RISKS AND YIELDS IN NOT LISTED BANKS:

THE MATTER OF THE REPRICING GAP

Mauro Bisceglia[1]
Enida Cico[2]

ABSTRACT

The concern relates to the repricing gap has to be analyzed in function of interest ratesrisk ,that is reliant on variation of market rates Δi_M , with resulting repercussions on the interest margin[3]. This work aims at analyzing the management of the repricing gap, in order to define as well as possible the future interest margin, MI, of a bank by acting on its possible variations ΔMI . The rates risk mainly affects three factors: such as different maturities, the imbalance of the structures between assets and liabilities, and the different incidence on the lending and deposit rates variation Δi_a e Δi_p .

Interest rates risk can be observed according to the price risk or to the re-investment risk, the repricing gap serves to control the last one. In this work we have therefore studied the different methodologies to evaluate gap, in presence of maturities or of intervals related to assets and liabilities, that are sensitive to market fluctuations, with the ability to change maturities in order to ensure a better assessment of the interest margin. Finally it's suggested a weighting of the marginal gaps, which takes into account the remaining time to maturity and the value of the same according to the market cost.

Keywords: *Not listed banks, Interest rates risk, repricing gap, interest margin, Yield risk*
JEL Classification: *G12, G21, E43*

1. The repricing gap

The repricing gap aims, in terms of profitability, at rectifying the prospective analysis of the interest margin depending on Δi_M , using the gap that is created between financial assets and liabilities, that are market-sensitive

$$G_t = AS_t - PS_t \Leftrightarrow G_t = \sum_{j=1}^{n} as_{t,j} - \sum_{i=1}^{m} ps_{t,i} \quad [1]$$

Where G_t is the Gap for the period under review, while AS_t and PS_t are respectively sensitive assets and liabilities or rather those which expire or which are subject to review interest rate during the period *t*. $as_{t,j}$ represents instead the *j-nth* sensitive asset and $ps_{t,I}$ means the *i-nth* sensitive liabilities.

[1]Dipartimento di Scienze Economiche e Metodi matematici, Università degli Studi di Bari Aldo Moro, Bari 70100, Italy
[2]Università degli Studi di Bari Aldo Moro, Bari 70100, Italy
[33] Egea (2008)

The overall interest margin, related to activity of credit intermediation, is as the difference between the interests of financial assets, *IA,* and the interests of financial liabilities, *IP*

$$MI = IA - IP \Leftrightarrow MI = i_a A - i_p P \Leftrightarrow MI = i_a(AS + ANS) - i_p(PS + PNS)$$

from which

$$\Delta MI = \Delta i_a AS - \Delta i_p PS$$

The variation ΔMI is based on the simple consideration that the Δi_M produce effects on interest rates or yields of the bank i_a and i_p , and consequently the Δi_M produce effects even on the AS_t and PS_t .

In the first part of this study we consider for convenience

$$\Delta i_a = \Delta i_p = \Delta i$$

we will have

$$\Delta MI = \Delta i(AS - PS) \Leftrightarrow \Delta MI = \Delta i\left(\sum_{j=1}^{n} as_{t,j} - \sum_{i=1}^{m} ps_{t,i}\right) \Leftrightarrow \Delta MI = \Delta i \cdot G_t$$

From this last formula we know how the variation of the interest margin can be considered as *function* of thegap factors and Δi , so we have $\Delta MI = \varphi(\Delta i, G_t)$.

We can then synthesize the first impressions on the changes of the interest margin in dependence of its variables

$$\Delta MI = \Delta i \cdot G_t \Leftrightarrow \Delta MI : \begin{cases} > 0 \Leftrightarrow \begin{cases} \Delta i > 0 \quad e \quad G_t > 0 \\ \quad o \\ \Delta i < 0 \quad e \quad G_t < 0 \end{cases} \\ = 0 \Leftrightarrow \Delta i = 0 \quad o \quad G_t = 0 \\ < 0 \Leftrightarrow \begin{cases} \Delta i > 0 \quad e \quad G_t < 0 \\ \quad o \\ \Delta i < 0 \quad e \quad G_t > 0 \end{cases} \end{cases} .$$

2. The maturity adjusted gap

The maturity adjusted gap starts from the conception that the change in interest rate is fully active only in the period of the time to maturity , that is the time between the sensitive date and the end of the gapping period. In particular, in the case of any sensitive assets *j-nth* , that yields an interest rate $i_{a,j}$ at maturity s_j, it will produce a loan rate related to the next year

$$Ia_j = as_j \cdot i_{a,j} \cdot s_j + as_j(i_{a,j} + \Delta i_{a,j})(1 - s_j)$$

It is noticed how the yield of a sensitive assets is separable into two components, one certain, that is $as_j \cdot i_{a,j} \cdot s_j$, and one uncertain, or $as_j(i_{a,j} + \Delta i_{a,j})(1 - s_j)$, that represents the expected value in relation to the market. Therefore is natural to infer that the variation of loan rates is determined exclusively by the uncertain component

$$\Delta Ia_j = as_j \Delta i_{a,j}(1 - s_j)$$

and considering all the *n* assets of the bank,it turns out that

$$\Delta IA = \sum_{j=1}^{n} as_j \Delta i_{a,j} (1 - s_j)$$

likewise for the liabilities we will have

$$\Delta Ip_i = ps_i \Delta i_{p,i} (1 - s_i)$$

and for all banks' liabilities we'll have

$$\Delta IP = \sum_{i=1}^{m} ps_i \Delta i_{p,i} (1 - s_i)$$

.

Assuming an uniform variation of the active and passive interest rates, or rather

$$\Delta i_{a,j} = \Delta i_{p,i} = \Delta i \; , \forall (j,i) \in \{1,2,..., n(m)\}$$

we can then estimate the variation of the interest margin of the bank as

$$\Delta MI = \Delta IA - \Delta IP \Leftrightarrow \Delta MI = \left(\sum_{j=1}^{n} as_j (1 - s_j) - \sum_{i=1}^{m} ps_i (1 - s_i) \right) \Delta i \Leftrightarrow \Delta MI \equiv G^{MA} \Delta i$$

in which G^{MA} represents the maturity-adjusted gap, resulted from the difference between sensitive assets and liabilities, weighted in a gapping period, set at 1 year[4]; weighting which in our view is not very effective if not misleading, reducing the gap and making it less effective in its natural expression. Therefore we will discuss an alternative in paragraph 4.

3. Marginal and cumulative gaps

It's useful to think working on maturity is very laborious and complex, knowing the high number of the same, therefore it makes sense to observe marginal and period gaps, relating to specific future periods. So with G'_{t_1} we mean the first marginal gap in the period *t*, and, obviously, $G_{t_2} = G'_{t_1} + G'_{t_2}$ will represent the gap cumulated at time 2 in the period *t.* Regarding of period gaps it's necessary to refer, with slight inaccuracy, to one of the maturities of the period, such as

$$t_j^* = \frac{t_j + t_{j-1}}{2}$$

this maturity allows the weighting of the marginal gap according to the method of maturity-adjusted gap

$$\Delta MI \cong \Delta i \sum_{j | t_j \leq 1} G'_{t_j} (1 - t_j^*) \Leftrightarrow \Delta MI \cong \Delta i G_1^W \; [2]$$

in which G_1^W stands for the cumulative gap weighted to one year. The indicator, obtained as the sum of weighted gaps of the period, is a marker of the sensitivity of the interest margin to change in market rates, and it is also denominated *duration of the interest margin.* The marginal gaps lend themselves better to the evaluation of the interest margin in presence of a vibrant market.

4 Saita (2000)

4. Hypothesis of an alternative model to the repricing gap

In our opinion a weak spot of the repricing gap is the kind of weighting utilized, which considers the sensitive positions related to the time to maturity. It's clear how in this way the weight of the sensitive positions is reduced, making ineffective and misleading the same gap in the evaluation of the ΔMI , as well as it is distorting in the different immunization policies .

The individual sensitive positions have not only effect on the ΔMI for their specific magnitude, but since this last has an impact on the *MI* related to the estimated period, we have to reassess the position considering its time to maturity. Consequently a marginal gap weighted in this alternative model results

$G_{t_k}^{'*} = G_{t_k}^{'} m(t_0, t_k, t_m)$

while in presence of a single gap we would have

$$\Delta MI^{*} = \Delta i G_{t_1}^{'} m(t_0, t_1, t_m)$$

Otherwise in the case of more of one marginal gap we would find

$$\Delta MI^{*} = \sum_{k=1}^{m} \Delta i_k G_{t_k}^{'} m(t_0, t_k, t_m) .$$

Where $m(t_0, t_k, t_m)$ represents indeed a unitary reinvestment to maturity based to the current *risk free* yield. Thus by a group of short-term government bonds, knowing that

$$v(t_0, t_k) = [1 + j(t_0, t_k)]^{-1} \text{ e } v(t_0, t_k) = [1 + i(t_0, t_k)]^{-t_k}$$

or[5]

$$[1 + j(t_0, t_k)]^{-1} = [1 + i(t_0, t_k)]^{-t_k} \Leftrightarrow i(t_0, t_k) = \sqrt[t_k]{1 + j(t_0, t_k)} - 1$$

therefore knowing the unitary yield $i(t_0, t_k)$ that is constant for the entire *k-nth* period, and considering that $m(t_0, t_k) = e^{\delta(t_k - t_0)}$, it is obtained the respective monthly unitary strength of interest δ_m

$$[1 + i(t_0, t_k)]^{(t_k - t_0)} = e^{\delta_m (t_k - t_0)} \Leftrightarrow \delta_m = \log(1 + i(t_0, t_k)) .$$

Examining the structure of the *RendiBot* 2016[6], known the yield $j(t_0, t_0, t_{12})$, we can obtain $i(t_0, t_0, t_{12})$ and consequently the monthly strength of interest $\delta_m(t_0, t_0, t_{12})$ indispensable to the weighting of period marginal gaps that exist in the first interval (t_0, t_k); whereas about the gaps related to the next interval $[t_1, t_2]$, the use of the yield $j(t_0, t_0, t_{12})$ remains not totally corresponding to market realities, as it intersects itself with the incoming yield $j(t_0, t_1, t_{13})$, yield that, in our opinion, is important to take in consideration.

Therefore known the strength of interest $\delta_m(t_0, t_1, t_{13})$ which intersects the previous one in the interval $[t_1, t_{12}]$, and being unitary indeed, we can think of an average impact between them. In general, known yields composition $\{\delta_m(t_0, t_k, t_{m+k}), \forall k \in \{0,1,2,..., m-1\}\}$, we can determine

[5] Fisher (1965)

[6] www.bancaditalia.it

$$\delta_m(t_0, t_k, t_m) = \frac{1}{k+1}\sum_{\gamma=0}^{k} \delta_m(t_0, t_\gamma, t_{m+\gamma}), \forall k \in \{0,1,2,..., m-1\}$$

that is necessary to re-evaluate marginal and period gaps of the interval (t_k, t_{k+1}). The reasoning so far conducted is replicable for each subsequent interval.
In this way it is created the following structure for yield maturity, or

$$\{\delta_m(t_0, t_0, t_{12}), \delta_m(t_0, t_1, t_{12}), \delta_m(t_0, t_2, t_{12}),..., \delta_m(t_0, t_{11}, t_{12})\} [3]$$

That is necessary to the weighting of each marginal gap in the gap period taken in exam.

5. Indices as a function of the gap

In addition to prospective evaluation of the interest margin, the gap is utilized even in determing some indexes such as
1. *Index of the capital profitability* which provides a measure of the variation of the profitability of the interest margin on its own means, in addiction of market variations

$$\Delta\left(\frac{MI}{MP}\right) = \frac{G}{MP}\Delta i$$

2. *Index of management profitability* which provides a measure of the variation of interest margin on its interest-bearing assets, in addiction of market variations

$$\Delta\left(\frac{MI}{AF}\right) = \frac{G}{AF}\Delta i$$

3. *Gap Ratio* which relates sensitive assets and liabilities, providing possible comparisons both in time and space between banks, even of different measures.

$$gap\ \ ratio = \frac{AS}{PS}$$

6. Problems related to repricing gap

The repricing gap method, in spite of its more accurate versions, shows some criticalities, which regards:
6.1 The hypothesis of uniform variations of lending and funding rates and of the rates of different maturities. The fundamental hypothesis of the model is indeed the uniformity of the variation of the market interest rates, on assets and liabilities. A possible solution could be that one of considering the adjustment sensitivity explicitly in the calculation of the gap, through the identification of the reference rate, the valuation of different bank lending and funding rates sensibility, then the calculation of the *proper gap*.
For what has been said

$$\Delta MI = \sum_{j=1}^{n} as_j \Delta i_{a,j} - \sum_{i=1}^{m} ps_i \Delta i_{p,i} \Leftrightarrow \Delta MI \cong \sum_{j=1}^{n} as_j \beta_j \Delta i_a - \sum_{i=1}^{m} ps_i \gamma_i \Delta i_p \Leftrightarrow$$

$$\Leftrightarrow \Delta MI \cong \left(\sum_{j=1}^{n} as_j \beta_j - \sum_{i=1}^{m} ps_i \gamma_i\right)\Delta i \Leftrightarrow \Delta MI \equiv G^s \Delta i$$

in which β_j and γ_k stand for the coefficients of assets and liabilities items, otherwise G^s is the standardized gap.

6.2 The treatment of on-demand items. Speaking about on-demand items we mean assets and liabilities items of which the maturity is not determined. According to the schema of subdivision of the gapping period, such items should be numbered among those sensitive whose reference period may also be the daily one. By empirical analysis it was found that these items are not readily adapt to changes in market rates; it has been observed that the adjustment of the yield of the on-demand items is asymmetrical. In this case a solution is possible through the estimate of the average delays of the various on-demand items to rates adjustment compared with the instant in which rates variation happen, and generally it is employed the statistical analysis of past data[7].

6.3 Omitted consideration of the effects of the variation of the interest rates on the amount of funds intermediated. In the repricing gap model no account is taken of stock value, but only the flow value are examined, and then all the amounts of assets or liabilities traded by the bank are ignored. Moving from the utilized solution to the hypothesis of uniform variations of lending and funding rates, it is possible to change the coefficients β and γ to take into account the elasticity of quantities compared with prices. In practice it is enough to build β' as

$$\beta' = \beta(1 + x\%)$$

Indicating with $x\%$ the percentage relative to the variation of the volumes; the same argument can be made for the coefficient of sensitivity of the liabilities γ. However, in reality, also the choice of β' as a linear function of $x\%$ does not seem to be so right but this would require the use of a sophisticated econometric model.

6.4 Omitted consideration of the effects of rates variation on market values. A rise of interest rates doesn't produce its own effects only on the profit flows associated to sensitive assets and liabilities, but that rise would also affects the value itself of these items. For this reason the repricing gap model is not suitable to capture the effects that changes in rate may have on the assets value, conversely of a asset-type model: the duration gap one.

7 Analysis case

In order to make a first analysis about the study we have conduct, we used the balance sheet data closed on 31/12/2015 of a BCC of Apulia and Basilicata, that for matter of privacy we call Bank Alpha. the prediction field is then reported to 2016, in the following initial framework

Chart 1 Assets situation of Bank Alpha on 31/12/2015

Sensitive assets 74.741.925	Sensitive liabilities 54.868.264
Not sensitive assets 186.507.716	Not sensitive liabilities 183.243.524
	Shareolders'equity 23.084921
Total 261.249.641	Total 261.249.641

In particular assets and liabilities that will mature their sensitivity in the area of the observation period result so divided

[7] A. Resti, A. Sironi (1997)

Chart 2 Division of sensitive assets and liabilities by maturity date

	On view	1-7 days	7-15 days	15-30 days	1-2 months	2-3 months	3-6 months	6-12 months
Assets	134.235.771	13.203.432	9.105.674	2.738.607	1.497.100	2.133.699	10.790.254	35.157.225
Liabilities	18.269.771	1.197.398	224.014	2.210.092	3.924.641	8.629.517	4.118.259	34.501.341

Chart 3 Division of sensitive assets and liabilities by repricing date

	On view	1-3 months	3-6 months	6-12 months
Assets	67.353	17.534	93.748	4.652
Liabilities	131.114	16.981	10.802	35.219

Therefore the gap that has been calculated according to [1] related to the data of **Charts 2** and **3**, results

$$G_t = AS_t - PS_t = \sum_{j=1}^{n} as_{t,j} - \sum_{i=1}^{m} ps_{t,j} = 74.741.925 - 54.868.264 = 19.873.661$$

excluding on-demand items, which amount respectively at 134.303.124 and at 18.400.885

7.1 Gap computing after the redistribution of on-demand items

In order to overcome the problem of the on-demand items treatment, we estimate, for each of them, the structure of average delays of rates adjustment related to the moment in which happens a variation in market rates. Let's consider that the overall coefficient of sensitivity[8] to the three month rate Euribor results equal to 80%; these 8000 b.p. are so divided:

Chart 4 Progressive redistribution of sight deposits

Time horizon	Perceived change	Assets reallocation	Liabilities reallocation
On view	0%	/	/
On 1 month	10%	13.430.312	1.826.977
On 3 months	50%	37.151.562	9.134.886
On 6 months	12%	16.116.375	2.192.373
On 1 year	8%	10.744.250	1.461.582
Total	80%	107.442.499	14.615.817

Therefore the new composition of sensitive items

Chart 5 Division of sensitive assets after the revaluation of on-demand assets items

	1-7 days	7-15 days	15-30 days	1-2 months	2-3 months	3-6 months	6-12 months
Maturity date	13.203.432	9.105.674	2.738.607	1.497.100	2.133.699	10.790.254	35.157.225
Repricing date		/		17.534		93.784	4.652
On-demand items		13.430.312		67.151.562		16.116.375	10.744.250

$$AS_t = \sum_{j=1}^{n} as_{t,j} = 182.184.460$$

[8] www.bancaditalia.it

Chart 6 Division of sensitive liabilities after the revaluation of on-demand liabilities items

	1-7 days	7-15 days	15-30 days	1-2 months	2-3 months	3-6 months	6-12 months
Maturity date	1.197.398	224.014	2.210.092	3.924.641	8.629.517	4.118.259	34.501.341
Repricing date		/		16.981		10.802	35.219
On-demand items		1.826.977		9.134.886		2.192.373	1.461.582

$$PS_t = \sum_{i=1}^{m} ps_{t,i} = 69.484.082$$

The on-demand items redistribution changes the capital scenario of the bank

Chart 7 Capital situation after the redistribution

Sensitive assets 182.184.424	**Sensitive liabilities 69.484.082**
Not sensitive assets 79.065.217	Not sensitive 23.084.921
	Shareolders'equity 23.084921
Total 261.249.641	Total 261.249.641

We can therefore observe the new Gap after the strong distribution of the masses exposed

$$G_t = AS_t - PS_t = \sum_{j=1}^{n} as_{t,j} - \sum_{i=1}^{m} ps_{t,i} \Leftrightarrow G_t = 182.184.424 - 69.484.082 = 112.700.342$$

If we assume a $\Delta i_a = \Delta i_p = \Delta i = 1\%$, the positive variation of the interest margin will result

$$\Delta MI = \Delta i(AS - PS) \Leftrightarrow \Delta MI = \Delta i G_t \Leftrightarrow \Delta MI = 0.01 \cdot 112.700.342 = 1.127.003,42$$

greater then five time than that one we would have without on-demand items.

7.2 Weighting of marginal gaps

For a better interpretation of the exposure to the bank market rates risk, the gaps related to different maturities should be analyzed.

Then the average maturities have to be calculated, which will be considered the maturities of the sensitive items in the interval, and then will be weighted the marginal gap $G_t^{'}$, according to [2], just as reported in

Chart 8 Computing of weighted cumulated gap

(t_{j-1}, t_j)	G_t'	G_t	$t_j - t_{j-1}$	t_j^*	$1 - t_j^*$	$G_t'(1 - t_j^*)$
1-7 days	12.006.034	12.006.034	(7-1)/360	4/360	356/360	11.872.633,62
7-15 days	8.881.660	20.887.694	(15-7)/360	11/360	349/360	8.610275,94
15-30 days	528.515	21.416.209	(30-15)/360	22,5/360	337,5/360	495.482,81
0-1 month	11.603.335	33.019.544	(1-0)/12	1/24	23/24	11.119.862,71
1-2 months	-2.427.541	30.592.003	(2-1)/12	1,5/360	10,5/12	-2.124.185,88
2-3 months	-6.495.818	24.096.185	(3-2)/12	2,5/12	11/12	-5.954.499,83
1-3 months	58.017.229	82.113.414	(3-1)/12	2/12	10/12	48.347690,83
3-6 months	20.678.943	102.792.357	(6-3)/12	4,5/12	7,5/12	12.924.339,38
6-12months	9.987.985	112.700.342	(12-6)/12	9/12	3/12	2.476.996,25

$$\Delta MI \cong \Delta i \left(\sum_{j | t_j \le 1} G_{t_j}^{'} \left(1 - t_j^*\right) \right) \Leftrightarrow \Delta MI \cong \Delta i G_t^W \Leftrightarrow \Delta MI \cong 0.01 \cdot 87.768.595,83 = 877.685,96$$

7.3 Alternative hypothesis of weighting

In order to execute this alternative it's necessary to organize rates of return risk-free related to the period under exam; thereby we use the following structure of the cash exchange rates on an annual basis, related to the short-term BOT average yields, just like in the publication of the *Rendistato anno 2016 of the Bank of Italia*[9], considering that the Alpha Bank data are captured on 31/12/2015

$$\{j(t_0,t_0,t_{12}),\ j(t_0,t_1,t_{13}),\ j(t_0,t_2,t_{14}),\dots,\ j(t_0,t_{11},t_{23})\}\text{, or}$$

$$\{-0.141\ ;-0.110\ ;-0.141\ ;-0.191\ ;-0.255\ ;-0.187\ ;-0.264\ ;-0.276\ ;-0.308\ ;-0.339\ ;-0.314\ ;-0.370\}$$

Thus considering what we have seen in point 4, we obtain the related structure for maturity of the instantaneous intensities of the interest $\{\delta_m(t_0,t_0,t_{12}),\delta_m(t_0,t_1,t_{12}),\delta_m(t_0,t_2,t_{12}),\dots,\ \delta_m(t_0,t_{11},t_{12})\}$ or

$$\{-0{,}000051\ ;-0{,}0000454\ ;-0{,}0000473\ ;-0{,}0000527\ ;-0{,}0000607\ ;-0{,}0000618\ ;\ -0{,}0000667\ ;-0{,}0000708\ ;-0{,}0000754\ ;-0{,}0000802\ ;-0{,}0000832\ ;-0{,}0000874\}\quad[3^*]$$

and bearing in mind average maturities $t_k^* = \frac{t_k + t_{k-1}}{2}$, the alternative weighting we propose results

$$G_{t_k}^{'*} = G_{t_k}^{'}\, m(t_0,t_{k-1},t_k) \Leftrightarrow G_{t_k}^{'*} = G_{t_k}^{'}\, e^{\delta_m(t_0,t_{k-1},t_k)(1-t_k^*)}$$

Chart 11 weighting of marginal gaps according to the logical method we adopted

Period	$G_t^{'}$	t_k^*	$1-t_k^*$	$\delta_m(t_0,t_{k-1},t_k)$	$G_{t_k}^{'*}$
1-7 days	12.006.034,00	7+1/2	(360-4)/30	-0,000051	11.998.768,11
7-15 days	224.014,00	15+7/2	(360-11)/30	-0,000051	8.876.393,58
15-30 days	528.515,00	30+15/2	(360-22,5)/30	-0,000051	528.221,85
0-1 month	11.590.223,90	1+0/2	12-0,5	-0,000051	11.596.531,64
1-2 months	-2.427.541,00	2+3/2	12-1,5	-0,0000454	-2.426.484,01
2-3 months	-6.495.818,00	3+2/2	12-2,5	-0,0000473	-6.492.899,76
1-3 months	57.951.672,50	3+1/2	12-2	-0,0000473	57.989.793,34
3-6 months	20.663.209,68	6+3/2	12-4,5	-0,0000618	20.669.396,51
6-12 months	106.595.745,40	12+6/2	12-9	-0,0000874	9.905.387,47

$$\Delta MI^* \cong \Delta i \sum_{k=1}^{m} \Delta i_k G_{t_k}^{'}\, m(t_0,t_{k-1},t_k) \Leftrightarrow \Delta MI^* \cong 0.01 \cdot 112.645.098{,}70 = 1.126.450{,}98$$

8. Conclusions

The analysis conducted until here places under examination the following repricing gap summary, which could be replicated for a sample of comparable banks

Chart 10 Summary

	Without on-demand items	With on-demand items	Weighting	Alternative weighting
G_t	19.873.661	112.700.342	87.768.595,83	112.645.099
ΔMI	198.736,61	1.127.003,42	877.685,96	1.126.450,99

[9] www.bancaditalia.it

$\Delta(MI/MP)$	0,00861	0,0488	0,0380	0,0479
$\Delta(MI/AF)$	0,000793	0,004497	0,0035	0,004495
AS/PS	1,36	2,62	2,62	2,62

As we can observe this lead to apparently seemingly results in the case of alternative weighting, as it is shown in the second column, but this is simply due to the presence of negative rates on the market.
While it seems very interesting the comparison developed between the two different weighting, knowing the differences of the results, thus leading to projections and different immunization policies with understandable consequences in the hypothesis, you have to consider a lower gap. Problem of risks management of the interest rate, which results even more important in the periods characterized by high volatility of them, and, in particular, in presence of negative variation.

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