



THE EUROPEAN CENTRAL BANK DATA PORTAL

An Open Data Platform for Economic and Financial Insights

by Hannes Bähr

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1. The ECB and its Data Portal
2. Data Sets and Data Formats
3. Catalogue System and API
4. Data quality in the 5-star Open Data plan

I.THE ECB AND IT'S DATA PORTAL

Who is the ECB?

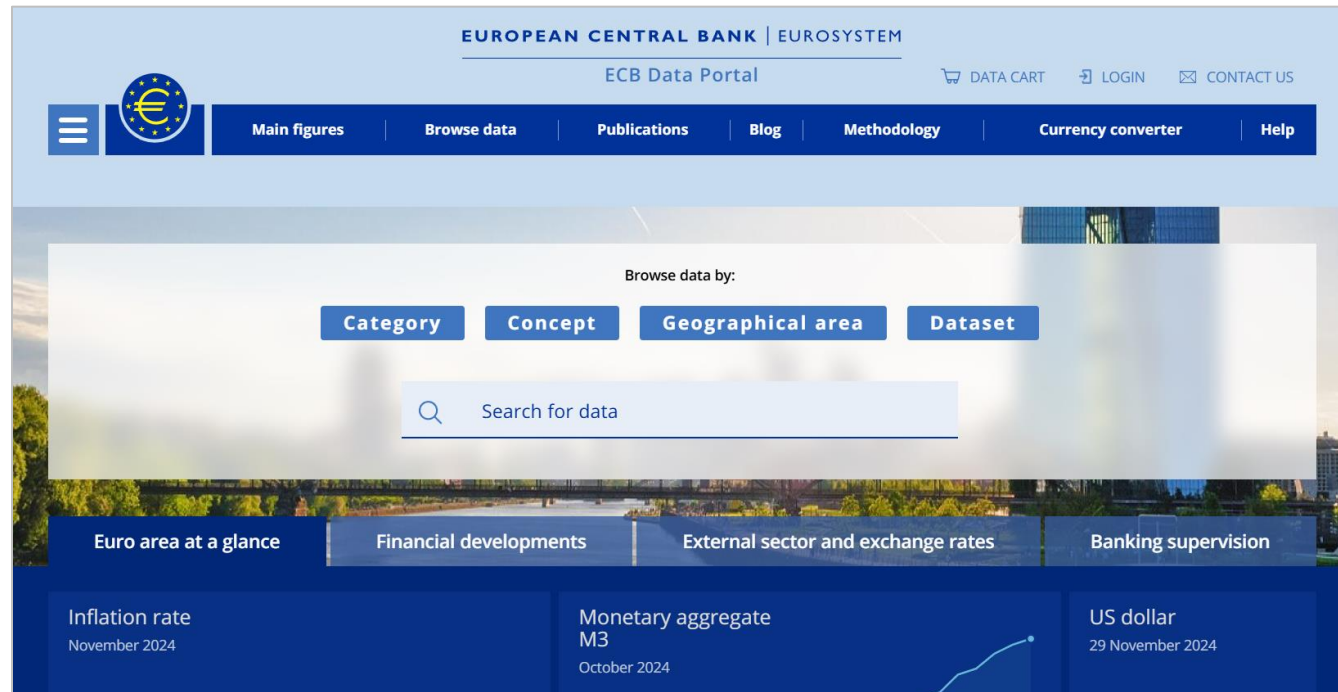
- founded on June 1st 1998 it's the monetary authority of the **E**conomic and **M**onetary **U**nion
- managing the euro, ensuring price stability, implementing EU economic and monetary policies
- sets key interest rates, manages Eurozone's currency reserves, ensures financial markets and institutions are well supervised
- main goal: stable prices, thereby supporting economic growth and job creation



I.THE ECB AND ITS DATA PORTAL

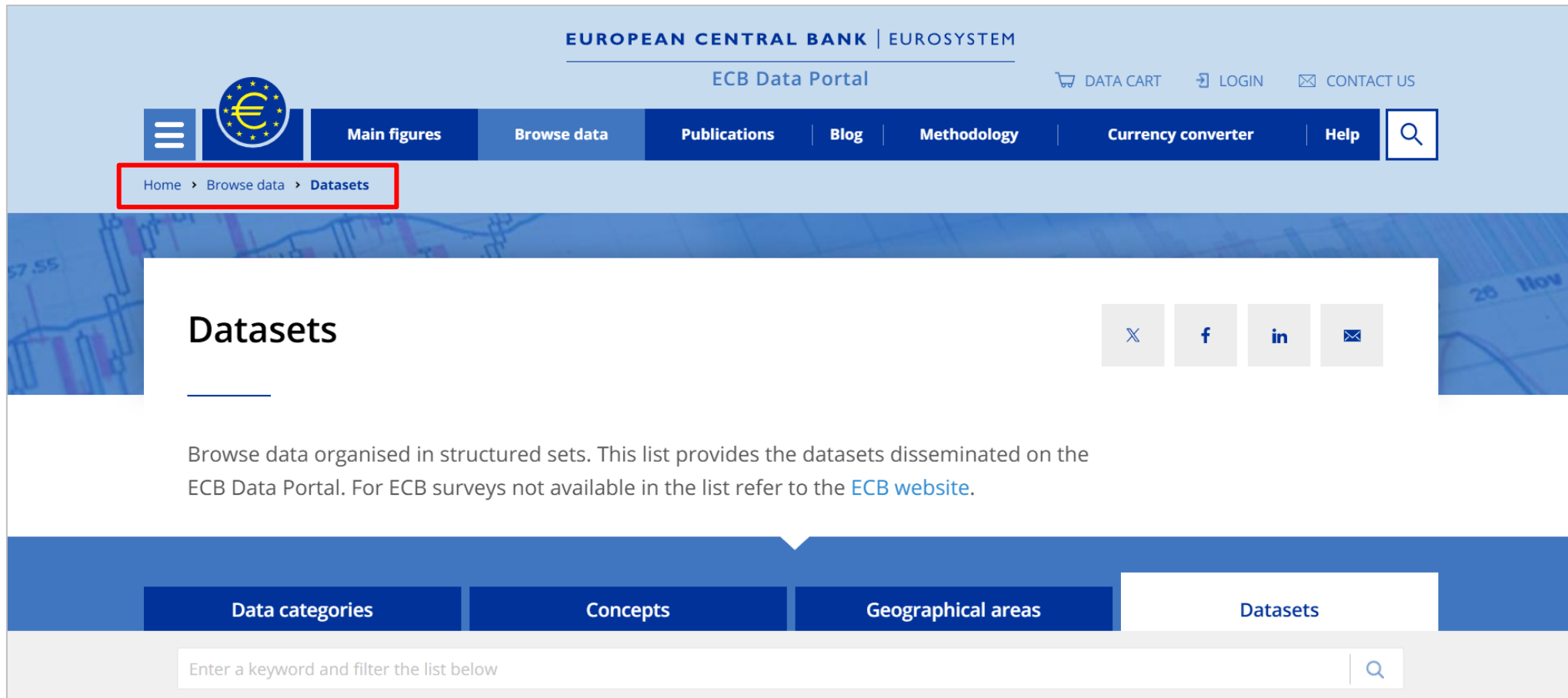
The ECB Data Portal

- ECB's online service for statistical data, related metadata and publications
- **user-friendly:** various tools for searching, visualizing, customizing, and downloading ECB's data
- tutorial: <https://www.youtube.com/playlist?list=PLnVAEZuF9FZmxUaFiVWclp0efM9e7bzIF5>



2. DATA SETS AND DATA FORMATS

Data Sets (<https://data.ecb.europa.eu/data/datasets>)



The screenshot shows the ECB Data Portal website. At the top, the header includes the European Central Bank logo and the text "EUROPEAN CENTRAL BANK | EUROSYSTEM". Below this, the "ECB Data Portal" is prominently displayed. Navigation links include "DATA CART", "LOGIN", and "CONTACT US". A main menu bar contains "Main figures", "Browse data", "Publications", "Blog", "Methodology", "Currency converter", and "Help". A breadcrumb trail "Home > Browse data > Datasets" is highlighted with a red box. The "Datasets" section title is followed by social media icons for Twitter, Facebook, LinkedIn, and Email. A descriptive paragraph states: "Browse data organised in structured sets. This list provides the datasets disseminated on the ECB Data Portal. For ECB surveys not available in the list refer to the [ECB website](#)." At the bottom, a filter bar includes "Data categories", "Concepts", "Geographical areas", and "Datasets". A search bar at the very bottom prompts the user to "Enter a keyword and filter the list below".

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ECB Data Portal

DATA CART LOGIN CONTACT US

Main figures Browse data Publications Blog Methodology Currency converter Help

Home > Browse data > Datasets

Datasets

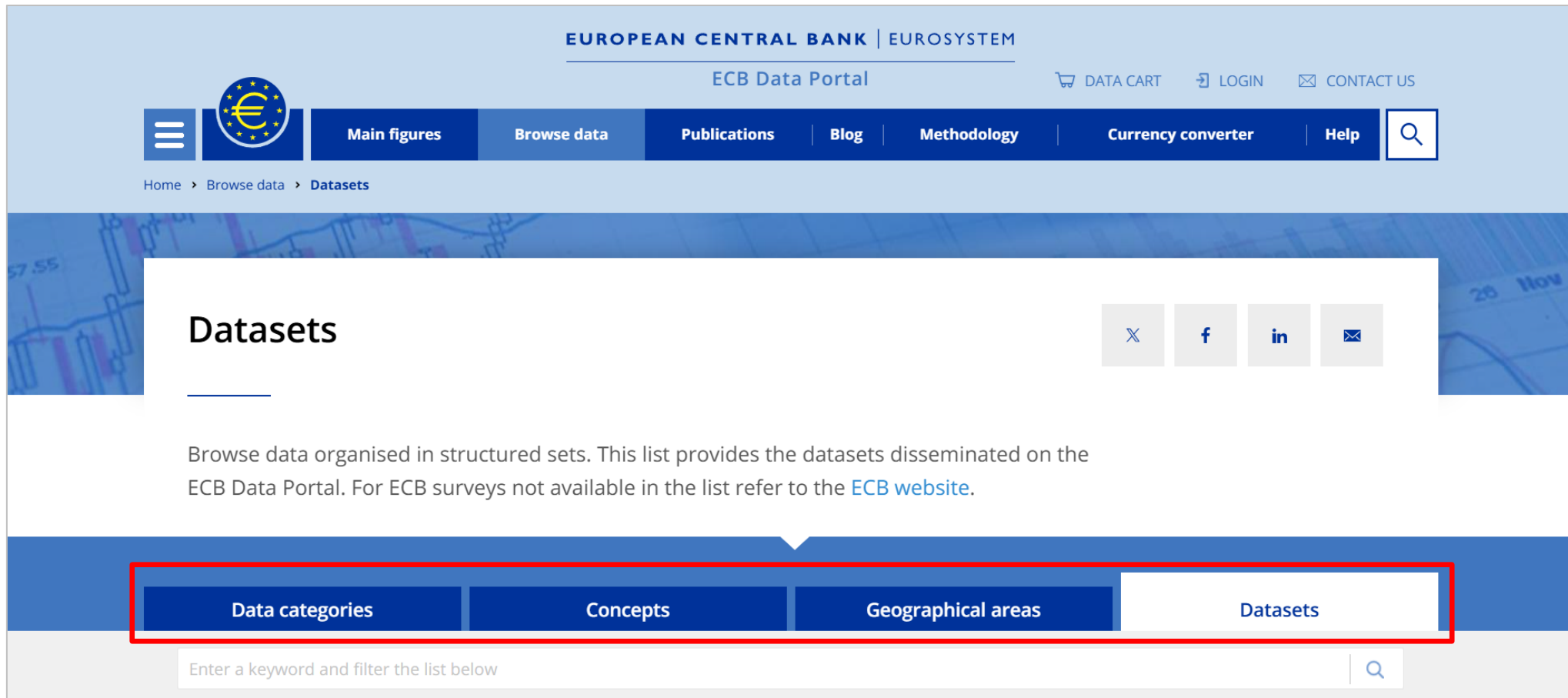
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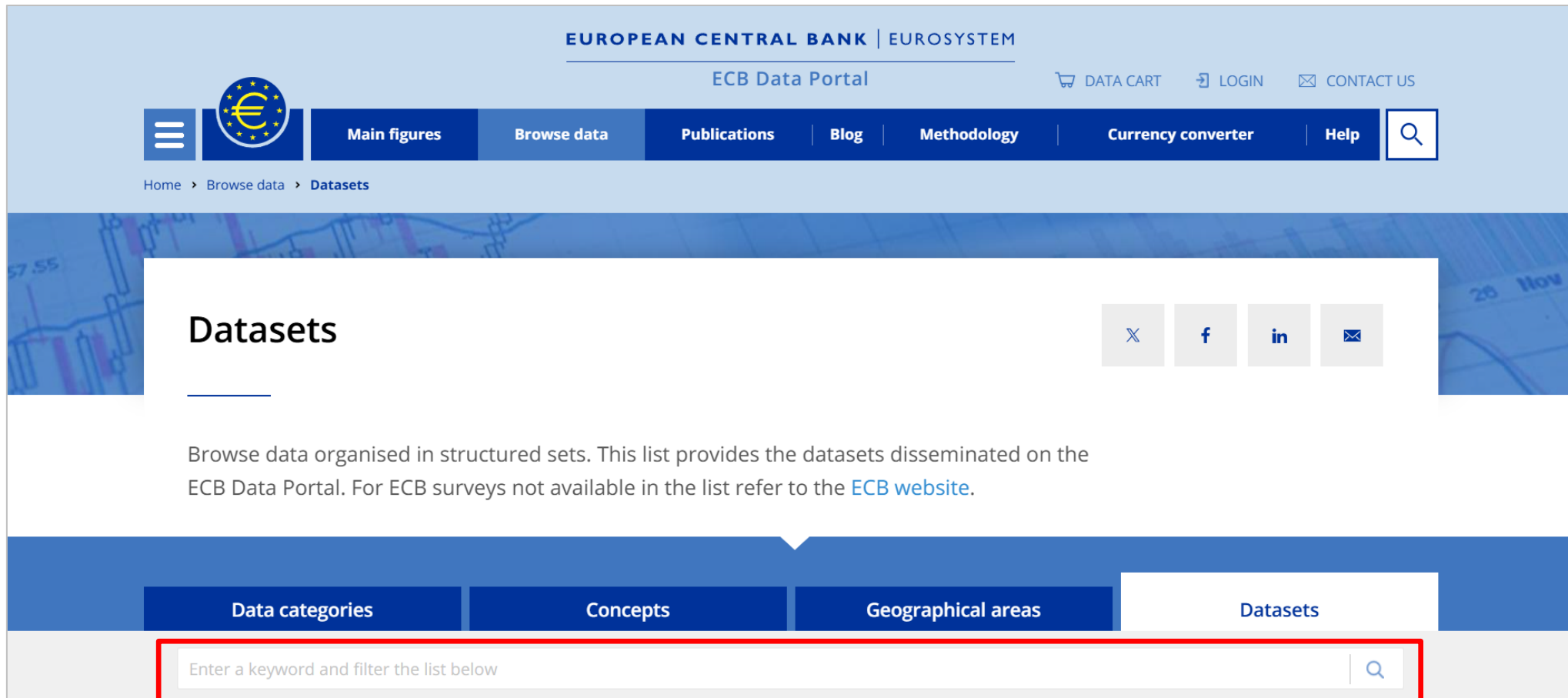
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2. DATA SETS AND DATA FORMATS

Data Sets

- economic and financial data: inflation, interest rates, government finance, balance of payments, financial institutions' data...
- **searchable by categories, concepts, geographic region, datasets**
- mainly aggregated and country specific data of Eurozone, European Union, European Economic Area
- but also data from countries all over the world in varying amounts

Data Formats

- statistical data formats: **SDMX-JSON**, SDMX-ML (default, XML-based)
- tabular data formats: CSV (incl. PivotTable-ready), XLS/XLSX
- graphical data formats: PNG, PDF, PPT (for visualizations and exports)

3. CATALOGUE SYSTEM AND API ACCES

Catalogue System

- **not** a standard open-source catalogue system like CKAN
- custom-designed system to organize financial and economic datasets
- metadata driven search: browse by categories, concepts, indicators, and geographical areas
- datasets follow SDMX standards for interoperability and contain detailed metadata (sources, update frequency, methods)

3. CATALOGUE SYSTEM AND API ACCES

API access

- RESTful API following SDMX standards
- features include customizable queries, metadata retrieval and multi-format outputs
- suitable for automating data retrieval and integration

Example API request on the following slides!

3. CATALOGUE SYSTEM AND API ACCES

Step 1: Import Package, define paramters and make request

```
import pandas as pd
import requests
import matplotlib.pyplot as plt

# Define parameters and API URL:
base_url = "https://data-api.ecb.europa.eu/service/data"
flow_ref = "EXR" # exchange rates dataflow
series_key = "D.USD.EUR.SP00.A" # Daily USD/EUR exchange rates
start_period = "2023-01-01"
end_period = "2023-12-31"
url = f"{base_url}/{flow_ref}/{series_key}?startPeriod={start_period}&endPeriod={end_period}&format=jsondata" # full URL with parameters

# Fetch the data:
response = requests.get(url)
if response.status_code == 200:
    data = response.json()
    print("Data retrieved successfully.")
else:
    print(f"Failed to fetch data. Status Code: {response.status_code}")
    print(response.text)
    raise SystemExit("Exiting script due to error.")
```

data

3. CATALOGUE SYSTEM AND API ACCES

```
... Data retrieved successfully.
```

```
{  
  "header": {  
    "id": "0f2ad931-a51c-4902-b2e5-8b799b9116f5",  
    "test": false,  
    "prepared": "2024-12-09T06:28:21.288+01:00",  
    "sender": {"id": "ECB"}},  
  "dataSets": [{  
    "action": "Replace",  
    "validFrom": "2024-12-09T06:28:21.288+01:00",  
    "series": {"0:0:0:0:0": {"attributes": [0,  
      null,  
      0,  
      null,  
      null,  
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      0,  
      null,  
      0,  
      0,  
      0,  
      0]}},  
    "values": [{"id": "F", "name": "Free"}]},  
    {"id": "OBS_PRE_BREAK",  
     "name": "Pre-break observation value",  
     "values": []},  
    {"id": "OBS_COM", "name": "Observation comment", "values": []}]}}}
```

Output is truncated. View as a scrollable element or open in a text editor. Adjust cell output settings...

Output of the code from the previous slide!

3. CATALOGUE SYSTEM AND API ACCES

Step 2: Extract relevant data

```
# Extract series data and observations:
series_data = data['dataSets'][0]['series']
structure = data['structure']
time_periods = structure['dimensions']['observation'][0]['values'] # extract time values

observations = [] # lists for observations
dates = [] # list for dates

for series_key, series_content in series_data.items():
    series_observations = series_content['observations']
    for obs_key, obs_values in series_observations.items():
        date_index = int(obs_key) # use obs_key as index into time_periods
        date = time_periods[date_index]['id'] # map index to actual date
        value = obs_values[0] # first element in the observation array
        if value is not None:
            dates.append(date)
            observations.append(value)

df = pd.DataFrame({'Date': pd.to_datetime(dates), 'Exchange Rate': observations})
df.head(5)
```

[8] ✓ 0.0s

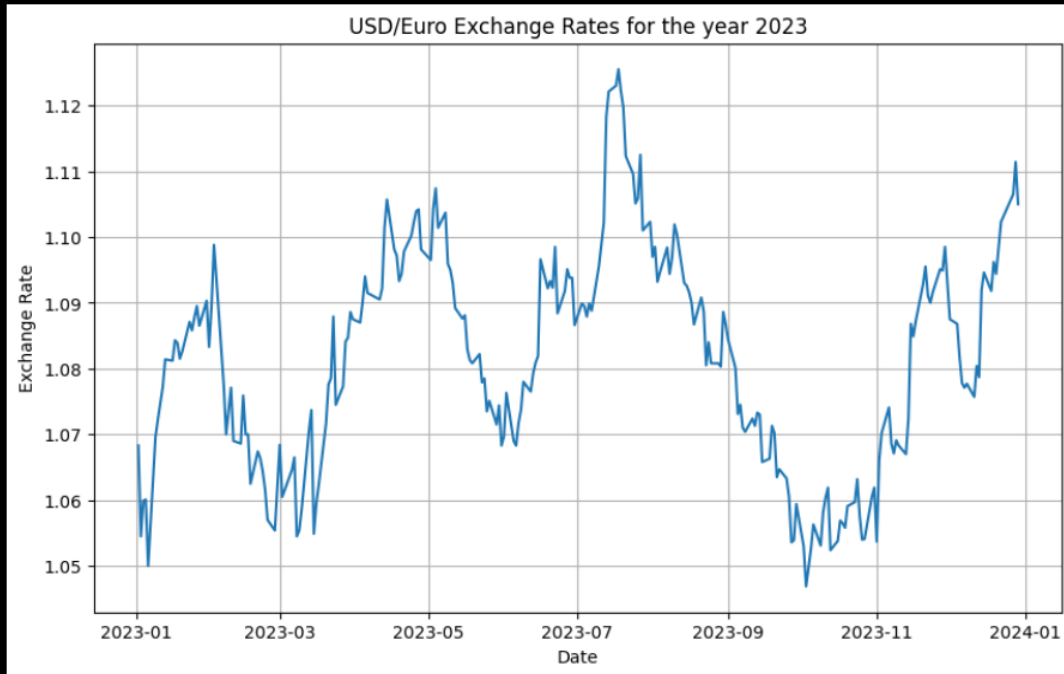
...	Date	Exchange Rate
0	2023-01-02	1.0683
1	2023-01-03	1.0545
2	2023-01-04	1.0599
3	2023-01-05	1.0601
4	2023-01-06	1.0500

3. CATALOGUE SYSTEM AND API ACCES

Step 3: Plot a time series

```
plt.figure(figsize=(10, 6))
plt.plot(df['Date'], df['Exchange Rate'])
plt.title("USD/Euro Exchange Rates for the year 2023")
plt.xlabel("Date")
plt.ylabel("Exchange Rate")
plt.grid(True)
plt.show()
```

[13] ✓ 0.3s



4. DATA QUALITY IN THE 5-STAR OPEN DATA PLAN

Deployment schema for Open Data by Tim Berners-Lee:

- * Make your stuff available on the Web (whatever format) under an open license.
- ** Make it available as structured data (e.g., Excel instead of image scan of a table).
- *** Make it available in a non-proprietary open format (e.g., CSV instead of Excel).
- **** Use URIs to denote things, so that people can point at your stuff.
- ***** Link your data to other data to provide context.

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THANKS FOR YOUR ATTENTION!
ANY QUESTIONS?