

FISIM tests on maturity and default risk

Eurostat has developed a series of spreadsheets to test the options proposed by the Eurostat Task Force on FISIM. Some of these options are the same as those that the ISWGNA FISIM task force (TF) agreed to explore as a means of establishing (at least in a practical sense) the merits of the various options. See *MaturityYourData.xls*; *FISIM_Maturity.xls*.

The spreadsheets cover, to varying degrees, most of the options the TF agreed to explore at its last meeting. These include 4 simulations (described below). Of these the first three are also covered in the Eurostat Test spreadsheets.

- i) Single reference rate using inter-bank lending rates
- ii) Matching reference rates using different rates for short-term and long-term deposits and loans
- iii) Average reference rate (weighted by the stocks of short-term and long-term loans and deposits) calculated using different rates for the short-term and long-term reference rates.
- iv) Reference rate calculated using the midpoint of interest rates on deposits and interest rates on loans

The 'varying degrees' reflects two points.

The first concerns the distinction between short and long term deposit and loans. The spreadsheet developed by Eurostat is somewhat more prescriptive than the recommendations developed by the TF. It typically defines short-term instruments as 3-months and long-term as 5 years. Note that the Eurostat guidance note nor the spreadsheets in this regard have been modified, so if you feel that a different maturity is needed for either the short or long term simulation then please complete the questionnaire on this basis but, naturally, in your returns please let me know what maturity and instruments you've used to define the rates.

The second concerns the matched reference rates approach. The spreadsheets match instruments on the basis of short and long term maturities only. It would be useful for you to complete the spreadsheets in this way but if you feel that supplementary analysis that provides more detailed matching of maturities would be useful then naturally you should provide these, but note that the spreadsheets aren't set up for this type of detailed analysis.

In addition the spreadsheets do not provide FISIM estimates based on reference rates that are mid-way between rates on deposits and loans. You could achieve this however by overwriting the calculated weighted rates (calculated in columns Q and T of the worksheet entitled 'ref rates' in the *MaturityYourData* spreadsheet. But you will need to ensure that you do this after running and saving the results for the weighted average approach.

Note that the references to regulation 448/98 should be interpreted as meaning the reference rates that you currently use in your FISIM calculations for both internal (domestic) FISIM and external (international) FISIM.

The explanatory notes in *ReadMefirst.doc* also included additional spreadsheets, circulated by Eurostat, to measure default risk: See *RiskYourdata.xls*, and *FISIM_Risk.xls*. Note that the

TF did not recommend conducting these tests as part of the work going forward but please feel free to do so if you wish.

Finally there is a supplementary survey: AboutYourFisimData.doc. Again this is completely optional but certainly TF would be happy if you did choose to complete it.

Please returned the questionnaires sent to sna@un.org by 30 April 2012 or sooner if at all possible.

Instructions to fill in the questionnaires

Please read this instruction carefully before filling in the questionnaires.

1. Overview of the questionnaires

The questionnaires consist of two parts.

The first part is dedicated to FISIM test on maturity and it includes two excel files, namely:

- "MaturityYourData.xls" – where you provide your source data necessary to calculate FISIM by maturity. This includes reference rates (in per cent), accrued quarterly interest and average stocks (in million of currency unit) on deposits and loans, by short- and long-term maturities;
- "FISIM_Maturity.xls"- where FISIM by maturity test are performed for you by simply clicking on the macro box. This file provides you with the analysis (including charts) on this FISIM test.

The second part is dedicated to FISIM test on risk and it includes two excel files, namely:

- "RiskYourData.xls" - where you provide your source data necessary to calculate FISIM default risk. This includes writes-offs and provisions (in million of currency unit) for bad and doubtful loans;
- "FISIM_risk.xls" - where FISIM by maturity test are performed for you by simply clicking on the macro box. This file provides you with the analysis (including charts) on this FISIM test.

Compatibility between difference versions of MS Excel

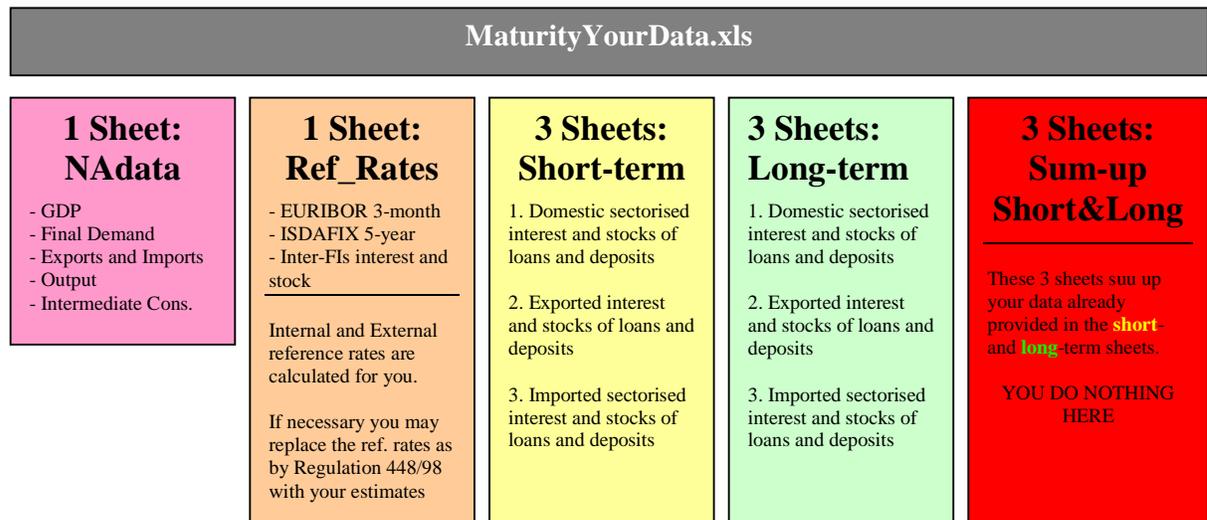
The spreadsheets were created in MS Excel 2003 and tested in MS Excel 2010. Thus there should no compatibility problems in running the macros in different MS Excel versions from 97-2003 (extension xls) to 2007-2010 (extension xlsx). Please make sure that the security level is set to medium or low in order to enable macros.

2. The Structure of the Excel Files

As explained in section 1 above, there are two files, where you provide your source data necessary for these two tests.

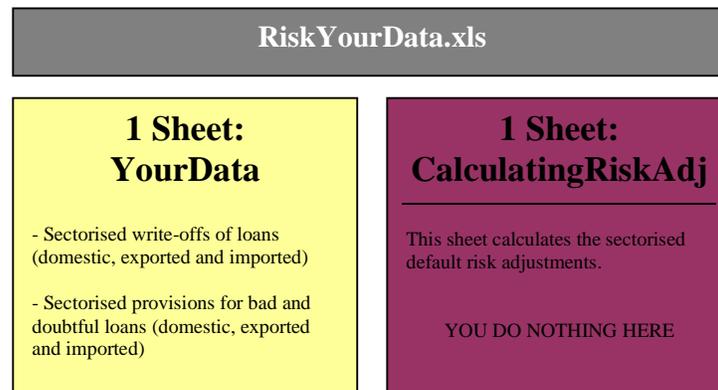
The file, where you provide your source data for test on FISIM by maturity is the file: "MaturityYourData.xls". The structure of this file is illustrated in the diagram 1 below. Please note that the diagram 1 uses the same colour scheme as in the xls file.

Diagram 1: The Structure of the file "MaturityYourData.xls"



The file, where you provided your source data for test on FISIM on default risk is the file: "RiskYourData.xls ". The structure of this file is illustrated in the diagram 2 below. Please note that the diagram 2 uses the same colour scheme as in the xls file.

Diagram 2: The Structure of the file " RiskYourData.xls"

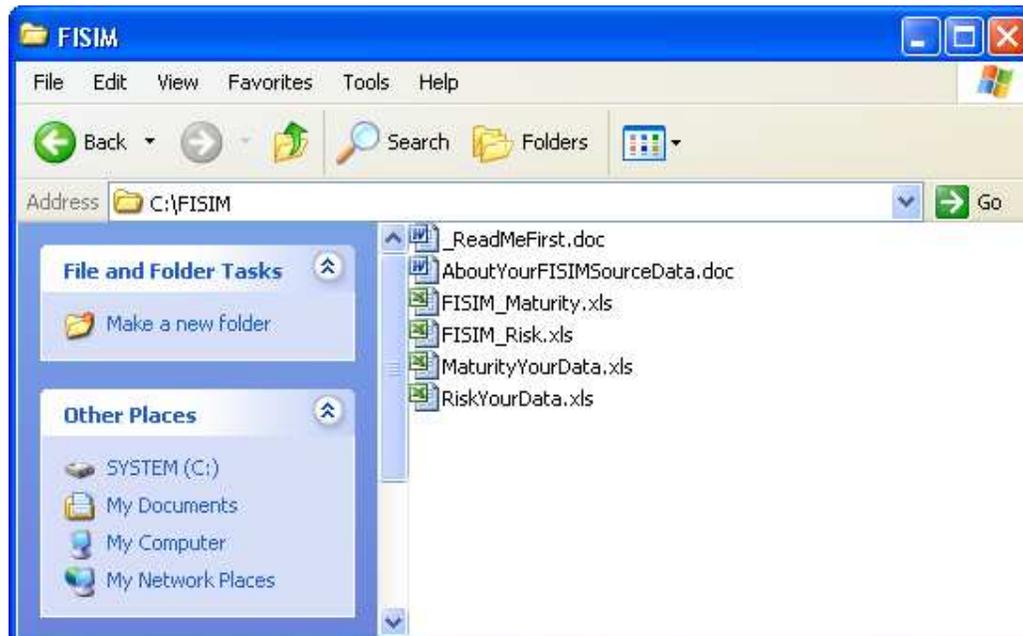


3. Step-by-Step to complete the questionnaires for tests

The files, where you provide you source data for the FISIM tests (see section 2 above) must be completed in specific order, starting from maturity test (see section 3.1) and then default risk test (Section 3.2).

The order of the test is important, because the test on default risk uses source data given in the maturity test (file "MaturityYourData.xls").

Before you start the tests, create a folder named: "FISIM" on your disk "C", and then copy the files provided by Eurostat. Once it is done, you should get the following structure on your PC.



General rule:

The time span in the tests is between 1995 Q1 and 2011 Q4. In case your source data is available for a shorter time-span, please leave the cells blank for the missing data (unless instructed otherwise).

Cells that you need to fill in are highlighted in yellow and green. Cells in other colours contain formulae and are protected against changes.

In case you calculated FISIM by groups of currencies. Please repeat the tests (all steps below) for each group of currency separately and save separately the corresponding files. For example: do the steps for Euro following the steps below, and save the four excel files in one location on your drive, and only when the tests are completed change the filenames (e.g. "MaturityYourDataEuro.xls"). Then open fresh copies of the test files for the calculation in foreign currencies and again follow the same steps below. As a result, you will get two set of files, one for the tests in euro and another one for the tests in foreign currencies.

The interest and stock data should be in million of currency unit (for 10 million, type 10 in the cell), and the rates in per cent (for 2.35 %, type 2.35 in the cell for EN language version of Excel, or 2,35 for language versions like EL, PL, DE, etc).

3.1. FISIM test on maturity

The FISIM test by maturity is performed in two stages. First, you provide your source data in the file "MaturityYourData.xls". Then, you run the macro in the file "FISIM_Maturities.xls", where the source data are uploaded, the calculations of FISIM by maturities are performed, and the analysis for your information are generated.

These are the steps you need to follow for this test:

1. Open the file "MaturityYourData.xls".
2. Go to sheet "NAdata" and provide your national accounts non-seasonally adjusted quarterly data at current prices in columns "B" to "I" for: GDP, household final consumption expenditure, NPISH final consumption expenditure, general government final consumption expenditure, exports of goods and services, imports of goods and services, output and intermediate consumption.
3. Go to sheet "Ref_Rates" and provide your data:
 - a) In columns "B-C": Euribor 3-month and ISDAFIX 5-year, or equivalent most appropriate rates for your country. Euro was introduced in 1999, thus an equivalent published interbank rate should also be provided for your country;
 - b) In columns "E-F": Appropriate interbank rates (IBOR 3-month type) and ISDAFIX 5-year in foreign currency (or average of different currencies), or equivalent most appropriate rates, which would represent financial operations, in which FISIM is transacted between your country and the rest of the world;
 - c) In columns "R" and "U": The internal and external reference rates according to the Regulation 448/98;
 - d) In column "W": Government security rate (known in the portfolio theory as risk-free rate). If this rate is not available, it can be calculated as implied rates on government security, e.g. interest payable on government security by the government divided by the corresponding average stock;
 - e) In columns "Q" and "T": DO NOTHING. In these columns the weighted (internal and external) reference rates are calculated using market rates from columns "B-C" weighted by short- and long-term stocks.
4. Go to sheet "Domestic_SHORT" and provide your data:
 - a) In columns "D-AP": short-term accrued quarterly interest and average stocks of loans and deposits between resident financial intermediaries (S.122 & S.123) and other resident user sectors, namely:
 - i. S.11 – non-financial corporations;
 - ii. S.124+S.125 – financial auxiliaries, and insurance corporations and pension funds. In some cases, units belonging to S.123 may be consumers of FISIM, thus S.123 as consumer should be included in this column;
 - iii. S.13 – general government;
 - iv. S.14 consumers – households as (final) consumers;

- v. S.14 Dwelling Loans – households in their capacity as owners of dwellings;
 - vi. S.14 Unin. Business - households in their capacity as owners of unincorporated enterprises (businesses);
 - vii. S.15 – non-profit institutions serving households (NPISH).
- b) Columns "AF" and AN": are on purpose filled in with zeros. DO NOTHING.
5. Go to sheet "Exports_SHORT" and provide your data:
 - a) In columns "D-L": short-term accrued quarterly interest and average stocks of loans and deposits between resident financial intermediaries (S.122 & S.123) and non-resident non-financial intermediaries.
 6. Go to sheet "Imports_SHORT" and provide your data:
 - a) In columns "D-AP": short-term accrued quarterly interest and average stocks of loans and deposits between non-resident financial intermediaries and resident user sectors.
 - b) Columns "AF" and AN": are on purpose filled in with zeros. DO NOTHING.
 7. Go to sheet "Domestic_LONG" and provide your long-term data as requested in step 4.
 8. Go to sheet "Exports_LONG" and provide long-term data as requested in step 5.
 9. Go to sheet "Imports_LONG" and provide long-term data as requested in step 6.
 10. Go to sheet "FISIM Domestic" and provide your non-seasonally adjusted quarterly FISIM estimates at current prices generated by resident financial intermediaries (S.122 + S.123) as compiled in your national accounts according to the Regulation 448/98 currently in force (NOTE: FISIM imports allocated to resident user sectors must not be included here):
 - a) In columns "B-H": FISIM on loans generated by resident financial intermediaries allocated to resident user sectors;
 - b) In columns "J-P": FISIM on deposits generated by resident financial intermediaries allocated to resident user sectors (NOTE: the column "N" is on purpose left blank. DO NOTHING.
 11. Go to sheet "FISIM Exports" and provide your non-seasonally adjusted quarterly FISIM estimates at current prices generated by resident financial intermediaries (S.122 + S.123) as compiled in your national accounts according to the Regulation 448/98 currently in force:
 - a) In column "B": FISIM on loans generated by resident financial intermediaries allocated to non-resident non-financial intermediaries;
 - b) In columns "D": FISIM on deposits generated by resident financial intermediaries allocated to non-resident non-financial intermediaries..
 12. Go to sheet "FISIM Imports" and provide your non-seasonally adjusted quarterly FISIM estimates at current prices generated by non- resident financial intermediaries (S.222 + S.223) as compiled in your national accounts according to the Regulation 448/98 currently in force:
 - a) In columns "B-H": FISIM on loans generated by non-resident financial intermediaries allocated to resident user sectors;

- b) In columns "J-P": FISIM on deposits generated by non-resident financial intermediaries allocated to resident user sectors (NOTE: the column "N" is on purpose left blank. DO NOTHING).

13. Save the file and close it.

NOTE: The above file "MaturityYourData.xls" contains also three more sheets not listed in the steps above, titled: "Domestic", "Exports", and "Imports". These sheets sum up the corresponding short- and long-term data explained in the steps above.

14. Open the file "FISIM_Maturity.xls", and when asked "enable macros"

15. Go to sheet "ReadMe" and click on the box to run the macro

16. Save the file

17. Analyse the results given in the sheets: "ImpactAnalysis", "AnalysisLOANS", and "AnalysisDEPOSITS".

NOTE: The analysis sheets provide the following information, which Eurostat will be looking at in more detail, as necessary:

- a) The sheet "ImpactAnalysis" – explains the impact on GDP and other national accounts data by revising the currently used FISIM method based on internal and external reference rates as in Regulation 448/98 with:
 - i. the FISIM method reliant on weighted reference rates;
 - ii. the FISIM method reliant on two reference rates for short- and long-term.
- b) The sheet "AnalysisLOANS" – compares the results of FISIM on loans calculated according to the three methods reliant on:
 - i. reference rates according to the Regulation 448/98;
 - ii. weighted reference rates;
 - iii. two reference rates for short- and long-term.
- c) The sheet "AnalysisDEPOSIT" – compares the results of FISIM on deposits calculated according to the three methods mentioned above.

18. Close the file.

The test on FISIM by maturities is now completed.

3.2. FISIM test on default risk

This test can only be performed after completing the test on FISIM by maturities.

The FISIM test on defaults risk is performed in two stages. First, you need to provide your source data in the file "RiskYourData.xls". Then, you run the macro in the file "FISIM_Risk.xls", where the source data are uploaded (from "MaturityYourData.xls" and

"RiskYourData.xls" files), the calculations of FISIM adjusted for default risk are performed, and the analysis for your information are generated.

These are the steps you need to follow for this test:

1. Open the file "RiskYourData.xls".
2. Go to sheet "YourData" and provide your data:
 - a) In columns "C-I" - write-offs of loans by resident sector;
 - b) In columns "K-Q" – provisions for bad and doubtful loans by resident sector;
 - c) In columns "S" and "U" - write-offs and provisions to non-resident non-financial corporations;
 - d) In columns "W-AK" – if possible, write-offs and provisions from non-resident financial corporations.

IMPORTANT: Do not leave any cells blank. In case, of missing data, fill these cells with zeros.

The data on provisions play a secondary role in calculation of the risk adjustments (see appending A for details). Therefore:

- if the data on provisions are not available by sector (only one series for total provisions representing all sectors is available), then copy this (same) series into each sector;
- if the data on provisions are not available at all, then copy the sectorised write-offs data into the corresponding sectorised provisions.

3. Save the file and close it.

NOTE: The above file "RiskYourData.xls" contains also a sheet titled: "CalculatingRiskAdj", where the sectorised default risk adjustments are calculated using exponentially weighted moving average method.

4. Open the file "FISIM_Risk.xls", and when asked "enable macros".
5. Go to sheet "ReadMe" and click on the box to run the macro.
6. Save the file.
7. Analyse the results given in the sheets: "ImpactAnalysis" and "AnalysisLOANS".

NOTE: The analysis sheets provide the following information, which Eurostat will be looking at in more detail, as necessary:

- a) The sheet "ImpactAnalysis" – explains the impact on GDP and other national accounts data by revising the currently used FISIM method as in Regulation 448/98 with the FISIM method adjusted for (excluding) default risk;
- b) The sheet "AnalysisLOANS" – compares the results of FISIM on loans calculated according to the method as in Regulation 448/98 and the method that excludes default risk.

8. Close the file.

The test on FISIM on default risk is now completed.

4. Returning the tests

After completing the tests as explained in section 3 above, the four excel files should be returned to: sna@un.org by 30 April 2012.

The countries that calculated FISIM by groups of currencies should provide one set of four excel files for each group of currency.

The excel files should be accompanied by a word files, which describe sources and methods used, as well problems and difficulties encountered and solutions used during the tests.

Appendix A. Calculating default risk adjustment

Banks when set up the rates on loans take into account possible (expected) futures losses due to defaults. Therefore, in adjusting FISIM for default risk, we must take this rational into consideration.

The algorithm to calculate the expected default risk adjustment uses the exponentially weighted moving average method. The aim of this algorithm is to convert the actual provisions and write-offs on loan of a given sector into an adjustment that would represent the expected default risk.¹

This algorithm can be explained by following two steps.

First, we calculate variable R for a given quarter q as share of 4-quarter average of write-offs to the corresponding 4-quarter average of provisions, exponentially weighted by the corresponding 4-quarter provisions. This can be best illustrated by the equation below:

$$R_q = \frac{\frac{1}{4} \sum_{i=0}^3 Write-off_{q-i}}{\frac{1}{4} \sum_{i=0}^3 Prov_{q-i}} * (0.4 Prov_q + 0.3 Prov_{q-1} + 0.2 Prov_{q-2} + 0.1 Prov_{q-3})$$

Then, we calculate the risk adjustment for a given quarter q by taking 2-quarter moving average of the variable R. This can be best illustrated by the equation below:

$$Risk_adj._q = \frac{1}{2} \sum_{i=0}^1 R_{q-i}$$

¹ See more on the above rational in the article: Hood K.K., *Computing Nominal Bank Services: Accounting For Default*, 31st General Conference of the International Association for Research and Wealth, Switzerland, 22-29 August 2010.