**Course on Securities Statistics**

**Workshop 1**

**Valuation of Debt Securities**



**Workshop - Valuation of Debt Securities**

**Instructions**

Assuming that the market price of a debt security corresponds to its fair value (discounted cash flows at the prevailing market interest rate), calculate the following parameters for seven different types of securities:

1. issuing price,
2. premium or discount,
3. accrued interest (coupon and other implicit interest) for the whole life of the instrument and all relevant points in time, and
4. coupon payments.

For the same seven debt securities, obtain:

1. nominal value as the sum of the issue price plus all accrued and not paid interest,
2. market value based on the discounted cash flows at each point in time,
3. dirty and clean price at each point in time,
4. revaluations.

Based on these results, record the corresponding:

1. opening stocks,
2. transactions,
3. revaluations, and
4. closing stocks.

**Features of the Debt Securities**

***Debt security 1***

Face value: 1,000 d.c.

Coupon: 10% per year, paid at the end of the year.

Maturity: 3 years

***Debt security 2***

Face value: 1,000 d.c.

Coupon: 6% per year, paid at the end of the year.

Maturity: 3 years

***Debt security 3***

Face value: 1,000 d.c.

Coupon: 13% per year, paid at the end of the year.

Maturity: 3 years

***Debt security 4***

Face value: 1,000 d.c.

Coupon: No payment of coupon during the life of the security (zero-coupon bond)

Maturity: 3 years

***Debt security 5***

Face value: 1,000 d.c.

Coupon: 5% per year, paid at the end of the year.

Maturity: 3 years

Principal indexed to the consumer price index

For the calculation of the fair value, it is assumed that the inflation observed during the last 12 months will prevail in the future.

***Debt security 6***

Face value: 1,000 d.c.

Coupon: 10% per year, paid at the end of the year.

Maturity: 3 years

Principal indexed to the U.S. dollar

For the calculation of the fair value, it is assumed that the spot exchange rate observed at the end of the period will prevail in the future.

***Debt security 7***

Face value: 1,000 d.c.

Coupon: 6% per year, paid at the end of the year.

Maturity: 3 years

Principal indexed to the price of gold

For the calculation of the fair value, it is assumed that the price of gold will increase at the same rate observed during the last 12 months.

The following market developments were observed during this three-year period:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | End-Year 0 | End-Year 1 | End-Year 2 | End-Year 3 |
| Market interest rate | 10.0% | 9.0% | 10.5% | 12.0% |
| CPI (December year 0 = 100) | 100.00 | 104.50 | 111.30 | 117.00 |
| Inflation (last 12 months) | 5.24% | 4.50% | 6.51% | 5.12% |
| Exchange rate (d.c.xUS$) | 10.00 | 9.30 | 10.50 | 11.00 |
| Gold price (d.c.) | 100.0 | 105.0 | 110.0 | 109.0 |

**Notes**

1. Calculations are to be made at the time of issuance (end-year 0) and at the end of each year until maturity (end-year 3), before and after coupons are paid.
2. Fair value is calculated with the formula:

where: Cash flowt = cash flow in period t,

n = number of future periods for which cash flows are expected,

i = discount rate, which for this exercise is the market interest rate at the beginning of the period.

1. The market interest rate observed at any point in time, used to discount the cash flows, is assumed to remain constant until the end of the life of the securities.
2. Clean price is calculated as the difference between market price (in this exercise, present value) of the debt securities and accrued and not paid interest on coupons.