Thirtieth Meeting of the

IMF Committee on Balance of Payments Statistics

Paris, France

October 24–26, 2017

BOPCOM—17/28

Remaining Maturity Compilation Issues: Estimating the Share of Long-Term Debt Security Liabilities with Short Residual Maturity

Prepared by the Banque de France

DGS – DBDP
Service des titres - 43-1561
Pierre Bui Quang

Estimating the share of long-term debt security liabilities with short residual maturity

Providing information on the residual maturity structure of debt liabilities is an important step to improve the analytical content of international investment positions statistics as residual maturity is useful to analyze refinancing risks and liquidity.

However, measuring residual maturities in liabilities requires detailed statistical reporting schemes, such as security-by-security holdings databases which are costly to establish and maintain

This document deals with the issue of estimating liabilities with residual maturity less than one year, when security-by-security holdings of domestic long-term debt securities are not available. Two approaches are developed:

- *In the first approach, we consider the estimation of short residual maturity liabilities using the residual maturity distribution of issuances. Indeed, investing in security-by-security information on domestic issuances may be a solution to avoid an increased burden on holdings reporters, as one could then rely on private providers (Bloomberg, Dealogic…) and public information made available by large issuers (State, large firms).*

- *In the second approach, we consider the possibility of estimating liabilities with short residual maturity using information on the initial maturity distribution of liabilities. Such information should be sufficiently detailed, but could be collected on an aggregate basis, with interval-valued distribution.*

Confronting these estimation procedures to actual data (derived from security-by-security databases) on French and Eurozone liabilities, both approaches appear relevant. However, they are expected to raise errors larger than 6 pp (in the estimated share of short residual maturity liabilities) in 5% cases. Considering the hypothesis underlying them, the first approach is expected to be more accurate when external investors are important owners of domestic securities. The second one is expected to be more accurate when liabilities are constant over time.

1. Estimating liabilities with short residual maturity using domestic issuances statistics

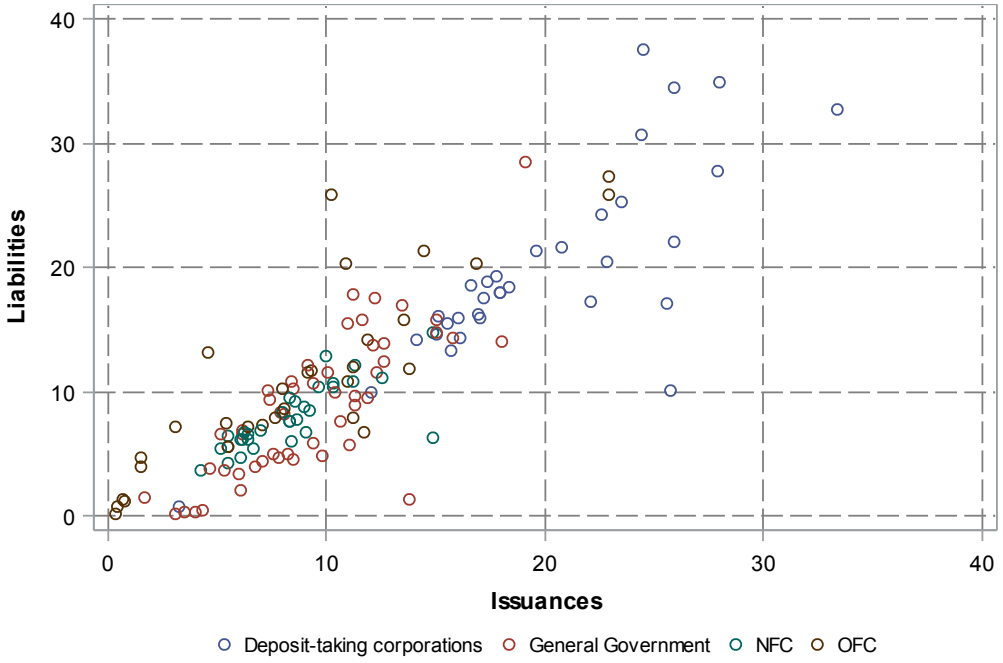
We assume that the statistician has access to detailed information on issuances, at the security-by-security level, including issue dates, maturity dates and amounts outstanding at end-of-year reference dates. Given this information, it is possible to compute the share of short residual maturity in long-term debt outstanding amount.

Our hypothesis is that this share provides an unbiased estimate of liabilities with short residual maturity. Implicitly, it relies on the assumption that the behaviors of non-resident and resident investors are similar, such that the structure of liabilities can be deduced from the structure of issuances.

We test this hypothesis using security-by-security data available for holdings and security issuances of Eurozone countries[1]. The share of short residual maturity is computed for liabilities and issuances, for each issuer sectors, at ends-of-year 2014, 2015 and 2016.

Figure 1: Short residual maturity debt in issuances and liabilities (as a % of total)

NB: Eurozone countries, in 2014, 2015 and 2016. Observations with inconsistencies between aggregate liabilities and aggregate issuances, or with aggregate issuances less than 5 Bn €, are excluded.



Sources: SHSDB and CSDB, calculations Banque de France

[1] For issuances, we use the *Centralized Security Database (CSDB)*, and we rely on the *Security Holdings Statistics Database (SHSDB)* for holdings. These are security-by-security databases managed by the ECB and to which central banks of the Eurosystem contribute. The CSDB provides the characteristics of debt securities including maturity date and amount outstandings on a monthly basis. The SHSDB provides holdings of securities broken down by holder sector and country (except for holdings of the Eurosystem itself, that we therefore assumed to be domestic). As the SHSDB mainly relies on reportings by custodians and financial investors located in the Eurozone, we deduce liabilities vis-à-vis non-residents from the difference between issuances and domestic holdings.

Overall, the share of short residual maturity debt in issuances seems to be an unbiased proxy for the share of short residual maturity debt in liabilities (Figure 1). Only for OFC issuers would it seem that external investors hold a significantly larger amount of short residual maturity debt than domestic investors.

Nonetheless, this proxy comes with an uncertainty which remains significant (Table 1). Based on what is observed for euro area countries, this estimation would induce an error larger than 6 pp of the actual value in 5% of cases (when all sectors are considered).

Table 1: Difference between the shares of short residual maturity in liabilities and issuances

	Number of observations	Mean	Standard deviation	95% confidence interval for the mean		Standard deviation under H0 (*)
				Lower bound	Upper bound	
Deposit-taking corporations	34	0,4	5,2	-1,4	2,2	5,2
General Government	50	-0,6	3,6	-1,6	0,4	3,6
NFC	31	-0,4	1,8	-1,1	0,2	1,9
OFC	31	2,2	3,9	0,9	3,6	4,4
All sectors	54	0,0	3,2	-0,8	0,9	3,1

(*) under the hypothesis that the share of short residual maturity debt in outstanding amount issued is an unbiased estimate of the share of short residual maturity in liabilities

Sources: SHSDB and CSDB, calculations Banque de France

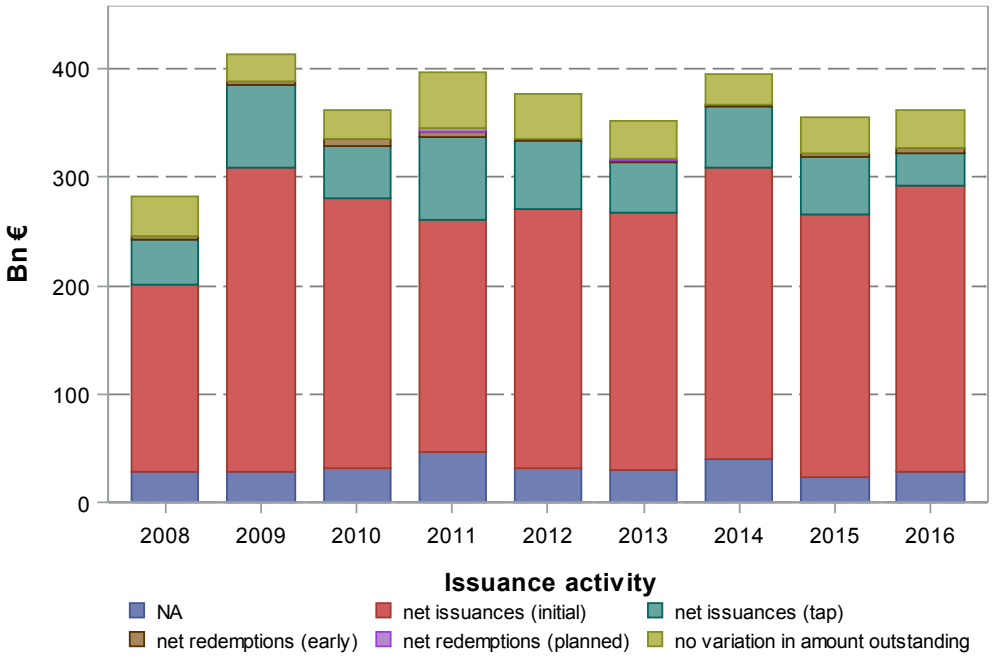
One possible strategy to improve the estimation is to consider the chronology of flows. Indeed, one may think that a good indication of long-term debt liabilities about to mature is the chronology of past large inflows and (retrospectively) future large outflows.

[Note that in this document, we use the term "inflows" (resp. "outflows") to refer to flows from non-resident investors in securities with positive (resp. negative) net investments from abroad over the reference year. Hence, inflows and outflows separate net incurrence of liabilities in portfolio investments according to the sign of net investments at the security level. They are not to be understood as a separation of flows on a transaction-by-transaction basis. Net flows are the difference between inflows and outflows.]

The underlying idea is that when investors are increasing their holdings, the average residual maturity of their portfolio should increase, as they tend to buy "new" securities. In the case of France, this idea would be supported by the observation that - when flows are considered at the security level - most securities that experience positive net purchases by non-residents over one year ("inflows") are securities with positive net issuance in that same year (Figure 2). And conversely, most securities that experience net sales (redemptions included) by non-residents ("outflows") are securities that are being redeemed (Figure 3).

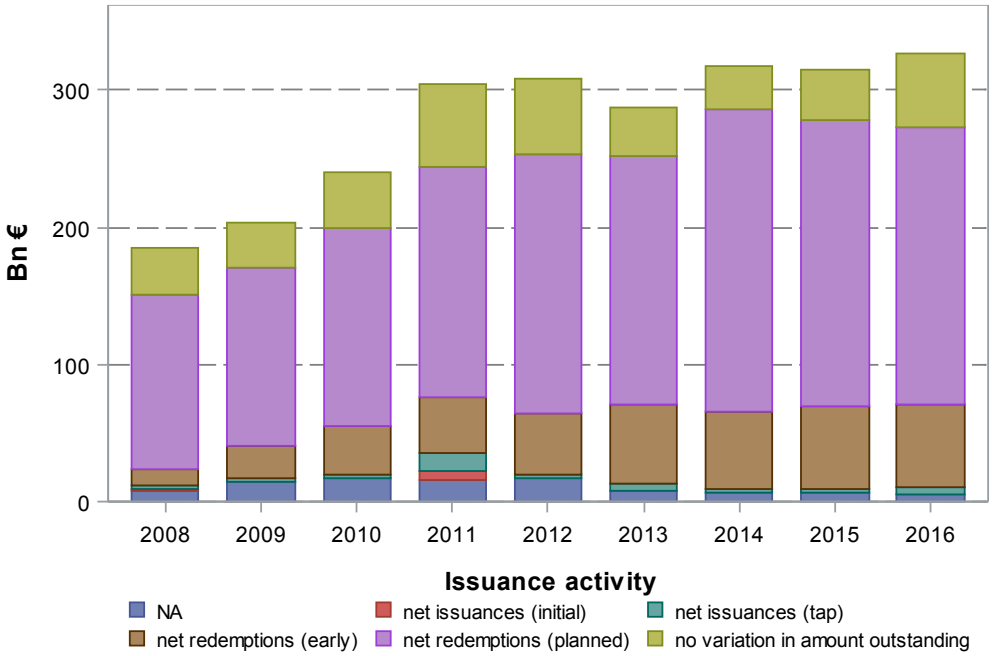
Thus, large outflows at some date may bring information about securities that were about to be redeemed the year before, and large inflows may bring information about future redemptions, assuming they would inherit the maturity structure of contemporaneous issuances.

Figure 2: Inflows in French LT-debt securities, broken down according to the net issuance activity associated to the security



Source: Banque de France

Figure 3: Outflows in French LT-debt securities, broken down according to the net issuance activity associated to the security



Source: Banque de France

However, with no information regarding security-by-security liabilities, the statistician cannot distinguish between outflows and inflows, and is left to consider only net flows. In this case, it

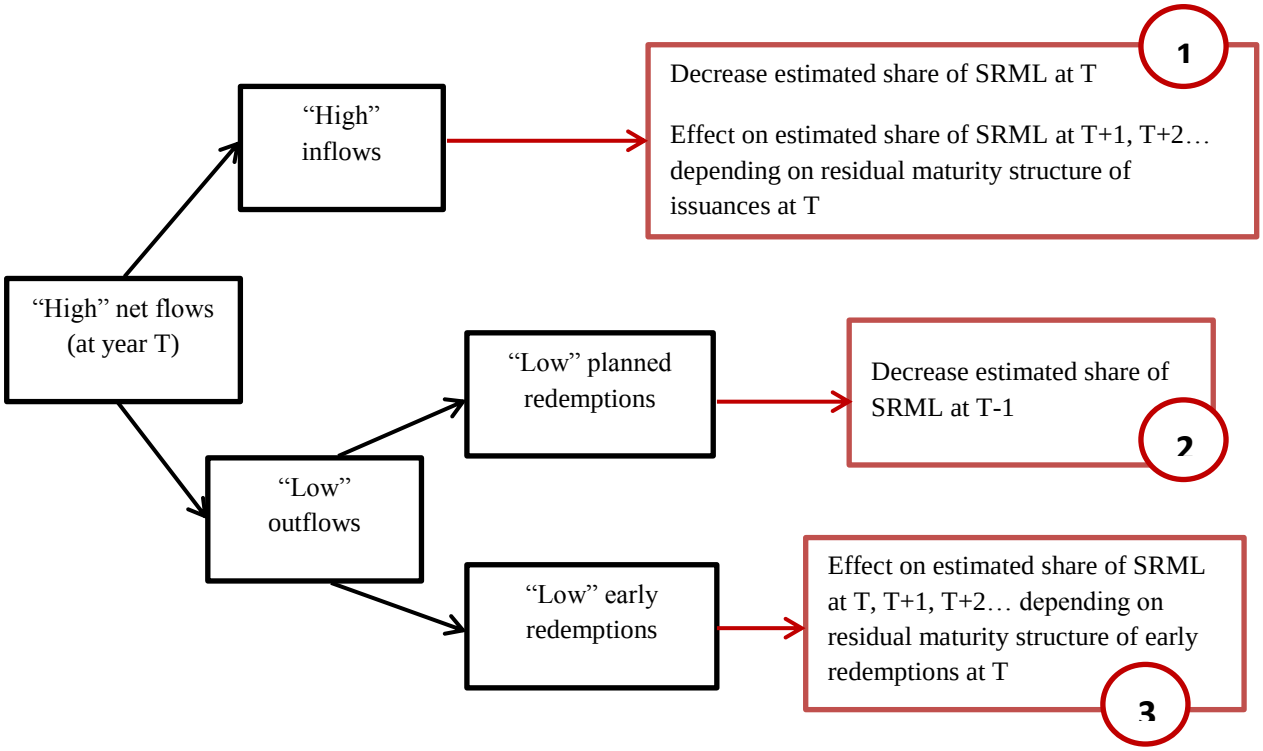
is not possible to identify whether "high" net flows in liabilities should be attributed to high inflows or low outflows (Figure 4).

Being left with no prior opinion about how to separate these two effects, we tested two updating estimation algorithms:

- one in which net flows at time ***t*** will update estimations of residual maturity distribution at ***t, t+1, etc.*** (effects 1+3 in figure 4, we refer to it as the "forward" updating algorithm)
- one in which net flows at time ***t*** update estimations at ***t-1, t, t+1, etc.*** (effects 1+2+3, "one-step-back-then-forward" updating algorithm).

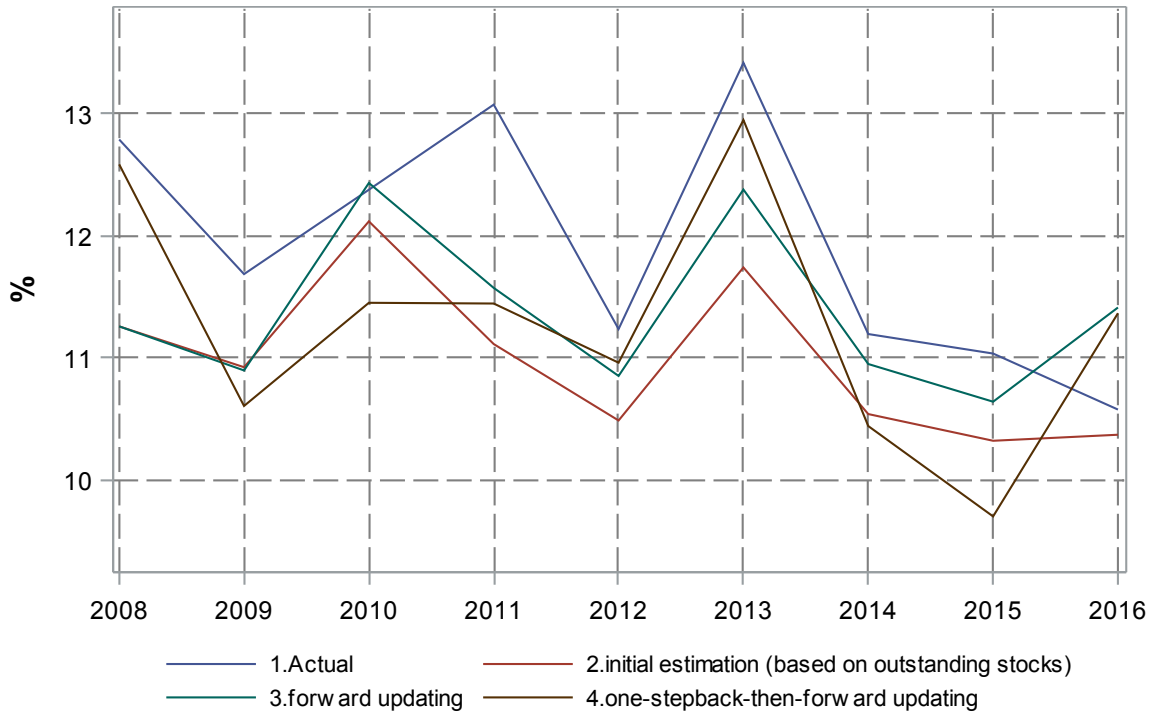
Figure 4: Effects of high net flows on estimated share of short residual maturity liabilities

SRML = Short residual maturity liabilities. Flows are to be understood as net incurrence of liabilities in portfolio investments.



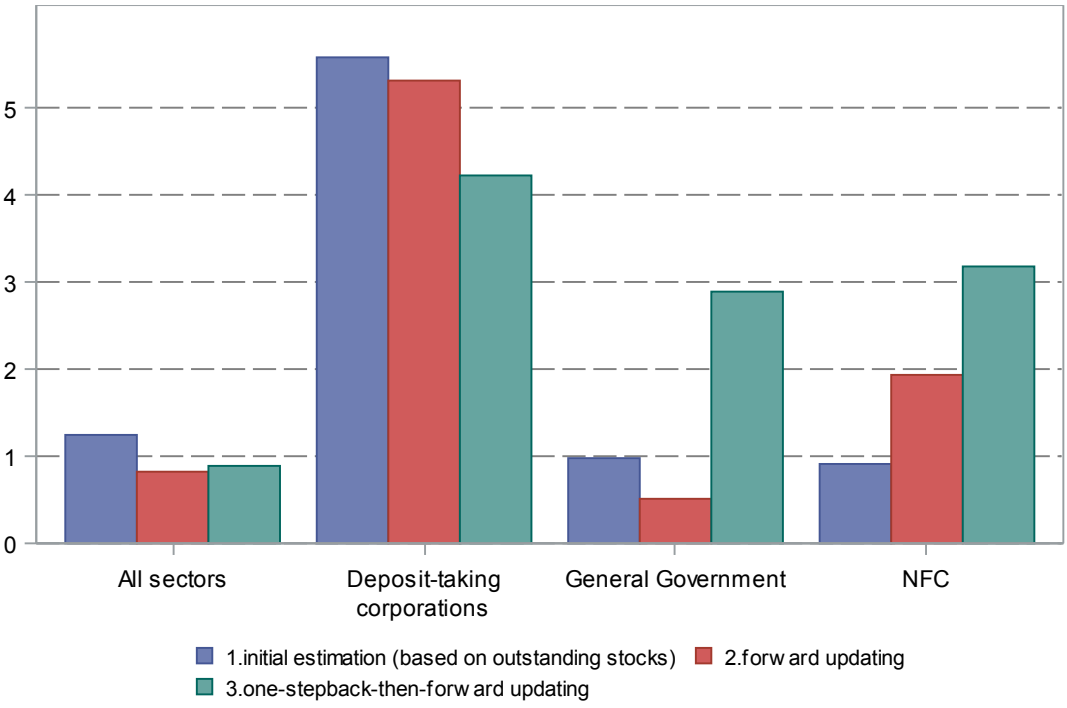
Testing these techniques on French data, it seems however that they do not improve the initial estimates of short residual maturity liabilities based on the outstanding amounts issued (Figures 5 and 6).

Figure 5: Actual and estimated proportions of short residual maturity liabilities for France (as a % of total liabilities in long-term debt securities)



Source: Banque de France

Figure 6: Mean squared error associated with the different estimation techniques, broken down by issuer sector (French data, OFC excluded for legibility)



Source: Banque de France

2. Estimating liabilities with short residual maturity using initial maturity information

We assume that the distribution of liabilities by initial maturity is known up to the intervals:

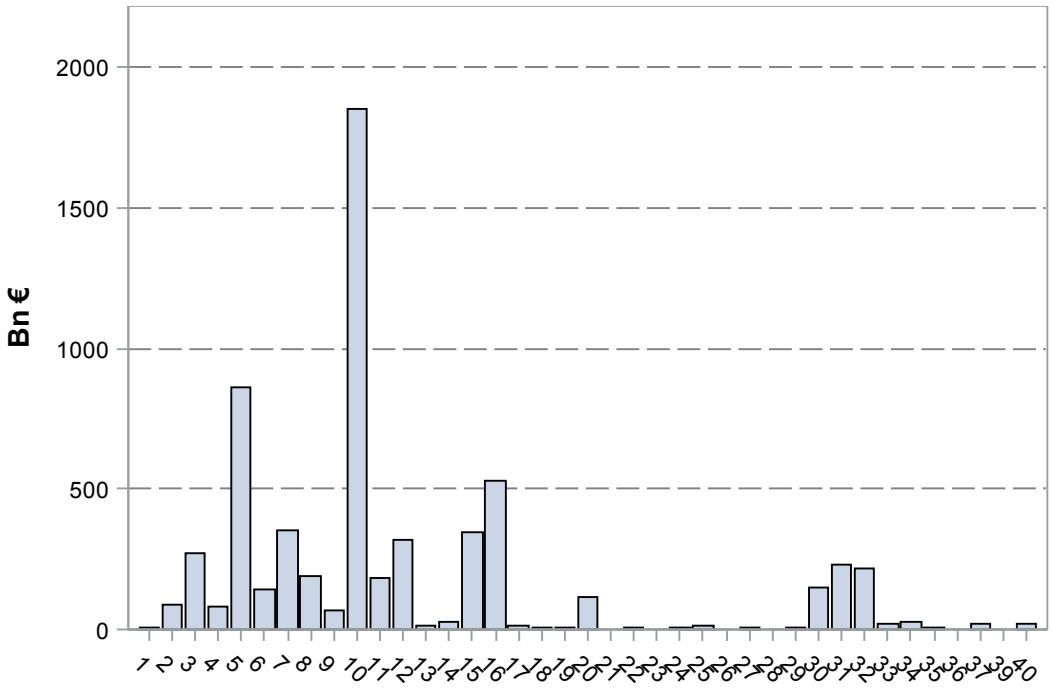
- More than 1 year and up to and including 2 years
- More than 2 years and up to and including 5 years
- More than 5 years and up to and including 10 years
- More than 10 years

Given this information, one can make assumptions about the distribution of initial maturity within an interval, and about the residual maturity distribution for a given initial maturity.

For example, if we assume a uniform distribution within the interval 2-5, we would consider that one third of the liabilities within this interval is made of securities with initial maturity in 4-5. And if we consider that for liabilities with initial maturity in 4-5, the residual maturities are uniformly distributed within 0-5, we may estimate that one fifth of these liabilities have a residual maturity lower than 1.

However, such uniformity assumption on within interval initial maturity distribution would not be adequate. Not only because they make no sense for the last unbounded interval, but also because the actual distribution of initial maturities within each bracket is far from uniform[2] (Figure 7). It is in fact not even smooth, such that usual parametric and non-parametric techniques for estimating densities based on interval-valued observations would be quite poor.

Figure 7: Outstanding amounts in French LT debt security by initial maturity (Dec. 2016)



[2] This may be explained by the fact that issuers adjust the characteristics of securities to the demand of investors that may be structured according to common benchmarks.

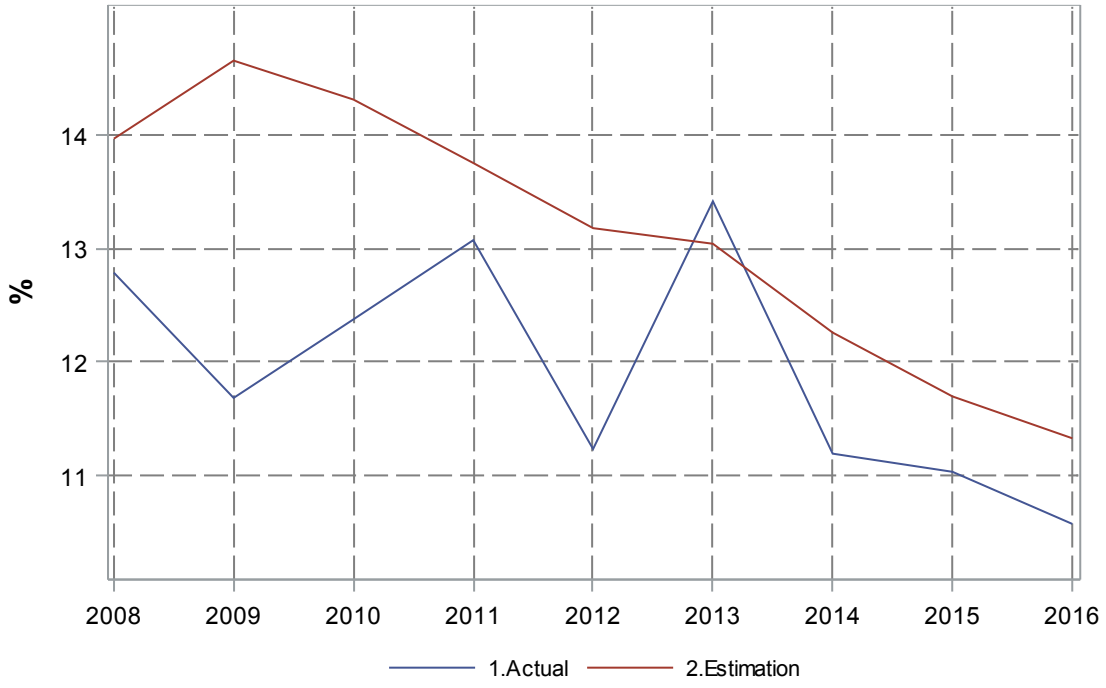
Source: Banque de France

Therefore, we use instead market-based estimates of initial maturity distribution within each initial maturity brackets in liabilities (i.e estimates derived from the distribution of outstanding amounts by initial maturity, as in Figure 6), combined with a uniform assumption on residual maturities.

For example, we will consider that 53 % of liabilities in the initial-maturity interval 2-5 correspond to liabilities with initial maturity in 4-5 (derived from outstanding amounts on the market). And we will consider that one fifth of the liabilities with initial maturity in 4-5 have a residual maturity less than 1 (residual maturities are assumed to be uniformly distributed between 0-5).

As far as French data are concerned, the resulting estimations for overall short residual maturity liabilities appear approximatively as accurate as the estimation based on residual maturity of outstanding stock issued (Figures 8 and 9). Based on what is observed for France, errors as large as 3pp would occur in 5% of cases[3]. However, it performs worse in the case of NFCs and OFCs (OFCs are excluded from Figure 8 for legibility) issuing sectors, although the significance of this results cannot be established with the few observations provided by French data.

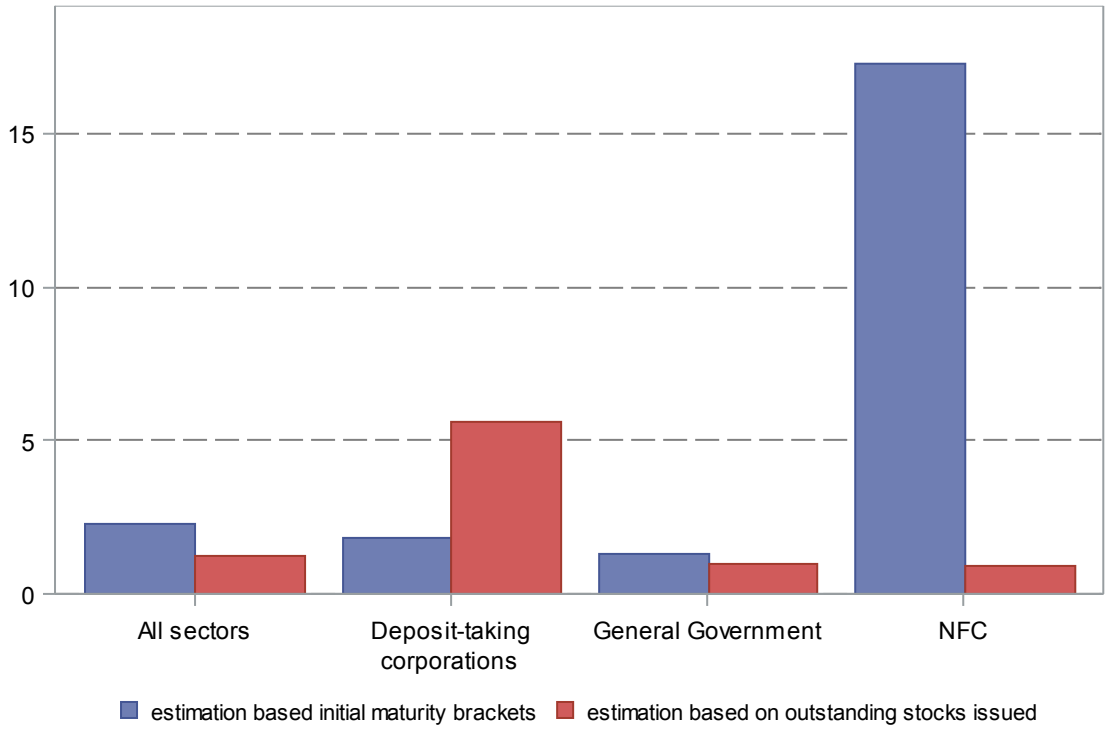
Figure 8: Actual vs estimated proportions of short residual maturity liabilities for France (as a % of total liabilities in long-term debt securities)



[3] This estimation is based on fewer observations than in part 1, and concerns only French data, so should be taken with caution.

Source: Banque de France

Figure 9: Mean squared error associated with the different estimation techniques, broken down by issuer sector (French data, OFC excluded for legibility)



Source: Banque de France