A NOTE ON CALCULATION OF HIGH-QUALITY LIQUID ASSETS IN BASEL III

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ABSTRACT. In order to prevent effectively the regulatory arbitrage when using the Liquidity Coverage Ratio (LCR) developed in Basel III, the formula of calculating the pool of high-quality liquid assets (HQLA) is stipulated based on several critical principals. Among those principals, the 40% cap is a key one. However, the formula provided by the Committee is not rational and rigorous enough to meet all the principals that the efforts of the Committee. The objective of this note is to present a revised formula which is able to calculate the pool of HQLA more rationally (safely) and make the calculated asset quantity consistent with all the proposed principals by the Committee. First, we shed light on the drawbacks of the original calculation formula. Then, an improved formula is presented with a rationality proof, and some examples are provided to verify the calculation.

Keywords: High-Quality Liquid Assets (HQLA); Liquidity Coverage Ratio (LCR); Basel III; Regulatory Arbitrage

1. Original Calculation with Imperfection. As set out in the Basel III rule document [1] as well as in the question-answer document [3] on liquidity, when calculating the liquidity pool, Level 1 assets can be included without limit, but several principles with respect to the cap on the Level 2 assets should be taken into account to meet Committee's requirements and intent to weaken the banks' efforts or capacity to arbitrage the restrictions on the composition of the liquidity pool.

Principles
1. Level 2 assets can only comprise up to 40% of the pool of high-quality liquid assets;
2. The calculation of the 40% cap should take into account the impact on the amounts held in cash or other Level 1 or Level 2 assets caused by secured funding transactions (or collateral swaps) maturing within 30 calendar days. Critically, the composition of the liquidity pool should take into consideration the unwind of all short-term transactions that mature in the 30 day period;
3. The maximum amount of adjusted Level 2 assets in the stock of high-quality liquid assets is equal to two-thirds of the adjusted amount of Level 1 assets after haircuts
have been applied.

As clarified in both Basel III documents [1, 3], the adjusted amount of Level $i$ assets is defined as the amount of Level $i$ assets that would result if all short term secured funding, secured lending and collateral swap transactions involving the exchange of any Level $i$ assets for any non-Level $i$ assets, were unwound, for $i = 1, 2$.

Denoting $\mathcal{L}_i$ the amount of Level $i$ assets and $\mathcal{L}_i + \Delta_i$ the adjusted amount of Level $i$ assets, respectively, with $\Delta_i$ as the adjustment of $\mathcal{L}_i, i = 1, 2$, the calculation method presented in [3] can be expressed in the following formula:

$$\text{Pool-of-HQLA} = \mathcal{L}_1 + \mathcal{L}_2 - \max\left\{\mathcal{L}_2 + \Delta_2 - \frac{2}{3}(\mathcal{L}_1 + \Delta_1), 0\right\}.$$  \hspace{1cm} (1)

The above formula (1) says that when it comes to the calculation of the cap on Level 2 assets, banks must subtract the amount; if any, that adjusted Level 2 assets exceed 2/3 of adjusted Level 1 assets from the sum of Level 1 and Level 2 assets. Moreover, the actually recognized amount of Level 2 assets, denoted by $\mathcal{L}_2^*$, is

$$\mathcal{L}_2^* = \mathcal{L}_2 - \max\left\{\mathcal{L}_2 + \Delta_2 - \frac{2}{3}(\mathcal{L}_1 + \Delta_1), 0\right\}.$$  

The formula (1) is intended to satisfy all the requirements in principles (P1)-(P3) among which, however, it unfortunately violates (P1), e.g.,

$$\frac{\mathcal{L}_2^*}{\text{Pool of HQLA}} = \frac{\mathcal{L}_2^*}{\mathcal{L}_1 + \mathcal{L}_2^*} \leq 40\%,$$

which can be easily showed by the following example.

**Example 1.** Bank A now has $5b of reserves, $5b of AAA-rated covered bonds and $10b of exchange traded equities in an AAA-rated company after executing over an O/N reverse repo of $5b of reserves for $10b of exchange traded equities in an AAA-rated company.

After the implementation of haircut (15%) to Level 2 assets, the present stock is comprised of $5b Level 1 assets and $4.25b Level 2 assets. Noting that the adjusted Level 1 and Level 2 assets (after unwinding the secured funding transactions with Level 1 assets for non-Level 1 assets) are $10b and $4.25b, respectively.

Hence, according to the calculation with (1),

$$\frac{\mathcal{L}_2^*}{\mathcal{L}_1 + \mathcal{L}_2^*} = \frac{4.25}{5 + 4.25} = 45.9\%.$$  

2. **An Improved Formula.** In this section, we present an improved calculation for the pool of HQLA which is consistent with all the principles (P1)-(P3). To begin with, the improved formula for the pool of HQLA is expressed as below:

$$\text{Pool of HQLA} = \mathcal{L}_1 + \mathcal{L}_2 - \max\left\{\mathcal{L}_2 - \frac{2}{3}\mathcal{L}_1 + \max\left\{\Delta_2 - \frac{2}{3}\Delta_1, 0\right\}, 0\right\}.$$  \hspace{1cm} (2)

where $\Delta_i$ is the adjustment of level $i$ assets, $i = 1, 2$. The formula (2) states that when determining the cap of Level 2 assets, the amount that adjusted Level 2 assets exceed 2/3 of adjusted Level 1 assets should be subtracted from the sum of current Level 1 assets and Level 2 assets only if the adjustment of Level 2 assets is is greater than or equal to 2/3 of the adjustment of Level 1 assets, otherwise, the amount subtracted should be the amount that
unadjusted Level 2 assets exceed 2/3 of unadjusted Level 1 assets. The vantage and rationality of this improved approach are elaborated by the following proposition.

**Proposition 1.** If the Pool-of-HQLA is calculated in (2), then we have

$$\frac{\mathcal{L}_2^*}{\mathcal{L}_1 + \mathcal{L}_2^*} \leq 40\%.$$  (3)

**Proof.** By the proposed calculation (2), it has that

$$\mathcal{L}_2^* = \mathcal{L}_2 - \max\left\{\mathcal{L}_2 - \frac{2}{3}\mathcal{L}_1 + \max\left(\Delta_2 + \frac{2}{3}\Delta_1, 0\right), 0\right\}. \quad (4)$$

Noting that

$$\mathcal{L}_2 - \frac{2}{3}\mathcal{L}_1 \leq \max\left\{\mathcal{L}_2 - \frac{2}{3}\mathcal{L}_1 + \max\left(\Delta_2 + \frac{2}{3}\Delta_1, 0\right), 0\right\}$$

we have

$$\mathcal{L}_2^* \leq \mathcal{L}_1$$

which implies the validity of inequality (3). The proof is completed.

**Example 2.** In the above Example 1, using new formula (2) and note that $\Delta_2 = 0.75 < 10/3 = \frac{2}{3}\Delta_1$, we have

$$\text{Pool-of-HQLA} = \mathcal{L}_1 + \mathcal{L}_2 - \max\left\{\mathcal{L}_2 - \frac{2}{3}\mathcal{L}_1 + \max\left\{\Delta_2 + \frac{2}{3}\Delta_1, 0\right\}, 0\right\}$$

$$= 5 + 5 - 5/3 = 25/3 \text{ (b),}$$

where

$$\mathcal{L}_2^* = 5 - 5/3 = 10/3$$

Furthermore, we have

$$\frac{\mathcal{L}_2^*}{\text{Pool-of-HQLA}} = \frac{10/3}{25/3} = 40\%$$

**REFERENCES**

