IRSG

INSURANCE AND REINSURANCE STAKEHOLDER GROUP

Advice on Interest rate risk proposal in the Solvency II review 2020

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CONTENTS

1. INTEREST RATE RISK IN THE SOLVENCY II REVIEW 2020

1.1. BACKGROUND

The IRSG brought up some concerns relating to EIOPA's interest rate risk proposal in its response to the Solvency II review, sent to EIOPA in early January 2020. In this paper we have made some of those arguments a lot more understandable and we hope these would help EIOPA in the work on reviewing the initial proposal and see whether new approaches or parameter could be justified. We also note that similar thoughts have been made by other stakeholders; AMICE had basically the same arguments and Insurance Europe, provided an alternative solution with the same goal and similar outcomes. It was based on the idea that the down shocks need to have a more realistic lower bound which is implemented through either an implicit floor included in the calibration or an explicit floor overlaid on to EIOPA's proposals. On the qualitative arguments for interest rate risks in a low yield environment, we would also refer to Swedish Centralbank's move away from negative rates *and the ECB's recently announced* review of its monetary policy *both of which we find further supporting our position. The recent COVID-19 pandemic and the consequences to both economies and on the financial markets is something that has also been carefully looked against this interest rate risk debate as it offers some important aspects on market risks during crisis, e.g. that the risk free Euro rates have not changed that much and that there has not been substantial ECB actions aiming to lower the rates more and similar signs have also been noticed from US FED which has had doubts on the econimic benefits of going that route.*

1.2. IRSG PROPOSAL FOR ALTERNATIVE FRAMEWORK FOR INTEREST RATE RISK

The IRSG's has made a proposal for an alternative framework for assessing interest rate down stress for maturity points until LLP. This alternative approach (example illustrated in section 1.3) has the following features:

a. There is always a downside risk but where there is no quantitative evidence this is set by using qualitative arguments (Annex 2). Backed by qualitative arguments, a fixed risk component can be found, for instance in range of -20 to -40bps. This would exist fully below a minimum level of interest rates, after which no data exists (r_low in the image below).
b. We can quantify and therefore calibrate a Var 99.5 interest rate down risk from times when rates and volatility were in more normal levels, say 2 percentage points or such (r_normal in example in section 1.3). Also there's evidence that the VaR 99,5 measure has radically increased during times of intense monetary policy in Euro area (more in sub-section 1.1.2). The quantitative interest rate down risk above this interest rate level would be equal to this calibrated risk but would reduce to zero as it gets closer to the minimal level (above in a.)

➔ The interest rate down risk would then be based to the quantitative risk component above normal levels, the qualitative risk component below the low level and combination of these two between these levels (figure 1 in section 1.3).

The rationale for this model would be the following:

- It is possible to calibrate the interest rate risk parameters at the interest rate levels where data exists.
- We are generally aware of the dynamics behind the drivers of change (up or down) in risk free rates in Europe. Example of the topics to be included into a qualitative risk assessment can be found below (more in sub-section 1.1.1).
- We consider that there is always a possibility that rates can go lower but, in low level of interest rates where there is a lack of data, the risk should reflect only the qualitative expert judgement on the risk dynamics (see appendix 2).
- If interest rates were at a higher level, the risk of rates going down would be much higher and analysis of the risk would be supported by quantitative evidence.

The parameters for such a model could be identified using available data and appropriate expert judgement, e.g.

- historical Var 99.5 interest rate down risk when rates have been in 'normal levels'
- the level after which the interest rate (relative) risk would no longer increase
- the interest rate low-end level
- suitable parameters for the qualitative risk component, also reflecting how these parameters might need to change in different maturity points

The consistency of the interest rate up parameters with this methodology would also require to be confirmed. Similar approach could be used even though more data exist for interest rates going up.

The interest rate shocks beyond the last liquid point (LLP) are not analyzed in this paper but these should be a function of the earlier maturity points and the UFR, consistent with the methodology applied to determine the risk-free rate term structure. Under such an approach the impact of the stress on the extrapolated/illiquid part of the interest rate term structure is determined using the standard extrapolation methodology and parameters (first stress of market data, then extrapolation based on the results)[1].

1.1.1. QUALITATIVE ASSESSMENT ON INTEREST RATE RISK

A qualitative assessment (an example is given in Annex 2 looking the economic environment in June 2020) of the interest rate risk profile is needed to set the level of the qualitative risk component. All main triggers to lower or increase the rates needs to be investigated. This could include the following topics measured by the historical impact, the possible future impact and the rapidity of that impact:

- The neutral real rate of interest
- Euro area Inflation short & long term expectations
- ECB actions (more in sub-section 1.1.2)
    - The negative interest rates policy by change of the official rates; deposit facility and refinancing rate
    - Quantitative easing
    - Forward guidance, which impacts strongly on the inflation expectation and thus on the maturity premium demand on the long maturities
    - Other ways to control unexpected situations; Stock market crises etc.
- Investment alternatives for risk free rates
    - Investing into cash
    - Investing into other highly qualified asset classes (HQLA as published by ECB) that are not strictly linked to the Euro risk free yield, Euro stock index for example
    - Investing into alternative asset classes that are considered liquid (e.g. gold, raw materials)

[1] Several industry proposals regarding the design of the shock for the extrapolated/illiquid part of the interest rate term structure have been provided as part of feedback to the 2018 and 2020 Reviews. An example of where such an approach is practically implemented can be found from the Swedish IORP II interest rate stress, refer in particular SFSA Regulatory Code ("FFFS") 2019:21, Ch 4 & Ch 7.

- The rise of digital currencies
    - By central banks
    - By private sector providers
- Changes in how Euro-swaps are used in the market
    - Individual citizens mortgage payment cap/floor hedges
    - Institutional investors (economic) ALM purposes to hedge (more in sub-section 1.1.3) own funds
    - Insurers to lower their SCR requirement
    - Option pricing purposes
    - Changes in overnight indexes (EONIA old, ESTER new)
- Convexity bias, which makes the long forward rates fold down because of the interest rate volatility (delta)
- New fundamental changes to existing market

1.1.2. ECB MONETARY POLICY

The ECB monetary policy has had a big impact on the Euro risk free rates over the last 5 years (-90bps for 2Y and -135bps for 10Y according to publications from ECB, Philip Lane Nov 2019). If the expectation is that this monetary policy cannot continue the same way as today, we might see only a fraction of a similar decrease of risk-free rates because of ECB actions. During the COVID-19 pandemic crisis such evidence has be seen.

1.1.3. MARKET IMPACT ON HEDGING ACTIVITY

Introducing a new interest rate risk module or substantial changes to RFF in the current low yield environment would most probably force part of the industry into serious interest rate hedging programs which in turn would bring the euro-swap down even more – this would create a vicious circle which will be very difficult to break.

1.1.4. EURO-SWAP ONE YEAR CHANGES

By analyzing the Euro-swap historical one-year changes one can find that the 1Y swap VaR 99,5 has increased from -210bps to -395bps during 2001, 2003 and the financial crisis (2008-2009). All year when ECB lowered the deposit facility rate aggressively. The impact is high in short maturities but disappears e.g. on the 10Y maturity point. More evidence can be found from Annex 1.

1.3. EXAMPLE OF POSSIBLE FRAMEWORK

An example of a possible framework would have the following structure:

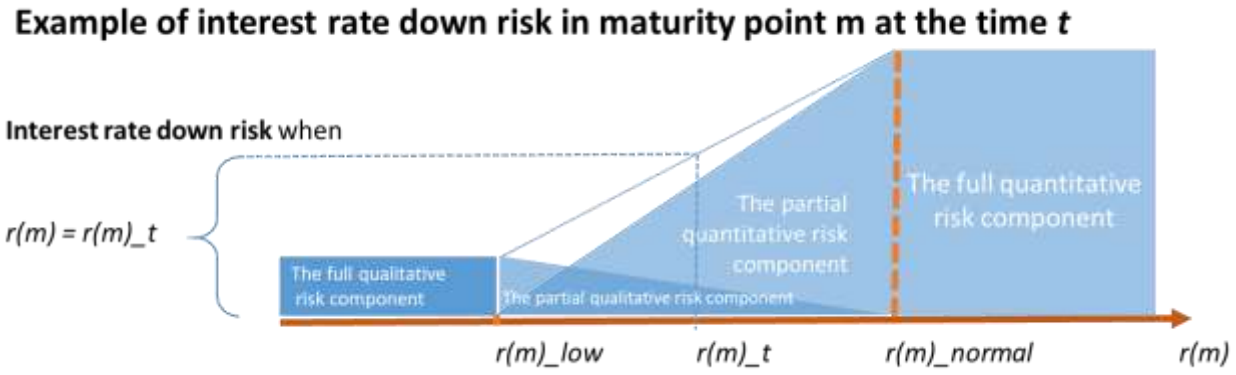


Figure 1.

1.4. EXAMPLE USING EIOPA'S FRAMEWORK

Example using the EIOPA's proposal

This model can be plugged into EIOPA's proposal but it also can be parametrized separately. If EIOPA's model and parameters is used for maturity points below LLP (20Y in here), then we can modify it in the following way:

For example if using EIOPA's definitions and model: r^down(m)_t = r(m)_t * [1- s(m)]-b(m), then

s(m) = α * s(m) AND b(m) = α * b(m) + (1-α)*B_ql(m), where

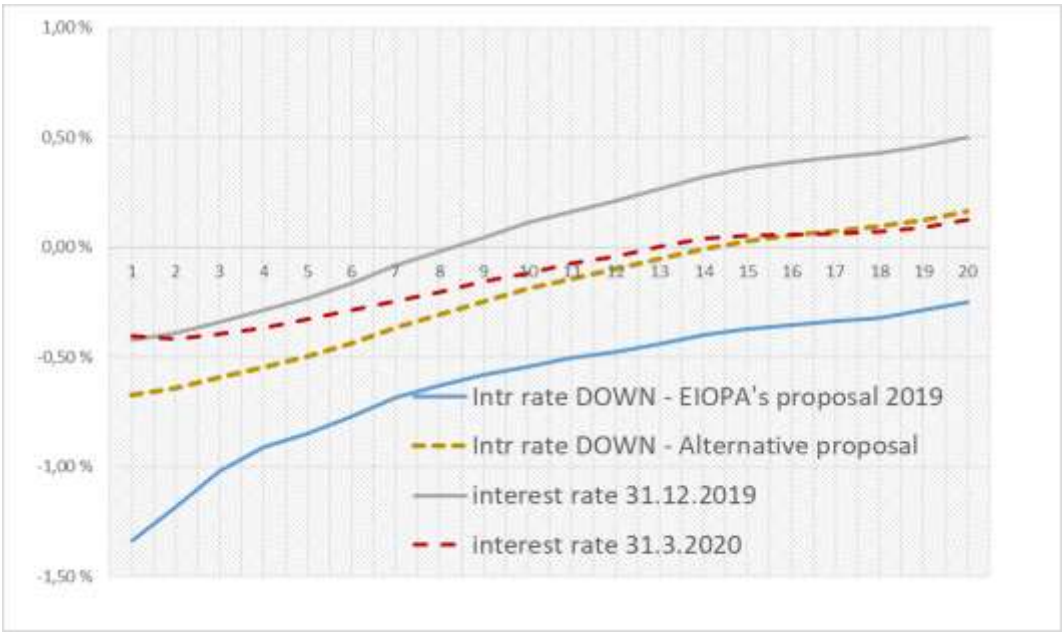
***s,b* = Based to quantitative historical analysis on VaR 99,5 interest rate down risk which could reflect parameters in EIOPA's proposals (s ,b)**

α = max[0;min[1;[r(m) - r(m)_low] / [r(m))_normal - r(m)_low]]]

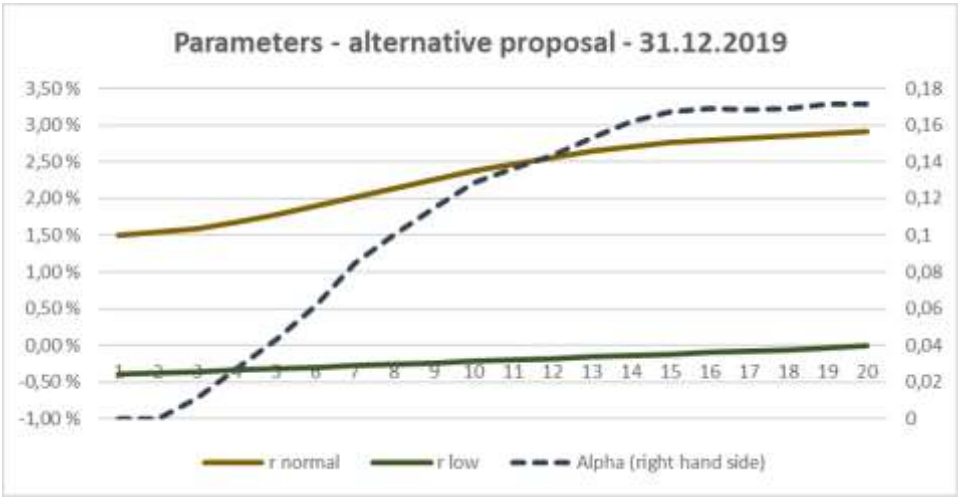
***B_ql(m)* is set based to qualitative analysis on interest rate risk,**

By using 31.12.2019 interest rates:

This gives us the following interest rate down risk against EIOPA's proposal:

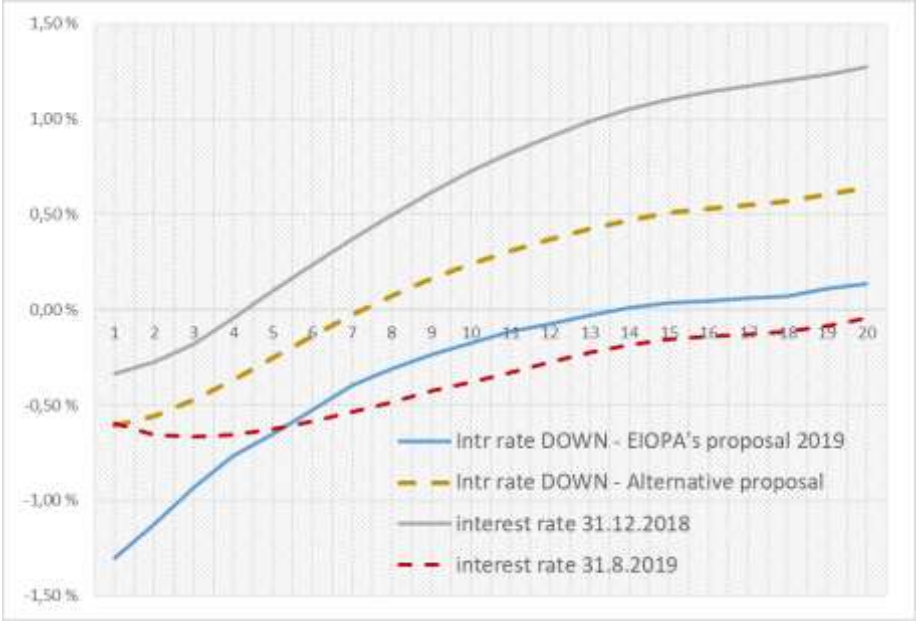


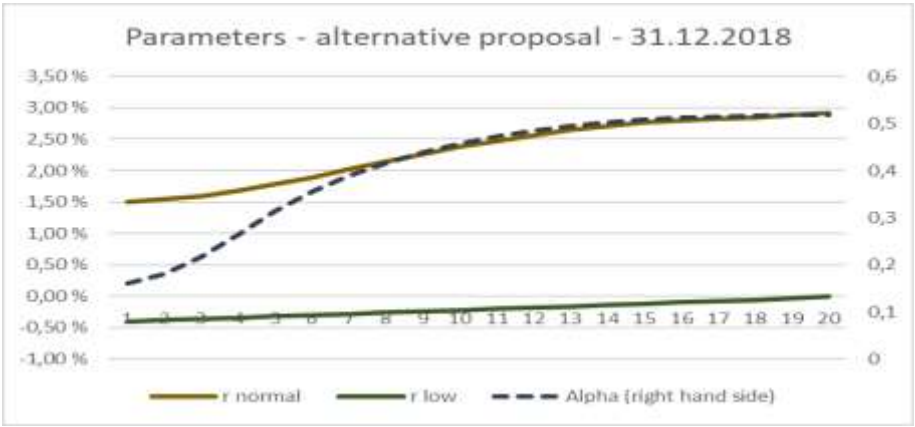
From here one can find that the interest rate down risk is on the minimum level nearly in all the maturity points (as alpha is zero or almost zero). The parameters (below) is set so that the r_low increase to zero and the r_normal starts from a 150bps 1Y level and then follow a term structure that could for instance be estimated from the history (by using nelson-siegel-mode etc.). Also if looking at how interest rates changed during the peak market spring 2020 movements of COVID-19 crisis one can find that the Euro swap curve did not change that much from end 2019.



By using 31.12.2018 interest rates:

If making the same calibration for 31.12.2018 Euro-swap's then we find that also then the interest rate down risk was close to r_low in the very start of the curve but converges towards the EIOPA parametrization quite fast.
For 2019 it is justified to look also how the interest rate risk model would go against the worst-in-history Euro-swap levels in August 2019. From the charts below one finds that only the starting point aligns with the end Aug swap rates and that EIOPA's proposal works better until 5Y maturity point. This could be easily tackled by setting parameters in a way that makes sure that the risk is absolutely hard but the problems occur when trying to justify such parameters. As there is less or even now data of the low interest rate environment, it seems that only qualitative risk assessment can be used for the risk parameters setting for interest rate down risks in the low interest rate environment.





Summary

This alternative model seems to keep interest rate down risk in the level where the qualitative parameter has been set when rates are low but requires additional parameters to the model proposed by EIOPA in 2019. The biggest technical need obviously would be the alpha-parameter, which is a function of the reporting day Euro-swap curve. Anyway, Solvency II framework already has similar parameters affecting on the SCR, take Equity risk counter-cyclical premium for instance. Simplifications could be done but the main idea, that interest rate down risk when rates a historically low and data does not exist, seems to require a qualitative component, justified by the qualitative risk assessment, and a balancing factor between the low and the normal levels of the rates.

1.5. SIMPLIFIED ALTERNATIVE EXAMPLE

A more simplified example using the EIOPA's proposal

The model can be simplified a lot more if it is allowed that the low limit for interest rates is zero. If making this assumption the use of the parameter *b()* can be also reviewed or even left out. If allowing this then one can modify the model in the following way:

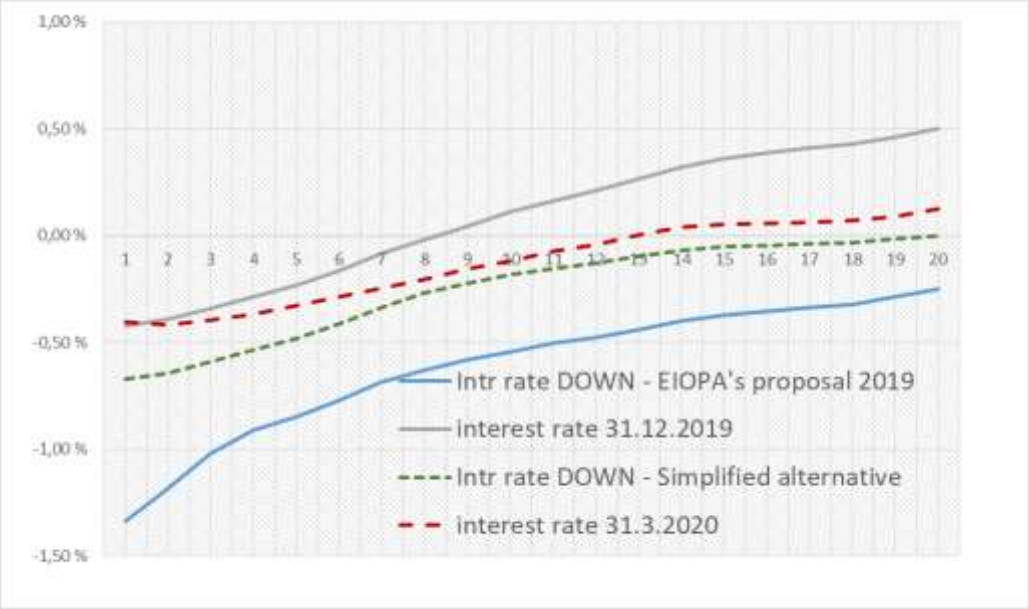
A more simplified alternative example *if setting r(m)_low = 0 and modifying EIOPA's definitions and model a bit would give us:*

$r^{down}(m)_t = r(m)_t * [1- s(m)] - B_{ql}(m)$, *when* $r(m) > 0$ *AND*

$r^{down}(m)_t = r(m)_t - B_{ql}(m)$, *when* $r(m) < 0$

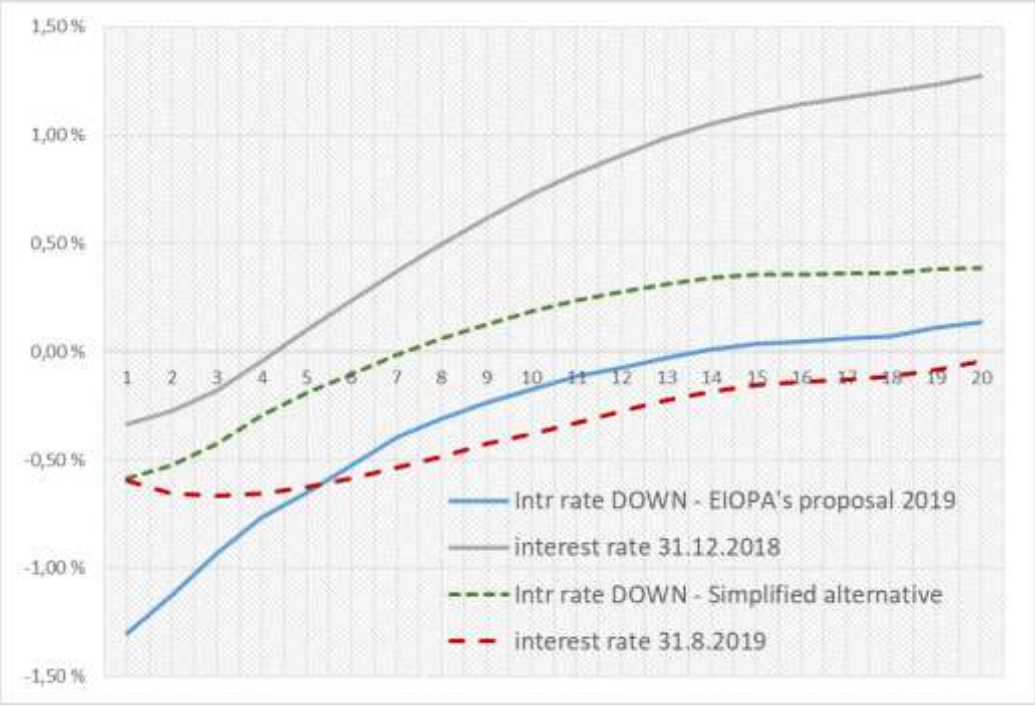
which gives the following results for this simplified alternative example.

By using 31.12.2019 interest rates:



B_ql(m) as in previous example (section 1.4)

And by using 31.12.2018 interest rates:

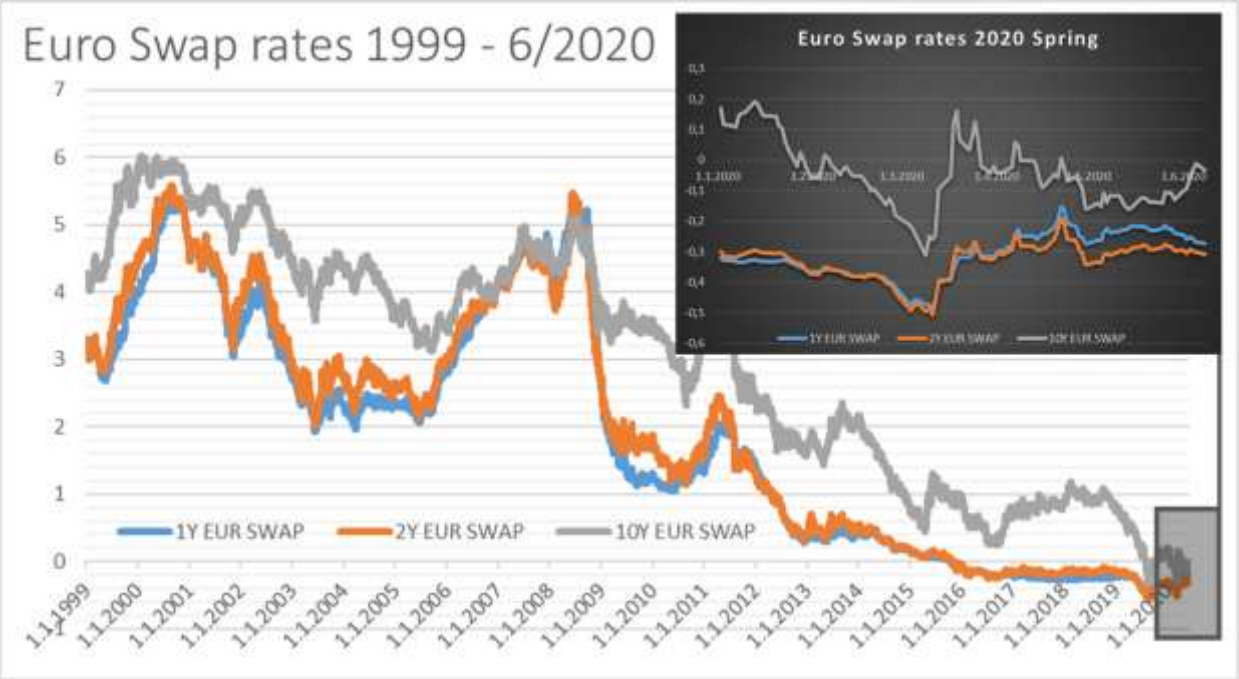


where B_ql(m) is set as in previous example (section 1.4)

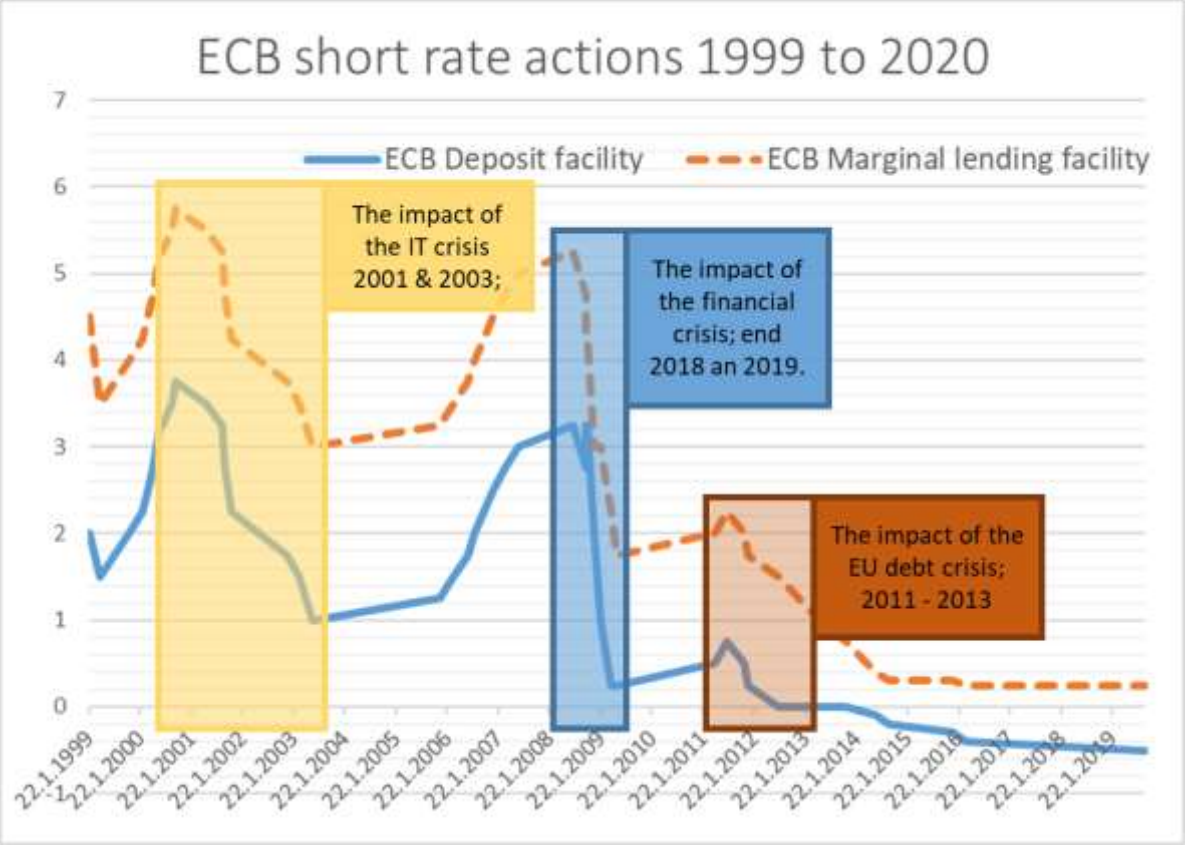
2. ANNEX 1 – EURO SWAP ONE YEAR CHANGES

Historical Euro-swap one-year changes

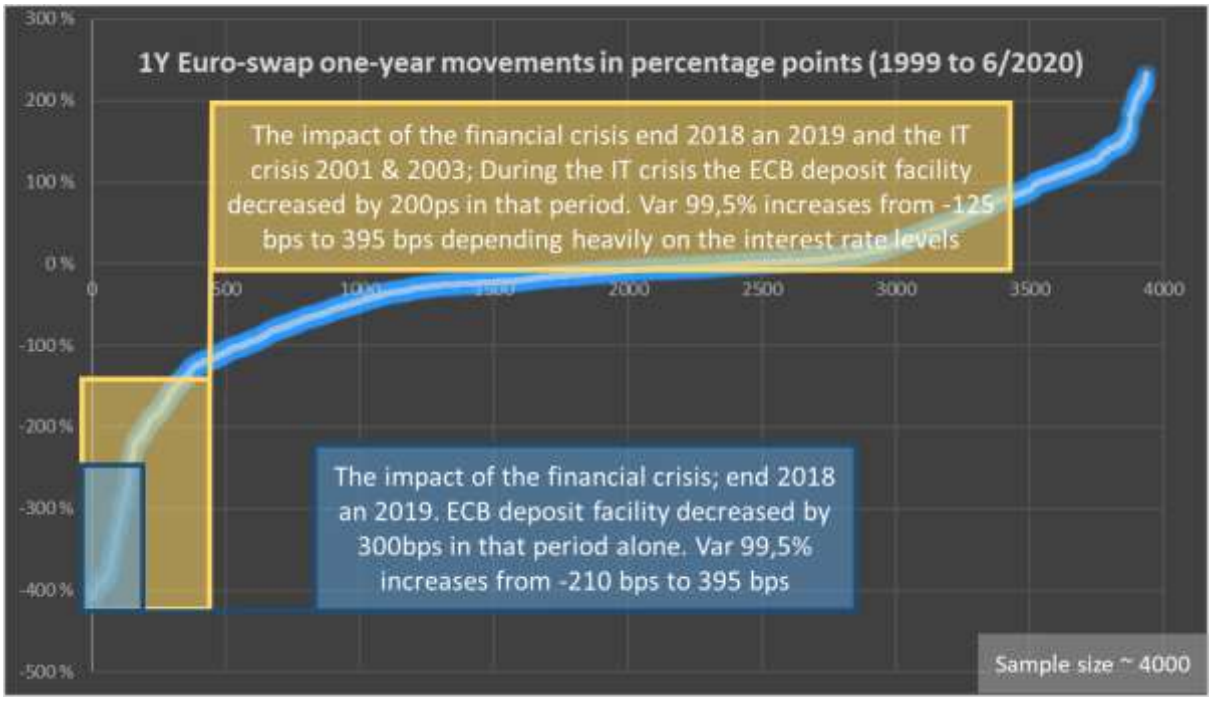
An investigation on the Euro-swap risk profile can be done from the total history (from 1999) looking the one-year changes on different maturity points of the Euro-swap rate. The chart below looks this history and how the short end (1Y & 2Y) and the long maturity point 10Y has moved during the 2 decades. As an example the latest data from the spring 2020 has been highlighted to show the recent developments during the crisis which have been quite modest actually.

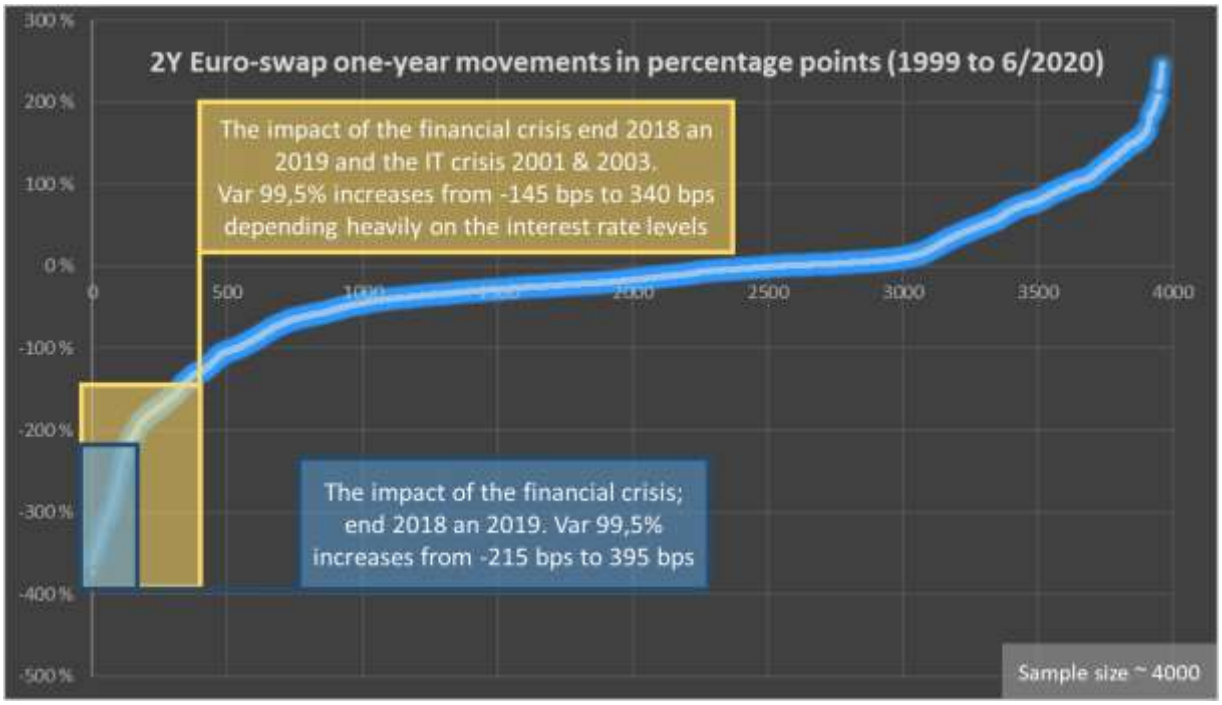


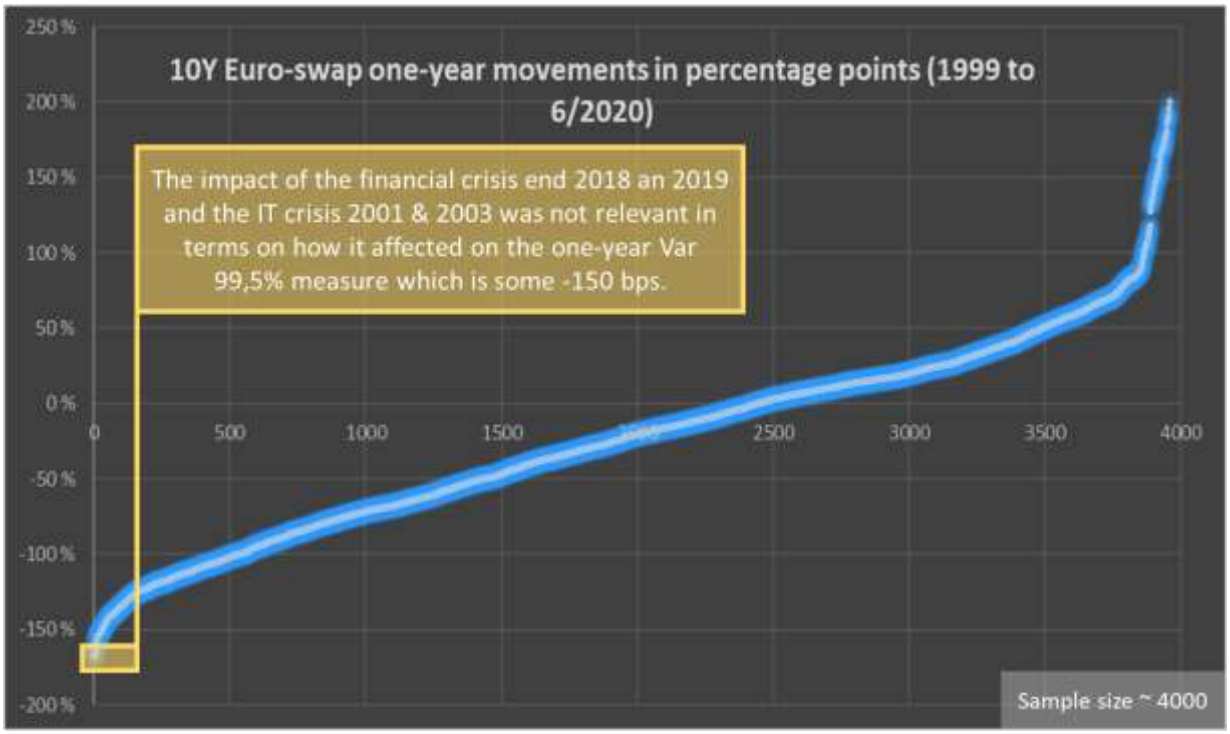
When investigating the euro-swap rate history it's important to look also how the rates have been changing because of the ECB actions. It can be found from the chart below that during the different financial crisis; 2001 to 2003, 2008 to 2009 and 2011 to 2013 there has been the biggest changes to the rates, at least in the very short end of the curve. Chart below illustrates the crisis and the way ECB official rates have changed.



It seems that the biggest one-year changes to euro-swap rates are closely linked to times when ECB has changed their official rates the most; during the financial crisis and the recession from 2001 to 2003. So the 1-year Var 99,5 is significantly different, even 3-times higher, during times when rates have been higher and ECB action more aggressive. This evidence is shown in more detail in below charts. Additionally it could be investigated how the one-year maximum change has been decreasing as the rates have been lowering. However, this evidence is not included into these findings.


1Y Euro-swap one-year movements in percentage points (1999 to 6/2020)
The impact of the financial crisis end 2018 an 2019 and the IT crisis 2001 & 2003; During the IT crisis the ECB deposit facility decreased by 200ps in that period. Var 99,5% increases from -125 bps to 395 bps depending heavily on the interest rate levels
The impact of the financial crisis; end 2018 an 2019. ECB deposit facility decreased by 300bps in that period alone. Var 99,5% increases from -210 bps to 395 bps
Sample size ~ 4000


2Y Euro-swap one-year movements in percentage points (1999 to 6/2020)
The impact of the financial crisis end 2018 an 2019 and the IT crisis 2001 & 2003. Var 99,5% increases from -145 bps to 340 bps depending heavily on the interest rate levels
The impact of the financial crisis; end 2018 an 2019. Var 99,5% increases from -215 bps to 395 bps
Sample size ~ 4000


10Y Euro-swap one-year movements in percentage points (1999 to 6/2020)
The impact of the financial crisis end 2018 an 2019 and the IT crisis 2001 & 2003 was not relevant in terms on how it affected on the one-year Var 99,5% measure which is some -150 bps.
250 %
200 %
150 %
100 %
50 %
0 %
-50 %
-100 %
-150 %
-200 %
0
500
1000
1500
2500
3000
3500
4000
Sample size ~ 4000

3. ANNEX 2 – QUALITATIVE INTEREST RATE ASSESSMENT

In the tables below an example is provided on how a qualitative risk assessment could be done. By using this the aim is to find what are the main drivers for Euro risk free interest rate changes in a low yield environment.

Used measures for assessing the interest rate changes	
High (+)	over 50 bps increase
Medium (+)	20 to 50 bps increase
Low (+)	below 20bps increase
Low (-)	below 20bps decrease
Medium (-)	20 to 50 bps decrease
High (-)	over 50 bps decrease
Fast	Happening in a month
Medium	Happening in a year
Long	Takes several years to devellop fully
Example: High (+) / Fast	Strong hedging impact on the particular change that happens quite fastly
Example: Low (-) / Medium	Small decreasing effect on interest rates because of the particular change that can be observed in the interest rates fully in a 1 year

A qualitative way of assessing the risk profile behind Euro-swap rates in a low interest rate environment (2014 onwards)

What are the drivers changing Euro risk free yields? (read more)	Historical impact on Euro-swap curve maturity points (2014 onwards)		Possible future impact on Euro-swap curve maturity points		The estimated rapidity of the impact
	Short Maturity (< 3Y)	Long Maturity (> 10Y)	Short Maturity (< 3Y)	Long Maturity (> 10Y)	
The neutral real rate of interest	Low (-)	Low (-)	Low (-)	Low (-)	Long
Euro area inflation short & long term expectations	Low (-)	Low (-)	Low (-)	Low (+)	Medium
ECB actions	Low (-)	Medium (-)	Low (-)	Low (-)	Medium
The negative interest rates policy by change of the official rates; deposit facility and refinancing rate	Low (-)	Low (-)	Low (-)	Low (-)	Medium
Quantitative easing	Medium (-)	High (-)	Low (-)	Low (-)	Medium
Forward guidance	Low (-)	Medium (-)	Low (-)	Low (-)	Medium
Other ways to control unexpected situations; Stock market crises etc.			Low (-)	Low (-)	Medium
Investment alternatives for risk free rates	Low (+)	Low (+)	Low (+)	Low (+)	Long
Investing into cash	Low (+)	Low (+)	Low (+)	Low (+)	Long
Investing into other highly qualified asset classes	Low (+)	Low (+)	Low (+)	Low (+)	Long
Investing into alternative asset classes that are considered liquid (e.g. gold, raw materials)	Low (+)	Low (+)	Low (-)	Low (+)	Medium
The rise of digital currencies			Low (-)	Low (-)	Long
By central banks			Low (-)	Low (-)	Long
By private sector providers			Low (-)	Low (-)	Long
Changes in how Euro-swaps are used in the market	Low (-)	Low (-)	Low (+)	Low (-)	Medium
Increasing of individual citizens mortgage payment cap/floor hedges	Low (+)	Low (+)	Low (+)	Low (+)	Medium
Increasing of institutional investors (economic) ALM purposes to hedge own funds	Low (-)	Medium (-)	Low (-)	Low (-)	Long
Increasing of insurers appettite to lower their SCR requirement	Low (-)	Low (-)	Low (-)	Medium (-)	Long
Option pricing purposes	Low (+)	Low (+)	Low (+)	Low (+)	Fast
Changes in overnight indexes (EONIA, ESTER)	Low (-)	Low (-)	Low (-)	Low (-)	Fast
Convexity bias / Term Premium?		Low (-)	Low (-)	Low (-)	Fast
New fundamental changes to existing market			Low (-)	Low (-)	Long
NEW OWN CATEGORY			Low (+)	Low (+)	Long
TOTAL estimated impact in a low interest rate environment for fast/medium term			**Low (-)**	**Low (-)**	**Fast /Medium**
TOTAL estimated impact in a low interest rate environment for long term			**Low (-)**	**Low (-)**	**Long**

What are the drivers changing Euro risk free yields?	Examples / further information	Drivers fast to Medium term	Possibility of the event?	Drivers long term	Possibility of the event?
read more					
The neutral real rate of interest	read more			Yes	
Euro area Inflation short & long term expectations	read more	Yes			
ECB actions		Yes			
The negative interest rates policy by change of the official rates; deposit facility and refinancing rate	read more	Yes			
Quantitative easing		Yes			
Forward guidance	read more	Yes			
Other ways to control unexpected situations; Stock market crises etc.		Yes			
Investment alternatives for risk free rates				Yes	
Investing into cash	read more			Yes	
Investing into other highly qualified asset classes	read more			Yes	
Investing into alternative asset classes that are considered liquid (e.g. gold, raw materials)		Yes			
The rise of digital currencies				Yes	
By central banks	read more			Yes	
By private sector providers				Yes	
Changes in how Euro-swaps are used in the market		Yes			
Increasing of individual citizens mortgage payment cap/floor hedges	read more	Yes			
Increasing of institutional investors (economic) ALM purposes to hedge own funds	read more			Yes	
Increasing of insurers appettite to lower their SCR requirement				Yes	
Option pricing purposes	read more	Yes			
Changes in overnight indexes (EONIA, ESTER)	read more	Yes			
Convexity bias / Term Premium?	read more	Yes			
New fundamental changes to existing market	read more			Yes	
NEW OWN CATEGORY	read more			Yes	
TOTAL estimated impact in a low interest rate environment for fast/medium term	read more	**Total impact of all drivers**	100 %		
TOTAL estimated impact in a low interest rate environment for long term	read more			**Total impact of all drivers**	100 %