

FIXED INCOME CALCULATION API - VERSION 1.0  
Developer's Manual and Reference  
Sep 2020



## Fixed Income Calculation API – Version 1.0

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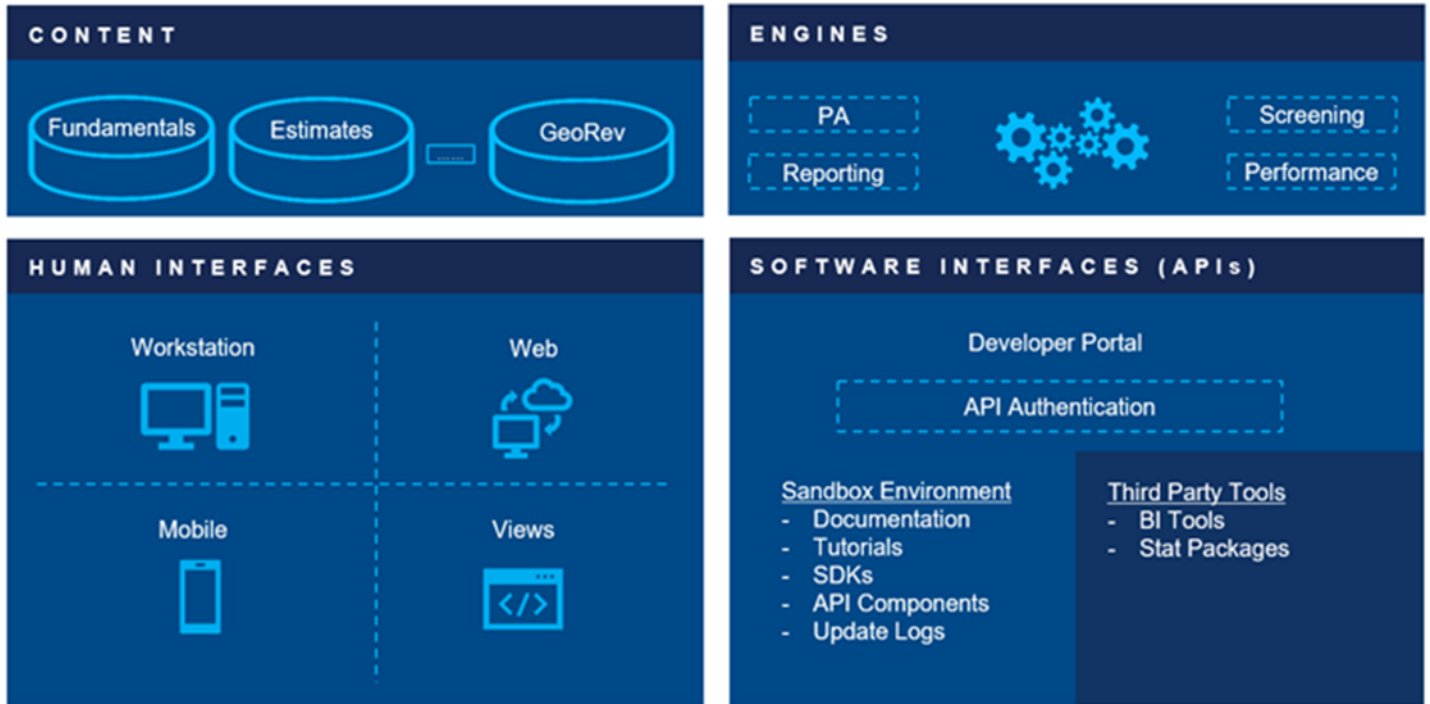
## 1. Motivation

In 1997, FactSet launched Portfolio Analysis 1.0, which set the foundation for Analytics. Soon after, Portfolio Analysis 2.0 integrated risk analytics from third-party vendors, and then expanded to include Fixed Income in 2004. FactSet now offers a robust suite of multi-asset portfolio analytics products that leads the market in flexibility, analytics, and breadth. Today, clients rely on FactSet for interactive analytics through various products, such as Portfolio Analysis (PA), SPAR, Alpha Testing, Optimizers, and Portfolio Dashboard, as well as the distribution of analytics through Portfolio Batchter, Publisher Flat Files, and Publisher documents.

## 2. API Program

### 2.1 Overview

Clients have been moving towards building a custom solution, driven by the need to increase productivity by consolidating information into a single user experience. By exposing analytics, performance, and risk through APIs, it provides you with a sophisticated channel to interact with FactSet’s leading multi-asset analytics. As the market continues to demand more transparency and data, FactSet will provide flexible options to meet those demands. APIs complement the current analytics suite offerings and facilitate partnerships by allowing you to build private experiences, integrate with third-party BI tools like Tableau, third-party stat packages like RStudio, and increase control over internal consumption of analytics from FactSet.



The first stage of exposing Analytics APIs focused on the portfolio analytics engine. Since inception, program has expanded to include other analytics engines, products, and APIs from other business units.

The program provides the following:

- Developer toolkit to build proof of concept
- Uniform feel across all FactSet's Enterprise scale APIs
- Adherence to industry standards
- Versioned APIs
- Extensive documentation and tutorials on the developer portal

### 3. FI Calculation API

Programmatically calculate advanced Fixed Income analytics on a universe of securities with FactSet's Fixed Income Calculation Engine. With an extensive inventory of analytics and automated calculations, go from data to decision first.

All APIs are hosted under <https://api.factset.com>. Authentication is handled using API Keys and authorization is handled using FactSet's in-house subscriptions product. You can find more information about using API Keys at <https://developer.factset.com/authentication>.

HTTP request and response header names should be considered case insensitive as per [HTTP Standard](#). Please do not rely on case sensitive matching of headers in your code.

### 3.1 Calculation API

#### 3.1.1 Run FI Calculation

**POST** /analytics/engines/fi/v1/calculations

This endpoint runs fixed income analytics calculations on a universe based on parameters specified in the POST body. It must be used first, before checking status or cancelling endpoints. A successful response will contain the results of the calculation, or a URL to check the status of the request if the calculation takes longer than 30 seconds to complete.

#### Request Headers

Header name	Description
<b>Authorization</b>	Standard HTTP header. Value needs to use 'Basic <base64 encoded value>' format.
<b>Content-Type</b>	Standard HTTP header. Value needs to specify application/JSON (i.e., caller needs to specify that the body is in JSON format).

#### Request Body

The request body accepts a collection of calculation parameters. The parameters are outlined below:

Parameter name	Data type	Required	Description	Format
<b>securities</b>	Array	Yes	List of securities to analyze	Each security represented by an object containing calculation inputs. See below for for schema and example values.
<b>calculations</b>	Array	Yes	List of calculations to compute for each security	See <a href="#">Appendix: Available Calculations</a> for a list of available calculations
<b>jobSettings</b>	Object	Yes	Job settings	yieldCurveDate should follow YYYYMMDD format

#### Response Headers

Header name	Description
<b>X-DataDirect-Request-Key</b>	FactSet's request key header.
<b>X-FactSet-API-Request-Key</b>	Key to uniquely identify an Analytics API request. Only available after successful authentication.
<b>X-FactSet-API-Units-Limit</b>	Maximum units limit across all requests.
<b>X-FactSet-API-Units-Remaining</b>	Number of units remaining till unit limit reached.
<b>Location</b>	Standard HTTP header. Contains URL to check status of the request.
<b>X-FactSet-API-RateLimit-Limit</b>	Number of allowed requests for the time window.
<b>X-FactSet-API-RateLimit-Remaining</b>	Number of requests left for the time window.

<b>X-FactSet-Api-RateLimit-Reset</b>	Number of seconds remaining till rate limit resets.
--------------------------------------	---

**Returns**

HTTP status code	Description
202	Expected response, contains the URL in the Location header to check the status of the request.
400	Invalid POST body.
401	Missing or invalid authentication.
403	User is forbidden access with current credentials.
415	Missing/Invalid Content-Type header. Header needs to be set to application/json.
429	Rate limit reached. Cancel older requests using Cancel Calculation endpoint or wait for older requests to finish / expire.
500	Server error. Log the X-DataDirect-Request-Key header to assist in troubleshooting.
503	Request timed out. Retry the request in sometime.

**Remarks**

- Maximum 50 securities allowed per request.
- Multi-horizon calculations are not currently supported through this endpoint.

**Examples**

```

Request:
POST https://api.factset.com/analytics/engines/fi/v1/calculations

Headers:
content-type: application/json
Authorization: Basic RkRTX0RFTU9fVVMt*****
Accept-Encoding: gzip
content-length: 201

Body:
{
  'securities': [{
    'face': 1,
    'calcFromValue': 99.73,
    'symbol': '88579YAU',
    'settlementDate': '20200810',
    'discountCurve': 'UST',
  ]
}
    
```

```

        'calcFromMethod': 'PRICE'
    }
],
'calculations': ['Security Type',
    'Security Name',
    'Calc From Method',
    'Yield Curve Date',
    'Settlement Date',
    'Discount Curve',
    'Price',
    'Yield to No Call',
    'Actual Spread',
    'OAS',
    'Effective Duration',
    'Effective Convexity'],
'jobSettings': {
    'yieldCurveDate': '20200810'
}
}

```

**Response:**

HTTP 202 Accepted

**Headers:**

location: <https://api.factset.com/analytics/engines/fi/v1/calculations/5F6133DC7EBf288B8>  
 x-datadirect-request-key: zpdo6aebv58fiaoi  
 x-factset-api-request-key: 6p2d41m4sw1yfh0h

**3.1.2 Get Calculation Status By ID**

GET /analytics/engines/fi/v1/calculations/{id}

**Description**

This is the endpoint to check on the progress of a previous request that was submitted using [Run FI Calculation](#) endpoint. The response body contains status information of the calculation. If the calculation has finished computing, the response body will contain the result.

**Request Headers**

Header name	Description
Authorization	Standard HTTP header. Value needs to use 'Basic <base64 encoded value>' format.

**Response Headers**

Header name	Description
X-DataDirect-Request-Key	FactSet's request key header.
X-FactSet-API-Request-Key	Key to uniquely identify an Analytics API request. Only available after successful authentication.
Cache-Control	Standard HTTP header. Header will specify max-age in seconds. Polling can be adjusted based on the max-age value.
X-FactSet-API-RateLimit-Limit	Number of allowed requests for the time window.
X-FactSet-API-RateLimit-Remaining	Number of requests left for the time window.
X-FactSet-API-RateLimit-Reset	Number of seconds remaining till rate limit resets.

**Returns**

HTTP status code	Description
200	Expected response. The response body contains status information of the entire request and each individual calculation.
400	Invalid identifier parameter provided.
401	Missing or invalid authentication.
403	User is forbidden access with current credentials.
404	There was no request for the identifier provided, or the request was already canceled for the provided identifier.
500	Server error. Log the X-DataDirect-Request-Key header to assist in troubleshooting.
503	Request timed out. Retry the request in sometime.

**Examples**

```

Request:
GET https://api.factset.com/analytics/engines/fi/v1/calculations/5F6133DC7EBf288B8

Headers:
Authorization: Basic RkRTX0RFTU9fVVMt*****

Response:
HTTP 200 Success

Headers:
x-datadirect-request-key: yxuvd73bjejn02ij
x-factset-api-request-key: 4nboxc5wctfzauq0

Body:
    
```

```
{
  "status": "Executing",
  "units": 1,
  "calculations": {
    "1": {
      "status": "Executing"
    }
  }
}
```

### 3.1.3 Cancel Multiple Calculations

**DELETE** /analytics/engines/fiv/1/calculations/{id}

#### Description

This endpoint is used to cancel a previously submitted request. Instead of doing a HTTP GET on the status URL, cancel the request by doing a HTTP DELETE.

#### Request Headers

Header name	Description
Authorization	Standard HTTP header. Value needs to use 'Basic <base64 encoded value>' format.

#### Response Headers

Header name	Description
X-DataDirect-Request-Key	FactSet's request key header.
X-FactSet-API-Request-Key	Key to uniquely identify an Analytics API request. Only available after successful authentication.
X-FactSet-API-RateLimit-Limit	Number of allowed requests for the time window.
X-FactSet-API-RateLimit-Remaining	Number of requests left for the time window.
X-FactSet-API-RateLimit-Reset	Number of seconds remaining till rate limit resets.

#### Returns

HTTP status code	Description
204	Expected response, request was cancelled successfully.
400	Invalid identifier parameter provided.
401	Missing or invalid authentication.
403	User is forbidden access with current credentials.



404	There was no request for the identifier provided, or the request was already canceled for the provided identifier.
500	Server error. Log the X-DataDirect-Request-Key header to assist in troubleshooting.
503	Request timed out. Retry the request in sometime.

### Examples

**Request:**  
DELETE <https://api.factset.com/analytics/engines/fi/v1/calculations/5F6133DC7EBf288B8>

**Headers:**  
Authorization: Basic RkRTX0RFTU9fVVMt\*\*\*\*\*

**Response:**  
HTTP 204 No Content

**Headers:**  
x-datadirect-request-key: iwkitryrtam8l8z1  
x-factset-api-request-key: dx8wju5k6ogb2rp8

## 4. Troubleshooting

Following steps are recommended to troubleshoot errors from any of the different APIs:

- Record the X-DataDirect-Request-Key response header so that FactSet's API engineering team can analyze your specific request/response.
- Record the response body when the response is an error response. All HTTP status codes equal to and greater than 400 are considered error responses.
- Reach out to your account team with the above information for assistance.

## 5. Version Upgrade

FactSet will support old API versions for a limited time. The actual support time will depend on the API and the release stage (i.e., beta or production). All breaking changes, functionality additions, and bug fixes across earlier versions will be documented in the changelog.

FactSet's API engineering team will work with the clients to ensure smooth transition to newer versions.

## 6. Appendix: Available Calculations

Below table lists down the currently available calculations

Calculation Identifier

Sector  
Sector Sub Group  
  
Principal Type  
  
Interest Type  
  
Investment Type  
  
Last Known Factor  
  
Original Maturity  
  
Coupon  
  
Delay Days  
  
Callable?  
  
Country  
  
Called Date  
  
Factor for PA  
  
Sector Industry  
  
Prepay Name  
  
Ex-dividend Type  
  
Floating Index  
  
Collateral Issuer Main  
  
Production Year  
  
Net WAC  
  
Gross WAC  
  
Current WAM

WALA

Principal Paydown %

Discount Curve

Price

Accrued Interest

Tomorrow's Accrued Interest

Yield

Current Yield

Strip Yield

Yield to First Call

Yield to Worst Call

Yield to No Call

Modified Duration to First Call

Modified Duration to Worst Call

Actual Spread

Actual Spread to Worst Call

Bullet Spread

Expected Maturity

Avg Life

Mod Duration

Mod Duration Floater

Convexity

Real Yield

Real Modified Duration

Clean Price

Price Adjustment Factor

Conversion Parity

Proj CPR 1mo

Proj CPR 3mo

Proj CPR 6mo

Proj CPR 1yr

Proj CPR 5yr

PB Wavg PSA

PB Wavg CPR

Daily Coupon Return (Numerator Only)

Today's Interest- % of Current Face

Today's Principal- % of Current Face

Tomorrow's Interest- % of Current Face

Tomorrow's Principal- % of Current Face

Tomorrow's Other Income- % of Current Face

Today's Other Income- % of Current Face

Zero PV Premium

OAS

Spread Duration

Spread  $dP/dY$

Effective Yield

Effective Duration

Effective Convexity

Coupon Curve Duration

Coupon Curve Convexity

$dP/dCDS$

OAS Convexity

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