MODELLING WEEK 2012

DETERMINING THE INFLUENCE OF MACROECONOMIC FACTORS ON THE RUN-OFF OF BANKING DEPOSITS

January 2012

1. Introduction

In the times of plenty that preceded the current financial crisis, there was little or no regulation on the amount of liquid assets (i.e. cash and quick-to-sell instruments) that a bank should keep in case its clients suddenly claimed it.

This has led to several cases of dramatic situations where a large number of clients wished to withdraw their savings but the bank would not allow it due to lack of liquidity. Some of them, like the Northern Rock case in 2007 or the Argentinian "corralito" in 2001-02, became famous as examples of bad liquidity management.

Clients of Northern Rock queuing to withdraw their money. EFE, Sep. 14, 2007

Therefore, it has been proven that liquidity is not an inexhaustible source and thus banks must keep a buffer of liquid assets to be ready to return the cash to its clients in a short time in case they should claim it.

To regulate this, the Basel Committee on Banking Supervision issued some recommendations in a paper that has been informally named "Basel III"[1], and that has recently become mandatory in all European Union countries.

In this paper, among other prudential measures, banks are advised to monitor a liquidity coverage ratio (LCR), which essentially shows whether a bank will be able to satisfy its due payments over the next 30 days.

Its expression is:

$$LCR = \frac{Stock\ of\ high\ quality\ liquid\ assets}{Net\ cash\ outflows\ over\ a\ 30-day\ time\ period} \geq 100\ \%$$

The denominator includes several parameters, one of which is the **run-off rate**: the percentage of the amount of deposits that presumably will be withdrawn by customers in a severe stress scenario.

Basel III estimates the run-off rate to be 5% for stable deposits and 10% for less stable deposits. However, it does not provide any mathematical or economical background for these rates.

Our main goal in this problem is to challenge these rates through rigorous mathematical modelling, using real data from Spanish banks over a seven-year period.

[1] Read the document *Basel III: International framework for liquidity risk measurement standards and monitoring,* BCBS (2010), for a wider knowledge.

2. Problem to be solved

The objectives of the problem are:

- To describe the relationship between the run-off rate and the macroeconomic situation via appropriate mathematical models.

- To forecast and backcast the run-off rates using historical and projected macroeconomic factors.

- To provide alternative, sound and mathematically supported run-off rates to those of Basel III, considering a severe stress scenario.

3. Phases

3.1. Definition of the problem and clarification of doubts

In this first phase, Management Solutions will present the problem in greater detail, providing the ideas that have been developed so far, and will clarify any doubts raised concerning the understanding of the problem.

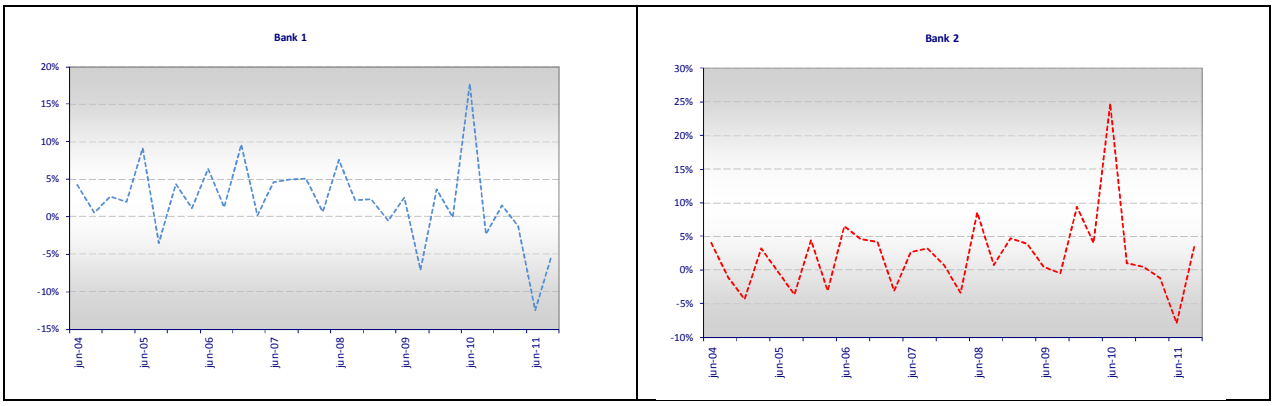
Management Solutions will also provide a polished and ready-to-use Excel file, so that as little time as possible will be spent on data processing:

- Real time series of the amount of deposits of several Spanish banks. The fundamental information which the sample will contain is:
  - Quarter
  - Total amount of current and term accounts

- Quarterly macroeconomic data such as:
  - Euribor
  - Unemployment rate
  - GDP
  - Exchange rate
  - …

3.2. Phase 1: Time series modelling

Firstly, the time series should be analysed in order to find possible trends, seasonality or other characteristics of the data such as peaks or autocorrelation. The characteristics should be questioned and a list of reasons of why they could occur is to be made.



Secondly, the macroeconomic data is to be analysed in order to find relationships between the run-off series and various macroeconomic variables.

Lastly, the time series should be modelled. Some of the models that could help to solve the problem are AR, ARIMA or panel data models.

The objectives of this phase are the following:

- Delve into the nature and significance of the time series of the run-off of deposits.
- Estimate the characteristics of the time series.
- Model the time series using the most suitable model.

3.3. Phase 2: Forecast and Backcast

Once the model has been estimated, the students should forecast, backcast and backtest the results of the model and analyze whether these projections make economic sense. The differences must be quantified and analysed, providing a conclusion on the different aspects which could be producing them.

If the conclusion of this phase is that the model is not suitable, students should use their experience to look for another model in Phase 1.

3.4. Phase 3: Provide an alternative considering a severe stress scenario

From the results obtained in the previous two phases, an alternative mathematically and economically robust run-off rate to that established in the Basel III legislation should be proposed.

To this purpose, students should build a sound stress scenario considering the macroeconomic factors of the model and determine the run-off rate.

3.5. Phase 4: Exposure and discussion of results

The study will conclude with the students' presentation of the methods used and results obtained.