Extra Problems – Part II
Finance
Summer 2019

1. Electronic Arts (EA) is contemplating the introduction of a new video game.

EA expects that the major cash outflows associated with the product will occur early in the product's life (e.g., research & development, test marketing, early promotion). These cashflows (all cashflows are in millions of dollars) are estimated to be $225 today, $200 one year from today, and $125 two years from today. EA will introduce the new game two years from now. Once the game is introduced, the product will then have a five-year life. EA forecasts that it will receive its first cash inflows as of the end of year three (when it anticipates a positive net cash inflow of $175). The remaining cash inflows will increase by 9% per year throughout the product's life.

If EA's required return is 16%, show whether it should introduce the new game.

PV of outflows

Period	CF	$\frac{1}{(1+r)^T}$	PV of CF
0	225	1.000	225
1	200	.8621	172
2	125	.7432	93
			490

PV of inflows

$$PVGA = C\left(\frac{1-\left(\frac{1+g}{1+r}\right)^T}{r-g}\right)$$

$$= 175\left(\frac{1-\left(\frac{1.09}{1.16}\right)^5}{.16-.09}\right)$$

$$= 175(3.8206)$$

$$= 669$$

Present Value of Growing Annuity (Ordinary). Cashflow of $175 occurs at end of year 3. Using present value of growing (ordinary) annuity formula provides value of cashflows as of end of year 2

$$PV = 669\left(\frac{1}{1.16^2}\right)$$

$$= 669(.7432)$$

$$= 497$$

Use present value formula to discount value as of end year 2 back to value of cash inflows as of today.

Since PV of inflows ($497) is greater than PV of outflows ($490), the project appears to be acceptable.

2. A brand manager at UnderArmour is considering the introduction of a new product. The new product will have a five-year life. Cashflows will occur at the end of each of the five years (with the first cashflows occurring one year from today).

The cash outflows are estimated to be $400 per year for every year of the product's life. The cash inflows from the sale of the product are estimated to be $312 at the end of the first year, and the cash inflows are expected to subsequently grow by 15% per year during the life of the product.

If UnderArmour's required return is 10%, explain whether the manager should introduce the new product.

Introduce new product if $NPV > 0$

PV of cash outflows = Present Value of Annuity (PVAN)

$$PVAN = C\left[\frac{1 - \frac{1}{(1+r)^T}}{r}\right] = 400\left[\frac{1 - \frac{1}{(1.10)^5}}{.10}\right] = 400(3.791) = 1516$$

PV of cash inflows = Present Value of Growing Annuity

$$PVGA = C\left[\frac{1 - \left(\frac{1+g}{1+r}\right)^T}{r-g}\right] = 312\left[\frac{1 - \left(\frac{1.15}{1.10}\right)^5}{.10 - .15}\right] = 312(4.978) = 1553$$

NPV = PV of cash inflows − PV of cash outflows

$37 = 1553 - 1516$

Since $NPV > 0$, the project initially appears to be acceptable

3. Kraft is contemplating the acquisition of the Soero Company (a bakery which manufactures a unique type of cookie). If it buys the Soero Company, Kraft expects to manufacture the cookie for 25 years. It will begin selling the cookie today. Kraft expects that the new product will generate cashflows of $10,000 per year. The first of the yearly cashflows will occur at the end of this year. If the interest rate (required rate of return) for Kraft is 10%, how much should Kraft be willing to spend today to acquire the Soero Company?

Present Value of annuity (PVAN) - ordinary

$$PVAN = C \times \left[\frac{1 - \frac{1}{(1+r)^T}}{r} \right]$$

$$= 10{,}000 \times \left[\frac{1 - \frac{1}{(1.10)^{25}}}{.10} \right]$$

$$= 10{,}000 \times 9.0770$$

$$= 90{,}770$$

Kraft should pay no more than $ 90,770 to buy the company

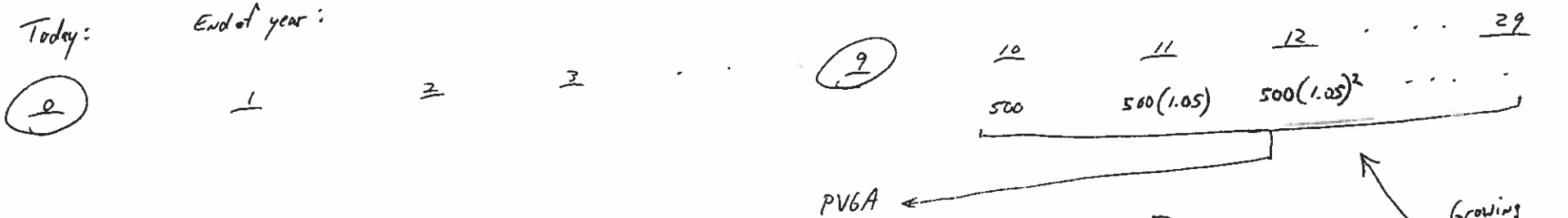
4. You are the CFO of a relatively young company. Your firm will not make any pension disbursements until 10 years from now (when expected retirees then will begin receiving cash benefits under your firm's defined benefits plan).

You predict that these retirees will receive annual payments for each of 20 years. Your first cash payment will be $500,000 and will be made 10 years from today. The subsequent cash payments will increase by 5% per year throughout the term of your obligation.

If your interest rate is 8%, what is the value today of your obligation?

See next page

4. Timeline



PVGA

$$PVGA = C \times \left[\frac{1 - \left(\frac{1+g}{1+r}\right)^T}{r - g}\right]$$

$$= 500 \times \left[\frac{1 - \left(\frac{1.05}{1.08}\right)^{20}}{.08 - .05}\right]$$

Growing Annuity

$T = 20$

$g = .05$

$r = .08$

$C = 500$

$7{,}179 = 500 \times 14.358$

Find Value as of today

Value as of end of year 9.

Treat as ordinary annuity as of end of year 9 since first cashflow of annuity begins one year later (year 10).

We could have also solved for value as of year 10 if used annuity due formula (since at year 10, first cashflow occurs instantaneously).

$$PV = C_T \times \frac{1}{(1+r)^T}$$

$$= 7{,}179 \times \frac{1}{(1.08)^9}$$

$$3{,}591 = 7{,}179 \times .500$$

Value today of the pension obligation is $\$3{,}591$ (assuming 8% discount rate).

5. If the G&P Corporation pays $21,000 today, it will acquire the rights to sell a very popular product. Your marketing department estimates that the product will be in demand throughout the foreseeable future (i.e., forever). For the year that ended yesterday, the product provided cashflows of $1,800. You expect the cashflows to grow by a constant rate every year. If your required return is 14%, what is the annual growth rate that the product must generate for this transaction to be favorable for G&P?

Use present value of growing perpetuity formula; solve for g where NPV = 0

Set present value of cash outflows = Present Value of cash inflows

$$21{,}000 = \frac{C_1}{r - g}$$

$$21{,}000 = \frac{1{,}800(1+g)}{.14 - g}$$

$C_1 = C_0(1+g)$

$= 1800(1+g)$

$$21{,}000(.14 - g) = 1{,}800(1+g)$$

$$2{,}940 - 21{,}000g = 1{,}800 + 1{,}800g$$

$$1{,}140 = 22{,}800g$$

$$.05 = g$$

The annual growth rate of the cash inflows must be at least 5% for this transaction to be favorable.