3. government bond denominated in foreign currency – with fixed interest payment

MIFID classification
defensive

Government bonds denominated in a foreign currency are potential alternatives to regular term deposits. Foreign exchange government bonds are interest-bearing government securities denominated in EUR, USD, CHF, GBP or JPY with a maturity of typically several years. They are issued occasionally.

product description

Government bonds are issued by the Hungarian Debt Management Agency representing the foreign exchange debt of the Hungarian State for maturities longer than one year. The bond payments are guaranteed by the State.

Government bonds pay annually or semi-annually interest (coupon), **which is fixed as a percentage of the face value.** Government bonds can be purchased at the current price in every case, while at maturity the face value (typically EUR or USD 1 000-2 000) is repaid and you are entitled to all future interest payments of your bonds. Interest payments are fixed similarly to term deposits, thus the yield until maturity is predictable also for this instrument.

The **price of the government bond** gives today's value of the bond's future cash-flow (coupon+principal). (Present value of the bond's future cash-flow at the yield level at time of purchase). As the coupon payments and principal repayment occur at different dates the price can be interpreted as the sum of deposits with the same payments as the bond's cash-flow at the different expiries at the current market yield.

As most investors are concerned on the yield level the trading of the securities is based on the yield. The **yield of the bond** expresses the realised yield level for the whole tenor if the bond is held until maturity and the coupon payments are reinvested at the same yield level.

The usually liquid secondary market allows the sale of the security before maturity, thus if you need the invested amount you can **sell your government bonds,** however the time proportional yield will be uncertain, i.e. it can be lower or higher than the yield level at the time of purchase. Sale of a treasury bill does not involve additional costs as breaking the deposit in case of a term deposit, however the realised time proportional yield will be uncertain, i.e. it can be lower or higher than the yield level at the time of purchase. Generally speaking **it is not recommended to buy foreign exchange government bonds with longer tenor than the intended tenor of the investment,** as the liquidity of these securities is slightly weaker compared to forint government bonds, thus a sale before maturity may incur a loss even if market yields remain unchanged. **However, this risk does not exist if the bond is held until maturity.**

yield and price calculation of government bonds (with fixed coupon payments)

Calculating price from yield:

in case of remaining tenor is more than a year: **gross price =**

$$\sum_{i=1}^{n} \frac{\text{coupon}}{\left(1+\frac{\text{yield}}{100}\right)^{t}} + \frac{\text{notional}}{\left(1+\frac{\text{yield}}{100}\right)^{t}}$$

in case of remaining tenor is less than a year: **gross price =**

$$\sum_{i=1}^{n} \frac{\text{coupon}}{\left(1+\frac{\text{yield}}{100}\times\frac{k}{365^{a}}\right)^{t}} + \frac{\text{notional}}{\left(1+\frac{\text{yield}}{100}\times\frac{k}{365^{a}}\right)^{t}}$$

where:

- n = number of remaining coupon payments
- t = number of years until maturity, where the day count of the actual interest period must be taken into account (365 or 366)
- k = days remaining until maturity
- ^{a} = 366 in leap years

For example to calculate after coupon payment the gross price of a bond with annual 5% coupon payments (EUR 50 / piece) with a remaining tenor of 3 years and a face value of EUR 1 000 at 6.00% market yield, the following formula can be used:

$$\left(\frac{500}{(1+0.06)^{1}}\right)+\left(\frac{500}{(1+0.06)^{2}}\right)+\left(\frac{500}{(1+0.06)^{3}}\right)+\left(\frac{1000}{(1+0.06)^{3}}\right)=973.27$$

Prices of government bonds are typically quoted as a percentage rounded to 4 digits according to market convention. Thus the price of the bond in the example is 97.3270% as a percentage of the face value.

In case the bond's coupon payment is higher than the actual market yield, the price is higher than the face value, which is compensated by the above market coupon payments. Thus the price of a bond with the same parameters as above at 4% market yield:

$$\left(\frac{500}{(1+0.04)^1}\right)+\left(\frac{500}{(1+0.04)^2}\right)+\left(\frac{500}{(1+0.04)^3}\right)+\left(\frac{1000}{(1+0.04)^3}\right)=1027.751$$

i.e. the gross price of the bond will be 102.7751%.

Sale and purchase of government bonds are conducted at the gross price explained above. Gross price is the sum of **the accrued interest and the net price.** At coupon payment the owner of the bond receives the full payment for the interest period, therefore the buyer has to pay also the accrued interest (interest not yet paid for the time elapsed from the interest period)
Accrued interest is zero at the time of issuance or coupon payment, i.e. gross and net prices are equal. Otherwise:

$$\textbf{accrued interest} = \text{coupon\%} \times \frac{\text{days elapsed after the last interest payment}}{\text{number of days in the actual interest period (365 of 366)}} \times \text{nominal value}$$

If you wish to sell your investment **before maturity** the realised yield can be calculated as follows:

$$\textbf{realized yield} = \left(\frac{\text{gross selling price} + \text{reinvested value of received coupons}}{\text{gross buying price}}\right)^{\frac{365}{\text{days elapsed}}} - 1$$

example for buying government bond – held until maturity: an investor wishes to invest his EUR 100 000 for 3 years. Current market yield of 3-year euro government bonds is 7.35%. The current price of the government bond with 8% coupon and 3-years until maturity is 101.6950% (as a percentage of the face value), i.e. EUR 1016.95 / piece.

example for buying government bond – sold before maturity: an investor wishes to invest his EUR 200,000 for 3 years. He places EUR 100 000 in term deposit with 7.35% interest, while he buys euro government bonds for EUR 100,000 with 7.35% yield. The purchased security matures in 3 years and pays 8% coupon, the purchase is concluded right after coupon payment. One year (365 days) after the transactions he wishes to access EUR 100 000.
In this case he can choose from 2 solutions. The first possibility is to break his deposit. In this case however the bank pays only 1% sight interest, i.e. EUR 101 000 is repaid after the invested 100 000. The realised annual interest is 1%.
The other possibility is to sell his euro government bonds worth of HUF 100 million before maturity. In this case there are three scenarios depending on the evolution of the market yield. As the bonds are sold exactly one year after the purchase it is important to note that the transaction is right after coupon payment so the received interest can be reinvested at the actual market yield.

1. market yield **increases by 1%** - after one year of purchase the price of the government bond at 8.35% market yield is EUR 993,788. The investor also receives the 8% coupon, i.e. EUR 80. In sum he realises EUR 1073.788, which equals to **5.59%** realised yield.
2. market yield **unchanged** - after one year of purchase the price of the government bond at 7.35% market yield is EUR 1011.695 / piece. The investor also receives the 8% coupon, i.e. EUR 80. In sum he realises EUR 1091.695, which equals to **7.35%** realised yield.
3. market yield **decreases by 1%** - after one year of purchase the price of the government bond at 6.35% market yield is EUR 1030.103 / piece. The investor also receives the 8% coupon, i.e. EUR 80. In sum he realises EUR 1110.103, which equals to **9.16%** realised yield.

advantages

- held until maturity the government bond provides fixed yield
- possibility to earn interest similar to a term deposit, while in case you need to sell the investment before maturity there is no “break fee”, the price is based on the actual market yield
- if government bonds are bought with a longer tenor than intended you may realise better yield when selling before maturity (in case market yield decreased in the meantime)
- liquid instrument, the investment may be mobilized anytime

risks

- if you buy securities with longer tenor than you intend to invest the realised yield is uncertain. If you have to sell the government bonds before maturity, its value may be less than at time of purchase, i.e. the realised yield may be negative. This may occur if the sale is very shortly after the purchase relative to the tenor and/or the market yield increases significantly over the tenor.
- liquidity of foreign exchange bonds is slightly weaker compared to forint government bonds. Under extreme market circumstances (e.g. in November 2008) the market for government papers may be frozen for a short time. In such a case these securities cannot be sold or only at a very high yield level, which may cause significant losses or liquidity problems.
- government bonds bear the risk of default of the Hungarian State. In case of default the resulting loss of capital may be unlimited Moreover a default on foreign exchange debt is more probable as on forint debt (The latter can be avoided by money printing and inflation, whereas this is not possible with foreign exchange debt)
- if you or your company has expenditures not in the currency of the investment then you may incur exchange rate losses if the forint-foreign currency exchange rate moves unfavorably.
- chapter I/b.entitled “Risk Factors” of “K&H Treasury Handbook of Market Risk Management” lists those risks that do not originate exclusively from the nature of the product described here, but rather, from other factors.