Government bonds - Sensitivity Analysis

Even if a bond is finally redeemed at the promised nominal value (usually 100% of its face value), the price of it is subject to fluctuations during its lifetime. These price fluctuations are in direct negative correlation with the development of the (secondary) market yield for this sort of bond. If the market yield for this type of security increases (for example because the risk assessment made by market participants has deteriorated, or because the central bank's key interest rate increased), the market price of already existing bonds of this type will decrease, until they feature the same market yield. Because the coupon of bonds is usually fixed, it is only possible to achieve the same higher market yield till final maturity for a new sale through a price reduction of the existing bond traded in the secondary market.

This means de facto that bond prices decrease when the level of secondary market yields for this type of bond (type = comparable issuer/risk class/duration) rises. This price decrease is all the more considerable as the duration of the bond increases. The duration classifies the average capital lockup period in the bond, measured in years. The duration is above all determined by the remaining maturity of the bond – the longer the remaining maturity of the bond, the higher the duration of the bond and therefore the heftier the price decrease of the bond during an increase of the secondary market yield level.

In addition, with the help of an example the sensitivity of the market price (rate) of a bond to a change of (secondary) market yields and furthermore increasing duration will be shown.

Example:

The table shows the resulting price decrease of a bond (starting from a price of 100%) from every combination of the duration of a bond and a given increase of secondary market yield levels. For the decrease of the secondary market yield level, the same sensitivity applies as shown in the table, only in this case the price of this bond increases by the same amount instead of decreasing.

Table 1: new price of a government bond, starting from 100%, for a given increase of secondary market yield levels (in percentage points) dependent on the duration of the bond.

Yield increase on secondary market in percentage points	Duration in years										
	1	2	3	4	5	6	7	8	9	10	15
0.1	99.900	99.800	99.701	99.601	99.501	99.402	99.303	99.204	99.104	99.005	98.512
0.2	99.800	99.601	99.402	99.204	99.006	98.808	98.611	98.414	98.218	98.022	97.047
0.3	99.701	99.403	99.105	98.809	98.513	98.219	97.925	97.632	97.340	97.049	95.606
0.4	99.602	99.205	98.810	98.416	98.024	97.633	97.244	96.857	96.471	96.087	94.188
0.5	99.502	99.007	98.515	98.025	97.537	97.052	96.569	96.089	95.610	95.135	92.792
0.6	99.404	98.811	98.221	97.636	97.053	96.474	95.899	95.327	94.758	94.193	91.418
0.7	99.305	98.615	97.929	97.248	96.572	95.901	95.234	94.572	93.915	93.262	90.065
0.8	99.206	98.419	97.638	96.863	96.094	95.332	94.575	93.824	93.080	92.341	88.734
0.9	99.108	98.224	97.348	96.480	95.619	94.766	93.921	93.083	92.253	91.430	87.424
1	99.010	98.030	97.059	96.098	95.147	94.205	93.272	92.348	91.434	90.529	86.135
1.5	98.522	97.066	95.632	94.218	92.826	91.454	90.103	88.771	87.459	86.167	79.985
2	98.039	96.117	94.232	92.385	90.573	88.797	87.056	85.349	83.676	82.035	74.301

Specific example:

If for example, like shown in the table above, the secondary market yield level for a bond with a duration of 5 years (column 5) increases by 0.5 percentage points (row 5), the market price of this bond will decrease by about 2.5% (difference between the new market price of about 97.5 vs. the original price of 100%).

Typical reasons why the secondary market yield level should increase are for example an improvement of the economic outlook, the expectation that key interest rates will be increased in the near future by the central bank or even the fact that the central bank is actually increasing key interest rates.
The secondary market yield level for a specific bond type can also increase, if the market's risk assessment for this specific type of bond (for example Greek government bonds with a duration of about 5 years) deteriorates. In this case, the market will demand a higher yield to compensate for the higher risk it feels these papers entail. The secondary market yield level will increase accordingly as the market price of current bonds drops. Here, the same sensitivity numbers as presented in the previous table apply.

Data as of: 27 June 2016