1_Example_ReadFAMEdatabase

August 18, 2018

1   Reading FAME databases from Python

This example demonstrates reading FAME data objects into Pandas structures.

FAME databases map data object names to data structures. FAME data types include `BOOLEAN`, `DATE` (at various frequencies), `NUMERIC`, `PRECISION`, and `STRING`. The pyhli package maps FAME data types to compatible basic Python data types. The `qomautils` package further maps to more complex Pandas data structures such as `DatetimeIndex`, `Series`, and `DataFrame`.

```
In [1]: import os
        from __future__ import print_function
        import pandas as pd
        import qoma_smuggler as qm
```

The Qoma utility function `open_hli()` opens the FAME environment and prints diagnostic information.

```
In [2]: if qm.open_hli()!=0:
            raise
```

```
Linux 4.9.0-4-amd64 (#1 SMP Debian 4.9.65-3+deb9u1 (2017-12-23)) x86_64
Python 3.6.5 | packaged by conda-forge | (default, Apr  6 2018, 13:39:56)
[GCC 4.8.2 20140120 (Red Hat 4.8.2-15)]
NumPy 1.13.3 Pandas 0.23.4 FAME HLI 11.63000 pyhli 0.0.11 qoma-smuggler 0.0.2
```

The `qomautils` function `read_fame()` reads FAME data objects into a nested Python dictionary. At the top level, each FAME object name is mapped to a dictionary with entries `data` and `fame`. * As appropriate, the entry `data` maps to a single data value or to multiple data values in an array. * For FAME SCALAR objects, `data` maps to a value. * For FAME SERIES objects, `data` maps to an array of values. * The entry `fame` maps to FAME object meta data such as object class (`SCALAR` or `SERIES`), object data type, and index values for `data`.

The FAME distribution includes a number of sample databases. We will use the `driecon` sample database for this notebook.

```
In [3]: dbname = os.path.join(os.environ['FAME'],'util','driecon')

        famedata = qm.read_fame(dbname)
        print("read_fame() returned {0} FAME objects from {1}.\n".format(len(famedata),dbname))
```

1

```
read_fame() returned 55 FAME objects from /opt/pkg/fame116linux/util/driecon.
```

The print_fame_cata() function in qomautils package is similar to the FAME 4GL command CATALOG. We use print_fame_cata() to display a description of the contents of the Python dictionary famedata obtained wtih the read_fame() call.

In [4]: qm.print_catalog(famedata)

```
SERIES $N : PRECISION BY DATE(ANNUAL) 1930 to 2002
POPULATION INCLUDING ARMED FORCES OVERSEAS (P25E)
-- documentation:
POPULATION INCLUDING ARMED FORCES OVERSEAS (P25E)
MILLIONS OF PERSONS, ESTIMATES ARE FOR JULY 1
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CURRENT POPULATION REPORTS, SERIES P-25
INCLUDING ALASKA AND HAWAII BEGINNING IN 1940
--

SERIES BOPMERCH : PRECISION BY DATE(ANNUAL) 1960 to 2002
US INTERNATIONAL TRANSACTIONS - BALANCE ON GOODS (BOP)
-- documentation:
US INTERNATIONAL TRANSACTIONS - BALANCE ON GOODS (BOP)
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
U.S. INTERNATIONAL TRANSACTIONS
--

SERIES CUSA0 : PRECISION BY DATE(MONTHLY) Jan1947 to Jul2003
CPI (ALL URBAN) - ALL ITEMS
-- documentation:
CPI (ALL URBAN) - ALL ITEMS
INDEX BASE:  1982-84=1.00, SEASONALLY ADJUSTED
CALCULATED BY DRI USING SEASONAL FACTORS PROVIDED BY
US DEPT OF LABOR, BUREAU OF LABOR STATISTICS
--

SERIES CUSAONS : PRECISION BY DATE(SEMIANNUAL) Jun1984 to Jun2003
CPIU - All items
-- documentation:
CPIU - All items
INDEX BASE 1982-84 = 1.0, NOT SEASONALLY ADJUSTED
ALL URBAN CONSUMERS
--

SERIES DBTGFNS : PRECISION BY DATE(MONTHLY) Jan1958 to Jul2003
FEDERAL DEBT OUTSTANDING - TOTAL (TB)
```

```
-- documentation:
FEDERAL DEBT OUTSTANDING - TOTAL (TB)
BILLIONS OF CURRENT DOLLARS, NOT SEASONALLY ADJUSTED, END OF MONTH
U.S.  DEPARTMENT OF THE TREASURY
'MONTHLY STATEMENT OF RECEIPTS & OUTLAYS' AND 'TREASURY BULLETIN'; BEGIN
THIS CONCEPT SERIES DERIVES FROM DBTGFPUBNS+DBTGFAGCYNS
--


SERIES DESC : STRING BY CASE 1 to 52
Object Descriptions


SERIES DJ30C : PRECISION BY DATE(BUSINESS) 4Jan1960 to 22Aug2003
DOW JONES: 30 INDUSTRIAL AVERAGE
-- documentation:
DOW JONES: 30 INDUSTRIAL AVERAGE
INDEX BASE: 1884 = 100
DOW JONES
--


SERIES DJ65CMC : PRECISION BY DATE(BUSINESS) 4Jan1960 to 22Aug2003
DOW JONES: 65 COMPOSITE AVERAGE
-- documentation:
DOW JONES: 65 COMPOSITE AVERAGE
AVERAGE
REUTERS AMERICA INC.
--


SERIES FBL3Y : PRECISION BY DATE(BUSINESS) 2Jan1973 to 21Aug2003
TREASURY BILL: SECONDARY, 3-MONTH BOND-EQUIVALENT YIELD (H15) - US
-- documentation:
TREASURY BILL: SECONDARY, 3-MONTH BOND-EQUIVALENT YIELD (H15) - US
PERCENT
FEDERAL RESERVE BOARD OF GOVERNORS
'SELECTED INTEREST RATES' (H15)
--


SERIES FCN30YY : PRECISION BY DATE(BUSINESS) 15Feb1977 to 7Mar2002
GOVT ISSUE: CONSTANT MATURITY, 30-YR (H15) - US
-- documentation:
GOVT ISSUE: CONSTANT MATURITY, 30-YR (H15) - US
PERCENT
FEDERAL RESERVE BOARD OF GOVERNORS
'SELECTED INTEREST RATES' (H15)
--


SERIES FIP1Q : PRECISION BY DATE(BUSINESS) 2Jan1998 to 22Aug2003
COMMERCIAL PAPER: NON-FINAN, 1-DAY QUOTED YIELD - US
-- documentation:
```

COMMERCIAL PAPER: NON-FINAN, 1-DAY QUOTED YIELD - US
PERCENT
FEDERAL RESERVE BANK OF NEW YORK
'DAILY COMPOSITE SHEET' AND 'SELECTED INTEREST RATES' (H15)
COMMERCIAL PAPER PLACED BY FIRMS RATED AA OR EQUIVALENT; QUOTED ON A '&&
::''&&'
--

SERIES FIP30Q : PRECISION BY DATE(BUSINESS) 2Jan1973 to 22Aug2003
COMMERCIAL PAPER: NON-FINAN, 1-MO QUOTED YIELD - US
-- documentation:
COMMERCIAL PAPER: NON-FINAN, 1-MO QUOTED YIELD - US
PERCENT
FEDERAL RESERVE BANK OF NEW YORK
--

SERIES FSCD30Y : PRECISION BY DATE(BUSINESS) 16Jul1973 to 21Aug2003
CD: SECONDARY MKT, 1-MO YIELD - US
-- documentation:
CD: SECONDARY MKT, 1-MO YIELD - US
PERCENT; US CLOSE
FEDERAL RESERVE BANK OF NEW YORK
'DAILY COMPOSITE SHEET'
AVG OF 5 TOP COMMERCIAL BANKS FOR $100,000
--

SERIES GDP : PRECISION BY DATE(ANNUAL) 1929 to 2002
GROSS DOMESTIC PRODUCT
-- documentation:
GROSS DOMESTIC PRODUCT
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
U.S. NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.1,1.3,1.5,1.9
--

SERIES GDP96C : PRECISION BY DATE(ANNUAL) 1929 to 2002
GROSS DOMESTIC PRODUCT (CHAINED)
-- documentation:
GROSS DOMESTIC PRODUCT (CHAINED)
BILLIONS OF CHAINED (1996) DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.2
1
--

SERIES GICV96 : PRECISION BY DATE(ANNUAL) 1964 to 2002

```
NEW CONSTRUCTION PUT IN PLACE - TOTAL PUBLIC
-- documentation:
NEW CONSTRUCTION PUT IN PLACE - TOTAL PUBLIC
BILLIONS OF 1996 DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CONSTRUCTION REPORTS C30, VALUE OF NEW CONSTRUCTION PUT IN PLACE
--


SERIES GNP : PRECISION BY DATE(ANNUAL) 1929 to 2002
GROSS NATIONAL PRODUCT
-- documentation:
GROSS NATIONAL PRODUCT
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
U.S. NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.9
--


SERIES GNP96C : PRECISION BY DATE(ANNUAL) 1959 to 2002
GROSS NATIONAL PRODUCT (CHAINED)
-- documentation:
GROSS NATIONAL PRODUCT (CHAINED)
BILLIONS OF CHAINED (1996) DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.10
--


SERIES HUCMPNC : PRECISION BY DATE(MONTHLY) Jan1979 to Jul2003
HOUSING COMPLETIONS, PRIVATE - NORTH CENTRAL (NRC)
-- documentation:
HOUSING COMPLETIONS, PRIVATE - NORTH CENTRAL (NRC)
THOUSANDS OF UNITS, SEASONALLY ADJUSTED AT ANNUAL RATES
U.S. DEPARTMENT OF COMMERCE AND OF HOUSING AND URBAN DEVELOPMENT
STATISTICAL REALEASE: NEW RESIDENTIAL CONSTRUCTION
17,000 PLACES THEREAFTER
--


SERIES HUCMPNE : PRECISION BY DATE(MONTHLY) Jan1979 to Jul2003
HOUSING COMPLETIONS, PRIVATE - NORTHEAST (NRC)
-- documentation:
HOUSING COMPLETIONS, PRIVATE - NORTHEAST (NRC)
THOUSANDS OF UNITS, SEASONALLY ADJUSTED AT ANNUAL RATES
U.S. DEPARTMENT OF COMMERCE AND OF HOUSING AND URBAN DEVELOPMENT
STATISTICAL REALEASE: NEW RESIDENTIAL CONSTRUCTION
17,000 PLACES THEREAFTER
--
```

```
SERIES HUCMPSO : PRECISION BY DATE(MONTHLY) Jan1979 to Jul2003
HOUSING COMPLETIONS, PRIVATE - SOUTH (NRC)
-- documentation:
HOUSING COMPLETIONS, PRIVATE - SOUTH (NRC)
THOUSANDS OF UNITS, SEASONALLY ADJUSTED AT ANNUAL RATES
U.S. DEPARTMENT OF COMMERCE AND OF HOUSING AND URBAN DEVELOPMENT
STATISTICAL REALEASE: NEW RESIDENTIAL CONSTRUCTION
17,000 PLACES THEREAFTER
--


SERIES HUCMPWT : PRECISION BY DATE(MONTHLY) Jan1979 to Jul2003
HOUSING COMPLETIONS, PRIVATE - WEST (NRC)
-- documentation:
HOUSING COMPLETIONS, PRIVATE - WEST (NRC)
THOUSANDS OF UNITS, SEASONALLY ADJUSTED AT ANNUAL RATES
U.S. DEPARTMENT OF COMMERCE AND OF HOUSING AND URBAN DEVELOPMENT
STATISTICAL REALEASE: NEW RESIDENTIAL CONSTRUCTION
17,000 PLACES THEREAFTER
--


SERIES HUSTS : PRECISION BY DATE(ANNUAL) 1959 to 2002
HOUSING STARTS, PRIVATE INCLUDING FARM - TOTAL (C20)
-- documentation:
HOUSING STARTS, PRIVATE INCLUDING FARM - TOTAL (C20)
THOUSANDS OF UNITS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CONSTRUCTION REPORT C20, HOUSING STARTS
--


SERIES HUSTS1 : PRECISION BY DATE(ANNUAL) 1959 to 2002
HOUSING STARTS, PRIVATE INCLUDING FARM - ONE UNIT (C20)
-- documentation:
HOUSING STARTS, PRIVATE INCLUDING FARM - ONE UNIT (C20)
THOUSANDS OF UNITS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CONSTRUCTION REPORT C20, HOUSING STARTS
--


SERIES HUSTS1NS : PRECISION BY DATE(MONTHLY) Jan1959 to Jul2003
HOUSING STARTS, PRIVATE INCLUDING FARM - ONE UNIT (C20)
-- documentation:
HOUSING STARTS, PRIVATE INCLUDING FARM - ONE UNIT (C20)
THOUSANDS OF UNITS, NOT SEASONALLY ADJUSTED AT MONTHLY RATES
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CONSTRUCTION REPORT C20, HOUSING STARTS
--


SERIES I : PRECISION BY DATE(ANNUAL) 1929 to 2002
```

```
GROSS PRIVATE DOMESTIC INVESTMENT
-- documentation:
GROSS PRIVATE DOMESTIC INVESTMENT
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
U.S. NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.1
--


SERIES I96C : PRECISION BY DATE(ANNUAL) 1929 to 2002
GROSS PRIVATE DOMESTIC INVESTMENT (CHAINED)
-- documentation:
GROSS PRIVATE DOMESTIC INVESTMENT (CHAINED)
BILLIONS OF CHAINED (1996) DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.2
--


SERIES ICV_G96 : PRECISION BY DATE(ANNUAL) 1964 to 2002
NEW CONSTRUCTION PUT IN PLACE - TOTAL
-- documentation:
NEW CONSTRUCTION PUT IN PLACE - TOTAL
BILLIONS OF 1996 DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CONSTRUCTION REPORTS C30, VALUE OF NEW CONSTRUCTION PUT IN PLACE
--


SERIES IPSB50001 : PRECISION BY DATE(MONTHLY) Jan1919 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  TOTAL INDEX
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  TOTAL INDEX
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSB51214 : PRECISION BY DATE(MONTHLY) Jan1954 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  PAPER PRODUCTS
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  PAPER PRODUCTS
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSB52100 : PRECISION BY DATE(MONTHLY) Jan1947 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  BUSINESS EQUIPMENT
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  BUSINESS EQUIPMENT
```

```
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG311 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  FOOD   NAICS=311
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  FOOD   NAICS=311
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG3121 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  BEVERAGE   NAICS=3121
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  BEVERAGE   NAICS=3121
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG3122 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  TOBACCO   NAICS=3122
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  TOBACCO   NAICS=3122
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG325188Z : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION  INDEX -  OTHER INORGANIC CHEMICALS  NAICS=325188P
-- documentation:
INDUSTRIAL PRODUCTION  INDEX -  OTHER INORGANIC CHEMICALS  NAICS=325188P
UNITS 1997=100, SEASONALLY ADJUSTED
FEDERAL RESERVE BOARD, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG336 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  TRANSPORTATION EQUIPMENT  NAICS=336
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  TRANSPORTATION EQUIPMENT  NAICS=336
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG339 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  MISCELLANEOUS  NAICS=339
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  MISCELLANEOUS  NAICS=339
```

```
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES JCOIN%LAG : PRECISION BY DATE(MONTHLY) Jan1959 to Jul2003
RATIO, COINCIDENT INDEX TO LAGGING INDEX (BCI)
-- documentation:
RATIO, COINCIDENT INDEX TO LAGGING INDEX (BCI)
RATIO, SEASONALLY ADJUSTED
THE CONFERENCE BOARD
BUSINESS CYCLE INDICATORS, 'BCI NUMBER 940
COPYRIGHTED: CANNOT REPRODUCE WITHOUT WRITTEN PERMISSION FROM SOURCE
--


SERIES JLAG : PRECISION BY DATE(MONTHLY) Jan1959 to Jul2003
LAGGING INDICATORS COMPOSITE INDEX (BCI)
-- documentation:
LAGGING INDICATORS COMPOSITE INDEX (BCI)
INDEX BASE: 1996 = 1.000, SEASONALLY ADJUSTED
THE CONFERENCE BOARD
BUSINESS CYCLE INDICATORS,' BCI NUMBER 930
COPYRIGHTED: CANNOT REPRODUCE WITHOUT WRITTEN PERMISSION FROM SOURCE
--


SERIES JLEAD : PRECISION BY DATE(MONTHLY) Jan1959 to Jul2003
LEADING INDICATORS COMPOSITE INDEX (BCI)
-- documentation:
LEADING INDICATORS COMPOSITE INDEX (BCI)
INDEX BASE: 1996 = 1.000, SEASONALLY ADJUSTED
THE CONFERENCE BOARD
BUSINESS CYCLE INDICATORS,' BCI NUMBER 910
COPYRIGHTED: CANNOT REPRODUCE WITHOUT WRITTEN PERMISSION FROM SOURCE
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SERIES MNY1 : PRECISION BY DATE(WEEKLY(MONDAY)) 6Jan1975 to 11Aug2003
MONEY SUPPLY - CURRENCY, DEMAND DEPOSITS, OTHER CHECKABLE DEPOSITS (H6)
-- documentation:
MONEY SUPPLY - CURRENCY, DEMAND DEPOSITS, OTHER CHECKABLE DEPOSITS (H6)
BILLIONS OF CURRENT DOLLARS, SEASONALLY ADJUSTED
BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM
STATISTICAL RELEASE H.6 AND THE 'FEDERAL RESERVE BULLETIN
AVERAGE OF DAILY FIGURES, WEEKS END ON MONDAYS
--


SERIES MNY2 : PRECISION BY DATE(WEEKLY(MONDAY)) 5Jan1981 to 11Aug2003
MONEY SUPPLY (M2) - M2 (H6)
-- documentation:
MONEY SUPPLY (M2) - M2 (H6)
```

BILLIONS OF CURRENT DOLLARS, SEASONALLY ADJUSTED
BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM
STATISTICAL RELEASE H.6 AND THE 'FEDERAL RESERVE BULLETIN'
AVERAGE OF DAILY FIGURES, WEEKS END ON MONDAYS
--

SERIES NAMES : STRING BY CASE 1 to 52
Object Names

SERIES PIDGNP : PRECISION BY DATE(ANNUAL) 1959 to 2002
IMPLICIT PRICE DEFLATOR - GROSS NATIONAL PRODUCT
-- documentation:
IMPLICIT PRICE DEFLATOR - GROSS NATIONAL PRODUCT
INDEX BASE: 1996 = 1.0, SEASONALLY ADJUSTED AT ANNUAL RATES
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME AND PRODUCT ACCOUNTS, TABLE 7.3
--

SERIES RUC : PRECISION BY DATE(MONTHLY) Jan1948 to Jul2003
UNEMPLOYMENT RATE - CIVILIAN (ESIT)
-- documentation:
UNEMPLOYMENT RATE - CIVILIAN (ESIT)
PERCENT, SEASONALLY ADJUSTED
U.S. DEPARTMENT OF LABOR, BUREAU OF LABOR STATISTICS
HOUSEHOLD DATA, TABLE A-1 OF 'EMPLOYMENT SITUATION'
--

SERIES RXC132%USNS : PRECISION BY DATE(MONTHLY) Nov1967 to Dec1998
EXCHANGE RATE IN NEW YORK - FRENCH FRANC PER US DOLLAR (G5)
-- documentation:
EXCHANGE RATE IN NEW YORK - FRENCH FRANC PER US DOLLAR (G5)
AVG OF CERTIFIED NOON BUYING RATES FOR CABLE TRANSFERS, UNADJUSTED
BOARD OF GOVERNORS OF THE FEDERAL RESERVE
STATISTICAL RELEASE G.5 AND 'FEDERAL RESERVE BULLETIN'
DATA PRIOR TO NOVEMBER 1981 CALCULATED BY GII
--

SERIES RXC134%USNS : PRECISION BY DATE(MONTHLY) Nov1967 to Dec1998
EXCHANGE RATE IN NEW YORK - GERMAN MARK PER US DOLLAR (G5)
-- documentation:
EXCHANGE RATE IN NEW YORK - GERMAN MARK PER US DOLLAR (G5)
AVG OF CERTIFIED NOON BUYING RATES FOR CABLE TRANSFERS, UNADJUSTED
BOARD OF GOVERNORS OF THE FEDERAL RESERVE
STATISTICAL RELEASE G.5 AND 'FEDERAL RESERVE BULLETIN'
DATA PRIOR TO NOVEMBER 1981 CALCULATED BY GII
--

```
SERIES RXC158%USNS : PRECISION BY DATE(MONTHLY) Nov1967 to Jul2003
EXCHANGE RATE IN NEW YORK - JAPANESE YEN PER US DOLLAR (G5)
-- documentation:
EXCHANGE RATE IN NEW YORK - JAPANESE YEN PER US DOLLAR (G5)
AVG OF CERTIFIED NOON BUYING RATES FOR CABLE TRANSFERS, UNADJUSTED
BOARD OF GOVERNORS OF THE FEDERAL RESERVE
STATISTICAL RELEASE G.5 AND 'FEDERAL RESERVE BULLETIN'
DATA PRIOR TO NOVEMBER 1981 CALCULATED BY GII
--


SERIES RXUS%C112NS : PRECISION BY DATE(MONTHLY) Jan1916 to Jul2003
EXCHANGE RATE IN NEW YORK - US CENTS PER BRITISH POUND (G5)
-- documentation:
EXCHANGE RATE IN NEW YORK - US CENTS PER BRITISH POUND (G5)
AVGS OF CERTIFIED NOON BUYING RATES FOR CABLE TRANSFERS
BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM
STATISTICAL RELEASE G.5 AND 'FEDERAL RESERVE BULLETIN'
NO ADJUSTMENT FOR SEASONALITY, IF ANY
--


SERIES STR : PRECISION BY DATE(MONTHLY) Jan1992 to Jul2003
RETAIL SALES, TOTAL - (NAICS)
-- documentation:
RETAIL SALES, TOTAL - (NAICS)
BILLIONS OF CURRENT DOLLARS, SEASONALLY ADJUSTED AT MONTHLY RATES
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CURRENT BUSINESS REPORTS, 'MONTHLY RETAIL TRADE'
--


SCALAR STRING_ATTRIBUTE_NAMES : NAMELIST

SERIES WPINS : PRECISION BY DATE(MONTHLY) Jan1913 to Jul2003
All commodities
-- documentation:
All commodities
INDEX BASE 1982 = 1.0, NOT SEASONALLY ADJUSTED
U.S. DEPARTMENT OF LABOR, BUREAU OF LABOR STATISTICS
--


SERIES YP : PRECISION BY DATE(ANNUAL) 1929 to 2002
PERSONAL INCOME
-- documentation:
PERSONAL INCOME
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 2.1
--
```

```
SERIES ZA : PRECISION BY DATE(ANNUAL) 1929 to 2002
CORPORATE PROFITS AFTER TAX - TOTAL
-- documentation:
CORPORATE PROFITS AFTER TAX - TOTAL
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS', SELECTED ISSUES
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 6.19
--

SERIES ZB : PRECISION BY DATE(ANNUAL) 1929 to 2002
CORPORATE PROFITS BEFORE TAX
-- documentation:
CORPORATE PROFITS BEFORE TAX
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS', SELECTED ISSUES
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 6.17
--
```

We can be more selective in what we retrieve from a FAME database. Here we specify a wild-card pattern "IP?". The Python dictionary famedata will now only include the industrial production time series in driecon with object name prefix "IP".

```
In [5]: famedata = qm.read_fame(dbname,wilnam="IP?")
        print("read_fame() returned {0} FAME objects from {1}.\n".format(len(famedata),dbname)
        qm.print_catalog(famedata)

read_fame() returned 9 FAME objects from /opt/pkg/fame116linux/util/driecon.

SERIES IPSB50001 : PRECISION BY DATE(MONTHLY) Jan1919 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  TOTAL INDEX
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  TOTAL INDEX
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--

SERIES IPSB51214 : PRECISION BY DATE(MONTHLY) Jan1954 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  PAPER PRODUCTS
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  PAPER PRODUCTS
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--
```

```
SERIES IPSB52100 : PRECISION BY DATE(MONTHLY) Jan1947 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  BUSINESS EQUIPMENT
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  BUSINESS EQUIPMENT
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG311 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  FOOD  NAICS=311
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  FOOD  NAICS=311
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG3121 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  BEVERAGE  NAICS=3121
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  BEVERAGE  NAICS=3121
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG3122 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  TOBACCO  NAICS=3122
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  TOBACCO  NAICS=3122
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG325188Z : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION  INDEX -  OTHER INORGANIC CHEMICALS  NAICS=325188P
-- documentation:
INDUSTRIAL PRODUCTION  INDEX -  OTHER INORGANIC CHEMICALS  NAICS=325188P
UNITS 1997=100, SEASONALLY ADJUSTED
FEDERAL RESERVE BOARD, INDUSTRIAL PRODUCTION, G.17;
--


SERIES IPSG336 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  TRANSPORTATION EQUIPMENT  NAICS=336
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  TRANSPORTATION EQUIPMENT  NAICS=336
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--
```

```
SERIES IPSG339 : PRECISION BY DATE(MONTHLY) Jan1972 to Jul2003
INDUSTRIAL PRODUCTION INDEX -  MISCELLANEOUS  NAICS=339
-- documentation:
INDUSTRIAL PRODUCTION INDEX -  MISCELLANEOUS  NAICS=339
UNITS 1997=100, SEASONALLY ADJUSTED
FRB, INDUSTRIAL PRODUCTION, G.17;
--
```

Some of the time series are quite long. If we are only interested in a particular time window, we may specify a FAME date range. Given Pandas data range `prng`, we convert to FAME date range `frng` using the qomautils function `to_fame_range()`. We pass the FAME range to `read_fame()` as a parameter named `fame_range`.

Note in Python and Pandas, the data range *excludes* the end point. In FAME, the end point is included in the date range. `to_fame_range()` and `to_pandas_range()` handle this distinction automatically.

```python
In [6]: # pandas range
        prng = pd.date_range(start='1998', end='2003', freq='A')

        # fame range
        frng = qm.to_fame_range(prng)

        famedata = qm.read_fame(dbname,fame_range=frng)
        print("read_fame() returned {0} FAME objects.\n".format(len(famedata)))
        qm.print_catalog(famedata)

read_fame() returned 16 FAME objects.

SERIES $N : PRECISION BY DATE(ANNUAL) 1998 to 2002
POPULATION INCLUDING ARMED FORCES OVERSEAS (P25E)
-- documentation:
POPULATION INCLUDING ARMED FORCES OVERSEAS (P25E)
MILLIONS OF PERSONS, ESTIMATES ARE FOR JULY 1
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CURRENT POPULATION REPORTS, SERIES P-25
INCLUDING ALASKA AND HAWAII BEGINNING IN 1940
--


SERIES BOPMERCH : PRECISION BY DATE(ANNUAL) 1998 to 2002
US INTERNATIONAL TRANSACTIONS - BALANCE ON GOODS (BOP)
-- documentation:
US INTERNATIONAL TRANSACTIONS - BALANCE ON GOODS (BOP)
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
U.S. INTERNATIONAL TRANSACTIONS
```

```
--

SERIES GDP : PRECISION BY DATE(ANNUAL) 1998 to 2002
GROSS DOMESTIC PRODUCT
-- documentation:
GROSS DOMESTIC PRODUCT
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
U.S. NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.1,1.3,1.5,1.9
--

SERIES GDP96C : PRECISION BY DATE(ANNUAL) 1998 to 2002
GROSS DOMESTIC PRODUCT (CHAINED)
-- documentation:
GROSS DOMESTIC PRODUCT (CHAINED)
BILLIONS OF CHAINED (1996) DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.2
1
--

SERIES GICV96 : PRECISION BY DATE(ANNUAL) 1998 to 2002
NEW CONSTRUCTION PUT IN PLACE - TOTAL PUBLIC
-- documentation:
NEW CONSTRUCTION PUT IN PLACE - TOTAL PUBLIC
BILLIONS OF 1996 DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CONSTRUCTION REPORTS C30, VALUE OF NEW CONSTRUCTION PUT IN PLACE
--

SERIES GNP : PRECISION BY DATE(ANNUAL) 1998 to 2002
GROSS NATIONAL PRODUCT
-- documentation:
GROSS NATIONAL PRODUCT
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
U.S. NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.9
--

SERIES GNP96C : PRECISION BY DATE(ANNUAL) 1998 to 2002
GROSS NATIONAL PRODUCT (CHAINED)
-- documentation:
GROSS NATIONAL PRODUCT (CHAINED)
BILLIONS OF CHAINED (1996) DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
```

'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.10
--

SERIES HUSTS : PRECISION BY DATE(ANNUAL) 1998 to 2002
HOUSING STARTS, PRIVATE INCLUDING FARM - TOTAL (C20)
-- documentation:
HOUSING STARTS, PRIVATE INCLUDING FARM - TOTAL (C20)
THOUSANDS OF UNITS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CONSTRUCTION REPORT C20, HOUSING STARTS
--

SERIES HUSTS1 : PRECISION BY DATE(ANNUAL) 1998 to 2002
HOUSING STARTS, PRIVATE INCLUDING FARM - ONE UNIT (C20)
-- documentation:
HOUSING STARTS, PRIVATE INCLUDING FARM - ONE UNIT (C20)
THOUSANDS OF UNITS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
CONSTRUCTION REPORT C20, HOUSING STARTS
--

SERIES I : PRECISION BY DATE(ANNUAL) 1998 to 2002
GROSS PRIVATE DOMESTIC INVESTMENT
-- documentation:
GROSS PRIVATE DOMESTIC INVESTMENT
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
U.S. NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.1
--

SERIES I96C : PRECISION BY DATE(ANNUAL) 1998 to 2002
GROSS PRIVATE DOMESTIC INVESTMENT (CHAINED)
-- documentation:
GROSS PRIVATE DOMESTIC INVESTMENT (CHAINED)
BILLIONS OF CHAINED (1996) DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.2
--

SERIES ICV_G96 : PRECISION BY DATE(ANNUAL) 1998 to 2002
NEW CONSTRUCTION PUT IN PLACE - TOTAL
-- documentation:
NEW CONSTRUCTION PUT IN PLACE - TOTAL
BILLIONS OF 1996 DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS

```
CONSTRUCTION REPORTS C30, VALUE OF NEW CONSTRUCTION PUT IN PLACE
--


SERIES PIDGNP : PRECISION BY DATE(ANNUAL) 1998 to 2002
IMPLICIT PRICE DEFLATOR -  GROSS NATIONAL PRODUCT
-- documentation:
IMPLICIT PRICE DEFLATOR -  GROSS NATIONAL PRODUCT
INDEX BASE: 1996 = 1.0, SEASONALLY ADJUSTED AT ANNUAL RATES
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME AND PRODUCT ACCOUNTS, TABLE 7.3
--


SERIES YP : PRECISION BY DATE(ANNUAL) 1998 to 2002
PERSONAL INCOME
-- documentation:
PERSONAL INCOME
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 2.1
--


SERIES ZA : PRECISION BY DATE(ANNUAL) 1998 to 2002
CORPORATE PROFITS AFTER TAX - TOTAL
-- documentation:
CORPORATE PROFITS AFTER TAX - TOTAL
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS', SELECTED ISSUES
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 6.19
--


SERIES ZB : PRECISION BY DATE(ANNUAL) 1998 to 2002
CORPORATE PROFITS BEFORE TAX
-- documentation:
CORPORATE PROFITS BEFORE TAX
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS', SELECTED ISSUES
NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 6.17
--
```

The Python dictionary `famedata` returned by `read_fame()` is easily converted to a Pandas DataFrame.

In [7]: pd.DataFrame(data=famedata).T

```
Out[7]:                                                          data  \
        $N        [276.115288, 279.294713, 281.674017, 285.545, ...
        BOPMERCH  [-246.696, -346.022, -452.423, -427.215, -482...
        GDP              [8781.5, 9274.3, 9824.6, 10082.2, 10446.2]
        GDP96C             [8508.9, 8859.0, 9191.4, 9214.5, 9439.9]
        GICV96      [145.297, 154.106, 161.523, 168.123, 173.099]
        GNP              [8778.1, 9297.1, 9848.0, 10104.1, 10436.7]
        GNP96C             [8508.4, 8883.7, 9216.2, 9237.3, 9433.5]
        HUSTS              [1616.9, 1666.5, 1568.7, 1602.7, 1704.9]
        HUSTS1             [1271.4, 1302.4, 1230.9, 1273.3, 1358.6]
        I                  [1538.7, 1636.7, 1755.4, 1586.0, 1593.2]
        I96C               [1558.0, 1660.5, 1762.9, 1574.6, 1589.6]
        ICV_G96     [665.156, 694.326, 718.708, 709.233, 701.943]
        PIDGNP             [1.0317, 1.0465, 1.0686, 1.0938, 1.1063]
        YP                 [7426.0, 7786.5, 8406.6, 8685.3, 8922.2]
        ZA                   [482.26, 514.315, 522.924, 470.9, 451.9]
        ZB                  [721.107, 762.105, 782.293, 670.2, 665.2]

                                                            fame
        $N        {'desc': 'POPULATION INCLUDING ARMED FORCES OV...
        BOPMERCH  {'desc': 'US INTERNATIONAL TRANSACTIONS - BALA...
        GDP       {'desc': 'GROSS DOMESTIC PRODUCT', 'docu': 'GR...
        GDP96C    {'desc': 'GROSS DOMESTIC PRODUCT (CHAINED)', '...
        GICV96    {'desc': 'NEW CONSTRUCTION PUT IN PLACE - TOTA...
        GNP       {'desc': 'GROSS NATIONAL PRODUCT', 'docu': 'GR...
        GNP96C    {'desc': 'GROSS NATIONAL PRODUCT (CHAINED)', '...
        HUSTS     {'desc': 'HOUSING STARTS, PRIVATE INCLUDING FA...
        HUSTS1    {'desc': 'HOUSING STARTS, PRIVATE INCLUDING FA...
        I         {'desc': 'GROSS PRIVATE DOMESTIC INVESTMENT', ...
        I96C      {'desc': 'GROSS PRIVATE DOMESTIC INVESTMENT (C...
        ICV_G96   {'desc': 'NEW CONSTRUCTION PUT IN PLACE - TOTA...
        PIDGNP    {'desc': 'IMPLICIT PRICE DEFLATOR -  GROSS NAT...
        YP        {'desc': 'PERSONAL INCOME', 'docu': 'PERSONAL ...
        ZA        {'desc': 'CORPORATE PROFITS AFTER TAX - TOTAL'...
        ZB        {'desc': 'CORPORATE PROFITS BEFORE TAX', 'docu...
```

We will call `read_fame()` one last time to retrieve *all* data from `driecon`.

```
In [8]: famedata = qm.read_fame(dbname)
        print("read_fame() returned {0} FAME objects from {1}.\n".format(len(famedata),dbname))

read_fame() returned 55 FAME objects from /opt/pkg/fame116linux/util/driecon.
```

We retrieve individual FAME data objects from the Python dictionary `famedata` using the qomautils function `get_fame_data()`.

```
In [9]: print(qm.meta_to_string(famedata,'STRING_ATTRIBUTE_NAMES'))
        qm.get(famedata,'STRING_ATTRIBUTE_NAMES')
```

```
SCALAR STRING_ATTRIBUTE_NAMES : NAMELIST
```

Out[9]: '{DRISOURCE, STATUS, DRIUPDATED, DRIATTRIBUTES, DRILONGNAME}'

In [10]: print(qm.meta_to_string(famedata,'DESC'))
        qm.get(famedata,'DESC')

```
SERIES DESC : STRING BY CASE 1 to 52
Object Descriptions
```

Out[10]: 1   US INTERNATIONAL TRANSACTIONS - BALANCE ON GOO...
         2   NEW CONSTRUCTION PUT IN PLACE - TOTAL PUBLIC
         3   NEW CONSTRUCTION PUT IN PLACE - TOTAL
         4   LAGGING INDICATORS COMPOSITE INDEX (BCI)
         5   LEADING INDICATORS COMPOSITE INDEX (BCI)
         6   RATIO, COINCIDENT INDEX TO LAGGING INDEX (BCI)
         7   DOW JONES: 65 COMPOSITE AVERAGE
         8   DOW JONES: 30 INDUSTRIAL AVERAGE
         9   GOVT ISSUE: CONSTANT MATURITY, 30-YR (H15) - US
         10   TREASURY BILL: SECONDARY, 3-MONTH BOND-EQUIVAL...
         11   CD: SECONDARY MKT, 1-MO YIELD - US
         12   EXCHANGE RATE IN NEW YORK - FRENCH FRANC PER U...
         13   EXCHANGE RATE IN NEW YORK - GERMAN MARK PER US...
         14   EXCHANGE RATE IN NEW YORK - JAPANESE YEN PER U...
         15   COMMERCIAL PAPER: NON-FINAN, 1-MO QUOTED YIELD...
         16   COMMERCIAL PAPER: NON-FINAN, 1-DAY QUOTED YIEL...
         17   EXCHANGE RATE IN NEW YORK - US CENTS PER BRITI...
         18   FEDERAL DEBT OUTSTANDING - TOTAL (TB)
         19   MONEY SUPPLY - CURRENCY, DEMAND DEPOSITS, OTHE...
         20   MONEY SUPPLY (M2) - M2 (H6)
         21   CORPORATE PROFITS AFTER TAX - TOTAL
         22   CORPORATE PROFITS BEFORE TAX
         23   IMPLICIT PRICE DEFLATOR - GROSS NATIONAL PRODUCT
         24   GROSS DOMESTIC PRODUCT
         25   GROSS DOMESTIC PRODUCT (CHAINED)
         26   GROSS NATIONAL PRODUCT
         27   GROSS NATIONAL PRODUCT (CHAINED)
         28   GROSS PRIVATE DOMESTIC INVESTMENT
         29   GROSS PRIVATE DOMESTIC INVESTMENT (CHAINED)
         30   PERSONAL INCOME
         31   HOUSING STARTS, PRIVATE INCLUDING FARM - ONE U...
         32   HOUSING STARTS, PRIVATE INCLUDING FARM - TOTAL...
         33   HOUSING STARTS, PRIVATE INCLUDING FARM - ONE U...
         34   HOUSING COMPLETIONS, PRIVATE - NORTHEAST (NRC)
         35   HOUSING COMPLETIONS, PRIVATE - WEST (NRC)

```
        36             HOUSING COMPLETIONS, PRIVATE - SOUTH (NRC)
        37       HOUSING COMPLETIONS, PRIVATE - NORTH CENTRAL (...
        38             INDUSTRIAL PRODUCTION INDEX -  TOTAL INDEX
        39       INDUSTRIAL PRODUCTION INDEX -  BUSINESS EQUIPMENT
        40          INDUSTRIAL PRODUCTION INDEX -  PAPER PRODUCTS
        41       INDUSTRIAL PRODUCTION INDEX -  MISCELLANEOUS  ...
        42       INDUSTRIAL PRODUCTION INDEX -  TOBACCO  NAICS=...
        43       INDUSTRIAL PRODUCTION INDEX -  BEVERAGE  NAICS...
        44       INDUSTRIAL PRODUCTION  INDEX -  OTHER INORGANI...
        45       INDUSTRIAL PRODUCTION INDEX -  TRANSPORTATION ...
        46         INDUSTRIAL PRODUCTION INDEX -  FOOD  NAICS=311
        47                  UNEMPLOYMENT RATE - CIVILIAN (ESIT)
        48       POPULATION INCLUDING ARMED FORCES OVERSEAS (P25E)
        49                        CPI (ALL URBAN) - ALL ITEMS
        50                                   CPIU - All items
        51                                    All commodities
        52                  RETAIL SALES, TOTAL - (NAICS)
        Name: DESC, dtype: object
```

In [11]: print(qm.meta_to_string(famedata,'GDP'))
        qm.get(famedata,'GDP')

```
SERIES GDP : PRECISION BY DATE(ANNUAL) 1929 to 2002
GROSS DOMESTIC PRODUCT
-- documentation:
GROSS DOMESTIC PRODUCT
BILLIONS OF CURRENT DOLLARS
U.S. DEPARTMENT OF COMMERCE, BUREAU OF ECONOMIC ANALYSIS
'SURVEY OF CURRENT BUSINESS' AND OTHER MATERIALS
U.S. NATIONAL INCOME & PRODUCT ACCOUNTS - TABLE 1.1,1.3,1.5,1.9
--
```

```
Out[11]: 1929-12-31     103.7
        1930-12-31      91.3
        1931-12-31      76.6
        1932-12-31      58.8
        1933-12-31      56.4
        1934-12-31      66.0
        1935-12-31      73.3
        1936-12-31      83.7
        1937-12-31      91.9
        1938-12-31      86.1
        1939-12-31      92.0
        1940-12-31     101.3
        1941-12-31     126.7
        1942-12-31     161.8
```

```
1943-12-31      198.4
1944-12-31      219.7
1945-12-31      223.0
1946-12-31      222.3
1947-12-31      244.4
1948-12-31      269.6
1949-12-31      267.7
1950-12-31      294.3
1951-12-31      339.5
1952-12-31      358.6
1953-12-31      379.9
1954-12-31      381.1
1955-12-31      415.2
1956-12-31      438.0
1957-12-31      461.5
1958-12-31      467.9
                 ...
1973-12-31     1385.5
1974-12-31     1501.0
1975-12-31     1635.2
1976-12-31     1823.9
1977-12-31     2031.4
1978-12-31     2295.9
1979-12-31     2566.4
1980-12-31     2795.6
1981-12-31     3131.3
1982-12-31     3259.2
1983-12-31     3534.9
1984-12-31     3932.7
1985-12-31     4213.0
1986-12-31     4452.9
1987-12-31     4742.5
1988-12-31     5108.3
1989-12-31     5489.1
1990-12-31     5803.2
1991-12-31     5986.2
1992-12-31     6318.9
1993-12-31     6642.3
1994-12-31     7054.3
1995-12-31     7400.5
1996-12-31     7813.2
1997-12-31     8318.4
1998-12-31     8781.5
1999-12-31     9274.3
2000-12-31     9824.6
2001-12-31    10082.2
2002-12-31    10446.2
Freq: A-DEC, Name: GDP, Length: 74, dtype: float64
```

```
In [12]: frng = famedata['GDP'].get('fame').get('range')
         print(frng)
         print(qm.to_pandas_range(frng))

[203, 80, 153]
DatetimeIndex(['1929-12-31', '1930-12-31', '1931-12-31', '1932-12-31',
               '1933-12-31', '1934-12-31', '1935-12-31', '1936-12-31',
               '1937-12-31', '1938-12-31', '1939-12-31', '1940-12-31',
               '1941-12-31', '1942-12-31', '1943-12-31', '1944-12-31',
               '1945-12-31', '1946-12-31', '1947-12-31', '1948-12-31',
               '1949-12-31', '1950-12-31', '1951-12-31', '1952-12-31',
               '1953-12-31', '1954-12-31', '1955-12-31', '1956-12-31',
               '1957-12-31', '1958-12-31', '1959-12-31', '1960-12-31',
               '1961-12-31', '1962-12-31', '1963-12-31', '1964-12-31',
               '1965-12-31', '1966-12-31', '1967-12-31', '1968-12-31',
               '1969-12-31', '1970-12-31', '1971-12-31', '1972-12-31',
               '1973-12-31', '1974-12-31', '1975-12-31', '1976-12-31',
               '1977-12-31', '1978-12-31', '1979-12-31', '1980-12-31',
               '1981-12-31', '1982-12-31', '1983-12-31', '1984-12-31',
               '1985-12-31', '1986-12-31', '1987-12-31', '1988-12-31',
               '1989-12-31', '1990-12-31', '1991-12-31', '1992-12-31',
               '1993-12-31', '1994-12-31', '1995-12-31', '1996-12-31',
               '1997-12-31', '1998-12-31', '1999-12-31', '2000-12-31',
               '2001-12-31', '2002-12-31'],
              dtype='datetime64[ns]', freq='A-DEC')
```

The Qoma utility function `close_hli()` closes the FAME environment.

```
In [13]: if qm.close_hli() != 0:
             raise
```