

# ***SDMX – an overview***

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***Views expressed are those of the presenter and not necessarily those of the BIS .***

## Ich über mich ...

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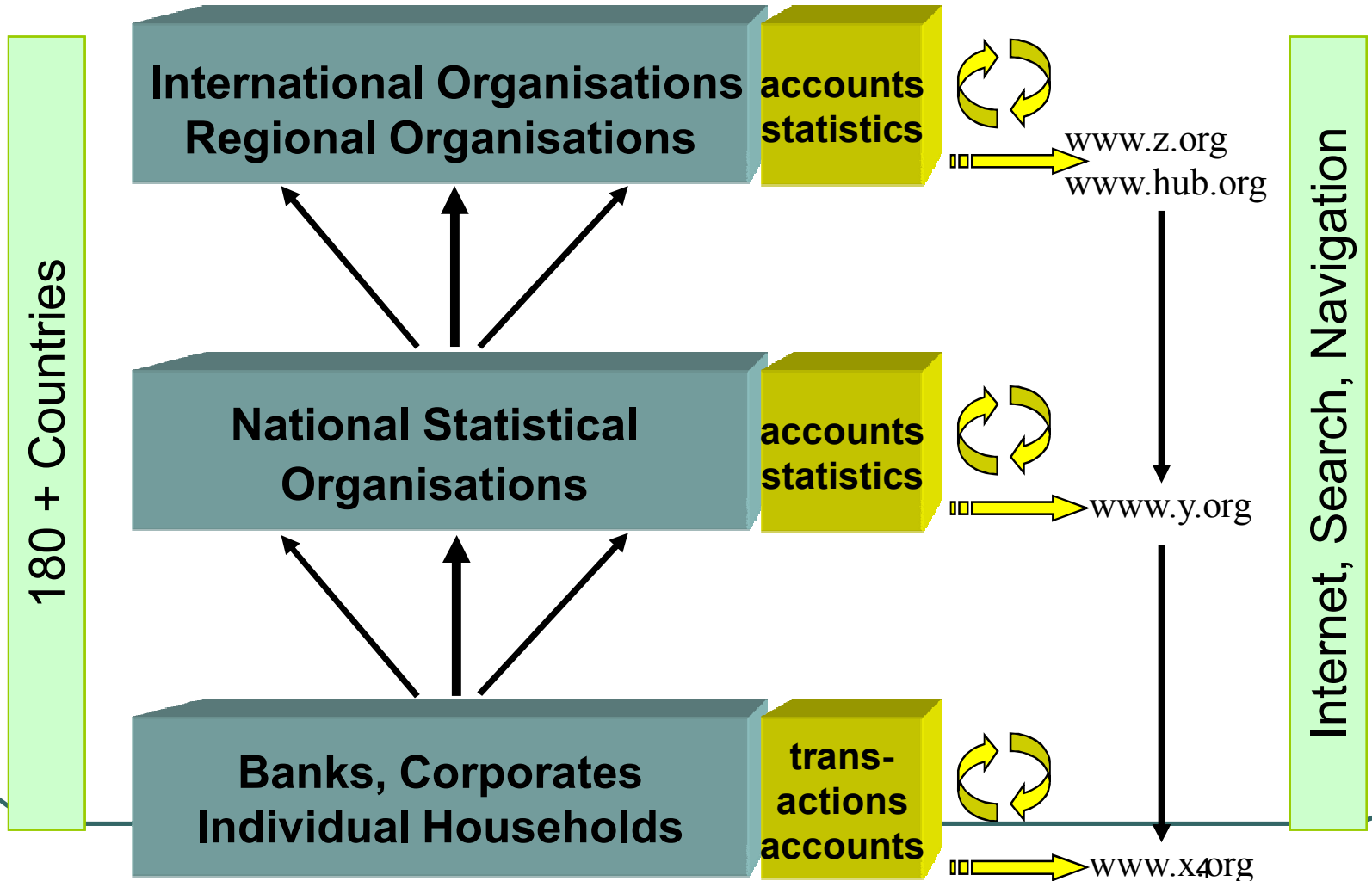
- Dipl. Volkswirtin (Universität Konstanz 1979)
- 3 Jahre Eurostat (Stat. Amt der EU)
- Seit 1984 bei der BIZ (Volkswirtschaftliche Abteilung)
  - Statistikerin
  - 1988 Leiterin der BIZ Datenbank Gruppe
  - Expansion der teilnehmenden Zentralbanken von 11 auf 35
  - Projektleitung Migration DB auf FAME und Sybase (1997-99)
  - Beginn der Entwicklung von GESMES/CB (EDIFACT), 1997
  - Seit 2004 Leiterin Stat. Informationssysteme
  - Projektleitung, IT Strategie für statistische. Systeme
  - SDMX!

# Economic Statistics

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- Are used by analysts, researchers, political advisers, students, central bankers and ....
- Originate in enterprises, households, customs offices, shops and ....
- Are collected and compiled by national statistical offices, central banks, ministries
- Are collected and aggregated by international organisations: BIS, ECB, IMF, OECD, United Nations, World Bank and ...

# statistical information building blocks



## Why SDMX?

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- Exchange and dissemination of statistical data is complex, resource intensive, and expensive
- The same data is stored in multiple locations
- Data and metadata often not re-usable during collection, compilation, analysis, transmission, dissemination
- Various international organisations have proprietary technical standards for exchanging data with their constituencies
- Standards combine “content” specific issues with technical solutions
- Multiple standards result in additional reporting burden
- Move from point to point transmission to web world (XML, web services)

## What is SDMX about?

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- Earlier limited willingness for international cooperation: resourcing statistical activities = control
- Electronic standards constitute major investments that all want to protect
- Constituencies of international organisations have asked for common solutions (especially central banks and national statistical agencies)
- International organisations are in a position to expand their cooperation without needing major additional resources
- Web technologies offer ways for more user friendly data provision

# Who is SDMX?

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- Sponsoring international organisations:
  - 2001: BIS, ECB, EUROSTAT, IMF, OECD, UN
  - 2003: + World Bank
- “ ... to focus on business practices in the field of statistical information that would allow more efficient processes for exchange and sharing of data and metadata within the current scope of our collective activities”
- Simple structure of coordination combined with joint marketing and some joint projects

## The SDMX Vision

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- Statistical information to be stored only once: with the original compiler.
- Information about data availability provided via registries in a structured way
- Registries “know” where the data is
- Users browse the registry, formulate a query and retrieve the data from the original source “on demand”
  
- Less double storage of data
- “Fresher” data
- Decrease of reporting burden



## Possible applications of SDMX

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- Data exchange format
- Basis for statistical processing system (storage and metadata handling)
- Basis for a dissemination environment (metadata for navigation, search and query)
- Data portal to internal and external data

# The SDMX Information model

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- Covers data and metadata
- Foundation of the technical standards
- “SDMX way” to organise data and metadata is simple and powerful
- Good data and metadata organisation is a prerequisite for
  - Enhancing the usability of data
  - Enhancing processing efficiency
  - Building generic processing systems
  - Building enhanced dissemination systems
  - ...
- Let’s take a quick look at the model ...

**TABLE 6 A**  
**EXTERNAL POSITIONS OF REPORTING BANKS VIS-A-VIS INDIVIDUAL COUNTRIES**

(In millions of US dollars)

Vis-à-vis all sectors

| VIS-A-VIS COUNTRIES     | AMOUNTS OUTSTANDING |              |              |               | ESTIMATED EXCHANGE RATE ADJUSTED CHANGES |              |            |            |            |            |
|-------------------------|---------------------|--------------|--------------|---------------|--|--------------|------------|------------|------------|------------|
|                         | 2003<br>Dec.        | 2004<br>Dec. | 2005<br>June | 2005<br>Sept. | 2003<br>Year                             | 2004<br>Year | 2004<br>Q4 | 2005<br>Q1 | 2005<br>Q2 | 2005<br>Q3 |
|                         | <b>ASSETS</b>       |              |              |               |  |              |            |            |            |            |
| ALL COUNTRIES .....     | 15,999,407          | 19,198,304   | 20,267,568   | 20,713,436    | 1,076,718                                | 2,285,487    | 589,417    | 1,032,687  | 1,086,110  | 531,992    |
| DEVELOPED COUNTRIES ... | 12,714,094          | 15,205,646   | 16,038,496   | 16,372,026    | 849,100                                  | 1,704,479    | 395,550    | 949,782    | 840,326    | 402,153    |
| i) Europe .....         | 8,902,490           | 10,890,218   | 11,340,803   | 11,526,615    | 764,144                                  | 1,300,440    | 270,722    | 788,703    | 548,882    | 239,455    |
| Austria .....           | 150,682             | 172,969      | 181,518      | 182,833       | 6,346                                    | 11,270       | 5,274      | 16,500     | 9,706      | 2,127      |
| Andorra .....           | 801                 | 836          | 941          | 1,018         | -12                                      | -19          | 65         | 186        | 28         | 84         |
| Belgium .....           | 329,716             | 411,059      | 414,257      | 418,763       | 44,928                                   | 49,372       | -3,348     | 44,125     | -955       | 6,334      |
| Denmark .....           | 127,711             | 147,391      | 169,553      | 164,233       | 22,941                                   | 10,803       | 1,966      | 23,675     | 12,647     | -4,799     |
| Finland .....           | 59,971              | 80,274       | 81,253       | 80,013        | -2,261                                   | 15,342       | -5,101     | 5,389      | 2,565      | -898       |
| France .....            | 866,647             | 1,131,382    | 1,154,143    | 1,125,202     | 56,591                                   | 203,007      | 70,385     | 82,426     | 34,620     | -23,725    |
| Germany .....           | 1,227,238           | 1,339,458    | 1,341,000    | 1,341,150     | 54,443                                   | 9,834        | -37,857    | 102,337    | 15,940     | 5,871      |
| Greece .....            | 108,585             | 143,593      | 143,298      | 146,995       | 7,300                                    | 24,740       | 5,007      | 6,487      | 5,849      | 4,360      |
| Iceland .....           | 8,979               | 15,115       | 18,835       | 20,039        | 1,707                                    | 4,666        | 2,123      | 1,478      | 3,408      | 1,307      |
| Ireland .....           | 380,853             | 522,705      | 560,716      | 577,880       | 88,447                                   | 101,919      | 38,589     | 35,889     | 44,881     | 19,521     |
| Italy .....             | 721,872             | 862,620      | 895,585      | 868,680       | 23,540                                   | 68,188       | 23,153     | 50,811     | 69,441     | -23,158    |
| Liechtenstein .....     | 4,649               | 4,629        | 5,387        | 5,598         | 483                                      | -305         | -67        | 387        | 278        | 243        |
| Luxembourg .....        | 457,102             | 507,272      | 503,014      | 548,900       | 47,186                                   | 19,632       | 19,486     | 10,386     | 28,052     | 48,297     |
| Netherlands .....       | 688,735             | 845,654      | 853,571      | 879,782       | 60,064                                   | 75,428       | 29,056     | 71,368     | 12,390     | 30,289     |
| Norway .....            | 109,192             | 138,028      | 149,008      | 158,430       | 14,063                                   | 23,177       | -2,592     | 10,555     | 9,048      | 10,025     |
| Portugal .....          | 191,531             | 213,920      | 200,656      | 202,292       | 30,759                                   | 5,752        | -156       | -2,254     | 10,988     | 2,519      |
| Spain .....             | 393,608             | 549,411      | 586,110      | 621,292       | 70,536                                   | 113,345      | 22,201     | 52,664     | 42,967     | 38,579     |
| Sweden .....            | 159,791             | 219,282      | 206,039      | 208,820       | 16,368                                   | 45,440       | 21,476     | 5,592      | -3,870     | 3,648      |
| Switzerland .....       | 505,470             | 546,373      | 567,611      | 625,243       | 20,470                                   | 17,150       | 11,906     | 1,938      | 50,366     | 59,674     |
| (of which in CHF) ..... | 96,809              | 103,252      | 108,285      | 103,980       | 580                                      | -2,514       | -4,631     | 3,826      | 11,317     | -3,908     |

## The SDMX Information model for data (and metadata)

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- To make sense to users data need to be
  - Identified (eg by a unique key)
  - Qualified (eg by „attributes“)
- In the example table we can distinguish identifying concepts:
  - Reporting country (= “all reporting countries“)
  - Vis-a-vis country ( = list of countries, “France”)
  - Sector (= “all sectors”)
  - Type (= Assets / Liabilities)
  - Measure (=Amounts outstanding / Exchange rate adjusted) flows)
- Qualifying concepts
  - Unit of measure (millions of US dollars)
- And Time ....(Period)
  
- Code lists (ie lists of possible values) exist for our concepts
- Other data can be organised in this way

# A sample data structure

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- DEBT SEC example
- CIBL example

## SDMX data exchange standards and models

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- Standards are based on the SDMX Information Model (IM)
- Define messages for exchange of data, metadata, structures and queries (for data / metadata ...)
- 2 syntaxes (EDIFACT and XML)
- Common message formats for all types of data exchange
  - “Push”: reporters push files to recipient
  - “Pull: recipient “pulls” “files from reporter
  - “data sharing”: user “pulls” from data sources “on the fly”
    - Access to SDMX data files provided on the web
    - interactive access to SDMX-based databases (query and response)

# Benefits of SDMX data exchange standards

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- For data users:
  - Data exchanges cover metadata and data
  - Facilitate comparative data and metadata analysis
  - Harmonisation of access mechanisms
  - Foster harmonisation (... in the medium term ...)
- For owners of statistical processing systems:
  - Repurpose IT processing modules (eg “output module”) for different types of data exchange as needed
  - Build generic statistical processing systems
  - Enhance statistical processing efficiency
  - Reduce reporting burden
  - Foster harmonisation (... in the medium term ...)
  - **Share software and applications**

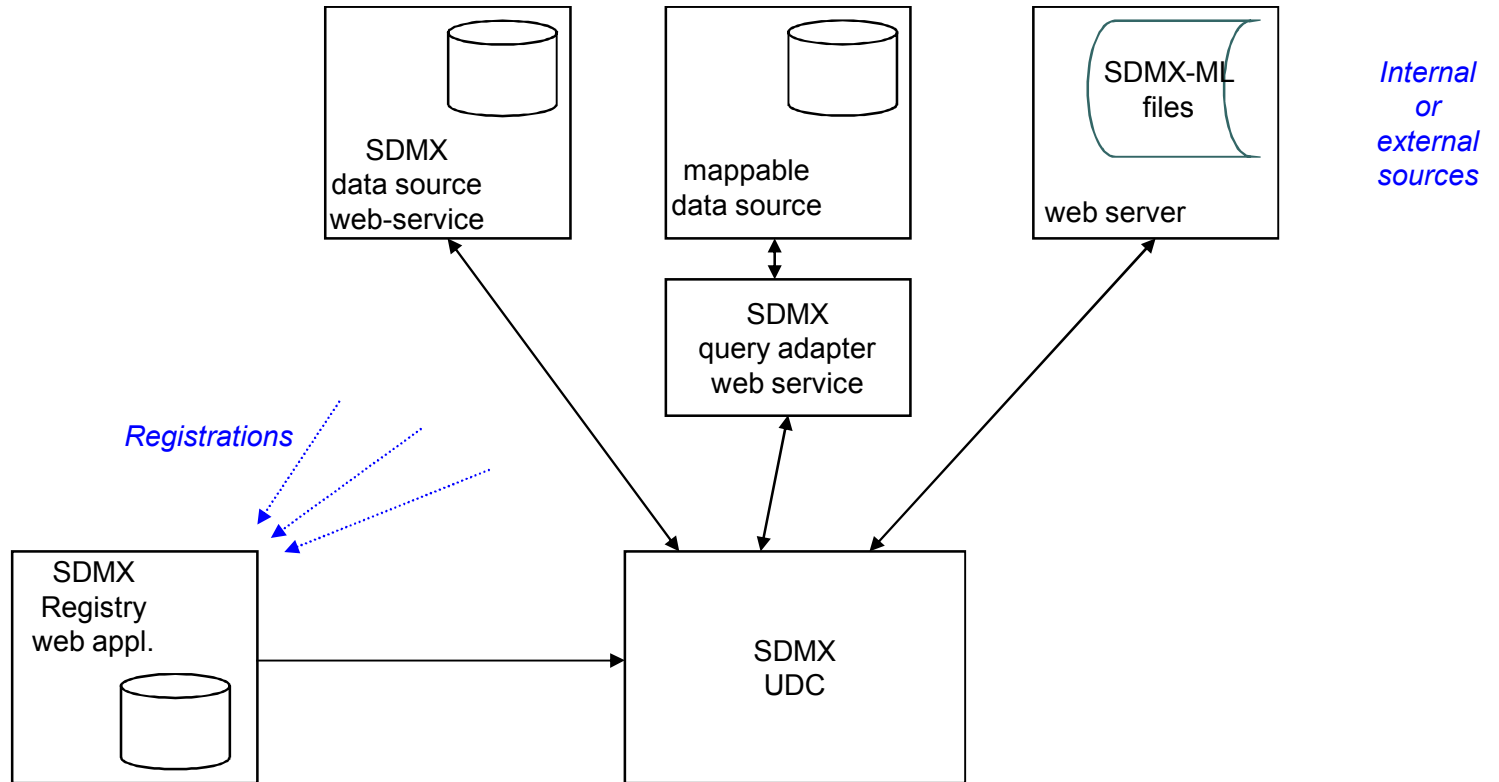
## Unified Data Catalogue (UDC) study: Objectives

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- Provide centralised access to a variety of **internal and external** data-sources
- Generic search facilities against “registered” data sources
- Directly retrieve data and metadata from all data sources
- Use SDMX technical standards, SDMX registry, web services



# Plan: schematic architecture



# Components of the UDC prototype

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- **SDMX Registry (“off the shelf” SDMX Tool)**
  - Data structure definitions of all “connected” data sources
  - Registrations for all data flows for all connected data sources
  - URLs to SDMX-files and SDMX query services
  - Updated via SDMX-ML messages or interactively (“KeyMaster”)
- **UDC (developed for the study)**
  - GUI to navigate the registry information
  - Queries the data sources
  - Retrieves data and presents them to the user
- **SDMX query web services (developed for the study)**
  - For the different types of data sources
- **Data query services (partly existing, partly developed)**
  - For each of the connected queryable data sources

## UDC Prototype: some results

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- UDC can provide (unsecured) access to
  - Time series on LINUX/UNIX (FAME/MS SQL)
  - Multi-dimensional cubes on MS Windows platform
  - MS SQL database on Windows platform
  - SDMX-ML generic files produced by BIS
  - SDMX-ML generic files translated with SDMX Tools from ECB provided SDMX-ML compact files
- SDMX vision is real ... with some practical issues

## And now what?

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- SDMX turns 10 in spring 2011
- SDMX Global Conference in Washington in May 2011
- Practical applications of SDMX (unsorted)
  - [ECB Inflation Dashboard](#) (visualises SDMX files)
  - [SDMX Health Domain](#) (WHO)
  - [BIS UDC paper given at MSIS](#) (2010)
  - [OECD National Accounts Project \(NAWWE\)](#)
  - Data exchanges between national statistical agencies and international organisations
  - “SDMX conformant” database designs
  - And ... and ... and
- [www.sdmx.org](http://www.sdmx.org)

# Danke!

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- Fragen??

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**Let's have a look at some screenshots**

**...**

# Search By Category

http://vmlbnds03:8580/UnifiedDataCatalogue/pages/FeasibilityStudy.html - Windows Internet Explorer

http://vmlbnds03:8580/UnifiedDataCatalogue/pages/FeasibilityStudy.html#

## Unified Data Catalog

Search By Category   Search By Concept/Codelist   **View Selected DSD**   Make Selections   View Query Results   View Basket   View Audit Events   Sync

**Category Schemes**

- BIS Statistical Subject-Matter Domains

**Data flows**

- International Bank Lending
- International Bank Lending by Location
- International Bank Lending by Nationality

**Categories**

- Bank Lending
  - International Bank Lending**
  - Other Category
- Financial Instruments
  - Bonds
  - Syndicated Credits
- Macroeconomic statistics
- Exchange Rates
  - Reference Exchange rates
  - Market Exchange rates

**Registrations**

| Registration URL  | File  |
|---|-------|
| http://vmlbnds03:8180/datasets/CIBL_REP_DE_publ_data_last12.xml | true  |
| http://vmlbnds03:8180/datasets/CIBL_VIS_BR_publ_data_last12.xml | true  |
| http://vmlbnds03:8180/datasets/CIBL_REP_FR_publ_data_last12.xml | true  |
| http://vmlbnds03:8180/datasets/CIBL_VIS_BR_publ_data_last12.xml | true  |
| http://vmlbnds03:8580/mstat/query                               | false |

**LOAD KEY FAMILY**

# View Selected DSD: dimensions

The screenshot shows the 'Unified Data Catalog' interface in a Windows Internet Explorer browser. The page title is 'View Selected DSD'. A yellow arrow points to the 'Dimensions' tab, which is circled in red. Below the tabs, there are three main sections: 'Primary Measure', 'Dimensions', and 'Attributes'. The 'Dimensions' section contains a table with the following data:

| Concept Name   | Codelist Name  | Dimension Type |
|--|--|----------------|
| Frequency  | Frequency code list (BIS, ECB)                           | NORMAL         |
| International Financial Statistics block                 | International Financial Statistics block                 | NORMAL         |
| Basis, measure   | Basis, measure   | NORMAL         |
| Type of reporting banks                                  | Type of reporting banks                                  | NORMAL         |
| Data type (vis-?-vis sector / maturity / risk transfers) | Data type (vis-?-vis sector / maturity / risk transfers) | NORMAL         |
| Reporting country  | Reference Area Code for BIS-IFS                          | NORMAL         |
| Vis-?-vis country  | Reference Area Code for BIS-IFS                          | NORMAL         |

Below the 'Dimensions' table, there are two sections: 'Concept' and 'Codes'. The 'Concept' section contains a table with the following data:

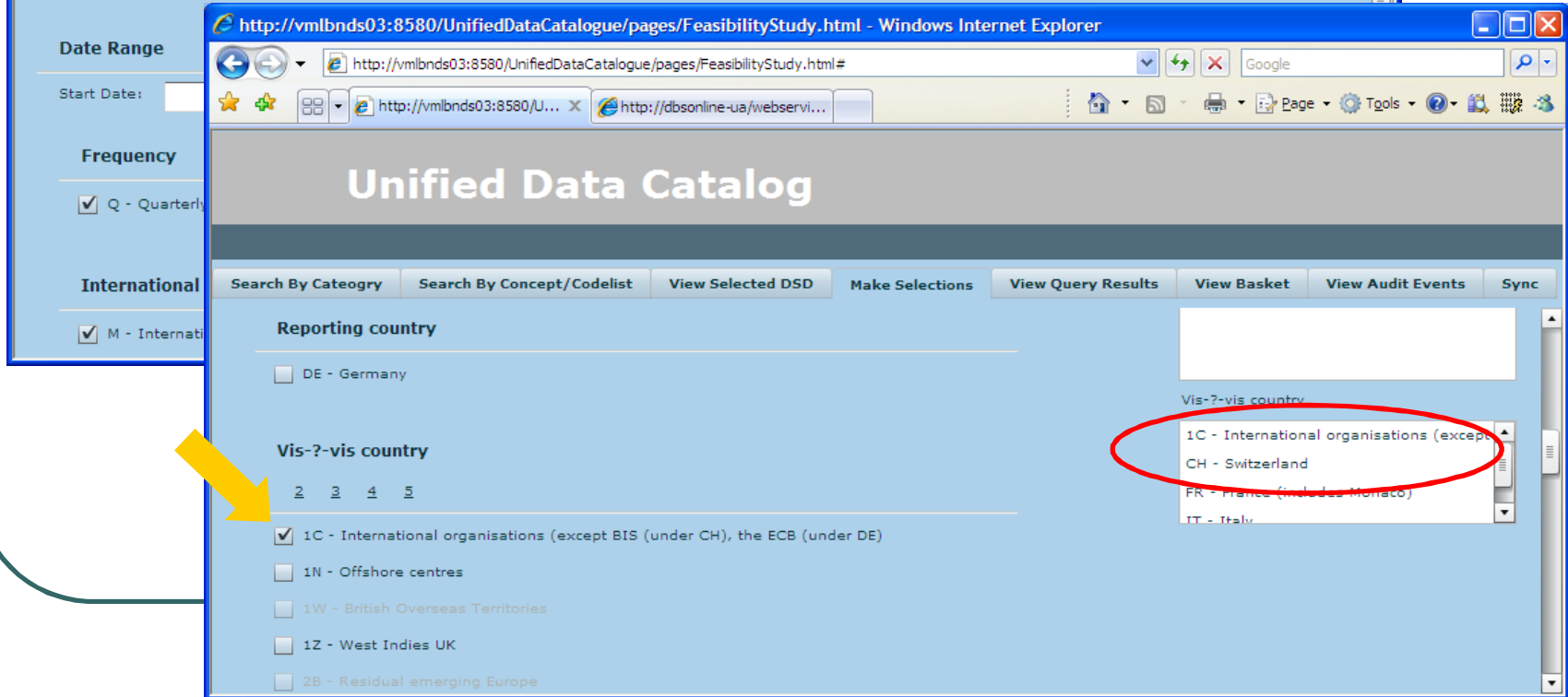
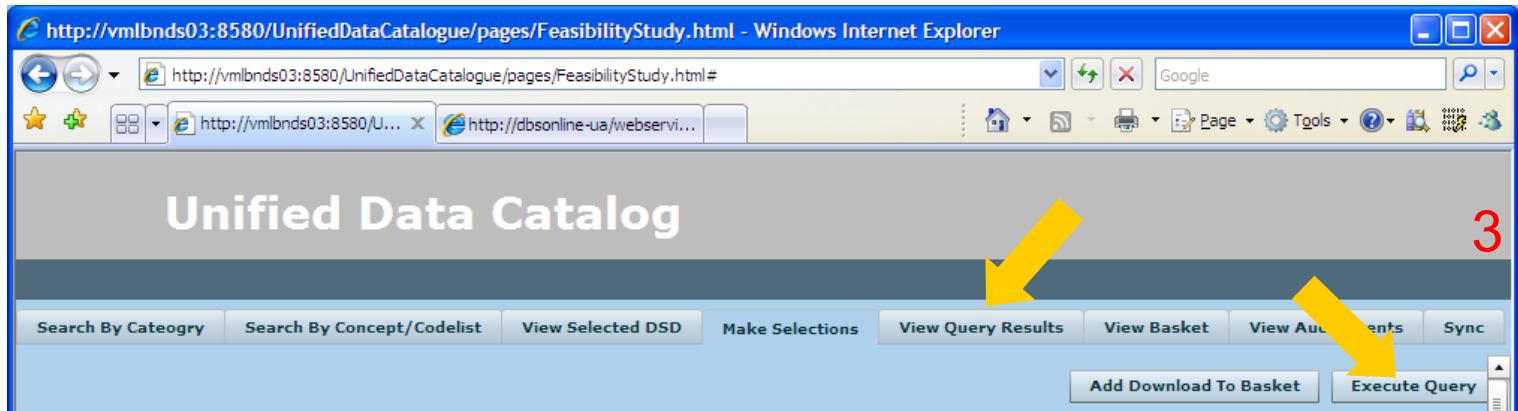
| Id   | Name      |
|------|-----------|
| FREQ | Frequency |

The 'Codes' section contains a table with the following data:

| Code Value | Code Description         |
|------------|--------------------------|
| A          | Annual                   |
| B          | Business (not supported) |
| D          | Daily                    |
| E          | Event (not supported)    |
| H          | Semiannual               |



# Make Selections



# View Query Results

http://vmlbnds03:8580/UnifiedDataCatalogue/pages/FeasibilityStudy.html - Windows Internet Explorer

http://vmlbnds03:8580/UnifiedDataCatalogue/pages/FeasibilityStudy.html#

## Unified Data Catalog

Search By Category   Search By Concept/Codelist   View Selected DSD   Make Selections   View Query Results   View Basket   View Audit Events   Sync

Viewing Results For Key Family IFS, International bank lending, consolidated

| DATE/TIME  | U:M:B:S:1C:Q:DE | U:M:B:S:CH:Q:DE | U:M:B:S:FR:Q:DE | U:M:B:S:IT:Q:DE |
|------------|-----------------|-----------------|-----------------|-----------------|
| 2005-03-31 | 3518            | 53693           | 200353          | 180270          |
| 2005-06-30 | 3121            | 50735           | 190924          | 186741          |
| 2005-09-30 | 3101            | 51281           | 173779          | 183973          |
| 2005-12-31 | 2881            | 45876           | 149594          | 172220          |
| 2006-03-31 | 2399            | 43826           | 172867          | 194354          |
| 2006-06-30 | 2529            | 48395           | 185774          | 192335          |
| 2006-09-30 | 2997            | 56854           | 194746          | 188146          |
| 2006-12-31 | 2973            | 61134           | 201625          | 201532          |
| 2007-03-31 | 3252            | 60325           | 227371          | 215519          |
| 2007-06-30 | 3185            | 67941           | 238613          | 228090          |
| 2007-09-30 | 4114            | 67336           | 232249          | 222254          |

# Search by Concept/Codelist

## - 1

http://vmlbnds03:8580/UnifiedDataCatalogue/pages/FeasibilityStudy.html - Windows Internet Explorer

http://vmlbnds03:8580/UnifiedDataCatalogue/pages/FeasibilityStudy.html

### Unified Data Catalog

Search By Category Search By **Concept/Codelist** View Selected DSD Make Selections View Query Results View Basket View Audit Events Sync

Serch By Code Name  Serch By Code Value

hous

- MARKIT - Business Entity - CENTERPOINT ENERGY **HOUSTON** Elec LLC
- MARKIT - Business Entity - Daiwa **House** Ind Co Ltd
- MARKIT - Business Entity - Sekisui **House** Ltd
- BIS - BIS Topic code list - Claims of monetary system on **households** and NPISHs, NSA
- BIS - BIS Topic code list - Claims of monetary system on **households** and NPISHs, cre

**Dataflows**

**Registrations**

| Registration URL | File |
|------------------|------|
|                  |      |
|                  |      |
|                  |      |

LOAD KEY FAMILY

# Search by Concept/Codelist

## - 2

The screenshot shows the Unified Data Catalog interface in a Windows Internet Explorer browser. The browser address bar displays the URL: <http://vmlbnds03:8580/UnifiedDataCatalogue/pages/FeasibilityStudy.html>. The page title is "Unified Data Catalog".

The interface features a navigation bar with the following tabs: Search By Category, Search By Concept/Codelist, View Selected DSD, Make Selections, View Query Results, View Basket, View Audit Events, and Sync. The "Search By Concept/Codelist" tab is active.

The search results are displayed under the "Search By Code Name" section. The search criteria is "BIS - BIS Topic code list - Claims of monetary system on households and NPISHs, NSI". A yellow arrow points to the "Get Key Families" button below the search input.

The "Dataflows" section is highlighted with a red circle and contains the following data:

| Dataflow                 |
|--------------------------|
| Macroeconomic Statistics |

The "Registrations" section is also highlighted with a red circle and contains the following table:

| Registration URL  | File  |
|---|-------|
| <a href="http://vmlbnds03:8180/datasets/BIS_MACRO_data_XM_last12.xml">http://vmlbnds03:8180/datasets/BIS_MACRO_data_XM_last12.xml</a> | true  |
| <a href="http://vmlbnds03:8580/database/query">http://vmlbnds03:8580/database/query</a>   | false |
| <a href="http://vmlbnds03:8180/datasets/BIS_MACRO_data_DE_last12.xml">http://vmlbnds03:8180/datasets/BIS_MACRO_data_DE_last12.xml</a> | true  |
| <a href="http://vmlbnds03:8180/datasets/BIS_MACRO_data_XM_all.xml">http://vmlbnds03:8180/datasets/BIS_MACRO_data_XM_all.xml</a>       | true  |

A yellow arrow points to the "LOAD KEY FAMILY" button at the bottom of the interface.