FNCE611 Problem Set 2

Jessica Blum, Jordan Farrer, Marc Lanthemann

2017-02-13

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1 Corporate Bonds

1.1 Yield to Maturity

If the coupon rate is 7.25%, then every 6 months Whole Foods will pay $1000 \times \frac{0.0725}{2} = 36.25$. Thus we can calculate the yield to maturity in Dec 2015 as

$$PV = \frac{coupon}{(1+\frac{y}{2})^1} + \frac{coupon}{(1+\frac{y}{2})^2} + \cdots + \frac{FV + coupon}{(1+\frac{y}{2})^{20}} \tag{1}$$

$$998.79 = \frac{36.25}{(1+\frac{y}{2})^1} + \frac{36.25}{(1+\frac{y}{2})^2} + \cdots + \frac{1000 + 36.25}{(1+\frac{y}{2})^{20}} \tag{2}$$

where

```
ytm <- function(price, coupon, term, freq, prin = 100) {
    npv <- function(yld, term, cpn, freq, prin) {
        i <- 1:(term * freq)
        payment <- (coupon / freq) * prin
        disc <- (1 + yld / freq)
        sum(payment / disc^(i)) + prin /(disc^(term * freq))
    }
    uniroot(function(yld) npv(yld, term, cpn, freq, prin) - price,
interval=c(0,100), tol=0.000001)$root
}

y = ytm(price = 998.79, coupon = 0.0725, term = 10, freq = 2, prin = 1000)
```

$$y = 7.27\%$$

1.2 Spread

$$Spread = ytm_{Coupon} - ytm_{treasury\,security}$$

$$Spread = 7.27\% - 4.17\% = 3.1\%$$

2 Valuing Stocks

Our solution was created in a spreadsheet and produced below:

```r
waw <- gs_title("FNCE611") %>%  gs_read(ws = "2.2")

waw %>% pander(missing = "")
```

t	growth rate	eps	payout rate	div	r	pv
1		$1.90	10%	$0.19	13%	$0.168
2	15%	$2.19	10%	$0.22	13%	$0.171
3	15%	$2.51	20%	$0.50	13%	$0.348
4	15%	$2.89	20%	$0.58	13%	$0.354
5	15%	$3.32	20%	$0.66	13%	$0.361
6	8%	$3.59	50%	$1.79	13%	$0.862
6	8%	$3.88	50%	$1.94	13%	$18.618
NPV						$20.882

The current value of a share of WAW stock is **$20.882**.

3 Growing Perpetuity

From the perpetuity formula, we know the value of the contract will be the first payment divided by $r - g$. So,

$$Value = \frac{First\,Payment}{r-g} = \frac{0.002 \times \$350m}{r-g}$$

We also know that

$$r = dividend\,yield + growth\,rate$$

so

$$r - g = dividend\,yield = 0.04$$

Finally,

$$Value = \frac{0.002 \times \$350m}{0.04} = \$17.5m$$

4 NPV and Payback Rule

4.1 NPV

Project 1: $NPV = -1000 + \frac{1000}{1.10} = -90.91$

Project 2: $NPV = -2000 + \frac{1000}{1.10} + \frac{1000}{1.10^2} + \frac{4000}{1.10^3} + \frac{1000}{1.10^4} + \frac{1000}{1.10^5} = 4044.73$

Project 3: $NPV = -3000 + \frac{1000}{1.10} + \frac{1000}{1.10^2} + \frac{1000}{1.10^4} + \frac{1000}{1.10^5} = 39.47$

We see that Project 2 and Project 3 have positive NPV.

4.2 Payback Period

Project	Payback Period
1	1 year
2	2 years
3	4 years

With a cutoff period of three years, the firm would accept projects 1 and 2.

5 IRR

Two disadvantages of the IRR Rule include

1. If the NPV rule is not a smoothly declining function of discount rate, the IRR rule can give an answer that is different than the NPV rule (i.e. multiple rates of return)
2. When comparing mutually exclusinve projects, one project can have a higher IRR than another, but a lower NPV and a manager would want to pick the project with the higher NPV

6 Capital Budgeting

Our solution was created in a spreadsheet and produced below, assuming PPC has a tax rate of 35% and discount rate of 15%:

```
cap_budget1 <- gs_title("FNCE611") %>%  gs_read(ws = "2.6.1")

cap_budget1 %>%
  pander(missing = "", justify = c('left', 'right', 'right', 'right','right'))
```

Time	0	1	2	3
Investment	100			
Working capital	5	5	5	0
Asset sales				10
Sales		40	50	60
Costs		-10	0	0
Depreciation		-30	-30	-30
Pre-tax Profit		0	20	40
Taxes		0	7	14

```
cap_budget2 <- gs_title("FNCE611") %>%  gs_read(ws = "2.6.2")

cap_budget2 %>% pander(missing = "", justify = c('left', 'right', 'right', 'right','right'),
                       caption = "Net Cash Flows")
```

Table 4: Net Cash Flows

Time	0	1	2	3
Investment	-$100			
Working capital	-$5			$5
Sales		$40	$50	$60
Taxes		$0	-$7	-$14
Operating Cash Flow		$40	$43	$46
Asset sales				$10
Net Cash Flows	-$105	$40	$43	$61
PV	-$105.00	$34.78	$32.51	$40.11
NPV				$2.41

The NPV of the project is **$2.41m**.