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SAS/ETS[®] 13.2 User's Guide The SASEQUAN Interface Engine

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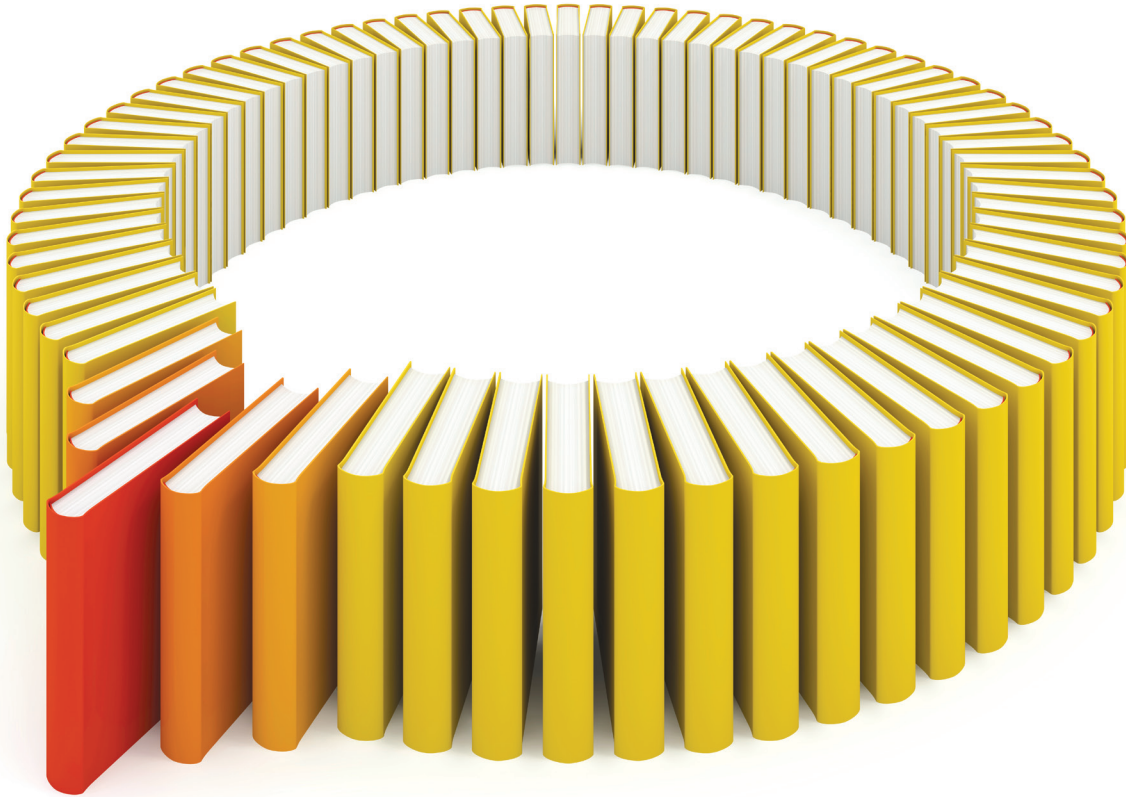
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Chapter 43

The SASEQUAN Interface Engine

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Overview: SASEQUAN Interface Engine

The SASEQUAN interface engine enables SAS users to retrieve economic data from the Quandl website, which is hosted by Quandl. The Quandl website offers access to 8 million time series data sets from 400 sources in finance, economics, society, health, energy, demography, and more. These time series are updated at annual, quarterly, monthly, weekly, and daily intervals. The economic time series on the Quandl website contain observation or measurement periods that are associated with data values.

The SASEQUAN interface engine uses the LIBNAME statement to enable you to specify how to subset your Quandl data and how to collapse the selected time series to the same update frequency. You can then use the SAS DATA step to perform further subsetting and to store the resulting time series in a SAS data set. You can perform more analysis (if desired) either in the same SAS session or in a later session.

The SASEQUAN interface engine supports Windows. Note that the SASEQUAN engine uses the Quandl API, but it is not endorsed or certified by Quandl, and that by using the SASEQUAN interface engine, you are agreeing to comply with the Quandl terms of use, which are described on the web page at the following URL: <http://www.quandl.com/about/terms>.

Getting Started: SASEQUAN Interface Engine

You can query the Quandl data set to retrieve the observations or data values for a list of economic time series by specifying the Quandl code of the data set. The Quandl code consists of a source code and a table code for the data set that contains the time series that you want to read into SAS. You must also specify your unique Quandl API key (authentication token for unlimited access). To obtain your own unique API key, visit the Quandl website at the following URL: http://www.quandl.com/users/sign_up.

The Quandl API key is a 20-character mixed-case alphanumeric string, such as “abCDefghiJKLMn123456,” and is represented by ‘XXXXXXXXXXXXXXXXXXXX’ in the APIKEY= option in the following example. In addition, the example URLs in this section and in the section “[Details: SASEQUAN Interface Engine](#)” on page 3018 use the same Quandl API key as the argument *your_quan_apikey*.

After you have your assigned Quandl API key and have agreed to the Quandl terms of use, but before you download any copyright-protected data series, be aware that you are solely responsible for obtaining copyright permissions for any copyright-protected time series that you download (other than for personal use).

Now that you are informed about the terms of use of the Quandl data, you can use your Quandl API key to access the Quandl data, as shown in the following example.

The statements that follow enable you to access the prices for oil from the National Stock Exchange of India’s time series data from September 1, 2013, to November 5, 2013, on a daily basis. The observations are sorted by the time ID variable DATE. The output is shown in [Output 43.1](#).

```
options validvarname=any;
title 'Retrieve Data for Oil India Limited Prices';
libname _all_ clear;

libname quan sasequan "%sysget(QUANDL) "
```

```

OUTXML=oil
XMLMAP="%sysget (QUANDL) oil.map"
APIKEY='XXXXXXXXXXXXXXXXXXXXX'
IDLIST='NSE/OIL';

data oil_gsa;
    set quan.oil;
run;

proc contents data=oil_gsa; run;
proc print data=oil_gsa(obs=15); run;

```

Figure 43.1 Oil India Limited Prices: Oil_Gsa (OBS=15)**Retrieve Data for Oil India Limited Prices**

Obs	date	Open	High	Low	Last	Close	Total Trade Quantity	Turnover (Lacs)
1	2009-09-30	1096.00	1156.70	1090.00	1135.00	1141.20	19748012	223877.07
2	2009-10-01	1102.00	1173.70	1102.00	1167.00	1166.35	3074254	35463.78
3	2009-10-05	1152.00	1165.90	1136.60	1143.00	1140.55	919832	10581.13
4	2009-10-06	1149.80	1157.20	1132.10	1143.30	1144.90	627957	7185.90
5	2009-10-07	1153.80	1160.70	1140.00	1141.45	1141.60	698216	8032.98
6	2009-10-08	1145.00	1179.80	1142.00	1178.10	1170.20	788173	9138.99
7	2009-10-09	1176.00	1210.00	1165.00	1183.00	1195.65	1047417	12449.44
8	2009-10-12	1184.00	1210.00	1176.00	1193.00	1195.70	464697	5551.35
9	2009-10-14	1198.00	1227.75	1185.00	1192.50	1190.45	581221	7015.84
10	2009-10-15	1198.00	1204.90	1180.05	1184.90	1184.55	301790	3593.52
11	2009-10-16	1188.65	1203.00	1182.00	1191.10	1191.00	313011	3735.12
12	2009-10-17	1240.00	1240.00	1180.00	1189.10	1189.80	35143	418.95
13	2009-10-20	1196.00	1203.50	1172.00	1174.00	1177.85	156941	1861.75
14	2009-10-21	1184.00	1194.00	1157.00	1166.00	1166.10	309098	3657.14
15	2009-10-22	1165.00	1184.40	1158.00	1168.00	1164.95	338413	3973.97

The XML data that the Quandl website returns are placed in a file that is named by the OUTXML= option—in this case, OIL1.xml. Note that the SASEQUAN engine appends a numeral to the XML filename, and the file extension (.xml) is excluded from the filename that appears in the OUTXML= option. This XML data file resides in the location that is given inside the string enclosed in double quotation marks in the SASEQUAN LIBNAME statement. So, in the preceding example, if the QUANDL environment variable is set to

```
C:\quandata\
```

then the downloaded XML file is located at

```
C:\quandata\OIL1.xml
```

An equivalent LIBNAME statement that does not use any environment variables could be as follows:

```
libname quan sasequan "C:\quandata\"
```

```

OUTXML=oil
XMLMAP="C:\quandata\oil.map"
APIKEY='XXXXXXXXXXXXXXXXXXXXX'
IDLIST='NSE/OIL';

```

You could also use either a SAS macro variable or a system environment variable to store the value of your Quandl API key so that the key does not appear explicitly in your SAS code. The XML map that is created is assigned the full pathname that the XMLMAP= option specifies. The SASEQUAN engine appends a numeral to the XML filename to indicate the position of the Quandl code in the IDLIST= option.

The IDLIST= option specifies the list of Quandl data sets (that contain time series) that you want to retrieve. This option accepts a string, enclosed in single quotation marks, that denotes a list of one or more Quandl data sets that you select (keep) in the resulting SAS data set. The result, OIL, is named in the DATA step and is shown in [Figure 43.1](#). The preceding example uses only one Quandl code, which is in the first position of the IDLIST= option, so the numeral 1 is appended to the name of the XML file, resulting in OIL1.xml.

It is more efficient to use the DATA step to store your Quandl data in a SAS data set and then refer to the SAS data set directly in your PROC PRINT or PROC GPLOT statement. You can also refer to the SASEQUAN libref directly, as in the statement

```
proc print data=quan.oil; run;
```

This statement uses the member name, OIL, in the PROC PRINT statement; this usage corresponds to specifying the OUTXML=OIL option. Although using this statement might seem easier, it is not as efficient, because every time you use the SASEQUAN libref, the Quandl interface engine reads the entire XML file into SAS again. So it is better to refer to the SAS data set repeatedly than to invoke the interface engine repeatedly. For another example that uses more SASEQUAN LIBNAME statement options, see the section “[Reading All Financial Ratios Data](#)” on page 3022.

Syntax: SASEQUAN Interface Engine

The SASEQUAN interface engine uses standard engine syntax to read the observations or data values for one or more Quandl data sets that can contain one or more time series in each data set. [Table 43.1](#) summarizes the options that the SASEQUAN engine uses. In addition, there is one required option: API_KEY='quan_api_key'.

Table 43.1 Summary of LIBNAME libref SASEQUAN Options

Option	Description
APIKEY=	Specifies the required Quandl access key that enables you to access the data that the Quandl website provides.
AUTOMAP=	Specifies whether or not to overwrite the existing XML map file.
COLLAPSE=	Specifies the reporting frequency (lower frequency to collapse the output results to). The valid reporting frequencies are daily, weekly, monthly, quarterly, annual, and none.
FORMAT=	Specifies a file extension that indicates the type of file to retrieve. Only XML is supported for the SASEQUAN interface engine in SAS/ETS 13.2 (SAS 9.4M2).
FREQ=	Specifies the frequency of the selected data: daily, weekly, monthly, quarterly, and annual. When the IDLIST= option contains more than one Quandl code, the FREQ= option aggregates higher-frequency data series to lower-frequency time series (such as converting a monthly time series to an annual time series).
IDLIST=	Specifies a list of Quandl codes for Quandl data set codes for accessing Quandl time series data. To select more than one data set, list the unique Quandl codes, separated by commas. There is a limit of nine Quandl codes in the IDLIST= option.
ROWS=	Specifies the maximum number of observations (rows) to return (integer between 1 and 100,000, optional; the default is 100,000)
SORT=	Specifies the order of the results in ascending or descending observation-date order. The valid sort arguments are <i>asc</i> and <i>desc</i> ; the default is <i>asc</i> .
START=	Specifies the start date (trim_start) for the observation period (YYYY-MM-DD formatted string, optional; the default is 9999-12-31 (latest available))
END=	Specifies the end date (trim_end) for the observation period (YYYY-MM-DD formatted string, optional; the default is 1776-07-04 (earliest available))
TRANS=	Specifies the transformation method to be used for data transformation. The valid transformation arguments are DIFF, RDIFF, CUMUL, NORMALIZE, and NONE; the default is NONE. See Table 43.2 for formulas.

The LIBNAME libref SASEQUAN Statement

LIBNAME libref SASEQUAN *'physical-name'* options ;

The LIBNAME statement assigns a SAS library reference (libref) to the physical path of the directory of Quandl data files in which the downloaded Quandl XML data are stored. The required *physical-name* argument specifies the location of the folder where your Quandl XML data reside. It should end with a backslash if you are in a Windows environment and a forward slash if you are in a UNIX environment.

You can specify the following *options* in the LIBNAME *libref* SASEQUAN statement.

APIKEY='quan_apikey'

specifies the Quandl authentication token or access key that enables you to access the data that the Quandl website provides. The Quandl access key is a 20-character mixed-case alphanumeric string, and it is required. It must be enclosed on single quotation marks. You can request your *quan_apikey* by visiting the website at the following URL:

http://www.quandl.com/users/sign_up

AUTOMAP=REPLACE | REUSE

specifies whether or not to overwrite the existing XML map file.

REPLACE specifies that the XML map file be overwritten, and ensures that the most current XML map that is generated by the SASEQUAN engine and named by the XMLMAP= option is used.

REUSE specifies that the XML map file not be overwritten, and ensures that a pre-existing XML map file that is named by the XMLMAP= option is used.

By default, AUTOMAP=REPLACE.

MAPREF=quan_xmlmapref

specifies the fileref to use for the map assignment. For an example of the SASEQUAN engine that uses the MAPREF= and XMLMAP= options in the FILENAME statement in order to assign a filename, as in the following, see the section “[Reading All Financial Ratios Data](#)” on page 3022:

```
FILENAME MyMap "U:\quan950\test\gstart.map";
```

You can use the MAPREF= and XMLMAP= options to control where the map resides, what you name the map, and how you refer to it with a fileref. You can use the OUTXML= option to name your XML data file. It is placed in the folder that is designated by *physical-name*, and you can reference it by using the myLib libref in your SASEQUAN LIBNAME statement. This is shown in the section “[Getting Started: SASEQUAN Interface Engine](#)” on page 3010, inside the DATA step in the SET statement. The SET statement reads observations from the input data set myLib.GSTART and stores them in a SAS data set named All_Fin.

OUTXML=quan_xmlfile

specifies the name of the file where the XML data that are returned from the Quandl website are stored. Each Quandl code that is listed in the IDLIST= option is given a positional numeral: 1 for the first code in the IDLIST, 2 for the second code in the IDLIST, and so on. The engine appends this numeral to the filename of the XML of each data set that the website returns. When all the XML files are retrieved, the data are merged into a SAS data set. When only one Quandl code is used in the IDLIST= option, the filename has the numeral 1 appended to the OUTXML filename.

XMLMAP=quan_xmlmapfile

specifies the fully qualified name of the location where the XML map file is automatically stored.

COLLAPSE=DAILY | WEEKLY | MONTHLY | QUARTERLY | ANNUAL | NONE

specifies the frequency to which you want to collapse the reporting frequency.

DAILY	collapses the report to a daily frequency.
WEEKLY	collapses the report to a weekly frequency.
MONTHLY	collapses the report to a monthly frequency.
QUARTERLY	collapses the report to a quarterly frequency.
ANNUAL	collapses the report to an annual frequency.
NONE	does not collapse the report.

COLLAPSE= is optional. By default, COLLAPSE=NONE when IDLIST=option specifies one Quandl code, but when the IDLIST= option specifies more than one Quandl code, the default for the collapse frequency is set to the same frequency that is specified in the FREQ= option.

The Quandl frequency-collapsing feature reports the native (higher-frequency) time series at a lower-frequency (the collapse frequency). When you collapse the frequency of a data set, Quandl returns the last observation for the given period. So if you collapse a daily data set to monthly, you get a sample of the original data set in which the observation for each month is the last data point available for that month. When you specify more than one Quandl code in the IDLIST= option, it is important to check that the *from* date and *to* date of every selected series use the same fiscal year, so that the reporting interval of the merged date values from all the data sets aligns to the same date for the first observation in the range. For example, if multiple Quandl codes are listed in the IDLIST= option, some annual time series have *from* dates that start in January, and some annual time series have *from* dates that start in June, then the merged data set will have observation dates reported for both January and June (if COLLAPSE=NONE), resulting in a semiannual interval instead of an annual interval in the merged data. To preserve the annual frequency, specify COLLAPSE=ANNUAL so that each annual time series aligns to the appropriate annual date in the merged data set. The COLLAPSE= option is applied to each Quandl data set that is specified in the IDLIST= option, so that when the data sets are merged, the reporting frequency is equal to the COLLAPSE= frequency. The resulting merged SAS data set contains the same data as a Quandl superset that is created from the same Quandl codes in the IDLIST= option. Quandl supersets are discussed at the following URL: <http://www.quandl.com/help#Supersets>.

NOTE: COLLAPSE=MONTHLY reports the daily, weekly, and monthly native frequencies of the time series at a monthly frequency (collapse frequency). If an annual native frequency time series is specified in the IDLIST= option, then it will not be selected when COLLAPSE=MONTHLY is specified. Only the time series that have native frequencies higher than the reporting frequency specified in the COLLAPSE= option are selected.

NOTE: It is highly recommended that you use the COLLAPSE= option when more than one Quandl code is specified in the IDLIST= option.

CAUTION: If the COLLAPSE= NONE is specified then undesirable time intervals can occur when more than one Quandl code is specified in the IDLIST= option.

FORMAT=XML

specifies the format of the file to be received from the Quandl website. Although Quandl can report data in many formats, the SASEQUAN engine for SAS 9.4M2 (SAS/ETS 13.2) supports only the XML format.

FREQ=DAILY | WEEKLY | MONTHLY | QUARTERLY | ANNUAL

specifies a lower frequency to aggregate values to. The FREQ= option also selects only those time series that aggregate to the specified frequency. In Quandl data, the highest frequency is daily, and the lowest frequency is annual.

DAILY	selects time series that aggregate to a daily frequency.
WEEKLY	selects time series that aggregate to a weekly frequency.
MONTHLY	selects time series that aggregate to a monthly frequency.
QUARTERLY	selects time series that aggregate to a quarterly frequency.
ANNUAL	selects time series that aggregate to an annual frequency.

The FREQ= option is not required, and the default value is the native frequency of the Quandl data set.

NOTE: An error is returned if you specify a frequency higher than the native frequency of the selected series. For example, if a series has the native frequency “Annual,” it is not possible to aggregate the series to the higher “Monthly” frequency. To find the native frequency of an economic time series, enter the following URL in your web browser, and click on the Quandl code. The output gives you the list of available time series and their native frequencies and descriptions, including the “Frequency” field, which shows the native frequency of that time series.

<http://www.quandl.com/resources/data-sources>

You can use the data-sources URL to obtain the necessary information to request time series data for any of the listed data sources that you want to query.

NOTE: When you specify a single Quandl code in the IDLIST= option and the FREQ= option is not specified or is an empty string, the native frequency of the time series in that data set is used as the reporting frequency unless you specify the reporting frequency in the COLLAPSE= option. When you specify multiple data sets (and time series) in the IDLIST= option, the “Annual” frequency is used as the default frequency unless you specify the reporting frequency in the COLLAPSE= option. If any time series in the IDLIST= option have a lower native frequency than the specified frequency, then those time series are dropped from the list and excluded from the output.

IDLIST='quan_idlist'

specifies the list of Quandl codes for the data sets that contain the time series to be included in the output SAS data set. There is a limit of nine Quandl codes in the IDLIST= option. This list is comma-delimited and must be enclosed in single quotation marks.

START=*'quan_startdate'*

specifies the start date for the time series in the format YYYY-MM-DD. START= is optional, and the default is 1776-07-04 (earliest available). The date must be enclosed in single quotation marks.

END=*'quan_enddate'*

specifies the end date for the time series in the format YYYY-MM-DD. END= is optional, and the default is 9999-12-31 (latest available). The date must be enclosed in single quotation marks.

ROWS=*quan_rows*

specifies the maximum number of rows (time series observations) to return, which is an integer between 1 and 100,000. ROWS= is optional, and the default is ROWS=100000.

SORT=ASC | DESC

specifies the order in which to sort the date of time series observations.

ASC sorts time series observations in ascending date order.

DESC sorts time series observations in descending date order.

SORT= is optional, and the default is SORT=ASC.

TRANS=CUMUL | DIFF | NORMALIZE | RDIFF | NONE**TRANSFORMATION=CUMUL | DIFF | NORMALIZE | RDIFF | NONE**

specifies the data value transformation.

CUMUL performs the cumulative function.

DIFF performs the difference function.

NORMALIZE performs the normalize function.

RDIFF performs the ratio difference function.

NONE does no transformation on the data.

TRANS= is optional, and the default is TRANS=NONE. The details of the arguments and the corresponding function formulas are presented in [Table 43.2](#).

Table 43.2 Quandl Transformation Codes

Trans Code	Description	Formula
cumul	Cumulative	$x_t + x_{t-1} + \cdots + x_{t-N}$
diff	Difference	$x_t - x_{t-1}$
normalize	Normalize	$\left(\frac{x_t}{x_{t-N}}\right) \times 100$
rdiff	Ratio difference	$\left(\frac{x_t - x_{t-1}}{x_{t-1}}\right)$

x_t is the value of series x at time period t . N is the number of observations per year, which differs by frequency: Daily ($N = 260$), Annual ($N = 1$), Monthly ($N = 12$), Quarterly ($N = 4$), and Weekly ($N = 52$).

Details: SASEQUAN Interface Engine

The SASEQUAN interface engine enables SAS users to access time series data that are stored in Quandl data sets that the Quandl website provides. Every Quandl data set is identified by a unique ID. For example, the Prague Stock Index is uniquely identified by the code PRAGUESE/PX. The unique code for any data set is always visible on the data set page beside the words “Quandl Code.”

Quandl API Key

The API key that is used in these examples, abCDefghiJKLMn123456, is for demonstration purposes only. To successfully download data from the Quandl website, use your own Quandl API key, which is a 20-character mixed-case alphanumeric string. You can request your own API key by visiting the website at the following URL:

http://www.quandl.com/users/sign_up

Available Sources That Provide Quandl Time Series Data

To obtain a list of the available sources of Quandl data, enter the following URL in your web browser. [Table 43.3](#) shows some of the financial sources available (in the order shown on the Quandl website), which you can see by clicking on the “Financial Data” category.

http://www.quandl.com/resources/data-sources?auth_token=your_quan_apikey

Table 43.3 Some Available Sources of Financial Data

Quandl Code (Source)	Name
OFDP	Open Financial Data Project
DMDRN	Damodaran Financial Data
YAHOO	Yahoo Finance
GOOG	Google Finance
PSYCH	PsychSignal
NASDAQ	NASDAQ
NSE	National Stock Exchange of India
NYX	NYSE Euronext
ICE	IntercontinentalExchange
SPDJ	S&P Dow Jones Indices
EUREX	Eurex
Quandl	Quandl
LIFFE	Euronext LIFFE
PXDATA	Price-Data.com
SHFE	Shanghai Futures Exchange
MGEX	Minneapolis Grain Exchange
CBOE	Chicago Board Options Exchange
SGX	Singapore Exchange
MX	Montréal Exchange
EUREKA	Eurekahedge
WFE	World Federation of Exchanges
ASX	Australian Securities Exchange
SIX	Swiss Exchange
WGC	World Gold Council
SANDP	Standard & Poor's
WSJ	The Wall Street Journal
BITCOIN	Bitcoin Charts
MYX	Bursa Malaysia
OSE	Osaka Securities Exchange
ABMI	Asian Bond Market Initiative
ODE	Osaka Dojima Commodity Exchange
AMMANSE	Amman Stock Exchange
BCHAIN	Block Chain
UCR	Unicorn Research Corporation
ML	Merrill Lynch
UIS	University of Stavanger
NIKKEI	Nikkei Group
WREN	Wren Research
MONEYTREE	MoneyTree Report
PUP	Policy Uncertainty Project
BARB	Beta Arbitrage
NASOMXNORDIC	NASDAQ OMX Nordic
PHILSE	Philippine Stock Exchange
THAISE	Stock Exchange of Thailand
BUDAPESTSE	Budapest Stock Exchange
RENCAP	Renaissance Capital

Useful Lists for Easy Downloading of Quandl Time Series Data

To get a list of Quandl codes for the available time series for a specific source, enter the following URL in your web browser and click on the category or the particular link for that source:

<http://www.quandl.com/resources/useful-lists>

Table 43.4 shows the list of Quandl codes for the Dow Jones Industrial Average.

Table 43.4 Quandl Codes for Dow Jones Industrial Average Constituents

Ticker Symbol	Quandl Code	Name
AXP	GOOG/NYSE_AXP	American Express
BA	GOOG/NYSE_BA	Boeing
CAT	GOOG/NYSE_CAT	Caterpillar
CSCO	GOOG/NASDAQ_CSCO	Cisco Systems
CVX	GOOG/NYSE_CVX	Chevron
DD	GOOG/NYSE_DD	DuPont
DIS	GOOG/NYSE_DIS	Walt Disney
GE	GOOG/NYSE_GE	General Electric
GS	GOOG/NYSE_GS	Goldman Sachs
HD	GOOG/NYSE_HD	The Home Depot
IBM	GOOG/NYSE_IBM	IBM
INTC	GOOG/NASDAQ_INTC	Intel
JNJ	GOOG/NYSE_JNJ	Johnson & Johnson
JPM	GOOG/NYSE_JPM	JPMorgan Chase
KO	GOOG/NYSE_KO	Coca-Cola
MCD	GOOG/NYSE_MCD	McDonald's
MMM	GOOG/NYSE_MMM	3M
MRK	GOOG/NYSE_MRK	Merck
MSFT	GOOG/NASDAQ_MSFT	Microsoft
NKE	GOOG/NYSE_NKE	Nike
PFE	GOOG/NYSE_PFE	Pfizer
PG	GOOG/NYSE_PG	Procter & Gamble
T	GOOG/NASDAQ_T	AT&T
TRV	GOOG/NYSE_TRV	Travelers
UNH	GOOG/NYSE_UNH	UnitedHealth Group
UTX	GOOG/NYSE_UTX	United Technologies
V	GOOG/NYSE_V	Visa
VZ	GOOG/NYSE_VZ	Verizon
WMT	GOOG/NYSE_WMT	Wal-Mart
XOM	GOOG/NYSE_XOM	ExxonMobil

Available Time Series for Each Quandl Code

Quandl data sets can contain different numbers of time series at various frequencies. To get the list of time series for a specific source, use the Quandl search capability by entering the following URL in your web browser and specify the source ID that corresponds to that Quandl code. For example, the following URL retrieves a list of all time series for the United Nations Office on Drugs and Crime (UNODC, source_ids=692):

```
http://www.quandl.com/search/*?source_ids=692&api_key=your_quan_apikey
```

A shortcut to this source is at the URL <http://www.quandl.com/resources/data-sources>.

Under International Organizations, you can see the UNODC code, which links to the list of available time series and their native frequencies and descriptions. You can use the data-sources URL to obtain the necessary information to request time series data for any of the listed data source that you want to query.

SAS Output Data Set

You can use a SAS DATA step to write the selected Quandl data to a SAS data set. This enables you to use SAS software to easily analyze the data. If you specify the name of the output data set in the DATA statement, the engine supervisor creates a SAS data set that has the specified name in either the SAS Work library or, if specified, the SAS User library.

The contents of the SAS data set include the date of each observation and the series name of each series that is read from the Quandl data source.

The SASEQUAN interface engine maintains the sort order, so the time series are sorted in the resulting SAS data set by the order that is specified in the SORT= option, by date (time ID), and by variable (time series item name).

You can use the PRINT and CONTENTS procedures to print your output data set and its contents. Alternatively, you can view your SAS output observations by opening the desired output data set in a SAS Explorer window. You can also use the SQL procedure with your SASEQUAN libref to create a custom view of your data.

SAS OUTXML File

The SAS XML (XML format) data that are returned from the Quandl website are placed in a file that is named by the OUTXML= option. The SASEQUAN interface engine creates a separate XML file for each Quandl code that is listed in the IDLIST= option. The engine numbers each data set's XML file in the order in which it appears in the IDLIST= option, so the first data set has a 1 concatenated to the filename, the second data set has a 2 concatenated to the filename, and so on. In instances of the IDLIST= option that contain more than one Quandl code, the variable names also have the same numeral concatenated to them. This naming convention enables the engine to merge all the selected time series into one SAS data set while preserving the identity of each time series. The SAS XML data file is placed in the location that is specified by the *physical-name* in your LIBNAME *libref* SASEQUAN statement, which is described in the section “The LIBNAME *libref* SASEQUAN Statement” on page 3013.

SAS XML Map File

The XML map that (by default) is automatically created is assigned the full pathname that is given by the XMLMAP= option in your LIBNAME *libref* SASEQUAN statement. The map file is either reused (not overwritten) if you specify AUTOMAP=REUSE or overwritten by a new map if you specify AUTOMAP=REPLACE (the default). The SASEQUAN interface engine invokes the XMLV2 engine to create the map and to read the data into SAS.

Reading All Financial Ratios Data

The following statements enable you to access the “All Financial Ratios Data” from the source Damodaran Financial Data (Quandl source code = DMDRN) for Google (GOOG) and IBM on an annual basis. The output is shown in [Output 43.2](#).

```
options validvarname=any;
title 'Quandl Data: All Financial Ratios for Google and IBM';
LIBNAME myLib sasequan "%sysget (QUANDL) "
    OUTXML=gstart
    AUTOMAP=replace
    MAPREF=MyMap
    XMLMAP="%sysget (QUANDL) gstart .map"
    APIKEY='XXXXXXXXXXXXXXXXXXXX'
    IDLIST='DMDRN/GOOG_ALLFINANCIALRATIOS,DMDRN/IBM_ALLFINANCIALRATIOS'
    START='2003-12-31'
    END='2012-12-31'
    FORMAT=xml
    ;

data all_fin;
    set myLib.gstart ;
run;

proc contents data=all_fin; run;
proc print data=all_fin; run;
```

Figure 43.2 Quandl Data: All_Fin

Quandl Data: All Financial Ratios for Google and IBM

Obs	date	Number of Shares Outstanding_1	3-Year Regression Beta_1	3-year Standard Deviation of S_1	Book Debt to Capital Ratio_1	Book Value of Equity_1	Book Value of Assets_1	Capital Expenditures_1	Cash_1	Cash as Percentage of Firm Val_1
1	2003-12-31	235.0	0.00	0.0000	0.010834	.	871.5	176.8	334.7	0.00635
2	2004-12-31	277.3	0.00	0.0000	0.000648	.	3313.4	319.0	2132.3	0.01691
3	2005-12-31	297.2	.	.	0.000000	9419.0	10271.8	838.2	8034.2	0.05709
4	2006-12-31	310.3	1.21	0.3342	0.000000	17039.8	18473.4	1902.8	11243.9	0.05155
5	2007-12-31	313.3	1.32	0.4285	0.000000	22689.7	25335.8	2402.8	14218.6	0.14919
6	2008-12-31	315.1	0.88	0.4044	0.000000	28238.9	31767.6	2358.5	15845.8	0.08174
7	2009-12-31	317.8	0.98	0.4180	0.000000	36004.2	40496.8	809.9	24484.8	0.12667
8	2010-12-31	321.3	0.85	0.2957	0.069710	46241.0	57851.0	4018.0	34975.0	0.16869
9	2011-12-31	325.1	1.23	0.3073	0.067400	58145.0	72574.0	3438.0	44626.0	0.18890

Quandl Data: All Financial Ratios for Google and IBM

Obs	Cash as Percentage of Revenues_1	Cash as Percentage of Total As_1	Change in Non-Cash Working Cap_1	Correlation with the Market_1	Current PE Ratio_1	Depreciation_1	Dividend Yield_1	Dividends_1	Earnings Before Interest and T_1	EBIT for Previous Period_1
1	0.12536	.	-4.435	.	499.086	43.9	0	0	615.68	246.27
2	0.40608	0.64354	143.910	.	310.686	128.5	0	0	1120.07	534.05
3	1.30880	0.78216	-114.693	.	92.689	256.8	0	0	2107.30	1433.74
4	1.06026	0.60865	-202.355	0.45482	74.173	571.9	0	0	3550.00	2602.68
5	0.85685	0.56121	-269.870	0.28005	22.671	807.7	0	0	5084.40	3766.93
6	0.72702	0.49880	82.169	0.35608	36.583	1212.2	0	0	6632.00	6004.02
7	1.03527	0.60461	319.377	0.53828	29.644	1240.0	0	0	8312.20	6466.81
8	1.19283	0.60457	12.300	0.76091	23.971	1067.0	0	0	10381.00	8178.05
9	1.17730	0.61490	111.130	0.80000	23.830	1396.0	0	0	11742.00	9275.71

Quandl Data: All Financial Ratios for Google and IBM

Obs	Earnings Before Interest Taxes_1	Effective Tax Rate_1	Effective Tax Rate on Income_1	Enterprise Value_1	EV to Invested Capital Ratio_1	EV to Trailing Sales Ratio_1	EV to EBIT Ratio_1	EV to EBITDA Ratio_1	EV To Sales Ratio_1	Expected Growth in Earnings Pe_1	Expected Growth in Revenues_1	Free Cash Flow to Firm_1
1	659.58	0.60000	.	52375.4	155.417	19.6170	85.069	79.4074	35.7292	.	.	117.81
2	1248.57	0.52320	.	123977.0	155.223	23.6102	110.687	99.2951	38.8740	0.635	0.465	199.64
3	2364.10	0.31963	.	132704.3	95.829	14.2408	62.974	56.1331	21.6180	0.455	0.385	967.04
4	4121.90	0.26685	.	206877.5	35.694	13.8169	58.275	50.1898	19.5077	0.325	0.285	1474.14
5	5892.10	0.25912	.	81085.5	9.572	3.8758	15.948	13.7617	4.8864	0.230	0.220	2441.70
6	7844.20	0.09469	.	178017.0	14.364	7.8499	26.842	22.6941	8.1676	0.160	0.135	4775.55
7	9552.20	0.22201	0.22202	168808.2	14.654	6.1263	20.308	17.6722	7.1376	0.165	0.125	6577.53
8	11448.00	0.21221	0.21221	172359.8	11.700	4.8198	16.603	15.0559	5.8784	0.200	0.170	5214.75
9	13138.00	0.21000	0.21000	191631.0	10.810	4.0300	16.320	14.5900	5.0600	0.155	0.185	7122.58

Figure 43.2 continued

Quandl Data: All Financial Ratios for Google and IBM

Obs	Firm Value_1	Ratio of Fixed Assets to Total_1	Forward Earnings Per Share_1	Forward PE Ratio_1	Growth in Earnings Per Share_1	Previous Year Growth in Revenue_1	Hi-Lo Risk_1	Insider Holdings_1	Institutional Holdings_1	Ratio of Intangible Assets to_1	Invested Capital_1
1	52710.1	0.21606	2.11	93.5071	.	2.3358	0.35502	0.6130	0.1144	0.12117	337.0
2	126109.3	0.11435	6.35	65.3323	.	0.8434	0.44223	0.0409	0.4728	0.05852	798.7
3	140738.5	0.09363	11.26	40.8952	.	0.7960	0.21485	0.0160	0.5684	0.02704	1384.8
4	218121.4	0.12966	16.06	40.9091	.	0.6549	0.26197	0.0090	0.6124	0.10242	5795.9
5	95304.1	0.15943	18.87	16.3037	.	0.5434	0.48656	0.0100	0.5995	0.09076	8471.1
6	193862.8	0.16475	21.52	28.8095	.	0.3058	0.37771	0.0100	0.6210	0.18372	12393.1
7	193293.0	0.11963	28.41	20.9071	0.845	0.0760	0.18527	0.0100	0.6024	0.14020	11519.4
8	207334.8	0.13412	38.80	16.6469	0.550	0.2261	0.15516	0.0100	0.6309	0.12619	14731.0
9	236257.0	0.13230	39.20	18.0500	0.365	0.3350	0.16370	0.0100	0.8362	0.12300	17723.0

Quandl Data: All Financial Ratios for Google and IBM

Obs	Market Capitalization_1	Market Debt to Equity Ratio_1	Market Debt to Capital Ratio_1	Net Income_1	Net Margin_1	Non-Cash Working Capital_1	Non-Cash Working Capital as Pe_1	Payout Ratio_1	Price to Book Value Ratio_1	PE to Growth Ratio_1	Pre-Tax Operating Margin_1
1	52703.5	0.000125	0.000125	105.6	0.07204	-5.4	-0.003684	0	97.5629	.	0.42000
2	126107.4	0.000015	0.000015	405.9	0.12727	222.6	0.069798	0	43.0533	4.89269	0.35121
3	140738.5	0.000000	0.000000	1518.4	0.24735	221.4	0.036067	0	14.9420	2.03711	0.34329
4	218121.4	0.000000	0.000000	2940.7	0.27730	491.3	0.046328	0	12.8007	2.28226	0.33475
5	95304.1	0.000000	0.000000	4203.7	0.25333	1034.9	0.062366	0	4.2003	0.98572	0.30640
6	193862.8	0.000000	0.000000	5299.3	0.24314	2030.3	0.093152	0	6.8651	2.28642	0.30428
7	193293.0	0.000000	0.000000	6520.4	0.27570	1934.7	0.081803	0	5.3686	1.79663	0.35146
8	203869.8	0.016996	0.016712	8505.0	0.29007	56.0	0.001910	0	4.4089	1.19853	0.35405
9	232053.0	0.018100	0.017800	9737.0	0.25690	437.0	0.011500	0	3.9900	1.54000	0.30980

Quandl Data: All Financial Ratios for Google and IBM

Obs	Price to Sales Ratio_1	Reinvestment Amount_1	Reinvestment Rate_1	Revenues_1	Return on Capital_1	Return on Equity_1	Sales General and Administrati_1	Stock Price_1	Total Debt_1	Trading Volume_1
1	35.9530	128.46	0.52164	1465.9	0.73078	0.17524	268.3	197.30	6.6	5627185
2	39.5420	334.41	0.62618	3189.2	0.66865	0.13857	611.6	414.86	1.9	7507209
3	22.9268	466.71	0.32552	6138.6	1.03534	0.16121	1459.8	460.48	0.0	2531693
4	20.5680	1128.55	0.43361	10604.9	0.44906	0.17258	2829.9	657.00	0.0	5350543
5	5.7433	1325.23	0.35181	16594.0	0.44468	0.18527	4860.5	307.65	0.0	2831538
6	8.8946	1228.47	0.20461	21795.6	0.48446	0.18766	6542.1	619.98	0.0	3434825
7	8.1729	-110.72	-0.01712	23650.6	0.56138	0.18110	6494.3	593.97	0.0	2764989
8	6.9530	2963.30	0.36235	29321.0	0.55516	0.18393	8523.0	645.90	3465.0	3018131
9	6.1200	2153.13	0.23210	37905.0	0.52340	0.16750	12975.0	707.38	4204.0	1992857

Figure 43.2 continued

Quandl Data: All Financial Ratios for Google and IBM

Obs	Trailing 12-month Revenues_1	Trailing Net Income_1	Trailing PE Ratio_1	Trailing Revenues_1	Value Line Beta_1	EV to Book Value Ratio_1	Number of Shares Outstanding_2	3-Year Regression Beta_2	3-year Standard Deviation of S_2	Book Debt to Capital Ratio_2
1	2669.9	190.6	276.514	2669.9	0.00	86.5235	1694.5	1.70	0.3289	0.45891
2	5251.0	0.0	.	5251.0	0.00	43.0260	1645.6	1.82	0.3107	0.43526
3	9318.6	2119.8	66.392	9318.6	1.05	14.9420	1574.0	1.64	0.1858	0.40620
4	14972.8	3889.6	56.078	14972.8	0.95	12.8007	1506.5	1.63	0.1988	0.44312
5	20921.2	4804.8	19.835	20921.2	0.75	4.2003	1385.2	1.05	0.2235	0.55337
6	22677.7	6034.9	32.124	22677.7	0.90	6.8651	1339.1	0.73	0.2266	0.71587
7	27554.8	7936.0	24.356	27554.8	0.90	5.3686	1305.3	0.69	0.2214	0.53423
8	35761.0	10075.0	20.235	35761.0	0.90	4.1712	1228.0	0.40	0.1460	0.55263
9	47544.0	10517.0	22.060	47544.0	0.90	3.7900	1163.2	0.63	0.1459	0.60750

Quandl Data: All Financial Ratios for Google and IBM

Obs	Book Value of Equity_2	Book Value of Assets_2	Capital Expenditures_2	Cash_2	Cash as Percentage of Firm Val_2	Cash as Percentage of Revenues_2	Cash as Percentage of Total As_2	Change in Non-Cash Working Cap_2	Correlation with the Market_2	Current PE Ratio_2
1	.	104457	4393	7647	0.04083	0.08237	.	253.577	1.03375	21.4948
2	.	109183	4368	10570	0.06860	0.11200	0.09681	-93.490	1.17155	15.1756
3	33098	105748	3842	13686	0.08112	0.15017	0.12942	68.163	0.80000	17.1465
4	28506	103234	4362	10657	0.06135	0.11657	0.10323	-146.379	0.76459	16.0391
5	28470	120431	4630	16146	0.11256	0.16344	0.13407	-336.333	0.64430	10.3835
6	13465	109524	4171	12907	0.06306	0.12455	0.11785	-382.777	0.63548	13.8453
7	22755	109022	3447	13974	0.06737	0.14593	0.12818	75.923	0.80000	13.5063
8	23172	113452	4185	11651	0.04791	0.11666	0.10270	176.586	0.80000	14.4647
9	20236	116433	4108	11922	0.04790	0.11150	0.10240	-111.350	0.80000	13.7300

Quandl Data: All Financial Ratios for Google and IBM

Obs	Depreciation_2	Dividend Yield_2	Dividends_2	Earnings Before Interest and T_2	EBIT for Previous Period_2	Earnings Before Interest Taxes_2	Effective Tax Rate_2	Effective Tax Rate on Income_2	Enterprise Value_2	EV to Invested Capital Ratio_2
1	4701	0.007336	1220.04	14786.83	10352.41	19487.83	0.29989	.	179624.7	4.09644
2	4915	0.009735	1316.48	11291.11	7903.21	16206.11	0.30005	.	143520.0	3.40870
3	5188	0.012931	1888.80	9376.00	6533.10	14564.00	0.30321	.	155025.9	3.68644
4	4983	0.015960	2410.40	12621.00	8923.93	17604.00	0.29293	.	163049.9	4.02274
5	5201	0.025610	2770.40	15276.00	10983.90	20477.00	0.28097	.	127303.2	2.67455
6	5450	0.017700	3022.60	15938.00	11760.65	21388.00	0.26210	.	191787.3	5.56163
7	4994	0.018500	3354.47	17013.00	12592.34	22007.00	0.25984	0.25984	193448.6	5.54596
8	4831	0.017000	3647.45	18150.00	13650.07	22981.00	0.24793	0.24793	231528.6	5.76731
9	4815	0.019000	4129.36	20286.00	15313.70	25101.00	0.24510	0.24510	237147.2	5.98000

Figure 43.2 continued

Quandl Data: All Financial Ratios for Google and IBM

Obs	EV to Trailing Sales Ratio_2	EV to EBIT Ratio_2	EV to EBITDA Ratio_2	EV To Sales Ratio_2	Expected Growth in Earnings Pe_2	Expected Growth in Revenues_2	Free Cash Flow to Firm_2	Firm Value_2	Ratio of Fixed Assets to Total_2	Forward Earnings Per Share_2	Forward PE Ratio_2	Growth in Earnings Per Share_2
1	1.93482	12.1476	9.2173	2.01529	0.115	0.095	10406.83	187271.7	0.14062	5.31	18.4840	0.070
2	1.52069	12.7109	8.8559	1.49045	0.095	0.075	8543.70	154090.0	0.13899	5.33	15.4184	0.060
3	1.73028	16.5343	10.6445	1.70108	0.095	0.070	7810.94	168711.9	0.13008	6.22	15.6190	0.050
4	1.69529	12.9189	9.2621	1.78345	0.130	0.090	9691.31	173706.9	0.13988	7.64	13.2369	0.055
5	1.20678	8.3335	6.2169	1.28868	0.145	0.110	11891.24	143449.2	0.12523	9.42	8.9342	0.075
6	2.00755	12.0333	8.9671	1.85069	0.105	0.070	13422.43	204694.3	0.13061	10.18	12.8585	0.120
7	1.97229	11.3706	8.7903	2.02018	0.130	0.065	14063.42	207422.6	0.12993	12.12	12.1089	0.145
8	2.17504	12.7564	10.0748	2.31830	0.120	0.090	14119.48	243179.6	0.12425	13.89	13.2383	0.160
9	2.27000	11.6900	9.4500	2.22000	0.095	0.065	16132.05	249069.2	0.11920	15.07	12.7100	0.165

Quandl Data: All Financial Ratios for Google and IBM

Obs	Previous Year Growth in Revenu_2	Hi-Lo Risk_2	Insider Holdings_2	Institutional Holdings_2	Ratio of Intangible Assets to_2	Invested Capital_2	Market Capitalization_2	Market Debt to Equity Ratio_2	Market Debt to Capital Ratio_2	Net Income_2
1	0.1159	0.10163	0.01	0.5458	0.07175	43849	163639.7	0.14441	0.12619	7613
2	0.1125	0.15940	0.01	0.5384	0.09366	42104	131163.0	0.17480	0.14879	8643
3	-0.0105	0.14284	0.01	0.5624	0.10500	42053	146070.9	0.15500	0.13420	8519
4	0.0481	0.15550	0.01	0.6406	0.14584	40532	151023.9	0.15019	0.13058	9416
5	0.1751	0.30649	0.01	0.5995	0.13611	47598	108175.2	0.32608	0.24590	10418
6	0.0852	0.23806	0.01	0.6032	0.19269	34484	170768.3	0.19867	0.16574	12334
7	-0.0521	0.11964	0.01	0.5886	0.20824	34881	181322.6	0.14394	0.12583	13425
8	0.1086	0.14358	0.01	0.6010	0.25230	40145	214555.6	0.13341	0.11771	14833
9	0.0700	0.08850	0.01	0.5817	0.25430	39634	217749.2	0.14380	0.12570	15855

Quandl Data: All Financial Ratios for Google and IBM

Obs	Net Margin_2	Non-Cash Working Capital_2	Non-Cash Working Capital as Pe_2	Payout Ratio_2	Price to Book Value Ratio_2	PE to Growth Ratio_2	Pre-Tax Operating Margin_2	Price to Sales Ratio_2	Reinvestment Amount_2	Reinvestment Rate_2
1	0.08541	6097	0.068405	0.16026	5.8728	1.86911	0.16590	1.83595	-54.42	-0.00526
2	0.08976	4701	0.048820	0.15232	4.4093	1.59744	0.11726	1.36212	-640.49	-0.08104
3	0.09348	4039	0.044319	0.22172	4.4133	1.80489	0.10288	1.60281	-1277.84	-0.19559
4	0.10299	2815	0.030791	0.25599	5.2980	1.23377	0.13805	1.65191	-767.38	-0.08599
5	0.10546	4956	0.050169	0.26592	3.7996	0.71610	0.15464	1.09505	-907.33	-0.08261
6	0.11902	4899	0.047274	0.24506	12.6824	1.31860	0.15380	1.64787	-1661.78	-0.14130
7	0.14020	3127	0.032655	0.24987	7.9685	1.03895	0.17767	1.89355	-1471.08	-0.11682
8	0.14852	2681	0.026845	0.24590	9.2593	1.20540	0.18174	2.14835	-469.41	-0.03439
9	0.14830	5346	0.050000	0.25400	10.7600	1.45000	0.18970	2.04000	-818.35	-0.05340

Figure 43.2 continued

Quandl Data: All Financial Ratios for Google and IBM

Obs	Revenues_2	Return on Capital_2	Return on Equity_2	Sales General and Administrati_2	Stock Price_2	Total Debt_2	Trading Volume_2	Trailing 12-month Revenues_2	Trailing Net Income_2	Trailing PE Ratio_2
1	89131	0.23609	0.27322	22929	98.15	23632	1872600	92838	0.0	.
2	96293	0.18771	0.29055	24737	82.18	22927	4456000	94378	8643.0	15.1756
3	91134	0.15535	0.25739	27156	97.15	22641	4432500	89596	3225.9	45.2807
4	91424	0.22017	0.33032	26366	101.13	22683	11019149	96178	9860.2	15.3165
5	98786	0.23076	0.36593	26453	84.16	35274	6537607	105490	11859.0	9.1218
6	103630	0.34105	0.91600	29723	130.90	33926	8080103	95533	13038.0	13.0977
7	95758	0.36101	0.58998	26772	146.76	26100	5406125	98083	14389.0	12.6015
8	99870	0.34002	0.64013	27863	183.88	28624	5608725	106448	15623.0	13.7333
9	106916	0.38640	0.78350	29852	191.55	31320	4551170	104689	16260.0	13.3900

Quandl Data: All Financial Ratios for Google and IBM

Obs	Trailing Revenues_2	Value Line Beta_2	EV to Book Value Ratio_2
1	92838	1.05	3.63663
2	94378	1.10	2.92535
3	89596	1.05	3.02682
4	96178	0.95	3.39344
5	105490	0.90	2.25040
6	95533	0.90	4.31927
7	98083	0.85	4.24568
8	106448	0.85	4.69495
9	104689	0.85	4.83000

The SASEQUAN interface engine supports the XML format. The XML data that the Quandl website returns are placed in a file named by the OUTXML= option. The XML map that is automatically created is assigned the full pathname specified by the XMLMAP= option, and the fileref that is used for the map assignment is specified by the MAPREF= option. In the example at the beginning of this section, the SASEQUAN engine uses the MAPREF= and XMLMAP= options in the FILENAME statement to assign a filename:

```
FILENAME MyMap "U:\quan950\test\gstart.map";
```

You can use the MAPREF= and XMLMAP= options to control where the map resides, what you name the map, and how you refer to it with a fileref. You can use the OUTXML= option to name your XML data file; it is described in the section “[SAS OUTXML File](#)” on page 3021. The XML data file is placed in the folder that is designated by *physical-name*, which is described in the section “[The LIBNAME libref SASEQUAN Statement](#)” on page 3013. You can refer to your data by using the myLib libref in your SASEQUAN LIBNAME statement. The myLib libref is shown inside the DATA step in the SET statement. The SET statement reads observations from the input data set myLib.gstart and stores them in a SAS data set named All_Fin, as shown in [Figure 43.2](#). You can also use the SAS DATA step to perform further processing and to store the resulting time series in a SAS data set; this process is described in the section “[SAS Output Data Set](#)” on page 3021.

To specify the list of Quandl data sets that you want to retrieve, use the IDLIST= option. This option accepts a string, enclosed in single quotation marks, that denotes a list of Quandl codes that specify data sets where the time series reside that you select for the resulting SAS data set. The Quandl codes are separated by commas, so valid Quandl codes cannot contain embedded commas or quotes. The All_Fin data set contains a total of 139 variables: the DATE variable and the 138 time series variables. The DMDRN/GOOG_ALLFINANCIALRATIOS data set includes 69 time series that are designated by _1 to indicate first order in the IDLIST= option; and the DMDRN/IBM_ALLFINANCIALRATIOS data set has 69 variables designated by _2 to indicate second order in the IDLIST= option. The observation range for both datasets is controlled by the START= and END= options. The All_Fin data set contains observations that range from December 31, 2003, to December 31, 2012, as specified by the START= and END= options. The frequency of the data is annual, which is the default frequency, because the FREQ= option was not specified.

NOTE: The “%20” is a special character for URL encoding of blanks. If the Quandl code that you name in the IDLIST= option contains a blank, you must use “%20” wherever the blank appears in the Quandl code. If the Quandl code contains an underscore, then you must use an underscore in the IDLIST= option. The underscore and the blank are not equivalent in the Quandl databases, so make sure that you use “%20” (URL-encoded space) to designate blank characters.

Examples: SASEQUAN Interface Engine

Example 43.1: Retrieving Historical Price Data for Oil India Limited

This example shows how to use one Quandl code, NSE/OIL, to retrieve historical prices for Oil India Limited, starting September 1, 2013, and ending November 5, 2013, with a daily frequency. The output is shown in Output 43.1.1.

```
options validvarname=any;

title 'Historical Prices for Oil India Limited';
libname _all_ clear;
libname mylib "U:\quan950\doc\";

libname myQoil sasequan "%sysget (QUANDL) "
    apikey='XXXXXXXXXXXXXXXXXXXXX'
    idlist='NSE/OIL'
    format=XML
    outXml=oil
    automap=replace
    mapref=MyMap
    xmlmap="%sysget (QUANDL) oil.map"
    start='2013-09-01'
    end='2013-11-05'
    freq='daily'
    collapse='daily'
    ;

data mylib.oilall;
    set myQoil.oil;
run;

proc contents data=mylib.oilall; run;
proc print data=mylib.oilall; run;
```

Output 43.1.1 Historical Prices for Oil India Limited**Historical Prices for Oil India Limited**

Obs	date	Open	High	Low	Last	Close	Total Trade Quantity	Turnover (Lacs)
1	2013-09-02	435.95	441.65	427.20	431.00	431.45	174437	755.45
2	2013-09-03	439.90	439.90	427.00	428.50	429.05	199749	860.41
3	2013-09-04	435.00	435.00	426.15	429.50	429.45	790295	3396.42
4	2013-09-05	430.00	439.95	430.00	435.00	432.60	586678	2539.29
5	2013-09-06	437.00	450.00	433.30	445.25	445.15	543652	2402.79
6	2013-09-10	450.00	465.00	446.10	462.10	460.65	663553	2997.61
7	2013-09-11	462.00	485.00	461.00	466.00	466.70	371647	1733.05
8	2013-09-12	458.05	466.00	446.10	448.70	448.10	211533	959.45
9	2013-09-13	452.50	484.00	448.15	471.05	470.25	826546	3884.01
10	2013-09-16	483.70	484.00	458.80	476.00	467.00	335598	1593.84
11	2013-09-17	467.00	479.20	460.35	473.00	475.55	241830	1148.25
12	2013-09-18	471.20	481.85	471.20	480.00	479.70	182343	868.29
13	2013-09-19	485.00	499.00	476.00	491.10	493.75	457626	2236.70
14	2013-09-20	493.00	493.00	459.00	472.15	466.50	295333	1393.19
15	2013-09-23	466.75	487.00	464.00	480.00	480.40	273803	1302.58
16	2013-09-24	481.90	481.90	464.10	466.00	465.80	314456	1486.22
17	2013-09-25	467.90	473.30	466.10	470.15	470.35	738597	3472.11
18	2013-09-26	471.00	473.70	447.30	453.00	451.95	537088	2434.72
19	2013-09-27	456.70	462.00	450.10	452.00	454.30	345246	1571.16
20	2013-09-30	449.70	457.80	435.00	435.25	437.40	394564	1742.00
21	2013-10-01	437.15	449.35	432.00	449.00	447.90	308033	1367.86
22	2013-10-03	448.00	461.00	444.15	457.10	458.90	197974	898.93
23	2013-10-04	456.95	464.00	455.55	461.50	461.10	227214	1047.43
24	2013-10-07	464.90	471.45	450.00	468.00	464.40	240571	1098.48
25	2013-10-08	467.00	471.65	461.00	463.00	462.25	208627	964.45
26	2013-10-09	462.00	465.80	456.75	465.50	465.10	101852	472.35
27	2013-10-10	465.10	468.50	459.20	460.30	462.25	339738	1578.62
28	2013-10-11	465.00	468.70	457.00	467.50	463.25	213591	983.10
29	2013-10-14	464.65	467.90	461.00	464.10	463.95	125129	580.40
30	2013-10-15	464.00	471.80	456.55	459.30	460.55	407231	1877.01
31	2013-10-17	460.50	465.00	452.50	453.20	454.40	220366	1009.36
32	2013-10-18	457.00	465.95	457.00	465.00	464.55	185891	857.04
33	2013-10-21	465.00	471.90	458.70	468.00	468.85	114130	531.62
34	2013-10-22	468.85	473.20	461.15	465.70	466.65	198435	924.12
35	2013-10-23	463.05	469.50	451.40	456.00	457.65	469852	2152.30
36	2013-10-24	458.00	462.95	452.00	452.00	453.40	246085	1126.66
37	2013-10-25	458.00	460.05	450.00	454.00	454.65	272926	1238.47
38	2013-10-28	455.00	459.70	445.10	457.00	454.10	173547	785.17
39	2013-10-29	457.00	469.30	451.50	464.00	459.95	258106	1179.18
40	2013-10-30	460.20	467.80	453.95	463.50	463.25	301971	1391.67
41	2013-10-31	463.00	481.00	456.00	473.00	473.85	472301	2221.88
42	2013-11-01	470.10	481.00	464.50	480.00	475.05	318091	1495.83
43	2013-11-03	479.00	482.20	475.25	476.00	477.70	34250	163.85
44	2013-11-05	475.05	476.90	465.10	467.05	469.35	190319	894.87

Example 43.2: Retrieving Data by Using Three Quandl Codes

This example shows how to use three Quandl codes of different native frequencies to retrieve quarterly data for corporate profits after tax (FRED/CP), gross domestic product (FRED/GDP), and total consumer credit owned and securitized, outstanding (TOTALSL). The output is shown in [Output 43.2.1](#).

```

title 'Retrieve Data for Three Time Series: FRED/CP, FRED/GDP, FRED/TOTALSL';
libname _all_ clear;
options validvarname=any;
libname mylib "U:\quan950\doc\";

libname myQ3 sasequan "%sysget(QUANDL)"
  OUTXML=fred3
  AUTOMAP=replace
  MAPREF=MyMap
  XMLMAP="%sysget(QUANDL)fred3.map"
  APIKEY='XXXXXXXXXXXXXXXXXXXXX'
  IDLIST='FRED/CP,FRED/GDP,FRED/TOTALSL'
  FORMAT=xml
  START='2009-07-01'
  END='2013-07-01'
  FREQ='quarterly'
  COLLAPSE='quarterly'
  ;

data mylib.thrall;
  set myQ3.fred3;
  label Value_1 = "Corporate Profits After Tax";
  label Value_2 = "Gross Domestic Product, 1 Decimal";
  label Value_3 = "Total Consumer Credit Owned and Securitized, Outstanding";
run;

proc contents data=mylib.thrall; run;
proc print data=mylib.thrall label; run;

```

Output 43.2.1 Retrieve Data for Corporate Profits after Tax, Gross Domestic Product, Total Consumer Credit Owned and Securitized, Outstanding

Retrieve Data for Three Time Series: FRED/CP, FRED/GDP, FRED/TOTALSL

Obs	date	Corporate Profits After Tax	Gross Domestic Product, 1 Decimal	Total Consumer Credit Owned and Securitized, Outstanding
1	2009-09-30	1259.6	14384.4	2577.25
2	2009-12-31	1382.2	14564.1	2553.48
3	2010-03-31	1446.9	14672.5	2537.65
4	2010-06-30	1431.2	14879.2	2521.71
5	2010-09-30	1492.1	15049.8	2520.66
6	2010-12-31	1486.9	15231.7	2648.09
7	2011-03-31	1399.2	15242.9	2675.45
8	2011-06-30	1466.1	15461.9	2699.38
9	2011-09-30	1482.1	15611.8	2723.44
10	2011-12-31	1545.1	15818.7	2756.97
11	2012-03-31	1724.9	16041.6	2794.10
12	2012-06-30	1730.3	16160.4	2843.53
13	2012-09-30	1769.4	16356.0	2877.61
14	2012-12-31	1796.4	16420.3	2924.32
15	2013-03-31	1784.8	16535.3	2969.45
16	2013-06-30	1821.4	16661.0	3012.29
17	2013-09-30	1868.7	16912.9	3057.07

Example 43.3: Selecting IBM and Google Quandl Codes for All Financial Ratios

This example shows how to retrieve data for multiple time series that have different Quandl codes. The time series for each Quandl code are named identically in the original Quandl data set, and many exceed the limit of 32 bytes for a valid SAS variable name. Names such as “3-Year Standard Deviation of Stock Price,” “Cash as Percentage of Firm Value,” “Cash as Percentage of Revenues,” and “Sales General and Administration Expenses” are truncated to 30 bytes before appending the suffix _1 to the Google data and _2 to the IBM data. Long variable names are represented using the long-name convention of “literal n variable name n”.

The resulting SAS data set contains the merged contents of both Quandl data sets; the first Quandl data set variable names have the appended suffix _1, and the second Quandl data set variable names have the appended suffix _2. The SASEQUAN engine appends the appropriate suffix, _N, for every Quandl code that appears in the IDLIST= option, where N is the positional number of the Quandl code in the IDLIST= option. The Quandl codes are separated by commas in the IDLIST= option. The output is shown in [Output 43.3.1](#).

```

title 'All Financial Ratios for Google and IBM';
libname _all_ clear;
options validvarname=any;
libname mylib "U:\quan950\doc\";

libname myTwo sasequan "%sysget(QUANDL) "
    OUTXML=tallfin
    AUTOMAP=replace
    MAPREF=MyMap
    XMLMAP="%sysget(QUANDL)tallfin.map"
    APIKEY='XXXXXXXXXXXXXXXXXXXX'
    IDLIST='DMDRN/GOOG_ALLFINANCIALRATIOS,DMDRN/IBM_ALLFINANCIALRATIOS'
    FORMAT=xml
    START='2003-12-31'
    END='2012-12-31'
    ;

data mylib.tallFin;
    set myTwo.tallfin;
run;

/* Using PROC CONTENTS to obtain alphabetical order of variable names */
proc contents data=mylib.tallFin out=newa(keep=name); run;

/* Create macro variables for each variable name and count the number of variables */
data _null_;
    set newa end=last;
    k+1;
    call symput('var' || trim(left(put(k,8))),trim(name));
    if last then call symput('total',trim(left(put(k,8))));
run;

%macro test;
    %do i=1 %to &total;

```

```

        %put var&i is: &&var&i;
    %end;

/*-- Use the QUOTELST macro to put " "N around the elements of a variable list --*/

%macro quotelst(strng,quotel=%str("%"),quote2=%str("%N"),delim=%str( ));
    %local i quotelst;
    %let i=1;
    %do %while(%length(%qscan(&strng,&i,|)) GT 0);
        %if %length(&quotelst) EQ 0
            %then %let quotelst=&quotel1.%qscan(&strng,&i,|)&quote2;
            %else %let quotelst=&quotelst.&quotel1.%qscan(&strng,&i,|)&quote2;
            %let i=%eval(&i + 1);
        %if %length(%qscan(&strng,&i,|)) GT 0 %then %let quotelst=&quotelst.&delim;
    %end;
    %unquote(&quotelst)
%mend quotelst;

/*-- macro variable longname&i holds all the N-literal SAS variable names, --*/
/*-- which are now in alphabetical order                                     --*/

%do i=1 %to &total;
    %let longname&i=%quotelst(&&var&i);
    %put LONGNAME&i is: &&longname&i;
%end;

%let total=%eval(&total-1); /* handle date variable separately */

/*-- RETAIN statement gives the preferred order of variables, --*/
/*-- with date first, and the rest in alphabetical order... --*/
/*-- shuffling to get each MSFT series next to each matching IBM series--*/

data mylib.orderFin;
    retain date;
    retain %do j=1 %to &total;
        &&longname&j
    %end;;
    set mylib.tallFin;
run;

proc print data=mylib.orderFin;
run;
%mend test;

/* Invoke the macro */

%test;

```

Output 43.3.1 All Financial Ratios for Google and IBM, Side by Side, Shuffled Order

All Financial Ratios for Google and IBM

Obs	date	3-Year Regression Beta_1	3-Year Regression Beta_2	3-year Standard Deviation of S_1	3-year Standard Deviation of S_2	Book Debt to Capital Ratio_1	Book Debt to Capital Ratio_2	Book Value of Assets_1	Book Value of Assets_2	Book Value of Equity_1
1	2003-12-31	0.00	1.70	0.0000	0.3289	0.010834	0.45891	871.5	104457	.
2	2004-12-31	0.00	1.82	0.0000	0.3107	0.000648	0.43526	3313.4	109183	.
3	2005-12-31	.	1.64	.	0.1858	0.000000	0.40620	10271.8	105748	9419.0
4	2006-12-31	1.21	1.63	0.3342	0.1988	0.000000	0.44312	18473.4	103234	17039.8
5	2007-12-31	1.32	1.05	0.4285	0.2235	0.000000	0.55337	25335.8	120431	22689.7
6	2008-12-31	0.88	0.73	0.4044	0.2266	0.000000	0.71587	31767.6	109524	28238.9
7	2009-12-31	0.98	0.69	0.4180	0.2214	0.000000	0.53423	40496.8	109022	36004.2
8	2010-12-31	0.85	0.40	0.2957	0.1460	0.069710	0.55263	57851.0	113452	46241.0
9	2011-12-31	1.23	0.63	0.3073	0.1459	0.067400	0.60750	72574.0	116433	58145.0

All Financial Ratios for Google and IBM

Obs	Book Value of Equity_2	Capital Expenditures_1	Capital Expenditures_2	Cash as Percentage of Firm Val_1	Cash as Percentage of Firm Val_2	Cash as Percentage of Revenues_1	Cash as Percentage of Revenues_2	Cash as Percentage of Total As_1
1	.	176.8	4393	0.00635	0.04083	0.12536	0.08237	.
2	.	319.0	4368	0.01691	0.06860	0.40608	0.11200	0.64354
3	33098	838.2	3842	0.05709	0.08112	1.30880	0.15017	0.78216
4	28506	1902.8	4362	0.05155	0.06135	1.06026	0.11657	0.60865
5	28470	2402.8	4630	0.14919	0.11256	0.85685	0.16344	0.56121
6	13465	2358.5	4171	0.08174	0.06306	0.72702	0.12455	0.49880
7	22755	809.9	3447	0.12667	0.06737	1.03527	0.14593	0.60461
8	23172	4018.0	4185	0.16869	0.04791	1.19283	0.11666	0.60457
9	20236	3438.0	4108	0.18890	0.04790	1.17730	0.11150	0.61490

All Financial Ratios for Google and IBM

Obs	Cash as Percentage of Total As_2	Cash_1	Cash_2	Change in Non-Cash Working Cap_1	Change in Non-Cash Working Cap_2	Correlation with the Market_1	Correlation with the Market_2	Current PE Ratio_1	Current PE Ratio_2	Depreciation_1
1	.	334.7	7647	-4.435	253.577	.	1.03375	499.086	21.4948	43.9
2	0.09681	2132.3	10570	143.910	-93.490	.	1.17155	310.686	15.1756	128.5
3	0.12942	8034.2	13686	-114.693	68.163	.	0.80000	92.689	17.1465	256.8
4	0.10323	11243.9	10657	-202.355	-146.379	0.45482	0.76459	74.173	16.0391	571.9
5	0.13407	14218.6	16146	-269.870	-336.333	0.28005	0.64430	22.671	10.3835	807.7
6	0.11785	15845.8	12907	82.169	-382.777	0.35608	0.63548	36.583	13.8453	1212.2
7	0.12818	24484.8	13974	319.377	75.923	0.53828	0.80000	29.644	13.5063	1240.0
8	0.10270	34975.0	11651	12.300	176.586	0.76091	0.80000	23.971	14.4647	1067.0
9	0.10240	44626.0	11922	111.130	-111.350	0.80000	0.80000	23.830	13.7300	1396.0

Output 43.3.1 continued

All Financial Ratios for Google and IBM

Obs	Depreciation_2	Dividend Yield_1	Dividend Yield_2	Dividends_1	Dividends_2	EBIT for Previous Period_1	EBIT for Previous Period_2	EV To Sales Ratio_1	EV To Sales Ratio_2	EV to Book Value Ratio_1
1	4701	0	0.007336	0	1220.04	246.27	10352.41	35.7292	2.01529	86.5235
2	4915	0	0.009735	0	1316.48	534.05	7903.21	38.8740	1.49045	43.0260
3	5188	0	0.012931	0	1888.80	1433.74	6533.10	21.6180	1.70108	14.9420
4	4983	0	0.015960	0	2410.40	2602.68	8923.93	19.5077	1.78345	12.8007
5	5201	0	0.025610	0	2770.40	3766.93	10983.90	4.8864	1.28868	4.2003
6	5450	0	0.017700	0	3022.60	6004.02	11760.65	8.1676	1.85069	6.8651
7	4994	0	0.018500	0	3354.47	6466.81	12592.34	7.1376	2.02018	5.3686
8	4831	0	0.017000	0	3647.45	8178.05	13650.07	5.8784	2.31830	4.1712
9	4815	0	0.019000	0	4129.36	9275.71	15313.70	5.0600	2.22000	3.7900

All Financial Ratios for Google and IBM

Obs	EV to Book Value Ratio_2	EV to EBIT Ratio_1	EV to EBIT Ratio_2	EV to EBITDA Ratio_1	EV to EBITDA Ratio_2	EV to Invested Capital Ratio_1	EV to Invested Capital Ratio_2	EV to Trailing Sales Ratio_1	EV to Trailing Sales Ratio_2	Earnings Before Interest Taxes_1	Earnings Before Interest Taxes_2	Earnings Before Interest and T_1
1	3.63663	85.069	12.1476	79.4074	9.2173	155.417	4.09644	19.6170	1.93482	659.58	19487.83	615.68
2	2.92535	110.687	12.7109	99.2951	8.8559	155.223	3.40870	23.6102	1.52069	1248.57	16206.11	1120.07
3	3.02682	62.974	16.5343	56.1331	10.6445	95.829	3.68644	14.2408	1.73028	2364.10	14564.00	2107.30
4	3.39344	58.275	12.9189	50.1898	9.2621	35.694	4.02274	13.8169	1.69529	4121.90	17604.00	3550.00
5	2.25040	15.948	8.3335	13.7617	6.2169	9.572	2.67455	3.8758	1.20678	5892.10	20477.00	5084.40
6	4.31927	26.842	12.0333	22.6941	8.9671	14.364	5.56163	7.8499	2.00755	7844.20	21388.00	6632.00
7	4.24568	20.308	11.3706	17.6722	8.7903	14.654	5.54596	6.1263	1.97229	9552.20	22007.00	8312.20
8	4.69495	16.603	12.7564	15.0559	10.0748	11.700	5.76731	4.8198	2.17504	11448.00	22981.00	10381.00
9	4.83000	16.320	11.6900	14.5900	9.4500	10.810	5.98000	4.0300	2.27000	13138.00	25101.00	11742.00

All Financial Ratios for Google and IBM

Obs	Earnings Before Interest and T_2	Effective Tax Rate on Income_1	Effective Tax Rate on Income_2	Effective Tax Rate_1	Effective Tax Rate_2	Enterprise Value_1	Enterprise Value_2	Expected Growth in Earnings Pe_1	Expected Growth in Earnings Pe_2	Expected Growth in Revenues_1
1	14786.83	.	.	0.60000	0.29989	52375.4	179624.7	.	0.115	.
2	11291.11	.	.	0.52320	0.30005	123977.0	143520.0	0.635	0.095	0.465
3	9376.00	.	.	0.31963	0.30321	132704.3	155025.9	0.455	0.095	0.385
4	12621.00	.	.	0.26685	0.29293	206877.5	163049.9	0.325	0.130	0.285
5	15276.00	.	.	0.25912	0.28097	81085.5	127303.2	0.230	0.145	0.220
6	15938.00	.	.	0.09469	0.26210	178017.0	191787.3	0.160	0.105	0.135
7	17013.00	0.22202	0.25984	0.22201	0.25984	168808.2	193448.6	0.165	0.130	0.125
8	18150.00	0.21221	0.24793	0.21221	0.24793	172359.8	231528.6	0.200	0.120	0.170
9	20286.00	0.21000	0.24510	0.21000	0.24510	191631.0	237147.2	0.155	0.095	0.185

Output 43.3.1 continued

All Financial Ratios for Google and IBM

Obs	Expected Growth in Revenues_2	Firm Value_1	Firm Value_2	Forward Earnings Per Share_1	Forward Earnings Per Share_2	Forward PE Ratio_1	Forward PE Ratio_2	Free Cash Flow to Firm_1	Free Cash Flow to Firm_2	Growth in Earnings Per Share_1	Growth in Earnings Per Share_2
1	0.095	52710.1	187271.7	2.11	5.31	93.5071	18.4840	117.81	10406.83	.	0.070
2	0.075	126109.3	154090.0	6.35	5.33	65.3323	15.4184	199.64	8543.70	.	0.060
3	0.070	140738.5	168711.9	11.26	6.22	40.8952	15.6190	967.04	7810.94	.	0.050
4	0.090	218121.4	173706.9	16.06	7.64	40.9091	13.2369	1474.14	9691.31	.	0.055
5	0.110	95304.1	143449.2	18.87	9.42	16.3037	8.9342	2441.70	11891.24	.	0.075
6	0.070	193862.8	204694.3	21.52	10.18	28.8095	12.8585	4775.55	13422.43	.	0.120
7	0.065	193293.0	207422.6	28.41	12.12	20.9071	12.1089	6577.53	14063.42	0.845	0.145
8	0.090	207334.8	243179.6	38.80	13.89	16.6469	13.2383	5214.75	14119.48	0.550	0.160
9	0.065	236257.0	249069.2	39.20	15.07	18.0500	12.7100	7122.58	16132.05	0.365	0.165

All Financial Ratios for Google and IBM

Obs	Hi-Lo Risk_1	Hi-Lo Risk_2	Insider Holdings_1	Insider Holdings_2	Institutional Holdings_1	Institutional Holdings_2	Invested Capital_1	Invested Capital_2	Market Capitalization_1
1	0.35502	0.10163	0.6130	0.01	0.1144	0.5458	337.0	43849	52703.5
2	0.44223	0.15940	0.0409	0.01	0.4728	0.5384	798.7	42104	126107.4
3	0.21485	0.14284	0.0160	0.01	0.5684	0.5624	1384.8	42053	140738.5
4	0.26197	0.15550	0.0090	0.01	0.6124	0.6406	5795.9	40532	218121.4
5	0.48656	0.30649	0.0100	0.01	0.5995	0.5995	8471.1	47598	95304.1
6	0.37771	0.23806	0.0100	0.01	0.6210	0.6032	12393.1	34484	193862.8
7	0.18527	0.11964	0.0100	0.01	0.6024	0.5886	11519.4	34881	193293.0
8	0.15516	0.14358	0.0100	0.01	0.6309	0.6010	14731.0	40145	203869.8
9	0.16370	0.08850	0.0100	0.01	0.8362	0.5817	17723.0	39634	232053.0

All Financial Ratios for Google and IBM

Obs	Market Capitalization_2	Market Debt to Capital Ratio_1	Market Debt to Capital Ratio_2	Market Debt to Equity Ratio_1	Market Debt to Equity Ratio_2	Net Income_1	Net Income_2	Net Margin_1	Net Margin_2	Non-Cash Working Capital as Pe_1
1	163639.7	0.000125	0.12619	0.000125	0.14441	105.6	7613	0.07204	0.08541	-0.003684
2	131163.0	0.000015	0.14879	0.000015	0.17480	405.9	8643	0.12727	0.08976	0.069798
3	146070.9	0.000000	0.13420	0.000000	0.15500	1518.4	8519	0.24735	0.09348	0.036067
4	151023.9	0.000000	0.13058	0.000000	0.15019	2940.7	9416	0.27730	0.10299	0.046328
5	108175.2	0.000000	0.24590	0.000000	0.32608	4203.7	10418	0.25333	0.10546	0.062366
6	170768.3	0.000000	0.16574	0.000000	0.19867	5299.3	12334	0.24314	0.11902	0.093152
7	181322.6	0.000000	0.12583	0.000000	0.14394	6520.4	13425	0.27570	0.14020	0.081803
8	214555.6	0.016712	0.11771	0.016996	0.13341	8505.0	14833	0.29007	0.14852	0.001910
9	217749.2	0.017800	0.12570	0.018100	0.14380	9737.0	15855	0.25690	0.14830	0.011500

Output 43.3.1 continued

All Financial Ratios for Google and IBM

Obs	Non-Cash Working Capital as Pe_2	Non-Cash Working Capital_1	Non-Cash Working Capital_2	Number of Shares Outstanding_1	Number of Shares Outstanding_2	PE to Growth Ratio_1	PE to Growth Ratio_2	Payout Ratio_1	Payout Ratio_2	Pre-Tax Operating Margin_1
1	0.068405	-5.4	6097	235.0	1694.5	.	1.86911	0	0.16026	0.42000
2	0.048820	222.6	4701	277.3	1645.6	4.89269	1.59744	0	0.15232	0.35121
3	0.044319	221.4	4039	297.2	1574.0	2.03711	1.80489	0	0.22172	0.34329
4	0.030791	491.3	2815	310.3	1506.5	2.28226	1.23377	0	0.25599	0.33475
5	0.050169	1034.9	4956	313.3	1385.2	0.98572	0.71610	0	0.26592	0.30640
6	0.047274	2030.3	4899	315.1	1339.1	2.28642	1.31860	0	0.24506	0.30428
7	0.032655	1934.7	3127	317.8	1305.3	1.79663	1.03895	0	0.24987	0.35146
8	0.026845	56.0	2681	321.3	1228.0	1.19853	1.20540	0	0.24590	0.35405
9	0.050000	437.0	5346	325.1	1163.2	1.54000	1.45000	0	0.25400	0.30980

All Financial Ratios for Google and IBM

Obs	Pre-Tax Operating Margin_2	Previous Year Growth in Revenue_1	Previous Year Growth in Revenue_2	Price to Book Value Ratio_1	Price to Book Value Ratio_2	Price to Sales Ratio_1	Price to Sales Ratio_2	Ratio of Fixed Assets to Total_1	Ratio of Fixed Assets to Total_2	Ratio of Intangible Assets to_1	Ratio of Intangible Assets to_2
1	0.16590	2.3358	0.1159	97.5629	5.8728	35.9530	1.83595	0.21606	0.14062	0.12117	0.07175
2	0.11726	0.8434	0.1125	43.0533	4.4093	39.5420	1.36212	0.11435	0.13899	0.05852	0.09366
3	0.10288	0.7960	-0.0105	14.9420	4.4133	22.9268	1.60281	0.09363	0.13008	0.02704	0.10500
4	0.13805	0.6549	0.0481	12.8007	5.2980	20.5680	1.65191	0.12966	0.13988	0.10242	0.14584
5	0.15464	0.5434	0.1751	4.2003	3.7996	5.7433	1.09505	0.15943	0.12523	0.09076	0.13611
6	0.15380	0.3058	0.0852	6.8651	12.6824	8.8946	1.64787	0.16475	0.13061	0.18372	0.19269
7	0.17767	0.0760	-0.0521	5.3686	7.9685	8.1729	1.89355	0.11963	0.12993	0.14020	0.20824
8	0.18174	0.2261	0.1086	4.4089	9.2593	6.9530	2.14835	0.13412	0.12425	0.12619	0.25230
9	0.18970	0.3350	0.0700	3.9900	10.7600	6.1200	2.04000	0.13230	0.11920	0.12300	0.25430

All Financial Ratios for Google and IBM

Obs	Reinvestment Amount_1	Reinvestment Amount_2	Reinvestment Rate_1	Reinvestment Rate_2	Return on Capital_1	Return on Capital_2	Return on Equity_1	Return on Equity_2	Revenues_1
1	128.46	-54.42	0.52164	-0.00526	0.73078	0.23609	0.17524	0.27322	1465.9
2	334.41	-640.49	0.62618	-0.08104	0.66865	0.18771	0.13857	0.29055	3189.2
3	466.71	-1277.84	0.32552	-0.19559	1.03534	0.15535	0.16121	0.25739	6138.6
4	1128.55	-767.38	0.43361	-0.08599	0.44906	0.22017	0.17258	0.33032	10604.9
5	1325.23	-907.33	0.35181	-0.08261	0.44468	0.23076	0.18527	0.36593	16594.0
6	1228.47	-1661.78	0.20461	-0.14130	0.48446	0.34105	0.18766	0.91600	21795.6
7	-110.72	-1471.08	-0.01712	-0.11682	0.56138	0.36101	0.18110	0.58998	23650.6
8	2963.30	-469.41	0.36235	-0.03439	0.55516	0.34002	0.18393	0.64013	29321.0
9	2153.13	-818.35	0.23210	-0.05340	0.52340	0.38640	0.16750	0.78350	37905.0

Output 43.3.1 *continued***All Financial Ratios for Google and IBM**

	Sales General		Sales General		Stock	Stock	Total	Total	Trading	Trading	Trailing
Obs	Revenues_2	Administrati_1	Administrati_2	Price_1	Price_2	Debt_1	Debt_2	Volume_1	Volume_2	Revenues_1	
1	89131	268.3	22929	197.30	98.15	6.6	23632	5627185	1872600	2669.9	
2	96293	611.6	24737	414.86	82.18	1.9	22927	7507209	4456000	5251.0	
3	91134	1459.8	27156	460.48	97.15	0.0	22641	2531693	4432500	9318.6	
4	91424	2829.9	26366	657.00	101.13	0.0	22683	5350543	11019149	14972.8	
5	98786	4860.5	26453	307.65	84.16	0.0	35274	2831538	6537607	20921.2	
6	103630	6542.1	29723	619.98	130.90	0.0	33926	3434825	8080103	22677.7	
7	95758	6494.3	26772	593.97	146.76	0.0	26100	2764989	5406125	27554.8	
8	99870	8523.0	27863	645.90	183.88	3465.0	28624	3018131	5608725	35761.0	
9	106916	12975.0	29852	707.38	191.55	4204.0	31320	1992857	4551170	47544.0	

All Financial Ratios for Google and IBM

	Trailing	Trailing	Trailing	Trailing	Trailing			Value	Value
Obs	12-month	Net	Net	PE	PE	Trailing	Trailing	Line	Line
	Revenues_2	Income_1	Income_2	Ratio_1	Ratio_2	Revenues_1	Revenues_2	Beta_1	Beta_2
1	92838	190.6	0.0	276.514	.	2669.9	92838	0.00	1.05
2	94378	0.0	8643.0	.	15.1756	5251.0	94378	0.00	1.10
3	89596	2119.8	3225.9	66.392	45.2807	9318.6	89596	1.05	1.05
4	96178	3889.6	9860.2	56.078	15.3165	14972.8	96178	0.95	0.95
5	105490	4804.8	11859.0	19.835	9.1218	20921.2	105490	0.75	0.90
6	95533	6034.9	13038.0	32.124	13.0977	22677.7	95533	0.90	0.90
7	98083	7936.0	14389.0	24.356	12.6015	27554.8	98083	0.90	0.85
8	106448	10075.0	15623.0	20.235	13.7333	35761.0	106448	0.90	0.85
9	104689	10517.0	16260.0	22.060	13.3900	47544.0	104689	0.90	0.85

The results before using the %test macro are shown in [Figure 43.2](#), but you can use the test macro to generate a different order of the results. In [Output 43.3.1](#), the TEST macro shuffles the financial ratios of company 1 (Google) with the ratios for company 2 (IBM) by listing their respective time series side by side. The %QUOTELST macro preserves the embedded blanks within variable names, whereas the RETAIN statement orders the time series for easy side-by-side comparison, as shown in [Output 43.3.1](#).

Example 43.4: Retrieving Data for the JASDAQ-TOP20 Exchange Traded Fund (ETF)

This example shows how to use one Quandl code, GOOG/TYO_1551, to retrieve the price and yield performance of the JASDAQ-TOP20 Exchange Traded Fund (ETF) in Japan, starting January 1, 2014, and ending March 26, 2014, with a daily native frequency. The output is shown in [Output 43.4.1](#).

```
options validvarname=any;

title 'JASDAQ-TOP20 ETF, Five Time Series';
libname _all_ clear;
libname mylib "U:\quan950\doc\";

libname myTOP20 sasequan "%sysget (QUANDL) "
    apikey='XXXXXXXXXXXXXXXXXXXXX'
    idlist='GOOG/TYO_1551'
    format=XML
    outXml=jasdaq
    automap=replace
    mapref=MyMap
    xmlmap="%sysget (QUANDL) jasdaq.map"
    start='2014-01-01'
    end='2014-03-26'
    ;

data mylib.jasdaq;
    set myTOP20.jasdaq;
run;

proc contents data=mylib.jasdaq; run;
proc print data=mylib.jasdaq; run;
```

Output 43.4.1 JASDAQ-TOP20 ETF**JASDAQ-TOP20 ETF, Five Time Series**

Obs	date	Open	High	Low	Close	Volume
1	2014-01-06	6200	6260	6020	6080	19310
2	2014-01-07	6020	6040	5900	5910	11470
3	2014-01-08	6020	6150	5990	6140	11300
4	2014-01-09	6100	6190	6070	6130	13050
5	2014-01-10	6150	6190	6060	6100	13980
6	2014-01-14	5950	6080	5920	5950	21170
7	2014-01-15	6100	6100	6000	6020	6630
8	2014-01-16	6070	6100	5900	5940	8990
9	2014-01-17	5910	6010	5850	6000	8130
10	2014-01-20	6020	6030	5930	5950	4650
11	2014-01-21	5980	6110	5960	6060	14470
12	2014-01-22	6100	6130	6060	6110	7630
13	2014-01-23	6110	6130	5940	5960	11220
14	2014-01-24	5820	6050	5700	5920	23250
15	2014-01-27	5560	5710	5560	5580	18300
16	2014-01-28	5600	5790	5580	5600	11680
17	2014-01-29	5780	5920	5760	5880	12980
18	2014-01-30	5680	5770	5610	5700	8040
19	2014-01-31	5780	5820	5550	5620	8440
20	2014-02-03	5570	5580	5400	5430	14610
21	2014-02-04	5140	5490	5080	5300	40470
22	2014-02-05	5500	5550	5100	5290	18350
23	2014-02-06	5340	5690	5340	5570	11950
24	2014-02-07	5670	5700	5550	5590	8070
25	2014-02-10	5570	5720	5570	5710	8370
26	2014-02-12	5880	5900	5770	5830	12160
27	2014-02-13	5820	5820	5650	5710	5240
28	2014-02-14	5660	5700	5480	5520	6990
29	2014-02-17	5530	5600	5400	5480	3340
30	2014-02-18	5580	5810	5580	5810	8150
31	2014-02-19	5720	5880	5690	5690	5060
32	2014-02-20	5700	5910	5610	5640	15270
33	2014-02-21	5700	5770	5640	5640	8550
34	2014-02-24	5660	5880	5650	5810	9100
35	2014-02-25	5900	6200	5850	6080	37800
36	2014-02-26	6010	6080	5940	5990	11740
37	2014-02-27	5960	5960	5740	5780	14700
38	2014-02-28	5830	5830	5650	5670	4420
39	2014-03-03	5610	5680	5470	5630	8530
40	2014-03-04	5530	5720	5530	5700	3820
41	2014-03-05	5780	5850	5750	5750	7380
42	2014-03-06	5770	5910	5700	5860	6770
43	2014-03-07	5870	5890	5850	5850	3740
44	2014-03-10	5830	5880	5830	5870	2880
45	2014-03-11	5880	5880	5800	5830	2140
46	2014-03-12	5710	5750	5710	5710	1860
47	2014-03-13	5680	5750	5630	5630	1830

Output 43.4.1 *continued***JASDAQ-TOP20 ETF, Five Time Series**

Obs	date	Open	High	Low	Close	Volume
48	2014-03-14	5550	5620	5420	5470	9030
49	2014-03-17	5470	5490	5330	5370	5090
50	2014-03-18	5500	5530	5380	5430	7630
51	2014-03-19	5460	5460	5250	5370	3130
52	2014-03-20	5300	5340	5130	5140	4780
53	2014-03-24	5170	5260	5140	5170	2300
54	2014-03-25	5100	5100	4885	4885	14080
55	2014-03-26	4860	5010	4850	4950	9100

Example 43.5: Collapsing Data for the JASDAQ-TOP20 Exchange Traded Fund (ETF)

This example shows how to collapse the daily data to a weekly interval by using the same Quandl code as in [Example 43.4](#), GOOG/TYO_1551, to retrieve the price and yield performance of the JASDAQ-TOP20 Exchange Traded Fund (ETF) in Japan, starting January 1, 2014, and ending March 26, 2014, with a daily native frequency, collapsing to a weekly frequency by using the COLLAPSE= option. The output is shown in [Output 43.5.1](#).

```
options validvarname=any;

title 'JASDAQ-TOP20 ETF, COLLAPSE=WEEKLY Option';
libname _all_ clear;
libname mylib "U:\quan950\doc\";

libname myTOP20 sasequan "%sysget (QUANDL) "
    apikey='XXXXXXXXXXXXXXXXXXXXX'
    idlist='GOOG/TYO_1551'
    format=XML
    outXml=jasdaqW
    automap=replace
    mapref=MyMap
    xmlmap="%sysget (QUANDL) jasdaqw.map"
    start='2014-01-01'
    end='2014-03-26'
    collapse=weekly
    ;

data mylib.jasdaqW;
    set myTOP20.jasdaqW;
run;

proc contents data=mylib.jasdaqW; run;
proc print data=mylib.jasdaqW; run;
```

Output 43.5.1 JASDAQ-TOP20 ETF, with COLLAPSE=WEEKLY**JASDAQ-TOP20 ETF, COLLAPSE=WEEKLY Option**

Obs	date	Open	High	Low	Close	Volume
1	2014-01-05	6090	6210	5980	6190	34760
2	2014-01-12	6150	6190	6060	6100	13980
3	2014-01-19	5910	6010	5850	6000	8130
4	2014-01-26	5820	6050	5700	5920	23250
5	2014-02-02	5780	5820	5550	5620	8440
6	2014-02-09	5670	5700	5550	5590	8070
7	2014-02-16	5660	5700	5480	5520	6990
8	2014-02-23	5700	5770	5640	5640	8550
9	2014-03-02	5830	5830	5650	5670	4420
10	2014-03-09	5870	5890	5850	5850	3740
11	2014-03-16	5550	5620	5420	5470	9030
12	2014-03-23	5300	5340	5130	5140	4780
13	2014-03-30	4905	5070	4905	5060	5920

Example 43.6: Transforming Data for the JASDAQ-TOP20 Exchange Traded Fund (ETF)

This example shows how to transform the daily data by using the diff transformation and the same Quandl code as in [Example 43.4](#) and [Example 43.5](#), GOOG/TYO_1551, to retrieve the price and yield performance of the JASDAQ-TOP20 Exchange Traded Fund (ETF) in Japan. Specify a range by using START='2014-01-01' and END='2014-03-26', a transformation function by using TRANS=DIFF, and a collapse frequency by using COLLAPSE=WEEKLY. The output is shown on [Output 43.6.1](#).

```
options validvarname=any;

title 'JASDAQ-TOP20 ETF, TRANS=DIFF Option';
libname _all_ clear;
libname mylib "U:\quan950\doc\";

libname myTOP20 sasequan "%sysget (QUANDL) "
  apikey='XXXXXXXXXXXXXXXXXXXXXXX'
  idlist='GOOG/TYO_1551'
  format=XML
  outXml=jasdaqX
  automap=replace
  mapref=MyMap
  xmlmap="%sysget (QUANDL) jasdaqX.map"
  start='2014-01-01'
  end='2014-03-26'
  collapse=weekly
  trans=diff
;
```

```

data mylib.jasdaqX;
    set myTOP20.jasdaqX;
run;

proc contents data=mylib.jasdaqX; run;
proc print data=mylib.jasdaqX; run;

```

Output 43.6.1 JASDAQ-TOP20 ETF, Weekly Data with TRANS=DIFF

JASDAQ-TOP20 ETF, TRANS=DIFF Option

Obs	date	Open	High	Low	Close	Volume
1	2014-01-05	-180	-60	70	120	-22850
2	2014-01-12	60	-20	80	-90	-20780
3	2014-01-19	-240	-180	-210	-100	-5850
4	2014-01-26	-90	40	-150	-80	15120
5	2014-02-02	-40	-230	-150	-300	-14810
6	2014-02-09	-110	-120	0	-30	-370
7	2014-02-16	-10	0	-70	-70	-1080
8	2014-02-23	40	70	160	120	1560
9	2014-03-02	130	60	10	30	-4130
10	2014-03-09	40	60	200	180	-680
11	2014-03-16	-320	-270	-430	-380	5290
12	2014-03-23	-250	-280	-290	-330	-4250
13	2014-03-30	-395	-270	-225	-80	1140

Example 43.7: Reading Superset Data for Multiple Time Series

This example shows how to read data from a Quandl superset by using the Quandl code TAMMER1/6KY to retrieve oil, gold, and stock prices. This superset is described at the following URL: <http://www.quandl.com/TAMMER1/6KY-GoldOil-Gold-and-Stocks>.

There are three superset columns (Oil, Gold, and S&P500), taken from three different Quandl data sets: DOE/_RWTC, BBK01/_WT5511, and YAHOO/_INDEX_GSPC, respectively. Because the Oil, Gold, and S&P500 columns are all from a daily native frequency data set, you can use the collapse frequency “Annual” to minimize the missing values in the output. In the following example, specify a range by using START=‘1961-12-31’ and END=‘2014-03-27’, and specify a collapse frequency by using COLLAPSE=ANNUAL. The output is shown in [Output 43.7.1](#).


```

options validvarname=any;

title 'TAMMER1/6KY Superset with Multiple Time Series Using the COLLAPSE= Option';
libname _all_ clear;
libname mylib "U:\quan950\doc\";

libname myTAM sasequan "%sysget (QUANDL) "
    apikey='XXXXXXXXXXXXXXXXXXXXXXX'
    idlist='TAMMER1/6KY'
    format=XML
    outXml=superT
    automap=replace
    mapref=MyMap
    xmlmap="%sysget (QUANDL) superT.map"
    start='1961-12-31'
    end='2014-03-27'
    collapse=annual
    ;

data mylib.superT;
    set myTAM.superT;
run;

proc contents data=mylib.superT; run;
proc print data=mylib.superT; run;

```

Output 43.7.1 Quandl Superset for Multiple Time Series (Oil, Gold, and Stocks) Using COLLAPSE= Option**TAMMER1/6KY Superset with Multiple Time Series Using the COLLAPSE= Option**

Obs	date	Oil	Gold	S&P500
1	1961-12-31	.	.	71.55
2	1962-12-31	.	.	63.10
3	1963-12-31	.	.	75.02
4	1964-12-31	.	.	84.75
5	1965-12-31	.	.	92.43
6	1966-12-31	.	.	80.33
7	1967-12-31	.	.	96.47
8	1968-12-31	.	41.95	103.86
9	1969-12-31	.	35.21	92.06
10	1970-12-31	.	37.38	92.15
11	1971-12-31	.	43.64	102.09
12	1972-12-31	.	64.70	118.05
13	1973-12-31	.	112.25	97.55
14	1974-12-31	.	187.50	68.56
15	1975-12-31	.	140.25	90.19
16	1976-12-31	.	134.55	107.46
17	1977-12-31	.	165.60	95.10
18	1978-12-31	.	224.50	96.11
19	1979-12-31	.	524.00	107.94
20	1980-12-31	.	589.50	135.76
21	1981-12-31	.	400.00	122.55
22	1982-12-31	.	448.00	140.64
23	1983-12-31	.	381.50	164.93
24	1984-12-31	.	309.00	167.24
25	1985-12-31	.	327.00	211.28
26	1986-12-31	17.93	390.90	242.17
27	1987-12-31	16.74	486.50	247.08
28	1988-12-31	17.12	410.15	277.72
29	1989-12-31	21.84	401.00	353.40
30	1990-12-31	28.48	391.00	330.22
31	1991-12-31	19.15	353.40	417.09
32	1992-12-31	19.49	332.90	435.71
33	1993-12-31	14.19	390.65	466.45
34	1994-12-31	17.77	382.50	459.27
35	1995-12-31	19.54	386.70	615.93
36	1996-12-31	25.90	369.55	740.74
37	1997-12-31	17.65	289.20	970.43
38	1998-12-31	12.14	287.45	1229.23
39	1999-12-31	25.76	290.85	1469.25
40	2000-12-31	26.72	272.65	1320.28
41	2001-12-31	19.96	276.50	1148.08
42	2002-12-31	31.21	342.75	879.82
43	2003-12-31	32.51	417.25	1111.92
44	2004-12-31	43.36	438.00	1211.92
45	2005-12-31	61.06	513.00	1248.29
46	2006-12-31	60.85	635.70	1418.30
47	2007-12-31	95.95	836.50	1468.36

Output 43.7.1 *continued***TAMMER1/6KY Superset with Multiple Time Series Using the COLLAPSE= Option**

Obs	date	Oil	Gold	S&P500
48	2008-12-31	44.60	865.00	903.25
49	2009-12-31	79.39	1104.00	1115.10
50	2010-12-31	91.38	1410.25	1257.64
51	2011-12-31	98.83	1574.50	1257.60
52	2012-12-31	91.83	1664.00	1426.19
53	2013-12-31	98.17	1201.50	1848.36
54	2014-12-31	104.05	1299.00	1864.85

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