Would it be possible to Access SDMX data provided by External data providers like the OECD, IMF, Eurostat, ECB

There are 3 methods to read SDMX Queries with SAS.

1) Use the ISTAT SDMX.jar tool to generate %gettimeseries() macro calls
2) Read SDMX Queries with SAS ETS Engines SASEOECD, SASEFRED and SASEQUAN
3) Read SDMX Queries using XMLV2 libname engine

Generic example using SDMX queries:

ISTAT provides a SDMX package to use together with Statistical software packages to read SDMX data. https://github.com/amattioc/SDMX

The latest release of packages can be found here:
https://github.com/amattioc/SDMX/releases/latest

Run following command:

"C:\Program Files\SASHome\SASPrivateJavaRuntimeEnvironment\9.4\jre\bin\java" -classpath c:\workshop\viyawhatsnew\sdmx_query\SDMX.jar it.bancaditalia.oss.sdmx.helper.SDMXHelper

Downloading the SDMX.jar package for use in SAS and to prepare the queries that select the time series using the gettimeseries.sas macro.

NEW: The SDMX helper can be used from within any statistical tool or as a standalone application (just double click the SDMX.jar)

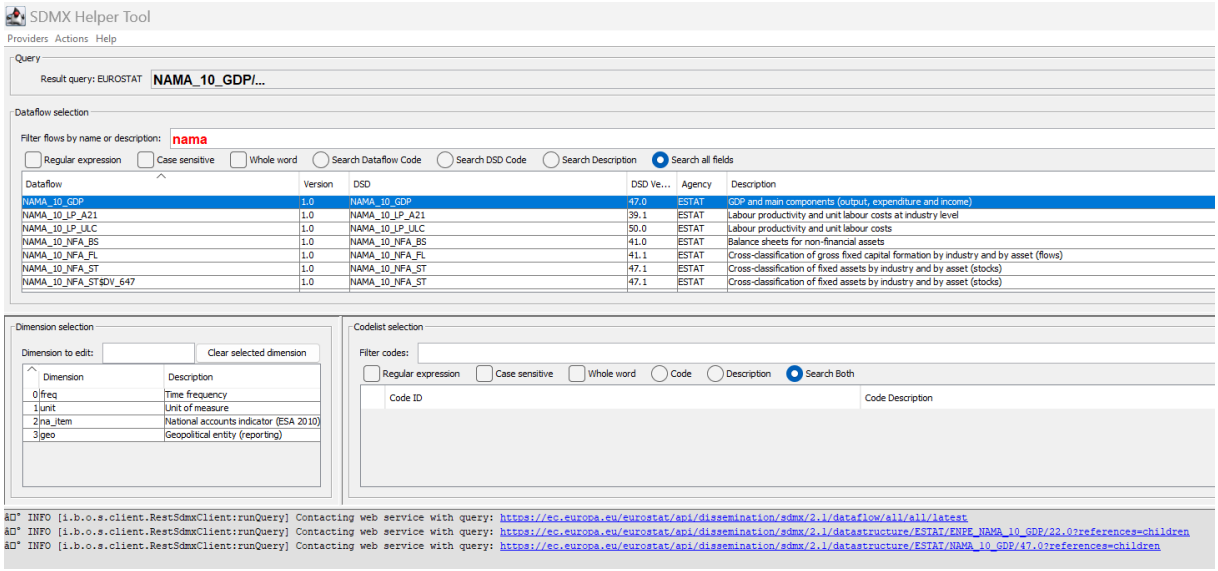
/*Add the downloaded jar file to the classpath of your sas session*/

/*in SASV9.CFG use: */

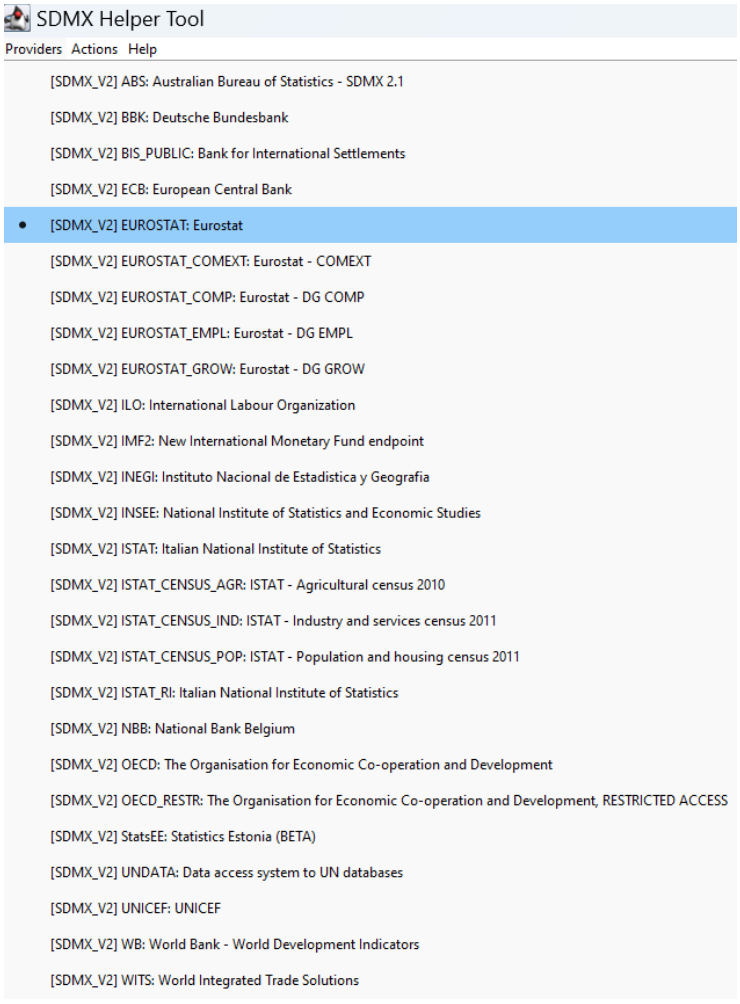
/*-SET CLASSPATH "&path/SDMX/lib/SDMX.jar"; */

*options set=CLASSPATH "&path/SDMX/lib/SDMX.jar";

You can select the Data Provider (e.g. ECB), then select the Data Flow (for Example Exchange Rates EXR) and the Dimensions of the Time Series like Currency=USD.

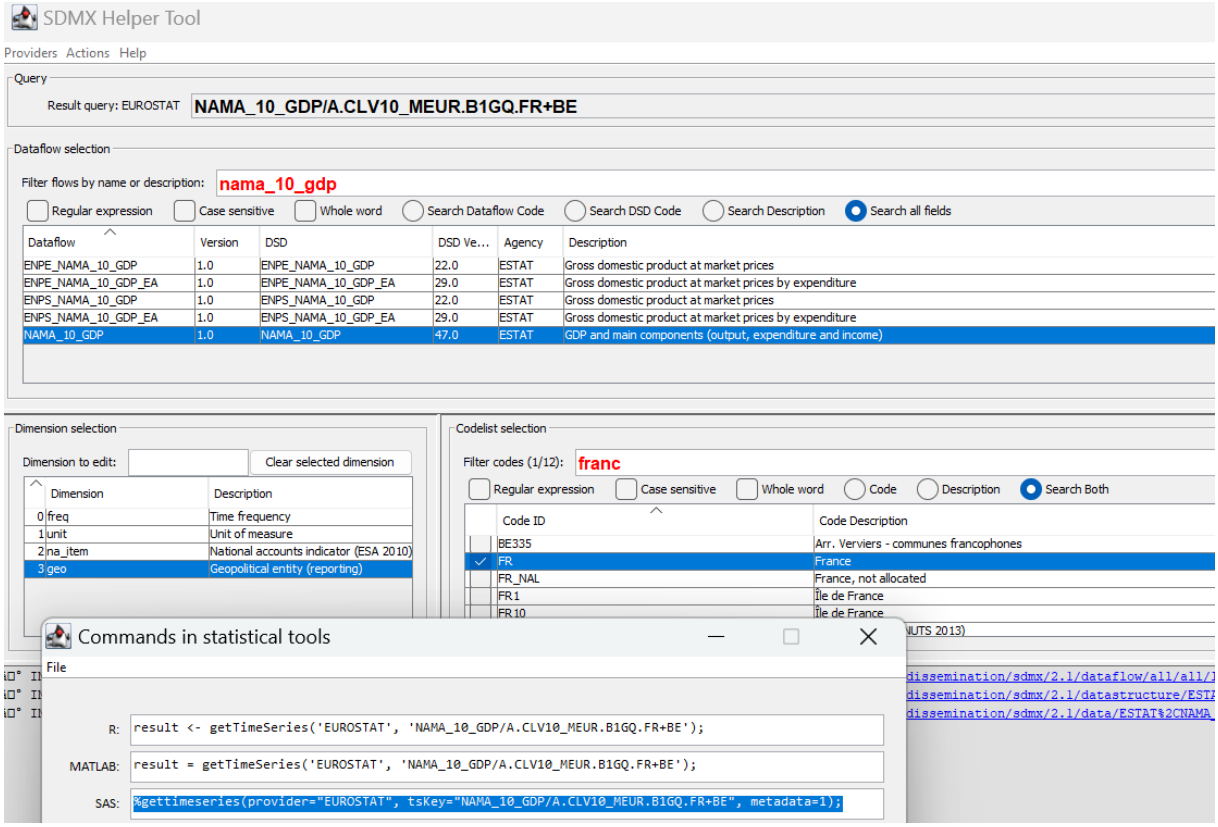


This menu option allows you to change the Providers:

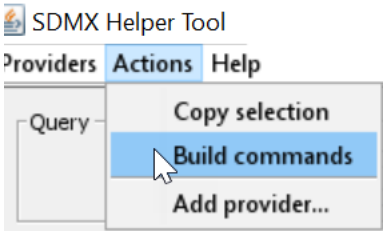


You select the required dimensions of the Query:

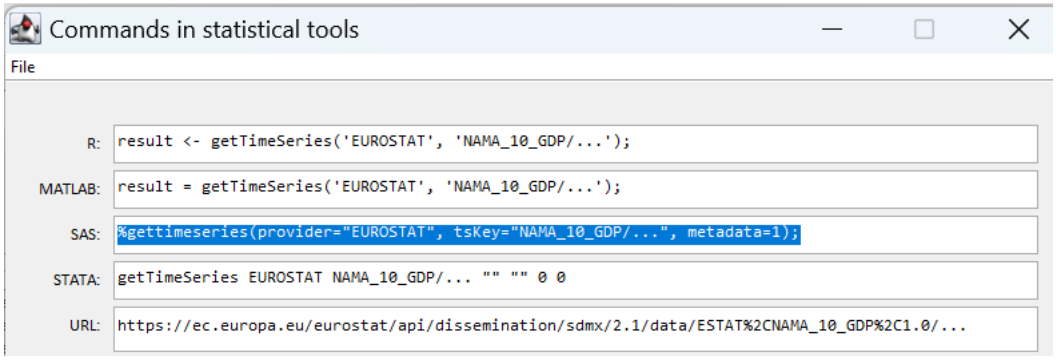
For example, Frequency: Annual, Unit of Measure: CLV10_MEUR and geo: BE+FR



With the Actions menu, you can then convert the selected query to a command:



The command in SAS uses the %gettimeseries () macro call:



The gettimeseries() macro can be found in the SDMX repository:

01_clonesdmx_repository.sas

02_dynamically_change_classpath.sas

03_gettimeseries.sas macro call

```
/*create the SDMX folder in the home directory of the user*/
%let homedir=%sysget(HOME);
%let path=&homedir;
options dlcreatedir;
libname data "&path/SDMX";

/*clone the SDMX git repository to a local folder*/
data _null_;
RC = GITFN_CLONE("https://github.com/amattioc/SDMX.git",
"&path/SDMX");
run;

/* example Getting Exchange Rates from ECB data provider*/
%gettimeseries(provider="ECB", tsKey="EXR.A.USD.EUR.SP00.A", metadata=1);
%macro
copytimeseries(tskey=NAMA_10_GDP/A.CLV_I10.B1GQ,outlib=work,metadata=1);
%let seriesname=%sysfunc(compress(%scan(&tskey,1,%str(+)),./));
data &outlib..&seriesname;
set sdmxdata;
run;
%if &metadata=1 %then %do;
data &outlib..&seriesname.meta;
set sdmxmetadata;
run;
data &outlib..&seriesname.ometa;
set sdmxobservationsmetadata;
run;
%end;
%mend;

/* example Getting Exchange Rates from ECB data provider*/
%gettimeseries(provider="ECB", tsKey="EXR.A.USD.EUR.SP00.A", metadata=1);
```

```
/* example getting Eurostat */

%gettimeseries(provider="EUROSTAT",

tsKey="NAMA_10_GDP/A.CLV_I10.B1GQ.EU27_2020+EU28+EU15+EA+EA20+EA19+EA12+BE+
BG+CZ+DK+DE+EE+IE+EL+ES+FR+HR+IT+CY+LV+LT+LU+HU+MT+NL+AT+PL+PT+RO+SI+SK+FI+
SE+IS+LI+NO+CH+UK+BA+ME+MK+AL+RS+TR+XK",

metadata=1);

/*copytimeseries to outlib=work*/

%copytimeseries(tskey=NAMA_10_GDP/A.CLV_I10.B1GQ,outlib=work,metadata=1);


%gettimeseries(provider="EUROSTAT",

tsKey="NAMA_10_GDP/A.CP_MEUR.B1GQ.EU27_2020+EU28+EU15+EA+EA20+EA19+EA12+BE+
BG+CZ+DK+DE+EE+IE+EL+ES+FR+HR+IT+CY+LV+LT+LU+HU+MT+NL+AT+PL+PT+RO+SI+SK+FI+
SE+IS+LI+NO+CH+UK+BA+ME+MK+AL+RS+TR+XK",

metadata=1);

%copytimeseries(tskey=NAMA_10_GDP/A.CP_MEUR.B1GQ,outlib=work,metadata=1);

%gettimeseries(provider="EUROSTAT",

tsKey="NAMA_10_GDP/A.CLV10_MEUR.B1GQ.EU27_2020+EU28+EU15+EA+EA20+EA19+EA12+
BE+BG+CZ+DK+DE+EE+IE+EL+ES+FR+HR+IT+CY+LV+LT+LU+HU+MT+NL+AT+PL+PT+RO+SI+SK+
FI+SE+IS+LI+NO+CH+UK+BA+ME+MK+AL+RS+TR+XK",

metadata=1);

%copytimeseries(tskey=NAMA_10_GDP/A.CLV10_MEUR.B1GQ,outlib=work,metadata=1)
;
```

Retrieving SDMX Data using SAS ETS engines: (see code below for examples)

(1)Eurostat is available in JSON format using root url: REST SDMX 2.1 - SDMX Web Services - Eurostat (europa.eu)
Example query: https://ec.europa.eu/eurostat/SDMX/diss-web/rest/data/nama_10_gdp/.CLV10_MEUR.B1GQ.BE/?startperiod=2005&endPeriod=2011
The data can be mapped and read into SAS using the JSON libname engine.
See "https://ec.europa.eu/eurostat/web/json-and-unicode-web-services/getting-started/rest-request" for details.
(2) IMF data (14,742 series) can be read using SASEFRED engine (ETS) see FRED website here: "https://fred.stlouisfed.org/tags/series?t=imf"
The SASEFRED Interface Engine
(3) ECB data (13 series) can be read using SASEFRED engine- see FRED website here: "https://fred.stlouisfed.org/tags/series?t=ecb"
(4) ECB data (212,000 series) can be read using SASEQUAN (another ETS/Econometrics engine). Previously known as QUANDL api, it is now the NASDAQ api , see the following documentation page:
"https://data.nasdaq.com/data/ECB-european-central-bank/documentation" for details.
You can get a list of the time series using the link shown on the doc page.

SAS Help Center: Getting Started: SASEQUAN Interface Engine

Retrieving OECD data SDMX data

https://documentation.sas.com/doc/en/etsug/15.2/etsug_saseoecd_examples01.htm

Example 52.1 Retrieving OECD Gross Domestic Product Data for One Region

(View the complete code for this example.)

You can start building an OECD query for this example on the web page at the following URL:

http://stats.oecd.org/index.aspx?datasetcode=SNA_TABLE1_SNA93

Select **Customize** →**Selection**, which shows the dimension values that are the key values for **Country**, **Transaction**, and **Measure**. Select **Euro area (17 countries)** from the **Country** list. Select **Gross domestic product (output approach)** from the **Transaction** box, and **Current prices** from the **Measure** list. Specify the Observation period to limit the time range to the span 1995 to 2013. On the **Export** tab, select **Developer API**. Then click **Generate API queries**.

The **Data query** box shows the URL for the key values that you selected for **Country**, **Transaction**, and **Measure**:

http://stats.oecd.org/sdmx-json/data/SNA_TABLE1_SNA93/EA17.B1_GA.C/all?startTime=1995&endTime=2013

In your SAS code, use SETID=SNA_TABLE1_SNA93 to indicate the OECD data set. Next, you can specify the INSET*n*= options by using *n*=0,1,2 for **Country**, **Transaction**, and **Measure**, respectively. The SAS code is shown after the next paragraph, followed by the output, which is shown in Output 52.1.1.

The SET statement reads observations from the input data set *myLib.GSTART* and stores them in a SAS data set named *myGDP*. When you specify the INSET*n*= option, you name the SAS input data set for each of the *n* keysets that define your selection of data. The SASEOECD engine takes the crossproduct of all the insets and creates a temporary data set named *CrossKey*. Each row in *CrossKey* defines a unique time series request. Not every row in *CrossKey* yields meaningful data. Only the rows that contain valid data are placed in a JSON file. When a request for data (using the values in each row) generates a valid JSON file, the file is named by concatenating the OUT= option name to the observation number (*n*) in the *CrossKey* data set that corresponds to the row whose values generated the request. When all the data are retrieved, they are placed in a SAS data set that is named by the OUT= option and that is located in the folder specified by the *physical-name* in the LIBNAME *libref* SASEOECD statement.

```
/*
http://stats.oecd.org/sdmx-
json/data/SNA_TABLE1_SNA93/EA17.B1_GA.C/all?startTime=1995&endTime=2
013
*/
options validvarname=any dlcreatedir;
%let homedir=%sysget(HOME);
%let path=&homedir/viyawhatsnew;

libname oecddata base "&path/sdmx_query/oecddata";

data keylist0;
   length key0 $8;
   key0='EA17'; output; /* country is euro area; 17 countries */
run;

data keylist1;
   length key1 $8;
   key1='B1_GA'; output; /* transaction is GDP; output approach */
run;

data keylist2;
   length key2 $2;
   key2='C'; output;     /* measure is current prices */
run;

title 'Request GDP for EA_17 in Current Prices';
LIBNAME myLib saseoecd "&path/sdmx_query/oecddata"
   setid=SNA_TABLE1_SNA93
   inset0=keylist0
   inset1=keylist1
```

```
    inset2=keylist2
    out=gstart
    ;

data myGDP;
    set myLib.gstart ;
run;
proc print data=myGDP; run;
```

FMI or IMF Data:

IMF SDMX Central

Reading SDMX using REST API and XMLV2 engine:

/*Using OECD XML Rest Api: */

*filename oecddata url 'https://stats.oecd.org/restsdmx/sdmx.ashx/GetData/QNA/AUS+AUT.GDP+B1_GE.CUR+VOBARSA.Q/all?startTime=2009-Q2&endTime=2011-Q4&format=compact_v2';

%let path = &path/sdmx_query;

filename map "&path.map.txt";

filename resp "&path.resp.txt";

proc http

URL="https://stats.oecd.org/restsdmx/sdmx.ashx/GetData/QNA/AUS+AUT.GDP+B1_GE.CUR+VOBARSA.Q/all?startTime=2009-Q2&endTime=2011-Q4&format=compact_v2"

METHOD="GET"

OUT=resp;

run;quit;

libname resp XMLv2 automap=REPLACE xmlmap=map;

proc datasets;

copy out=WORK in=resp;

run;quit;

proc sql;

%if %sysfunc(exist(WORK.QUERY_FOR_OBS1)) %then %do;

```
   drop table WORK.QUERY_FOR_OBS1;
%end;
%if %sysfunc(exist(WORK.QUERY_FOR_OBS1,VIEW)) %then %do;
   drop view WORK.QUERY_FOR_OBS1;
%end;
quit;
;
PROC SQL;
        CREATE TABLE WORK.QUERY_FOR_OBS1 AS
                SELECT
                        (t2.DataSet_ORDINAL),
                        (t2.Series_ORDINAL),
                        (t2.Series_LOCATION),
                        (t2.Series_SUBJECT),
                        (t2.Series_MEASURE),
                        (t2.Series_FREQUENCY),
                        (t2.Series_TIME_FORMAT),
                        (t2.Series_UNIT),
                        (t2.Series_POWERCODE),
                        (t2.Series_REFERENCEPERIOD),
                        (t1.Series_ORDINAL) AS Series_ORDINAL1,
                        (t1.Obs_ORDINAL),
                        (t1.Obs_TIME),
                        (t1.Obs_OBS_VALUE),
                        (t5.CompactData_ORDINAL),
                        (t5.Header_ORDINAL),
                        (t5.ID),
                        (t5.Test),
                        (t5.Truncated),
                        (t5.'Prepared'n) FORMAT=IS8601DT19. INFORMAT=IS8601DT19.,
                        (t6.Header_ORDINAL) AS Header_ORDINAL1,
```

```
                (t6.Sender_ORDINAL),
                (t6.Sender_id),
                (t7.DataSet_ORDINAL) AS DataSet_ORDINAL1,
                (t7.Annotations_ORDINAL),
                (t8.Annotations_ORDINAL) AS Annotations_ORDINAL1,
                (t8.Annotation_ORDINAL),
                (t8.AnnotationTitle),
                (t8.AnnotationURL)
        FROM
                WORK.OBS t1
                        INNER JOIN WORK.SERIES t2 ON (t1.Series_ORDINAL =
t2.Series_ORDINAL)
                        INNER JOIN WORK.DATASET t3 ON (t2.DataSet_ORDINAL =
t3.DataSet_ORDINAL)
                        INNER JOIN WORK.COMPACTDATA t4 ON (t3.CompactData_ORDINAL
= t4.CompactData_ORDINAL)
                        INNER JOIN WORK.'HEADER'n t5 ON (t3.CompactData_ORDINAL =
t5.CompactData_ORDINAL)
                        INNER JOIN WORK.SENDER t6 ON (t5.Header_ORDINAL =
t6.Header_ORDINAL)
                        INNER JOIN WORK.ANNOTATIONS t7 ON (t3.DataSet_ORDINAL =
t7.DataSet_ORDINAL)
                        INNER JOIN WORK.ANNOTATION t8 ON (t7.Annotations_ORDINAL =
t8.Annotations_ORDINAL)
        ;
QUIT;
RUN;
```

Some documentation:

SDMX – Statistical Data and Metadata eXchange | Welcome to the SDMX website

SDMX Connectors for Statistical Software | SDMX – Statistical Data and Metadata eXchange

.Stat Suite documentation (sis-cc.gitlab.io)

Example to use SASEQUAN engine :
https://sdw-wsrest.ecb.europa.eu/service/data/EXR/M.USD.EUR.SP00.A

```
/*Example to download ECB data using Nasdag API: */
title 'Germany , Current prices, National currency,
Index';
options validvarname=any;
%let path=c:\workshop\eurostat;

libname mylib "&path";


libname myQ3 sasequan "&path"
   OUTXML=fred3
   AUTOMAP=replace
   MAPREF=MyMap
   XMLMAP="&path\fred3.map"
   APIKEY='Ya9rzjEbW66K1mHphsvb'

IDLIST='ECB/ESA_A_DE_N_1000_COMPHW_0000_YD_D_V_N_I'
   FORMAT=xml
   START='2002-06-30'
   END='2021-12-31'
   /*FREQ='monthly'
   collapse='annual'*/
   ;

data mylib.thrall;
   set myQ3.fred3;
   label 'Pure Number'n = "Germany , Current prices,
National currency, Index";

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

Example of Timeseries from IMF using SASEFRED ETS Engine

```
title 'Retrieve Balance of Payment Data for the
Exports and Imports';
libname _all_ clear;
%let path=c:\workshop\eurostat;
libname fred sasefred "&path"
OUTXML=fredex01
AUTOMAP=replace
MAPREF=MyMap
XMLMAP="&path\fredex01.map"
APIKEY='399eb04a24a59583574beeaa2248db31'
IDLIST='bopxgs,bopmgs'
START='1997-01-01'
END='2011-01-01'
FREQ='a'
OUTPUT=1
AGG='avg'
FORMAT=xml;
data export_import;
set fred.fredex01 ;
run;
proc contents data=export_import; run;
proc print data=export_import; run;
```

Example: Global Price of Natural GAS, EU:

```
/*https://fred.stlouisfed.org/series/PNGASEUUSDM*/
title 'Retrieve Global Price of Natural GAS, EU in
USD per Million Metric British';
libname _all_ clear;
%let path=c:\workshop\eurostat;
libname fred sasefred "&path"
OUTXML=fredex01
AUTOMAP=replace
MAPREF=MyMap
XMLMAP="&path\fredex01.map"
APIKEY='399eb04a24a59583574beeaa2248db31'
IDLIST='PNGASEUUSDM'
START='1997-01-01'
END='2022-06-30'
FREQ='m'
OUTPUT=1
AGG='avg'
```

```
FORMAT=xml;
data PNGASEUUSDM;
set fred.fredex01 ;
run;
proc contents data=PNGASEUUSDM; run;
proc print data=PNGASEUUSDM; run;
proc sgplot data=PNGASEUUSDM;
vline date /response=PNGASEUUSDM stat=mean  ;
xaxis fitpolicy=rotatethin grid;
yaxis grid;
title "Global Price of Natural Gas, EU";
format date yymm5.;
label pngaseuusdm ="US Dollar per Mill. Metric
British Thermal Unit"
    date ="Source: International Monetary Fund";
quit;


/*Example Eurostat SDMX data: */
/*old url:
https://ec.europa.eu/eurostat/SDMX/diss-
web/rest/data/nama_10_gdp/.CLV10_MEUR.B1GQ.BE/?startp
eriod=2005&endPeriod=2011
new url:
https://ec.europa.eu/eurostat/api/dissemination/sdmx/
2.1/data/NAMA_10_GDP/?format=sdmx_2.1_generic
*/
%let path=c:\workshop\sdmx;
%let path = &path;

filename map "&path.map.txt";
filename resp "&path.resp.txt";
proc http

URL="https://ec.europa.eu/eurostat/api/dissemination/
sdmx/2.1/data/NAMA_10_GDP/?format=sdmx_2.1_generic"
    METHOD="GET"
    OUT=resp;
run;quit;

libname resp XMLv2 automap=REPLACE xmlmap=map;

proc datasets;
copy out=WORK in=resp;
```

```
run;quit;

proc sql;
create table sdmxrequest as
select *
from obs t1, obsdimension t2,
     obsvalue t3
where obs.obs_ordinal=obsdimension.obs_ordinal and
      obs.obs_ordinal=obsvalue.obs_ordinal
;
quit;
```