Euro Bond Markets

A Research Publication by DZ BANK AG

Methodological approach to overall bond market strategy

BONDS

Completed
30 Apr 2020 10:40

www.research.dzbank.de
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DZ BANK Fixed Income Research analyses, *inter alia*, the bond market classes of EMU government bonds ("government bonds"), Agency bonds (Agencies), covered bank bonds ("covered bonds"), corporate bonds of the financial industry ("bank bonds", senior unsecured) and non-financial industry corporate bonds ("corporate bonds", senior unsecured). Bonds in this sense are senior unsecured bonds of the issuers that we cover in the relevant classes who meet the index provider's requirements with regard to rating, outstanding volume, public placement, currency, coupon characteristics and liquidity in trading. The respective analyses do not include a credit rating within the meaning of Regulation (EU) 1060/2009 of 16 September 2009 regarding rating agencies.

The above-mentioned bond classes are combined as part of an overall market strategy to formulate a recommendation for the individual market segments in terms of underweighting, overweighting or neutral weighting. These weightings relate to the respective peer group, which means that they apply to the above-mentioned bond market classes that DZ BANK Fixed Income Research analyses. The iBoxx index family serves as a benchmark for this purpose. Our weighting recommendations are not recommendations of specific issuers or bonds.

The DZ BANK Fixed Income Strategy Total Return model is central to our strategy in the fixed income area. This model aims to forecast the total return performance of the iBoxx indices that represent the individual bond segments. The forecast horizons are three, six and twelve months. The total return computation takes place in three steps:

As a first step, we compute the effect of the forecasted changes in the interest rate environment on the total return performance of the indices (interest rate component).

As a second step, we compute the effect of the forecasted changes in the risk premiums of the individual bond classes on the total return performance of the indices (credit component).

As a third and final step we add up the results from the first two steps, thus arriving at our total return forecast for the individual iBoxx indices.

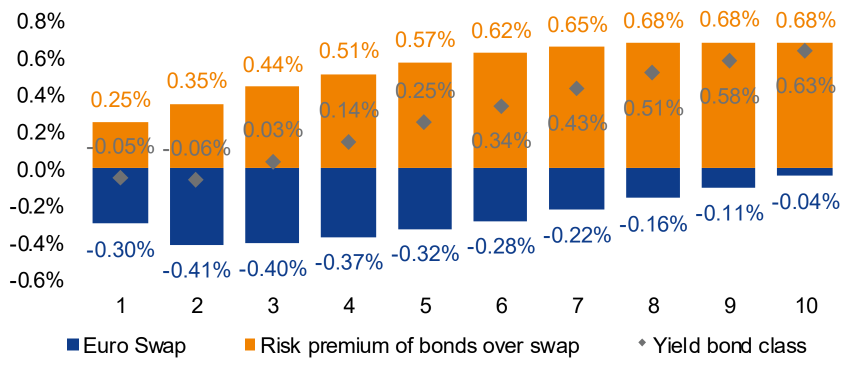
The result is an overall recommendation based on the views of DZ BANK Fixed Income Research regarding the individual bond market segments, and their relative interactions, that dovetails with DZ BANK Research's overall market assessment.

THE BASIS OF THE TOTAL RETURN MODEL

Two components: interest rate and credit

The aim of the DZ BANK Research Fixed Income Strategy Total Return model is to forecast the total return performance of the underlying iBoxx indices for periods of three, six and twelve months. The forecast total return performance consists of two components: the effect of any changes in the interest rate environment on the respective indices (interest rate component) and the effect of any changes in risk premiums within the individual bond classes on the respective indices (credit component). Adding these two components results in the total return forecast for the respective iBoxx indices.

DIVISION OF RETURN INTO INTEREST RATE AND CREDIT COMPONENT



Source: Bloomberg, DZ BANK Research

The individual iBoxx indices form the basis

As part of DZ BANK Fixed Income Research's overall market strategy, we are currently analysing the following bond segments:

ANALYSED BOND CLASSES AS PART OF THE OVERALL MARKET STRATEGY

Bond class	Underlying iBoxx index
Government bonds	iBoxx € Eurozone 1-10 Total Return Index
Agency bonds	iBoxx € Agencies Total Return Index
Covered bonds	iBoxx € Covered Total Return Index
Bank bonds	iBoxx € Banks Senior Total Return Index
Corporate bonds (outside the financial sector)	iBoxx € Non-Financials Senior Total Return Index

Source: Markit, DZ BANK Research

STEP 1: COMPUTATION OF THE INTEREST RATE COMPONENT

The residual term of the index plays an important role

DZ BANK Research's monthly interest rate forecasts also include a projection of any changes in euro swap rates with a view to the next three, six and twelve months. The swap rates that are relevant for the specific iBoxx indices we follow are calculated, first of all, by determining the required full-year data points on the swap curve as per the residual term of the respective index. For example: the iBoxx € Banks Senior Total Return Index (bank bonds) currently has a calculated average residual term of 4.35 years. Accordingly, the current euro swap rates for terms of three, four and five years as well as their forecast changes are required to perform the computations within the model. In our example, these rates are as follows:

EXAMPLE: EURO SWAP RATE FORECASTS

	3 years residual term	4 years residual term	5 years residual term	4.35 years residual term	3.35 years residual term
Current swap rate	-0.26%	-0.20%	-0.15%	-0.18%	-0.24%
Swap rate forecast +3M	-0.21%	-0.19%	-0.15%	-0.18%	
Swap rate forecast +6M	-0.22%	-0.19%	-0.15%	-0.18%	
Swap rate forecast +12M	-0.18%	-0.17%	-0.14%	-0.16%	

Source: DZ BANK Research

Determination of the relevant euro swap rates

The above full-year data are then used to calculate the current euro swap rate with a residual term of 4.35 years using linear interpolation, in line with the residual term of the underlying bank bond index. In the same manner, the 4.35-year swap rate is then computed on the basis of our forecasts with a view to the next three, six and twelve months. In addition, we also determine a current euro swap rate with a residual term of 3.35 years, which is necessary for the computation of the roll-down effect.

Computation of price changes

After the required euro swap rates have been derived, the percentage price change of the iBoxx index can be computed for three-, six- and twelve-month horizons, based on the forecast euro swap rate changes.

COMPUTATION OF PRICE CHANGES ON THE BASIS OF SWAP RATE PROJECTIONS

	4.35 years residual term	Projected price changes
Current swap rate	-0.18%	
Swap rate forecast +3M	-0.18%	-0.03%
Swap rate forecast +6M	-0.18%	-0.03%
Swap rate forecast +12M	-0.16%	-0.08%

Source: DZ BANK Research

Computation of interest-rate carry

In a further step, the interest-rate carry of the index is ascertained for the same forecast periods. For the three-month horizon, the current 4.35-year euro swap rate yield is divided by four. For the six-month horizon, the value is halved accordingly. With a view to the twelve-month period, the current swap rate yield is used unchanged.

Computation of interest-rate roll-down

To determine the interest-rate roll-down component, the percentage change in the price of the index is calculated on the basis of the roll-down effect between the swap rate yield with maturities of 4.35 years and 3.35 years. The result is the price effect for the forecast horizon of twelve months. For the forecast periods of six and three months, the price movement is halved respectively quartered.

COMPUTATION OF CARRY AND ROLL-DOWN ON THE BASIS OF SWAP RATE PROJECTIONS

	4.35 years residual term	3.35 years residual term	Interest-rate carry	Interest-rate roll-down
Current swap rate	-0.18%	-0.24%		
Swap rate forecast +3M	-0.18%		-0.05%	0.05%
Swap rate forecast +6M	-0.18%		-0.09%	0.09%
Swap rate forecast +12M	-0.16%		-0.18%	0.19%

Source: DZ BANK Research

Total return on the basis of the interest rate component

Finally, the price changes, interest-rate carry and interest-rate roll-down that were computed for the various forecast horizons are added. The outcome is the total return performance of the individual iBoxx index with a view to three, six and twelve months, based on the changes in the interest-rate environment. This concludes the computation of the first component, i.e. the interest-rate component, of the entire total return calculation.

COMPUTATION OF THE TOTAL RETURN ON THE BASIS OF SWAP RATE PROJECTIONS

	Projected price changes	Interest-rate carry	Interest-rate roll-down	Total return on the basis of the interest-rate component
+3M	-0.03%	-0.05%	0.05%	**-0.03%**
+6M	-0.03%	-0.09%	0.09%	**-0.03%**
+12M	-0.08%	-0.18%	0.19%	**-0.08%**

Source: DZ BANK Research

STEP 2: COMPUTATION OF THE CREDIT COMPONENT

The focus is on the risk premium compared to the asset swap spread

In connection with the computation of the credit component, the asset swap spread notation of the iBoxx indices examined takes centre stage. The asset swap spread notation is derived as the average of all risk premiums (compared to the asset swap spread curve) of the bonds contained in the index.

Computation of price changes

In order to ascertain the percentage price change of the indices as a function of the change in the credit component, DZ BANK Research first of all prepares a forecast of the change in the asset swap spread notation of the indices with a view to the next three, six and twelve months. Using these asset swap spread forecasts, the price change based on the credit component can be computed directly. The above example calculation for the bank bond index is continued below. In the example, the iBoxx € Banks Senior Index currently trades with an asset swap spread of 56 basis points, or 0.56%. Our forecasts project a decline of the risk premium to 55 basis points over a three-month horizon and an increase to 60 basis points over a six- and twelve-month horizon. Accordingly, the index price would change by 0.06%, -0.14% and -0.12% respectively on the current price level over the respective forecast horizons.

COMPUTATION OF PRICE CHANGES ON THE BASIS OF THE ASSET SWAP SPREAD FORECASTS

	Asset swap spread iBoxx € Banks Senior	Projected price changes
Current	0.56%	
Forecast +3M	0.55%	0.06%
Forecast +6M	0.60%	-0.14%
Forecast +12M	0.60%	-0.12%

Source: DZ BANK Research

Computation of credit carry

As a second step, the carry of the risk premium is also computed for the three forecast horizons with regard to the credit component of the model. For this purpose, the full amount of the current risk premium (asset swap spread notation of the index) is used as the credit carry for the twelve-month horizon. With a view to the next six months, the value is halved, and for the three-month horizon, the value is quartered, as shown in the table below.

COMPUTATION OF CREDIT CARRY ON THE BASIS OF THE ASSET SWAP SPREAD

	Asset swap spread iBoxx € Banks Senior	Credit carry
Current asset swap spread	0.56%	
Credit carry +3M		0.14%
Credit carry +6M		0.28%
Credit carry +12M		0.56%

Source: DZ BANK Research

Determination of asset swap spread curves

In order to compute the roll-down of the credit component, first of all, an asset swap spread curve must be derived for the respective index. For this purpose, we start by computing the asset swap spread curves for each rating class (AAA, AA, A, BBB) within each bond class, with our universe consisting of bonds of the respective index that possess the relevant average rating. Thereafter, the rating curves are multiplied with the percentage weighting of the rating class in the respective iBoxx index, and then all rating curves are added together to obtain a single asset swap spread curve for each bond class. In the bank bond index, for example, the share of bonds with an average rating in the AA area is currently 20.6%, the share of bonds rated in the A area is 59.4%, and the share of bonds rated in the BBB area is 20.0%. The index does not contain any bonds with the top score of AAA. The summed-up asset swap spread curve for the bank bond sector therefore presents as follows:

COMPUTED ASSET SWAP SPREAD CURVE IN THE BANK BOND SECTOR

Residual term (in years)	1	2	3	4	5	6	7	8	9	10
Asset swap spread bank bonds (in bps)	19	29	38	46	52	57	60	62	63	62

Source: DZ BANK Research; bps = basis points

Computation of credit roll-down

For the computation of the roll-down of the credit component, the average residual term of the individual index is, once again, a key element. In our example calculation, this term is 4.35 years for the iBoxx € Banks Senior Index. To compute the asset swap spread for a residual term of 4.35 years, we once again use a linear interpolation over a four- and a five-year period. In addition, the asset swap spread with a residual term of 3.35 years is also ascertained. To determine the credit roll-down component, the percentage price change of the index is calculated on the basis of the roll-down effect between the credit yields with maturities of 4.35 years and 3.35 years. The result is the price effect for the forecast horizon of 12 months. For the forecast periods of six and three months, the price movement is halved or quartered as follows:

COMPUTATION OF CREDIT ROLL-DOWN ON THE BASIS OF THE ASSET SWAP SPREAD

	ASW 3Y	ASW 4Y	ASW 5Y	ASW 4.4Y	ASW 3.4Y	Credit roll-down
Current asset swap spread	0.38%	0.46%	0.52%	0.48%	0.41%	
Credit roll-down +3M						0.06%
Credit roll-down +6M						0.12%
Credit roll-down +12M						0.24%

Source: DZ BANK Research; ASW = asset swap spread

Total return on the basis of the credit component

When adding the computations of the price changes, the credit carry and the credit roll-down, we arrive at a credit total return forecast for the relevant iBoxx index on the basis of the credit component. This concludes the computation of the second component of our model.

COMPUTATION OF TOTAL RETURN ON THE BASIS OF THE ASSET SWAP SPREAD FORECASTS

	Projected price changes	Credit carry	Credit roll-down	Total return on the basis of the credit component
+3M	0.06%	0.14%	0.06%	**0.26%**
+6M	-0.14%	0.28%	0.12%	**0.26%**
+12M	-0.12%	0.56%	0.24%	**0.68%**

Source: DZ BANK Research

STEP 3: COMPUTATION OF TOTAL RETURN FORECAST

The goal: total return forecast of the iBoxx indices

As mentioned above, the aim is to compute a total return forecast for the examined iBoxx indices over time horizons of three, six and twelve months. To achieve this goal, the total return computations from the interest-rate component (step 1) and the credit component (step 2) has to be added together in a third and final step. The final computation for our bank bond example calculation is as follows:

COMPUTATION OF THE TOTAL RETURN FORECAST FROM THE TWO COMPONENTS

	Total return on the basis of the interest-rate component	Total return on the basis of the credit component	Total return forecast for the iBoxx € Banks Senior Index
+3M	-0.03%	0.26%	**0.23%**
+6M	-0.03%	0.26%	**0.23%**
+12M	-0.08%	0.68%	**0.60%**

Source: DZ BANK Research

FINAL WEIGHTING RECOMMENDATION

Three weighting recommendations:
- Overweight
- Neutral weight
- Underweight

The total return computations of all bond segments examined by the model serve as a decision-making basis for the weighting recommendations for the individual bond segments. The final weighting recommendation follows after the computed performance indicators have been integrated into a general holistic market picture. If overarching factors, such as the economic environment, geopolitics, economic and general policies, regulation and monetary policy of the market background, render it expedient to deviate from the computed weighting recommendations, it is up to the individual analyst's discretion (as an expert) to do so. In the interest of making our decision-making process transparent for the readers of our studies, we will also provide the reasons for any deviation from the computed weighting recommendations in the relevant study. The weighting recommendations as part of the Fixed Income overall market strategy relate to the relative comparison of, at present, five bond segments within our overall market strategy. The overall market strategy currently includes the bond segments of government bonds, agency bonds, covered bonds, bank bonds (senior unsecured) and corporate bonds (senior unsecured). There are three weighting recommendations in total:

- "Overweighting" denotes an expectation that, according to the total return computations, the respective bond segment will significantly outperform all five bond segments on average, both in a rising and a falling total market scenario.

- "Underweighting" denotes an expectation that, according to the total return computations, the respective bond segment will significantly underperform all five bond segments on average, both in a rising and a falling total market scenario.

- "Neutral weighting" denotes an expectation that, according to the total return computations, the respective bond segment will perform roughly in line with the average of all five bond segments.

A zero-sum game

The total of the relative weighting recommendations within the five bond segments always add up to zero. They are relative, i.e. if not all the segments mentioned are weighted "neutral", at least one bond segment is rated "overweight" and one bond segment is rated "underweight".

No correlation between the weighting recommendations within the individual bond segments

The weighting recommendations within our overall market strategy are independent of the weighting recommendations within the individual bond segments themselves – government bonds, agency bonds, covered bonds, bank bonds (senior unsecured), corporate bonds (senior unsecured) – as the individual bond segments have entirely different peer groups. For instance, the weighting recommendations within the bond sector of government bonds relate to issuer countries that are of no relevance at the weighting level within our overall market strategy.

Period of validity: six months

These three weighting recommendations will be valid for a period of six months.

I. IMPRINT

Published by:
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Competent supervisory authorities:
DZ BANK AG Deutsche Zentral-Genossenschaftsbank, Frankfurt am Main is subject to the supervision of the Federal Financial Supervisory Authority (BaFin) and the European Central Bank (ECB).
VAT ident. no.: DE114103491
Protection schemes: DZ BANK AG Deutsche Zentral-Genossenschaftsbank, Frankfurt am Main is a member of the officially recognised BVR Institutssicherung GmbH and the additional voluntary Sicherungseinrichtung des Bundesverband der Deutschen Volksbanken und Raiffeisenbanken e.V. (Protection Scheme of the National Association of German Cooperative Banks):
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"**Neutral weighting**" means that the above bond segment is expected to perform roughly as well as the average of the other bond segments in coverage over a six-month period, or that the risk profile is subject to strong

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The weighting recommendations for market segments or differently defined groups of different issuers are independent of the recommendations for individual issuers or those for higher or lower market segments. They are relative, i.e. if not all the segments mentioned are rated "neutral", at least one bond segment is rated "overweight" and one bond segment is rated "underweight". Therefore, the weighting recommendations are not an absolute statement of profit and loss.

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2.Sector strategy Corporate Bonds
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Weighting recommendations for market segments	six months
Overall market strategy	six months
Sector strategy Corporate Bonds	six months
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