**Paper:** CIA.Accting (CIA.Accting) 01a-Question

**Problem:** 01

**Problem Type:** Calculate the change in (NI, OCI, Eq) due to the change in bond yield as given below.

**Formula**

chg(NI) = chg(PV(FVO)) - chg(APV(Liabs))

chg(OCI) = chg(PV(AFS))

**Formula**

chg(Eq) = chg(NI) + chg(OCI)

**Given:**

| | | | | | |
|---|---|---|---|---|---|
| data as of CY | 2016 | | | | |
| original bond yield: | 2.50% | | *** other bond info: next page** | | |
| new bond yield: | 3.50% | | *** original + MfAD(inv) o.w. lots of extra calcs** | | |
| PV(@ 2.5%) for FVO bonds: | **42,361** | | | | |
| PV(@ 2.5%) for AFS bonds: | **13,444** | | | | |
| PV(@ 3.5%) for FVO bonds: | **41,952** | | | | |
| PV(@ 3.5%) for AFS bonds: | **13,314** | | | | |
| NU (Net Unpaid): | 37,000 | | | | **see page** |
| MfAD(clms): | 7.00% | | APV(NU(@ 2.5%): | **38,294** | <= 04b |
| MfAD(inv): | 100 | bps | APV(NU(@ 3.5%): | **37,501** | <= 05b |
| | % cum pd | | | | |
| at end of 2017 | 30% | | | | |

| | |
|---|---|
| chg(NI) = | 383 |
| chg(OCI) = | -130 |
| chg(Eq) = | 254 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| chg(NI) | = | -409 | - | -793 | = | 383 | | |
| chg(OCI) | = | | | | = | -130 | | |
| | | | | | | 254 | = | chg(Eq) |

**Paper:** CIA.Accting (CIA.Accting) 02a-Question
**Problem:** 01a
**Problem Type:** Calculate the PV of the cash flows for each class of bond at the **ORIGINAL** bond yield

**Concept:**

| | | | | |
|---|---|---|---|---|
| **PRIOR TO** maturity date: | | CF(bond) | = | coupon |
| **AT** maturity date: | | CF(bond) | = | coupon + (par value) |
| | where | coupon | = | (coupon rate) x (par value) |

**Given:**

| | | |
|---|---|---|
| PV date: | 2016 | * yr-end |
| bond yield: | 2.50% | |

| | bond #1 | bond #2 | bond #3 | bond #4 | |
|---|---|---|---|---|---|
| class | FVO | FVO | FVO | AFS | |
| maturity | 2017 | 2017 | 2017 | 2017 | * yr-end |
| coupon rt | 6.00% | 5.00% | 7.00% | 6.00% | |
| # coupons/yr | 1 | 1 | 1 | 1 | |
| par value | 15,000 | 15,000 | 11,000 | 13,000 | |

**Assume:** All pmts are made AT THE END of the year

PV(FVO) = 42,361 PV(AFS) = 13,444 (CIA.Accting) 02b-Answer

| timing | bond #1 | bond #2 | bond #3 | bond #4 |
|---|---|---|---|---|
| 2017 | 15,900 | 15,750 | 11,770 | 13,780 |
| 2018 | | | | |
| 2019 | | | | |
| 2020 | | | | |

| Totals | |
|---|---|
| FVO | AFS |
| 43,420 | 13,780 |
| 0 | |
| 0 | |
| 0 | |

| Discounting | |
|---|---|
| FVO | AFS |
| 42,361 | 13,444 |
| 0 | |
| 0 | |
| 0 | |
| 42,361 | 13,444 |

**Paper:** CIA.Accting (CIA.Accting) 03a-Question
**Problem:** 01b
**Problem Type:** Calculate the PV of the cash flows for each class of bond at the **NEW** bond yield

**Concept:**

| | | | | |
|---|---|---|---|---|
| **PRIOR TO** maturity date: | | CF(bond) | = | coupon |
| **AT** maturity date: | | CF(bond) | = | coupon + (par value) |
| | where | coupon | = | (coupon rate) x (par value) |

**Given:**

| | | |
|---|---|---|
| PV date: | 2016 | * yr-end |
| bond yield: | 3.50% | |

| | bond #1 | bond #2 | bond #3 | bond #4 | |
|---|---|---|---|---|---|
| class | FVO | FVO | FVO | AFS | |
| maturity | 2017 | 2017 | 2017 | 2017 | * yr-end |
| coupon rt | 6.00% | 5.00% | 7.00% | 6.00% | |
| # coupons/yr | 1 | 1 | 1 | 1 | |
| par value | 15,000 | 15,000 | 11,000 | 13,000 | |

**Assume:** All pmts are made AT THE END of the year

PV(FVO) = 41,952 PV(AFS) = 13,314 (CIA.Accting) 03b-Answer

| timing | bond #1 | bond #2 | bond #3 | bond #4 |
|---|---|---|---|---|
| 2017 | 15,900 | 15,750 | 11,770 | 13,780 |
| 2018 | | | | |
| 2019 | | | | |
| 2020 | | | | |

| Totals | |
|---|---|
| FVO | AFS |
| 43,420 | 13,780 |
| 0 | |
| 0 | |
| 0 | |

| Discounting | |
|---|---|
| FVO | AFS |
| 41,952 | 13,314 |
| 0 | |
| 0 | |
| 0 | |
| 41,952 | 13,314 |

**Paper:** CIA.Accting
**Problem:** 02a
**Problem Type:** Calculate APV(NU) at **ORIGINAL** bond yield

**Note:** This APV calc works slightly differently from MfAD:

**MfAD:** - for given **AY**, use (unpd at end of **CY**, pmt pattern) to project future pmts
assume pmts are made **mid-year**
pull **projected pmts** back to end of **CY** (0.5, 1.5, 2.5,…)

**Here:** - for given **CY**, use (unpd at end of **CY**, pmt pattern) to project future pmts
**pmts** are made **at end of year**,
pull **projected pmts** back to end of given **CY** (1, 2, 3,…)

**Assume:** pmt are made at end-of-yr

**Given:**

| | | | | |
|---|---|---|---|---|
| for AY: | 2016 | | | % cum pd |
| NU at 12 mths: | 37,000 | | at end of 2017 | 30% |
| CU at 12 mths: | 0 | | at end of 2018 | 55% |
| i: | 2.5% | | at end of 2019 | 100% |
| MfAD(inv): | 100 | bps | | |
| MfAD(clms): | 7% | | | |
| MfAD(re): | 0% | | | |

APV(NU(@2.5%) 38,294 (CIA.Accting) 04b-Answer

| timing | % pd in period | | NU | | 2.5% disct'ing | | 2.5% NU(@i) | | 1.50% disct'ing | | 1.50% NU(@i') |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | 0.300 | x | 37,000 | / | 1.025 | = | 10,829 | \| | 1.015 | ---> | 10,936 |
| 2018 | 0.250 | x | 37,000 | / | 1.051 | = | 8,804 | \| | 1.030 | ---> | 8,979 |
| 2019 | 0.450 | x | 37,000 | / | 1.077 | = | 15,461 | \| | 1.046 | ---> | 15,923 |
| check | 1.000 | | | | | | 35,095 | | | | 35,837 |
| | | | | | | x | 7% | *MfAD(clms)* | | | |
| | | | | | | | 2,457 | | | | |

Now, SUM the beige highlighted cells to get APV: 38,294

**Paper:** CIA.Accting
**Problem:** 02b
**Problem Type:** Calculate APV(NU) at **NEW** bond yield

**Note:** This APV calc works slightly differently from MfAD:

**MfAD:** - for given **AY**, use (unpd at end of **CY**, pmt pattern) to project future pmts
assume pmts are made **mid-year**
pull **projected pmts** back to end of **CY** (0.5, 1.5, 2.5,…)

**Here:** - for given **CY**, use (unpd at end of **CY**, pmt pattern) to project future pmts
**pmts** are made **at end of year**,
pull **projected pmts** back to end of given **CY** (1, 2, 3,…)

**Assume:** pmt are made at end-of-yr

**Given:**

| | | | |
|---|---|---|---|
| for AY: | 2016 | | % cum pd |
| NU at 12 mths: | 37,000 | at end of 2017 | 30% |
| CU at 12 mths: | 0 | at end of 2018 | 55% |
| i: | 3.5% | at end of 2019 | 100% |
| MfAD(inv): | 100 bps | | |
| MfAD(clms): | 7% | | |
| MfAD(re): | 0% | | |

APV(NU(@3.5%) 37,501 (CIA.Accting) 05b-Answer

| timing | % pd in period | | NU | | 3.5% disct'ing | | 3.5% NU(@i) | | 2.50% disct'ing | | 2.50% NU(@i') |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | 0.300 | x | 37,000 | / | 1.035 | = | 10,725 | \| | 1.025 | ---> | 10,829 |
| 2018 | 0.250 | x | 37,000 | / | 1.071 | = | 8,635 | \| | 1.051 | ---> | 8,804 |
| 2019 | 0.450 | x | 37,000 | / | 1.109 | = | 15,017 | \| | 1.077 | ---> | 15,461 |
| check | 1.000 | | | | | | 34,377 | | | | 35,095 |
| | | | | | | x | 7% | *MfAD(clms)* | | | |
| | | | | | | | 2,406 | | | | |

Now, SUM the beige highlighted cells to get APV: 37,501