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Quiz 1 for the time value of money and annuity

> Monthly installment payment = $88.85
>
> Annual payment = $88.85 $\times$ 12 = $1066.2

Q1 ：**what is the fallacy in the sales person's reason, please explain your argument in detail.**

> 每期 88.85 元，應有 Time value，6.62% ≒ 7%，$r_{1/12}$=0.583%
>
> 1000 元貸款一年，實際上只能用 500 元的現值來估算

$$r \approx \frac{66.2}{(0+1000) \div 2} = 13.24\% .$$

Q2 ：**what will be the APR the car dealer charge you?**

$$PMT \times PVAF_{r,12} = 1,000$$

$$88.85 \times \frac{1 - \dfrac{1}{(1+r)^n}}{r} = 1,000 \qquad \therefore \ \textbf{r = 1\%, means APR = 12\%}$$

$$EAR = (1+r)^n - 1 = 1.01^{12} - 1 = 12.6825\%$$

Quiz 2

(1) Please explain the meaning of "agency problem"

A potential conflict of interests between the agent (manager) and (1) outside stockholders or (2) the creditors (debtholders). They get the glory but latters bear the cost. Some specific mechanisms used to motivate managers to avoid agency problem. Those are (1) Managerial compensation, (2) Direct intervention by shareholders, (3) The threat of firing and (4) The threat of takeovers (hostile takeovers).

(2) PV=-5,000K, APR=12%, npr=20 years, balloon=5 years

➤ balloon payment=partial amortization
→ Monthly mortgage payment = 5,000K/$PVAF_{1\%,240}$ = **$55,054.31**

➤ 已經還 5 年，還有多少未還？
→將未來 61~240 月之 amortization 折至現在值
Loan balance (balloon payment) = $55,054.31 \times PVAF_{1\%, 180}$ = **$4,587,216.72**

(3) CP=$100, forever, Opportunity rate=8%. What is the most you would pay for this bond?

➤ Perpetual Annuity

➤ $PVAF_{r,\infty} = \lim_{n \to \infty} \dfrac{1 - \dfrac{1}{(1+r)^\infty}}{r} = \dfrac{1}{r} \quad \because \lim_{n \to \infty} \dfrac{1}{(1+r)^\infty} = 0$

➤ $\lim_{n \to \infty} \dfrac{FV}{(1+r)^n} = 0$

➤ $\therefore \text{Vbond} = CP \times PVAF_{r,\infty} + \dfrac{FV}{(1+r)^\infty} = 100 \times \dfrac{1}{0.08} = 1,250$

(4) CP(annual)=$55, FV=$1,000, Mature=5 years, YTM=8%. What would you pay for the bond?

➤ Annual Coupon payment calculation, Coupon payment = CR*FV=$55

$$V_B = \sum_{i=1}^{n} \frac{CP}{(1+r)^i} + \frac{FV}{(1+r)^n} = \sum_{i=1}^{5} \frac{55}{(1.08)^i} + \frac{1,000}{(1.08)^5}$$

➤ 查表法：$= 55 \times PVFA_{8\%,5} + 1000 \times PVIF_{8\%,5}$

$= 55 \times 3.9927 + 1000 \times 0.6806 = 900.1985$

➤ 函數法：利用函數 PV(8%,5,-55,-1000)= **$900.1822**