1073757211_303_1	3/31/2015	6/30/2015	USD	0.420917177997
13		Russell 2000	1073757211_303_1	6/30/2015	9/30/2015	USD	-11.917792680388
14		Russell 2000	1073757211_303_1	9/30/2015	12/31/2015	USD	3.593771620691
15		Russell 2000	1073757211_303_1	12/31/2015	3/31/2016	USD	-1.518508258530
16		ML US Treasuries/10979_303_8978		12/31/2014	3/31/2015	USD	1.316549877065
17		ML US Treasuries/10979_303_8978		3/31/2015	6/30/2015	USD	-0.438122146737
18		ML US Treasuries/10979_303_8978		6/30/2015	9/30/2015	USD	1.215630711103
19		ML US Treasuries/10979_303_8978		9/30/2015	12/31/2015	USD	-0.842547321012
20		ML US Treasuries/10979_303_8978		12/31/2015	3/31/2016	USD	2.267179805097

TIP: To validate whether you selected the correct index from the search screen, you can “hover over” the comments flag in the cell to see the index name and other corresponding information related to the index.

5187 303 1	World ND , Total Fund Gross of Fees , MSCI AC World ND , World , Structured Index
------------	--

TIP You can easily search on indices that are assigned to your accounts and or groups by selecting the Acct/Group Search Tab / check the Index Search box / enter in your Group Name or Account ID in the “Enter Search Text” box.



The screenshot shows a software interface with three tabs: "Inputs/Outputs", "Index Search", and "Search". The "Index Search" tab is active. Below the tabs, there are search preferences: "Search Preference" with radio buttons for "Group" (selected) and "Account", and checkboxes for "Template Search" (unchecked) and "Index Search" (checked). Below these is a text input field labeled "Enter Search Text :" containing the text "Sample Fund", followed by a "Search" button. At the bottom, a table displays search results with two columns: "Grp_Desc" and "Index_Name".

Grp_Desc	Index_Name
Sample Fund 1	50 SP500 50 Russell 1000
Sample Fund Domestic Equity	DJ US Total Stock Market TR
Sample Fund 2	Sample Fund Strategic Blend
Sample Fund	Sample Fund Strategic Blend
Sample Fund	Sample Fund ACI - NEW
Sample Fund	Sample Fund BM



PLEASE NOTE: Legal: Use of the Northern Trust indices data service may be limited based on your contractual rights to view vended index information. You may attempt to search on a common index however, information may not display in the search window. Specific use of index information is required to have appropriate contractual agreements signed off with the Northern Trust Index Team. If you are in need of vended index information you do not have legal access to, please contact your Northern Trust representative for more information.

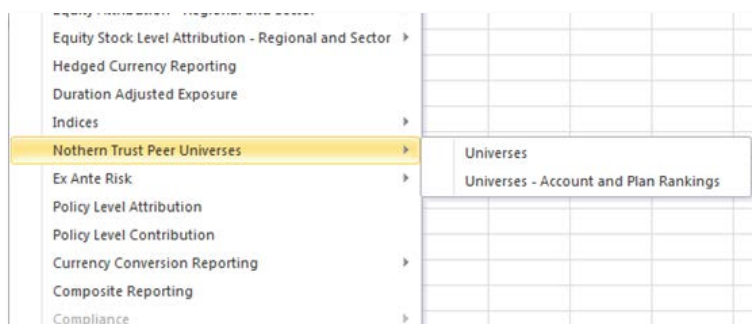
Northern Trust Peer Universes Data Services

The Northern Trust Peer Universes data services provide you Data Direct output on over 75 North American plan, program and manager universes. You can view rate of return and asset allocation results, characteristics, and various risk statistics to assist in the analysis on how our clients own performance results ranked against their peers.

There are two data service offerings:

Universes: provides peer performance data whereby you can customize breakdown points by percentiles, deciles, quartiles, or median.

Universes – Account and Plan Rankings: allows you to define one of your own manager accounts or groups and have these “ranked” against the peer group of choice.



Universes:

	A	B	C	D	E	F
1	*Universe Name	*Reference Date	Display Options	RoR Category Preference		
2	Foundations & Endowments	6/30/2013	Percentiles Display	Total Fund		
3						
4	*Universe Name	*Reference Date	*Percentiles	Market Value	1 Yr (M) Standard Deviation	1 Yr RoR
5	Foundations & Endowments	6/30/2013	1	9,943,182,763.44	8.826	23.285
6	Foundations & Endowments	6/30/2013	2	7,455,511,313.77	8.285	22.003
7	Foundations & Endowments	6/30/2013	3	6,778,020,754.10	6.987	21.054
8	Foundations & Endowments	6/30/2013	4	6,317,798,750.99	6.458	19.774
9	Foundations & Endowments	6/30/2013	5	5,642,514,698.11	6.323	19.499
10	Foundations & Endowments	6/30/2013	6	5,361,145,824.56	6.278	18.496
11	Foundations & Endowments	6/30/2013	7	5,038,924,332.71	5.916	17.461
12	Foundations & Endowments	6/30/2013	8	3,943,012,184.73	5.742	17.003
13	Foundations & Endowments	6/30/2013	9	3,136,636,827.66	5.683	16.637
14	Foundations & Endowments	6/30/2013	10	2,876,287,001.20	5.600	16.393
15	Foundations & Endowments	6/30/2013	11	2,611,378,865.18	5.548	15.848

Universes – Account and Plan Rankings:

	A	B	C	D	E	F
1	*Universe Name	*Reference Date	*Perf Object ID / Account ID	*Perf Object Type	Display Options	Benchmark Display
2	Small Cap	6/30/2013	2290090	Account	Standard Reporting Display	Primary
3						
4	*Universe Name	*Reference Date	*Percentiles	1 Yr RoR	1 Yr (M) Standard Deviation	
5	Small Cap	6/30/2013	10	32.983	10.870	
6	Small Cap	6/30/2013	25	28.432	9.755	
7	Small Cap	6/30/2013	50	25.493	8.700	
8	Small Cap	6/30/2013	75	21.732	7.842	
9	Small Cap	6/30/2013	90	18.659	7.361	
10	Small Cap Mgr	6/30/2013	--	25.106	8.825	
11	Account/Group Rank	6/30/2013	--	56	45	
12	Russell 2000	6/30/2013	--	24.206	8.848	
13	Index Rank	6/30/2013	--	68	45	

Policy Level Attribution and Policy Level Contribution Data Services

Policy Level Attribution (PLA) and Contribution (PLC) data services help clients understand how their investment strategy and manager returns impact their overall plan performance.

Policy Level Attribution provides detailed output depicting how your investment strategy and manager's returns impacted the "Total Plan" performance.

Policy Level Contribution provides analysis on how decisions within an investment strategy contributed or detracted from overall performance. This data service provides a comprehensive overview at various policy levels customized to meet the reporting needs of any investment hierarchy.

These data services requires a special setup which needs to be applied to your overall Plan. If you are interested in using either of these services, please contact your Northern Trust representative so they can verify whether this setup has been applied to your plan hierarchy.

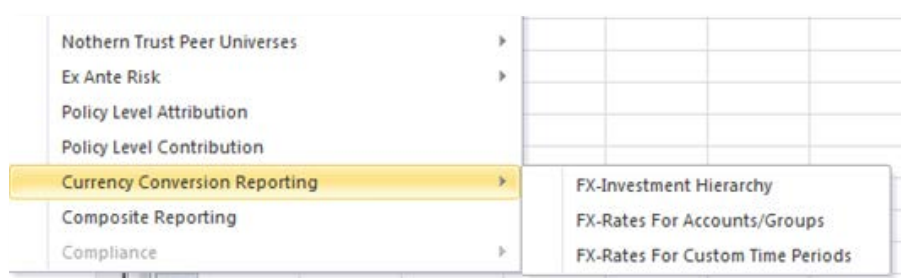
*Group ID/Template ID	*Performance Object Type	*Reference Date	Summary/Detail	3 Months					
1073829020	Group	6/30/2013	Detail	Y					
Account/Group Name	Time Period	Benchmark Name	Acct/Grp End Weight	Benchmark End Weight	Asset Allocation	Stock Selection	Total Mgmt Effect	Acct/Grp Contribution to Return	Benchmark Contribution to Return
Demo Fund North America	3 Months	Demo Fund Policy Index	100.000	100.000	-0.726	-2.607	-3.315	-3.632	-0.328
Large Cap Equity	3 Months	Russell 1000	2.657	10.000	-0.225	-0.030	-0.255	0.039	0.264
Small Cap Equity	3 Months	Russell 2000	6.570	10.000	-0.137	-0.006	-0.143	0.201	0.313
International Equity	3 Months	MSCI EAFE GD	56.282	35.000	-0.135	-2.814	-2.946	-3.280	-0.216
Fixed Income	3 Months	BC Global Aggregate	32.599	34.000	0.041	0.203	0.244	-0.673	-0.954
Private Equity	3 Months	S&P 500 + 3%	0.917	5.000	-0.167	0.028	-0.139	0.057	0.182
Real Estate	3 Months	NCREIF Property Index	0.109	3.000	-0.087	-0.002	-0.089	0.001	0.078
Fund of Funds Composite	3 Months	HFR FOF: Diversified	0.776	2.000	-0.008	0.022	0.015	0.023	0.004
Commodities	3 Months	--	0.039	0.039	0.000	0.000	0.000	0.000	0.000
Cash	3 Months	90 Day T-Bill	0.052	1.000	-0.004	0.000	-0.004	0.000	0.000

Currency Conversion Data Services

Currency Conversion data services provide capability to convert account and consolidation market values, cash flows, and rates of returns from base currency to one of sixteen exchange options. Conversion of these performance outputs occurs instantaneously after currency parameter is defined and data calls are made to the Northern Trust servers.

There are three data service offerings:

1. FX – Policy Tree
2. FX – Rates for Accounts / Groups
3. FX – Rates for Custom Time Periods.



Accounting Data Services

Data Direct provides seven accounting data services.

1. Accounting – General Ledger Reporting:
2. Accounting – Holdings Reports:
3. Accounting – Taxable Reports:
4. Accounting – Transactional Reports:
5. Accounting – Source and App with Performance
6. Accounting – PE and AF Reports
7. Fund Accounting

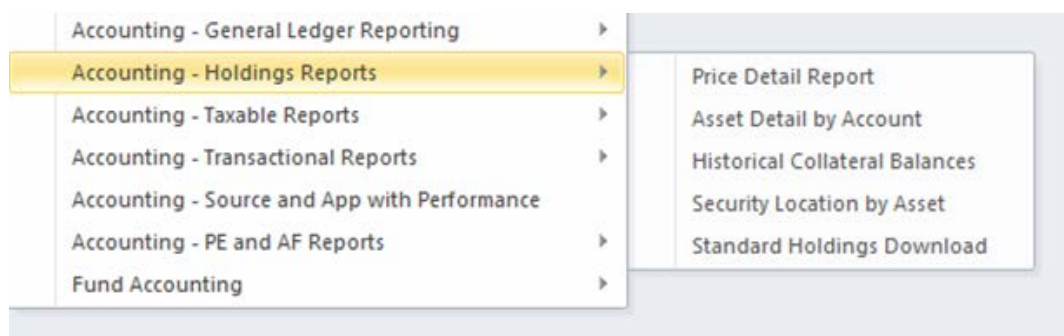
Accounting – General Ledger Reporting:

Supplemental reports Accounting –General Ledger Reporting Data Set has ten supplemental general ledger reports that can assist you in drilling down to the details supporting each ledger balance and/or activity. These are used with Northern's General Ledger premium Ledger Activity Trial Balance reports.



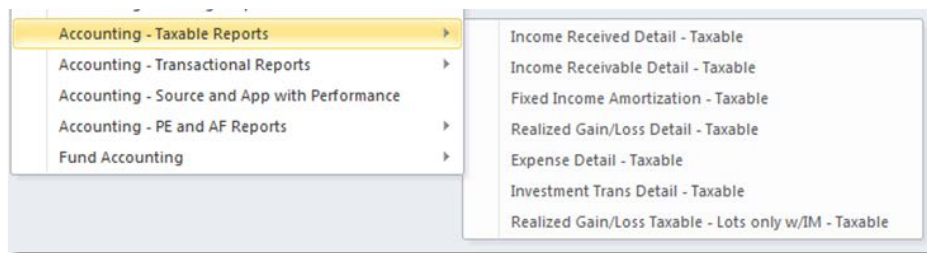
Accounting – Holdings Reports:

Holding templates work on **As of Date**



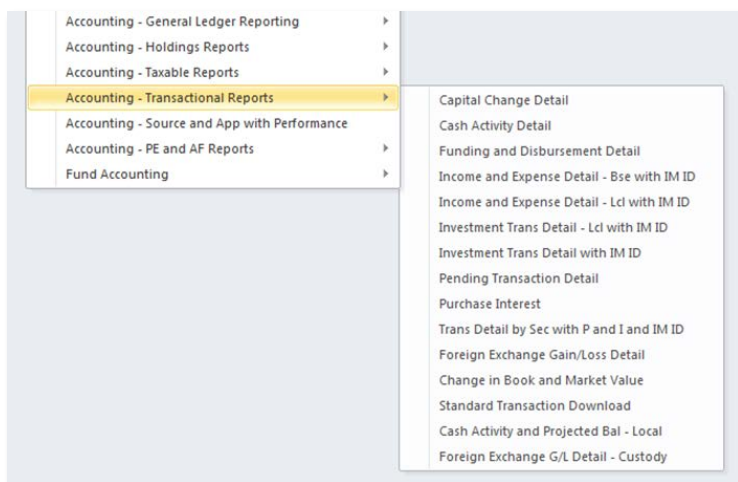
Accounting – Taxable Reports:

Taxable templates that will provide the user with taxable details within their accounts such as tax lots.

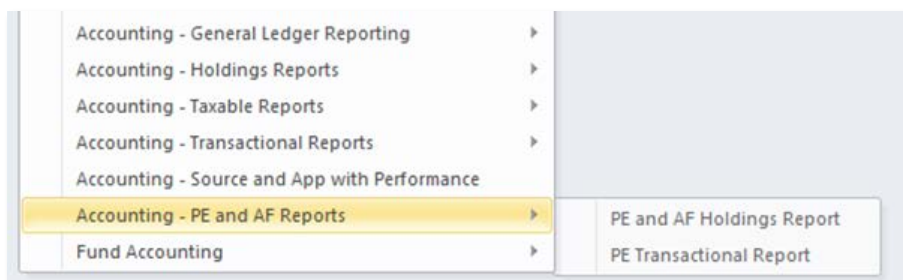


Accounting – Transactional Reports:

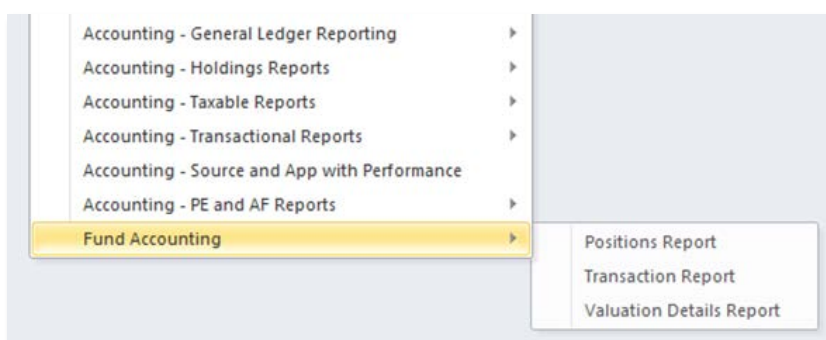
Transaction templates work on **from and through dates**



Accounting – PE and AF Reports:



Fund Accounting Reports:



Data Direct Scheduler

Data Direct Scheduler allows you to process data from previously saved reports at a scheduled date and time.

Reports can be scheduled on a preferred date, time and frequency from an existing or new Data Direct worksheet.

After subscribing to the service, you will see an additional tab that once selected, can enter desired delivery parameters.

The screenshot shows the 'Data Services' panel on the left side of an Excel worksheet. The 'Current Dataset' is 'Investment Hierarchy1'. The 'Display Orientation' is set to 'Row By Row'. The 'Data Options' are 'Current Dataset' and 'All Datasets'. The 'Last Refresh' is blank. The 'Inputs/Outputs' tab is selected, and the 'Schedule' button is highlighted with a blue box and a blue arrow. The worksheet data is as follows:

*Group ID	*Reference Date	Display Options	Category
1073829020	7/31/2017	Investment Hierarchy	Total Fund Gross of Fees
Account / Group ID	Account / Group Name	Market Value + Accruals	1 Mo RoR

The screenshot shows the 'Data Services' panel on the left side of an Excel worksheet. The 'Inputs/Outputs' tab is selected, and the 'Schedule' button is highlighted with a blue box and a blue arrow. The 'Schedule' dialog box is open, showing the following settings:

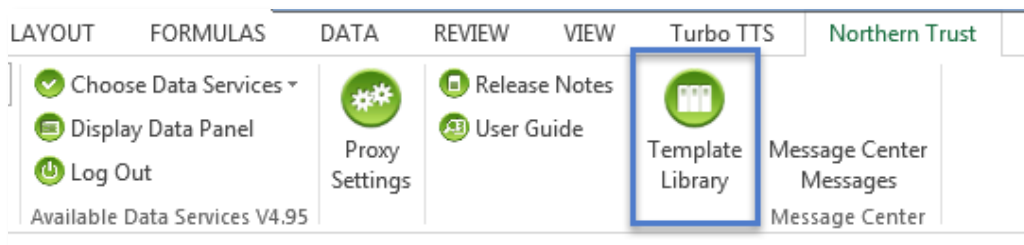
- Sponsor*: DEMO1
- Schedule Date: 9/22/2017
- Schedule Time: 12:15 (Local Time)
- Data Type: Internal
- Report Name: IH_Scheduled
- Frequency: Monthly
- Reference Date: 8/31/2017
- Output Format: Excel
- Send report to 3rd Party: ☐
- Destination: ORC Attach
- Buttons: Preferences, Save/Schedule, View Scheduled Reports

The worksheet data is as follows:

*Group ID	*Reference Date	Display Options	Category
1073829020	8/31/2017	Investment Hierarchy	Total Fund Gross of Fees
Account / Group ID	Account / Group Name	Market Value + Accruals	1 Mo RoR


Points of Interest

A template library is available for those who opt to use any of the available preformatted templates designed by Northern Trust. You can access this library by clicking the “Template Library” icon located on the Data Direct ribbon. A new browser window will open.



On the Template Library window, select the template you wish to download/save and follow steps in the Instructions tab of each workbook.

Please visit this site often for new template releases.

**NORTHERN TRUST**

Welcome!

Data Direct Report Library was designed to provide users access to download preformatted Excel templates. To get started, simply click on any available template below.

Templates Available for download:

Single Portfolio Holdings Template
This template introduces Top/Bottom Holdings and Sectors in Data Direct. It utilizes Pivot table to provide sorted Top/Bottom 5 holdings based on Market Value and Sectors based on Quarter to Date returns. Currently it is limited to single portfolio, either groups/accounts. Although it has first 5 holdings, the tables can easily be expanded to 10 or 15 holdings. It also uses Excel Conditional Formatting to show the data bars on each sorted items which helps to understand holdings weight/return in graphical form. This conditional formatting can be disabled easily. Data Direct user is provided in the report with single button to refresh all the pivot tables (existing) with ease. Feel free to experiment and let us know if you have any questions.
Ver 2.0, last updated on 23-March 2018

Single Portfolio Growth Over Time Template
This template is designed to provide monthly returns, and to calculate wealth ratio over the monthly returns.
Ver 2.0, last updated on 23-March 2018

Single Portfolio Excess Returns and Risk Stats
This report is designed to provide the user with account or account group returns and risk statistics for several periods and includes the option to specify a custom inception date for these measures.
Ver 1.0, last updated on 23-March 2018

Single Portfolio Rolling Excess Returns
This report is designed to provide the portfolio, benchmark and excess return for an account or account group using the selected frequency such as monthly, quarterly, etc.
Ver 1.0, last updated on 23-March 2018

Value Added and Risk Return from Inception
The 'Value Added and Risk Return from Inception' workbook provides two charts. The first is a Value added chart that shows a monthly excess return bar chart for an account vs its index from the inception date to the desired reporting month. In addition, a line is plotted for the same periods showing the cumulative excess return. The Risk Return chart shows the annualized gross of fee rate of return from inception to the desired reporting month for the account against its benchmark.
Ver 4.0, last updated on 23-March 2018

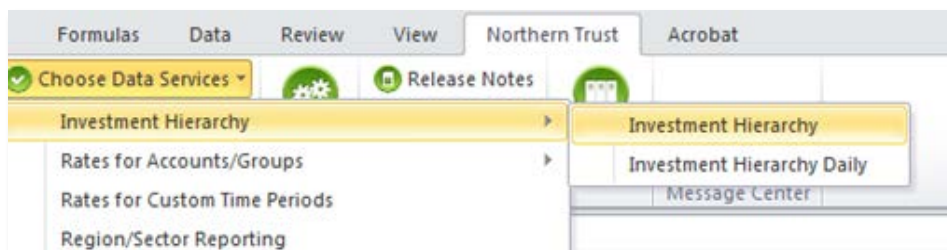
Feedback

For your convenience, we have created an initial series of templates based on common client tasks. We will be adding new templates on a regular basis. We invite you to help guide our template development by providing your feedback, wish lists, and ideas. Please [click here](#) and drop us a note. As always, thank you for your input!

You will note there are two data services for:

- Investment Hierarchy
- Rates for Accounts/Groups
- Equity Class and Stock Level Attribution.

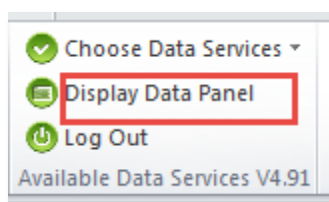
Those data services with “**Daily**” in the name support client accounts valued *daily* on the Northern Trust Performance Calculation Engine.



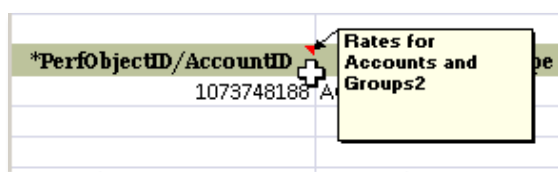
Rates for Custom Time Periods and **Holdings** support both monthly and daily valued accounts and groups. Monthly accounts and groups can utilize the daily data services for Investment Hierarchy Daily and Rates for Accounts/Groups Daily to view month to date or best available information for daily periods.

***Please Note:** Access to month date performance information requires a unique setting on your Trust Hierarchy. If your accounts are valued monthly and you are interested in reviewing “best available” daily performance, please contact your Northern Trust representative for assistance.*

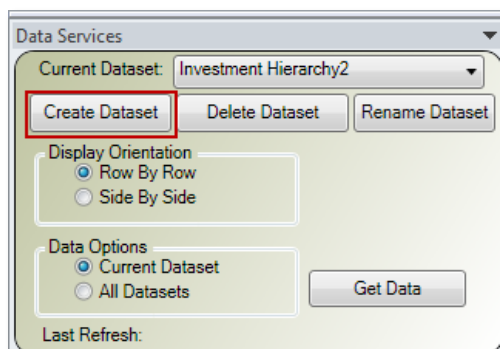
If you close out of the “floating ribbon”, you can re-launch by selecting the “Display Report Panel” button within the data services window.



If you have multiple web services setup you can always reference which web service applies to the data represented in your spreadsheet by placing your mouse pointer on the “comment flag” located in the upper right hand corner of each input/output cell.



A new web service can be called from an existing web service by clicking the “Create New Data Set” button. This will not duplicate your chosen inputs and outputs; this simply allows you to define a new set of inputs and outputs within your spreadsheet.

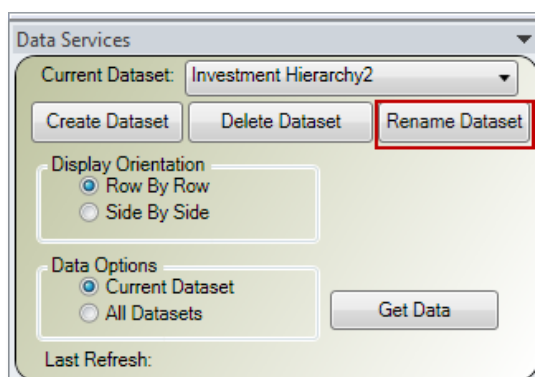


If a data service is no longer needed, you can delete the dataset by selecting the “Delete Dataset” button. This will be followed by a confirmation message asking you to confirm your option to remove the data set.

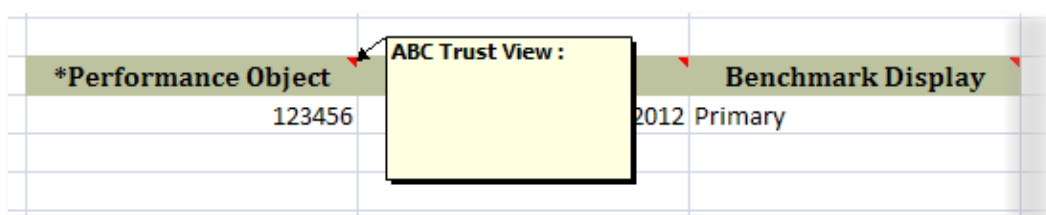
All input / output headers along with any existing data called using this data set will automatically be removed from your spreadsheet.

Data Direct allows you to modify the names of a Dataset by selecting the “Edit Dataset” button as follows:

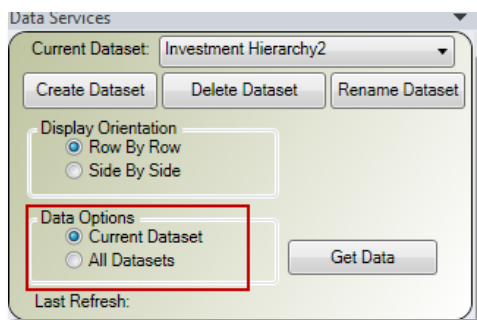
1. Within the Data Services window select **Rename Dataset**.
2. Enter a New Dataset Name.
3. Click **OK**.



You may still reference names of existing datasets within a spreadsheet by “hovering over” your input/output headers.

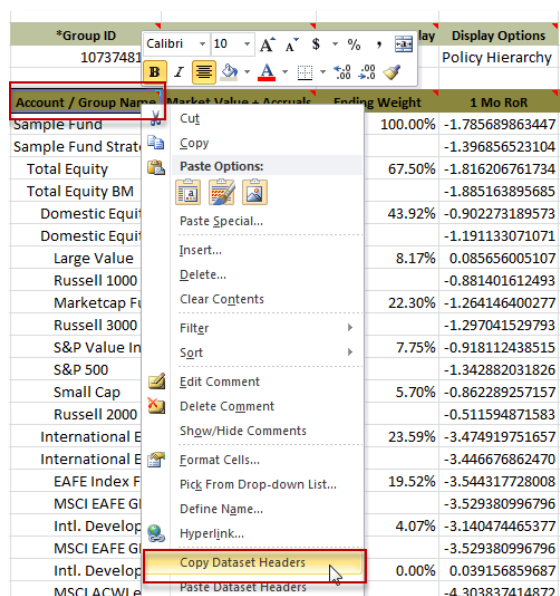


If multiple web services are setup in a workbook, you have the ability to either refresh a single (“Current dataset only”) or “All datasets”. This option applies a refresh of all data across multiple workbook tabs.

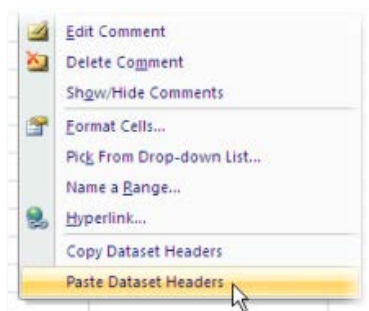


You also have an option to copy existing dataset headers. Performing this step will duplicate and existing setup by creating a new dataset.

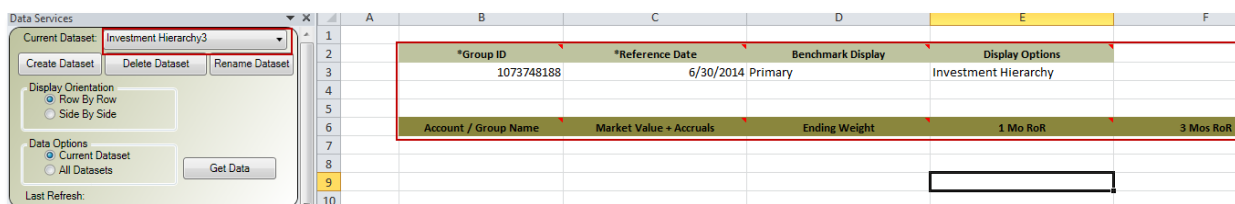
1. Highlight a cell within your inputs.
2. Right mouse click and select “Copy Dataset Headers”.



3. Place your mouse in an area of the spreadsheet/workbook you would like to paste headers.
 4. Right mouse click and select “Paste Dataset Headers”.
- You can then make changes to the inputs and refresh or simply refresh based on the current input parameters.

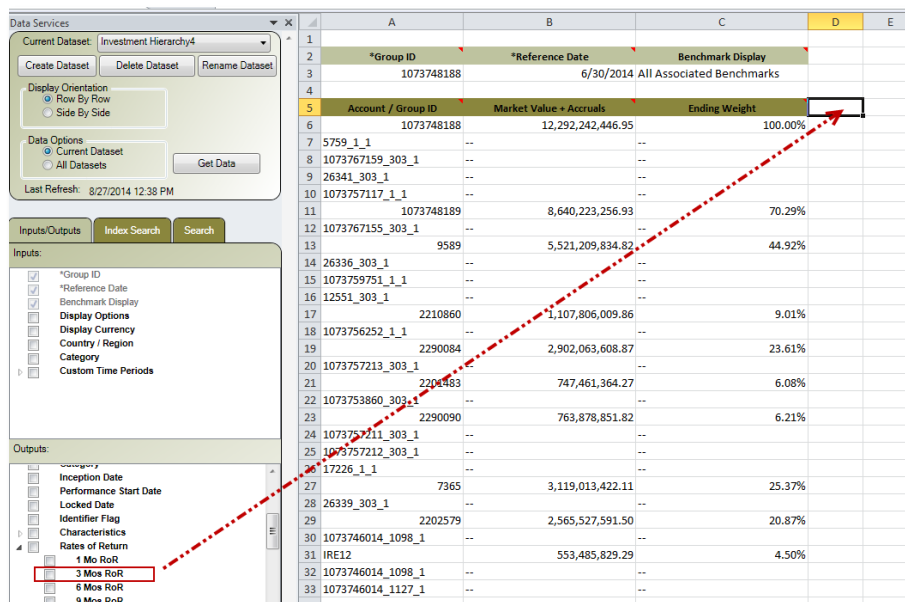


Headers for inputs and outputs will display in your worksheet. Additionally, you will note a new/duplicate dataset has been created in your floating pane.



To move an input/output header from a dropped location to another location within a spreadsheet:

1. Delete the original input/output header by highlighting header cell and using the delete button on your keyboard.
PLEASE NOTE: Right mouse click/delete is not recommended.
2. Once the original header is deleted, it will again become enabled in the floating pane. Simply drag and drop to the desired “new” location in your spreadsheet.



Supported methods for adding/deleting columns/rows/cells in Data Direct

1. Select any entire Column/Row which does **not** contain Headers and right click and select Delete/Insert. This should not affect the existing headers and should bring back the data intact.
2. Select any entire Column/Row which contains Headers and right click and select Delete. This would prompt for a message saying "Contains Header. Do you wish to continue?" If the user selects "Yes", the column will be deleted and the respective headers will be enabled in the Report Panel. If the user selects no, nothing would happen.
3. If you select a cell and then right click and select Delete/Insert, and then select "Entire Row"/"Entire Column" this would impact the headers. This functionality is not supported.
4. If you select a cell and then right click and select Delete/Insert, and then select "Shift cells up/down"/"Shift cells right/left", this would impact the headers. This functionality is not supported.
5. If you drop an input or output in a cell however, elect to have the header placed in another cell, user should delete (using the delete button on keyboard) and re-select the input/output from the query panel.
6. Once deleted, the option should become enabled for re-selection.

Appendix – Explanation of Major Inputs and Outputs

Inputs

Account / Group ID – Required input used to define your account number or group ID. Group ID can be located in the data services (Green) tab labeled “Acct/Group Search”. Here you simply need to enter in the group name and select “Go” for a list of available group names that match your freeform text. Once you locate the group name, drag to the cell below the input labeled “Account / Group ID”.

Benchmark Display – Not a required input selection. By default the data service will not display associated benchmark information for selected output parameters. To display benchmark information, the input parameter “Benchmark Display” must be selected. Once selected, you have the option to select via the drop down “Primary”, “Secondary”, “Primary & Secondary” or “All Associated Benchmarks”. Your selection will determine which benchmarks will be displayed below each account/group. The index assignments are determined by your Northern Trust representative.

Category - Not a required input selection. By default, the data service will display results at the “Total Fund Gross of Fees” level. If another category is preferred, (i.e. Total Fund Net of Fees), the user would select the input parameter “Category”. Once selected, you will note a drop down of available categories will be displayed.

Country/Region – Not a required input selection. By default, the data service will display results at the “World” level which encompasses all regions/countries. To display results for a particular country or region, the input parameter “Country / Region” must be selected. Once selected, you will note a drop down of available countries / regions will be displayed. If for example a user is interested in displaying market values and rates of returns for all countries excluding the United States, the option “World less United States” should be chosen.

Custom Time Periods – This input parameter allows you to define a custom period by inputting a start (CTP1.Start Date) and end date (CTP1.End Date). Once the start and end dates have been defined, a CTP option is available for selection under rates of returns and risk statistics. Output parameters such as Market Value, Ending Weight, and Characteristics will always be displayed as of the date entered under the input selection “Reference Date”.

Display Currency – Not a required input selection. By default the data service will display results in base currency assigned to accounts / groups. Once selected, you are offered two options in a drop down, “Base” or “Local”. Either option selected will dictate whether performance returns are displayed in base or local currency.

Display Options – Offers drop down options “Policy Hierarchy”, “Groups Only” or “Accounts Only” in the Policy Tree dataservice. You can select the level of detail they wish to display in generated output. By default, the dataservice will automatically display the entire hierarchy (Groups + Accounts) if input goes unselected.

Display Preference – Input option found in the holdings dataservice. This input parameter option offers three filtering options within a drop down- Holdings, Holdings by Sector, and Holdings by Country. Selection of “Holdings” will display all holdings in alphabetical order. “Holdings by Sector” will display a breakdown of all holdings segmented by individual sector. “Holdings by Country” will filter each holding by individual country.

Frequency – Input option found in the indices for custom periods and rates for custom time periods (late 2012) dataservices that provide a drop down of available options including a variety of rolling and calendar time period options. This input is used in conjunction with a defined start & end date.

Hedged Currency Display – Provides two drop down options in the Hedged Currency Reporting dataservice – “Hedged Currency Summary” or “Hedged Currency Detail”. Selecting either of the two options will dictate whether you display top level information or a more detailed breakdown of various categories.

Holdings Display – Input parameter in Equity Stock Level Attribution – Regional & Sector. Filtering parameter when *Sector / Regional Display Type equals “Holdings’ or “Detail & Holdings”. Provides the option to display “All Holdings”, “Top 10 / Bottom 10”, or “Top 25 / Bottom 25”.

***Performance Object** – Required input selection parameter. Performance Object is a Northern Trust backend ID that is assigned to all master trusts. This ID can be obtained through Fundamentals (Policy Tree). Directions on how to display Performance Object ID in Fundamentals is as follows:

On menu bar locate “Summary → Preferences → In Global Reporting Preferences Screen → Account/Group Display drop down → Account/Group Name & ID → Set as Default

***Performance Object Type** (or *Perf Object Type) – Required input selection parameter for Rates for Accounts / Groups (Monthly & Daily), Ex Ante Risk – Barra One, Ex Ante Risk Historical Simulation Model, Equity Attribution – Regional & Sector (Monthly & Daily). This input parameter is used to define whether the output is for an account or group. Once selected, a drop down allows you to select “Account” or “Group”.

***Reference Date** – Required input selection parameter. Reference Date serves as an “as of date” for the displaying of selected output parameters such as market value, characteristics, and rates of returns for predefined time periods – I.e. 1 year, 3 years, Inception to Date. *Note: If user selects the custom time period option (CTP), selected output items such as market values, ending weight and characteristics will be displayed as of the “Reference Date”. You will note there is a CTP output option available for rates of returns and risk statistics. In this case, rates of returns and risk statistics will reflect results for user defined period CTP1 Start Date thru CTP1 End Date.*

***Sector / Regional Display** – Input parameter for the Equity Attribution – Regional & Sector data services. This input parameter defines the desired level of display for attribution output results. There are five options for you to choose. “Sector Summary”

provides top level single row (sector class level) summary information for an account or group (i.e. Total account sector attribution). “Sector Detail” will display attribution results for top level and all sectors*. “Regional Summary” provides top level regional attribution results for accounts and groups. “Regional Detail” displays results for top level and regional/country components*. “Sector and Regional Summary” combines multiple sector and regional summary line information for accounts and groups. “Sector and Regional Detail” displays attribution results for top line and all sector/regional components*.

**Level of detail as defined through the setup applied by your Northern Trust representative.*

***Sector / Regional Display Type** – Input Parameter within the Equity Stock Level Attribution – Regional & Sector. This parameter defines level of detail desired in output. There are four options to choose via the dropdown – “Summary”, “Detail”, “Holdings”, or “Detail & Holdings”. “Summary” will display top level (total account) stock level attribution results, “Detail” displays top level and sectors/regions/countries, “Holdings” displays individual securities, and “Detail & Holdings” displays sectors/regions/countries along with security details. If choosing “Holdings” or “Detail & Holdings”, preference can be set on the number of holdings your wish to display – i.e. Top 10 / Bottom 10 , Top / 25 / Bottom 25, All Holdings – *see input option “Holdings Display”*.

***Sector / Regional Template** – Input Parameter within the Equity Stock Level Attribution – Regional & Sector. This input parameter defines output as “Sector” data, “Regional data”, or both “Sector & Regional”.

Template Type – Input parameter found in “Equity Attribution – Regional & Sector” (Regional, Sector, and Stock) data services. Presently the only option available through this drop down is the default “Primary Active”. This input parameter was added to allow you to select different attribution breakdowns as defined by your Northern Trust representative however, at the present time only one option is available. You need not select this input parameter since the default display for all attribution services will automatically be “Primary Active”.

Time Periods – This input parameter allows you to define the predefined time periods used to display attribution results. Results will be represented in row format when “time periods” is offered as an input parameter. The time periods selected will be displayed as of the user defined “Reference Date”.

Outputs:

% of Total – The ending weight assigned to securities held in each account or group (asset ending market value + accruals / account or group total market value + accruals).

Account / Group ID – Displays Northern Trust assigned account / group / Index ID's.

Account / Group Name – Displays account / group / index name

Accruals – Reports an ending accrual amount on groups/accounts/holdings.

Acct / Grp Avg Weight - (Account / Group Average Weight) Output parameter found in the Equity Attribution data services. Displays the average weight at each level for defined equity attribution breakdown.

Acct / Grp Base RoR – (Account / Group Base Rate of Return) Output parameter found in the Equity Attribution data services. Displays the base rates of returns for an account or group at each level in attribution output.

Acct / Grp End Weight - (Account / Group End Weight) Output parameter found in the Equity Attribution data services. Displays the end weight at each level for defined equity attribution breakdown.

Acct / Grp Local RoR – (Account / Group Local Rate of Return) Output parameter found in the Equity Attribution data services. Displays the local rates of returns for an account or group at each level in attribution output.

Acct / Grp Start Weight – (Account / Group Start Weight) Output parameter found in the Equity Attribution data services. Displays the start weight at each level for defined equity attribution breakdown.

Asset Allocation - Measure of the value added by the manager by choosing to overweight or underweight a sector relative to the benchmark.

Alternate ID – This output parameter allows for the display of client prescribed account or group identifiers – i.e. asset managers may have internal ID's they use to identify accounts. If you are in need of an alternate ID assignment to your accounts or groups, please contact your Northern Trust representative who can assist with the assignment of such ID's on our Performance Analytics Calculation Engine.

Alternate Name – This output parameter will display a secondary account or group name if applied on the Northern Trust Performance System. . If you are in need of an alternate name assignment on your accounts or groups, please contact your Northern Trust representative who can assist with the assignment of such ID's on our Performance Analytics Calculation Engine.

Benchmark Average Weight -Output parameter found in the Equity Attribution data services. Displays the benchmark average weight at each level for defined equity attribution breakdown.

Benchmark Base RoR –Output parameter found in the Equity Attribution data services. Displays the base rates of returns for a benchmark at each level in attribution output.

Benchmark End Weight - Output parameter found in the Equity Attribution data services. Displays the benchmark end weight at each level for defined equity attribution breakdown.

Benchmark Local RoR –Output parameter found in the Equity Attribution data services. Displays the local rates of returns for a benchmark at each level in attribution output.

Benchmark Name – Displays the assigned benchmark name in Equity Attribution data services.

Benchmark Start Weight – Output parameter found in the Equity Attribution data services. Displays benchmark start weight at each level for defined equity attribution breakdown.

Cash Flows – This collapsible folder contains six sub folders on cash flow information- Net, Positive, and Negative/Backdated Flows. Additionally, there are options to display Average Positive & Negative Days. Net flows are simply the sum of positive and negative flows. Positive flows are any contributions –cash, security in transfers, fee reversals, etc for a referenced time period. Negative flows are any distributions within an account- cash, security out transfers, fees, etc. Backdated flows are those flows that were determined to have been posted in a prior period. For example, if accounting determined in June a fee should have been posted in April, rather than reopening accounting, the flow is treated as a “backdated flow” and would post as a “day zero” flow in June. Lastly, the Average Positive & Negative Days provides an average day for +/- flows (offered as 1 month period). For example, if an account experiences a positive flow on day 1 or \$1000 and another on day 30 for \$1000, the average positive day would be the 15th.

Category Description – Displays category associated with output parameter Category / Geo / Security Name. For example security names will display associated sector / country / regional name.

***Category / Geo / Secty Name** – Depending on the preference set in inputs, this output parameter will display one or more of the following: Category – i.e. Consumer Durables, Technology, Equity. Geo – (Geographical / Region Name) i.e. United States, United Kingdom, Australia, Secty (Security Name) – i.e. Google, Qlogic Corp, Factset.

Change in Market Value – Output provides various time parameter options to display variation or change in market values from one period to the next.

Country – Displays the country assignment for each security within the holdings dataservice.

Country / Region – Displays the country / region name as defined through the input parameter “Country / Region”. If this input parameter is not selected, the default display will be “World”.

Cross Product – The difference in account weights vs. the index weight multiplied by the difference in account vs. index returns.

Cumulative Rates of Return – Output offering in the holdings dataservice. This option offers a number of time period preferences to report cumulative rates of returns. Time period options exist for periods greater than 1 year.

Currency - Displays currency in which calculations are derived.

End Date – Displays the end date for the output display. Selection parameter in Rates for “Custom Time Periods” as well as “Equity Attribution”.

Ending Weight – Displays ending weight for each account or group as of the user defined “Reference Date”. Ending weight is calculated as a percent of the total trust market value.

Excess RoR - The arithmetic difference between the account total fund rate of return and the benchmark rate of return.

Hedged Currency Effect - Evaluates the active currency management impact, as measured by the return of foreign exchange on the portfolio versus the benchmark.

Identifier Flag – Displays text tag on your Policy Tree to easily identify “Group”, “Account”, or “Index in each dedicated row of output. This provides an easy way to apply a conditional format to add bold, underline, italics to your output.

Inception Date – Populates the inception date of the account or group. If a fully funded date has been applied to an account or group, the inception date will display the fully funded date. *(Fully funded date is the date applied to an account or group as determined by the client. This date typically represents the period following the inception of the account when a manager has become fully vested and in compliance with defined mandates).*

Locked Date – Date applied by Northern Trust representative to define when performance data is considered audited/final.

Market Value – Displays account / group market values as of the date entered in the input parameter “Reference Date”. The default will display market values at the Total Fund Gross of Fees / World level or display user preference as defined through input parameters “Country / Region” and “Category”.

Market Value + Accruals – Displays the ending market value including accruals for each security held by account / group within the holdings dataservice.

Methodology – Displays whether attribution effects are arithmetically or geometrically calculated.

Policy Weights – Collapsible folder that offers three options – Policy Weight – Target, Policy Weight – Upper, & Policy Weight – Lower. If your Northern Trust consultant has your policy weight limits applied on our performance system, dataservices with this available output option allow for you to automatically display those weights in your output.

Relative Excess RoR - The geometric difference between the total fund rate of return and the benchmark rate of return.

Residual - Portion of the excess return that is not explained by the attribution analysis, typically caused by rounding.

Security Allocation - Measure of the value added by the manager by choosing to overweight or underweight a sector relative to the benchmark.

Security Cusip – Displays the cusip assigned to each asset.

Security ID – Displays the internal ID as assigned on the Northern Trust Performance Analytics Calculation Engine for each asset.

Security ISIN – Displays the international security identification number for each asset held.

Security Name – Displays the security name within the Holdings dataservice.

Security Rank – Ranks each security displayed by stock level attribution effects. If option is set to display Top / Bottom, security rank will be displayed as “Top: 1” Top: 2”...”Top: 10” and “Bottom: 10” Bottom: 9”...”Bottom: 1”.

Security Selection - Measure of the value added by the manager by the manager's selection of individual stocks within a sector.

Security Ticker – Displays the market ticker for each asset.

Shares – Displays shares held by account or group within the holdings dataservice.

Standard Deviation – Offers the option to display holdings based volatility for periods greater than 1 year.

Start Date – Displays the start date for the output display. Selection parameter in “Rates for Custom Time Periods” as well as “Equity Attribution”.

Stock Selection - Measure of the value added by the manager by the manager's selection of individual stocks within a sector.

***Template Name** – Available output in Equity Attribution data services. All attribution services are required to have a specific setup applied by your Northern Trust representative. When this setup is performed a unique name will be applied which can then be displayed in the attribution output. (i.e. “Equity Attribution Sector & Industries” or “Attribution breakdown by Region”).

***Time Period** – Available output in Equity Attribution data services. Displays the time period(s) as selected in the attribution inputs.

Total Mgmt Effect – (Total Management Effect) The difference between the total account return and the total benchmark return. A positive return reflects a positive contribution to

overall account returns vs. the index. A negative return conveys a negative contribution to overall management of the portfolio vs. the index.

Total Security Effect – Net effect depicting value added to portfolio derived from manager's selection of stocks and allocation choices to sectors/countries/regions.

Unhedged Currency Effect - A summation of the value added due to a manager's currency weighting decision and the manager's timing in moving in and out of a currency.

Contacting Northern Trust for Assistance

For Technical Help:

North America – 312-444-4357

Asia Pacific – 630-276-4357

United Kingdom - (0) 207- 982-4357

For general assistance, questions and comments on Data Direct, please contact your Northern Trust client service representative.

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