

Running Head: FINANCE

Finance

**Question 1** (20 marks)

- a. You wish to borrow \$150,000 for one year and have obtained the following quotes from three institutions:
- X: 9% per annum effective
  - Y: 4.5% per six months, effective
  - Z: 8.5% per annum, compounded monthly
- i. What is the effective annual interest rate for each option?
  - ii. Which option will you choose?
- b.
- i. If you can deposit \$5,000 today into an account that earns an effective annual rate of 8% (compounded quarterly), how much will you have in the account in one year?
  - ii. Instead of making a single deposit today, you decide to make four equal quarterly deposits with the first one being in three months' time. How much would each deposit have to be to have the same amount in the account in one year, as in (b)(i) above?
  - iii. Instead of making a single deposit today, you decide to make four equal quarterly deposits with the first one being today. How much would each deposit have to be to have the same amount in the account in one year, as in (b)(i) above?
  - iv. Explain your results in (i) - (iii) above.

**Answer 1****a).**

i). Calculation of Effective Annual Interest Rate (EAR) for each Option:

Borrowing amount = \$150000

$$\text{Effective annual interest rate} = \left(1 + \frac{i}{m}\right)^m - 1$$

Where, m = number of compounding period per year

$$\text{Effective annual interest rate (for option X)} = \left(1 + \frac{0.09}{1}\right)^1 - 1$$

= 0.09 or 9%

$$\text{Effective annual interest rate (for option Y)} = \left(1 + \frac{2 \times 0.045}{2}\right)^2 - 1$$

$$= 0.092 \text{ or } 9.20\%$$

$$\text{Effective annual interest rate (for option Y)} = \left(1 + \frac{0.085}{12}\right)^{12} - 1$$

$$= 0.084 \text{ or } 8.84\%$$

Assumption: The interest rate for option Y is given for six month so, it is changed in per annum that is 9% (4.5\*2).

Option	APR	Effective annual interest rate (EAR)
X	9% per annum	9% per annum
Y	4.5% per six month	9.20% per annum
Z	8.5% per annum	8.84% per annum

ii).

On the basis of the effective annual interest rate (EAR), the borrower will choose the option Z due to lower interest rate that is 8.84% per annum. The cost of borrowing will be lower in option Z compare to other two options.

b).

i).

Deposit amount = \$5000

Effective annual interest rate (i) = 8% per annum compounded quarterly

Time period (n) = 1 year

$$\text{Future value (FV)} = \text{Present value} \times \left(1 + \frac{i}{m}\right)^{nm}$$

Where, m = 4 (compounded quarterly)

$$\begin{aligned}
 n &= \text{Number of years} \\
 &= \$5000 * (1 + 0.08/4)^{1*4} \\
 &= \$5000 * (1.08) \\
 &= \$5400
 \end{aligned}$$

So, I will have \$5400 in the account after one year with the effective annual interest rate of 8% on the deposit of \$5000.

**ii).**

Deposit amount = \$1250 quarterly (First one being in three month's time)

Effective annual interest rate (i) = 8% per annum compounded quarterly

Time period (n) = 1 year

$$\text{Future value (FV)} = \text{Present value} * \left(1 + \frac{i}{m}\right)^{nm}$$

Where, m = 4 (compounded quarterly)

n = Number of years

$$\begin{aligned}
 \text{Future value of payment} &= \$1250 * (1.02)^3 + \$1250 * (1.02)^2 + \$1250 * (1.02)^1 + \$1250 \\
 &= (1250 * 1.06) + (1250 * 1.04) + (1250 * 1.02) + 1250 \\
 &= 1325 + 1300 + 1275 + 1250 \\
 &= \$5150
 \end{aligned}$$

The quarterly deposit of \$1250 (First one being in three month's time) will have \$5150 in the account in one year. This amount will be less than the amount calculated in b (i).

**iii).**

Deposit amount = \$1250 quarterly (First one being today)

Effective annual interest rate (i) = 8% per annum compounded quarterly

Time period (n) = 1 year

$$\text{Future value (FV)} = \text{Present value} * \left(1 + \frac{i}{m}\right)^{nm}$$

Where,  $m = 4$  (compounded quarterly)

$n$  = Number of years

$$\text{Future value of payment} = \$1250 * (1.02)^4 + \$1250 * (1.02)^3 + \$1250 * (1.02)^2 + \$1250 * (1.02)^1$$

$$= (1250 * 1.08) + (1250 * 1.06) + (1250 * 1.04) + (1250 * 1.02)$$

$$= 1350 + 1325 + 1300 + 1275$$

$$= \$5250$$

The quarterly deposit of \$1250 (First one being today) will have \$5250 in the account in one year. This amount will be less than the amount calculated in b (i) but higher than the b (ii).

**Question 2** (40 marks)

For this question use the Yahoo! Finance website at <http://au.finance.yahoo.com/> for data. You should use a spreadsheet to help you analyse the data but make sure you show how the results were achieved and not simply put down the answer. This can be done by cutting and pasting tables from a spreadsheet into the final Word document. Make sure that the table is correctly labelled and fully explanatory. This also applies to the graphs that you will generate.

- a. Find the monthly holding period returns for the period 1 January 2009 – 31 December 2009 for Quantum Energy Limited (QTM), Brambles Limited (BXB) and the market (MKT) as proxied by the All Ordinaries index. The monthly holding period return is the return you would receive if you bought an asset on the first day of the month (opening price) and sold it on the last day of the month (closing price). Graph your results on one graph with returns on the y axis and time on the x axis. (Use 'Close' rather than 'Adjusted Close' for the selling price. Ignore any dividends.)
  - b. For QTM, BXB and MKT:
    - i. What is the average monthly holding period return?
    - ii. What is the annual holding period return?
    - iii. Calculate the standard deviation of the monthly rates of return.
    - iv. Plot your results from (ii) and (iii) above with risk on the x axis and return on the y axis.
    - v. Which asset(s) would you invest in and which asset(s) would you not invest in. Explain your choice.
  - c.
    - i. If the long term government bond rate is 5.3% and the long term market premium is 5%, the betas ( $\beta$ ) for QTM and BXB are 1.08 and 0.84 respectively, using the Capital Asset Pricing Model (CAPM) find the expected returns for QTM, BXB and MKT.
- ii. Construct the Security Market Line (SML) showing where QTM, BXB and MKT lie.
  - iii. Considering the returns as determined by the CAPM in (c)(i), and given your results in (b) explain why QTM and BXB appear to be overpriced, underpriced or correctly priced

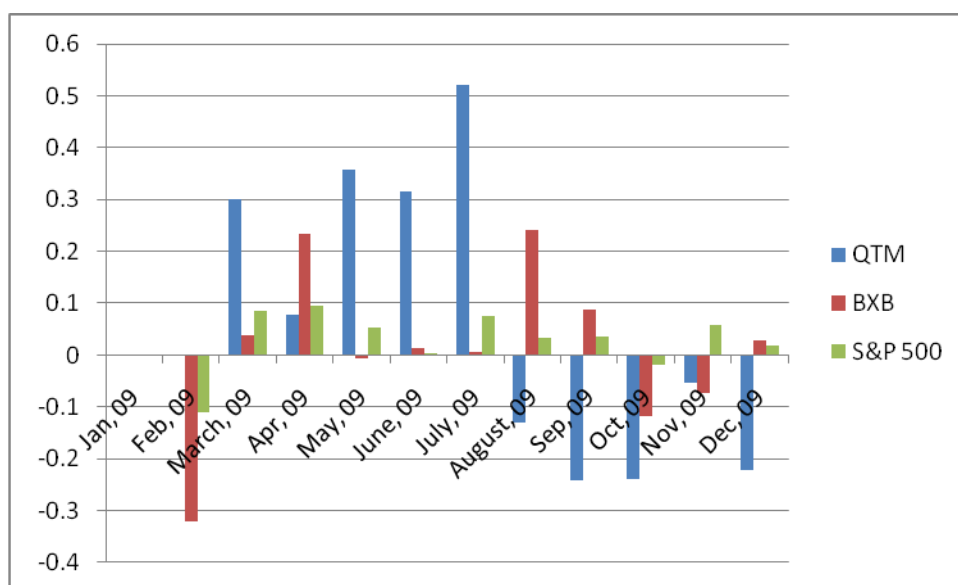
**Answer 2****(a).**

The monthly holding return for the stocks and market for the period 1 January 2009 to 31 December 2009 is calculated from the following formula –

Monthly return = (Next month value – first month value)/First month value

The following graph and table shows the monthly holding returns of QTM, BXB and S&P 500 index (Market) –

Month	Stock Price			Monthly Returns		
	QTM	BXB	S&P 500	QTM	BXB	S&P 500
Jan, 09	0.10	6.8	825.88			
Feb, 09	0.10	4.62	735.09	0%	-32.06%	-10.99%
March, 09	0.13	4.80	797.87	30%	3.90%	8.54%
Apr, 09	0.14	5.92	872.81	8%	23.33%	9.39%
May, 09	0.19	5.88	919.14	36%	-0.68%	5.31%
June, 09	0.25	5.96	919.32	32%	1.36%	0.02%
July, 09	0.38	5.99	987.48	52%	0.50%	7.41%
August, 09	0.33	7.43	1020.62	-13%	24.04%	3.36%
Sep, 09	0.25	8.08	1057.08	-24%	8.75%	3.57%
Oct, 09	0.19	7.12	1036.19	-24%	-11.88%	-1.98%
Nov, 09	0.18	6.60	1095.63	-5%	-7.30%	5.74%
Dec, 09	0.14	6.78	1115.10	-22%	2.73%	1.78%
		Total		68.10%	12.69%	32.15%



(b). i

Average monthly holding return – Total return/Number of months

Total return for QTM is 68.10% while it is obtained in 11 months. So, the average monthly holding period return for QTM =

$$= 68.10\%/11$$

$$= \mathbf{6.19\%}$$

Average monthly holding return for BXB =

$$12.69\%/11$$

$$= \mathbf{1.15\%}$$

Average monthly holding return for MKT (S&P 500 index) =

$$= 32.15\%/11$$

$$= \mathbf{2.92\%}$$

ii).

Annual holding return is calculated from the following formula =

$(\text{Value at 31 December 2009} - \text{Value at 1 Jan.2009})/\text{Value at an.2009}$

Annual holding return for QTM =

$$= 0.14 - 0.10 / 0.10$$

$$= \mathbf{40\%}$$

Annual holding return for BXB =

$$= 6.78 - 6.80 / 6.80$$

$$= \mathbf{-0.29\%}$$

Annual holding return for MKT (S&P 500 index) =

$$= 1115.10 - 825.88 / 825.88$$

$$= \mathbf{35.02\%}$$

iii)

Standard deviation for each security and market is calculated by using the excel solver.

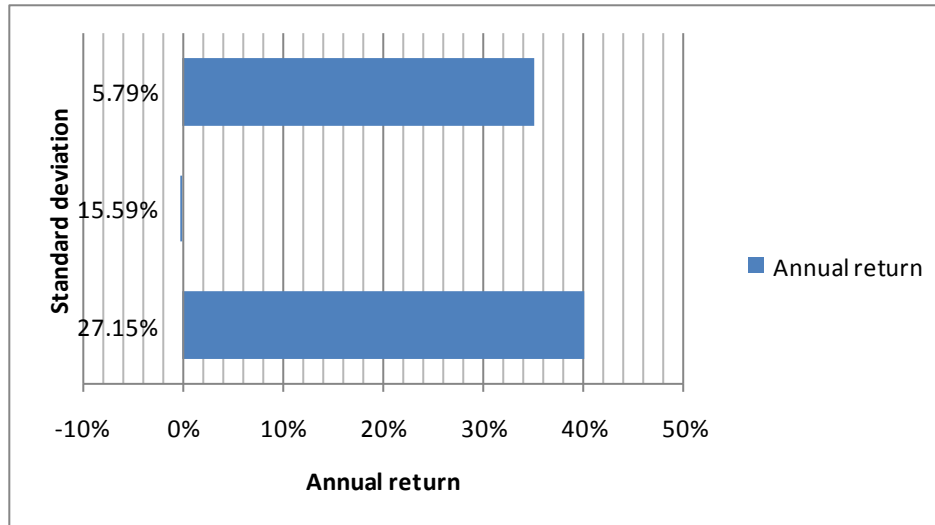
Manually it can be calculated by the following steps –

1. First subtract the average monthly rate from the monthly holding rate
2. Square the resulted return from the first step
3. Make total for each security resulted in second step
4. Divide by number of months to total
5. Calculate square root of variance calculated in step 4.

Standard deviation is calculated in the following table –

Month	Monthly Returns		
	QTM	BXB	S&P 500
Jan, 09			
Feb, 09	0%	-32.06%	-10.99%
March, 09	30%	3.90%	8.54%
Apr, 09	8%	23.33%	9.39%
May, 09	36%	-0.68%	5.31%
June, 09	32%	1.36%	0.02%
July, 09	52%	0.50%	7.41%
August, 09	-13%	24.04%	3.36%
Sep, 09	-24%	8.75%	3.57%
Oct, 09	-24%	-11.88%	-1.98%
Nov, 09	-5%	-7.30%	5.74%
Dec, 09	-22%	2.73%	1.78%
<b>Standard Deviation</b>	27.15%	15.59%	5.79%

iv).



v)

The above result describes that the investor should invest in the S&P 500 index and QMT as this security and market is providing higher return on investment. The risk is higher for QMT but at the same time, the return is also higher than other securities and market. On the other hand, the return from market is quite high with lower amount of risk than both the securities. The investor should not invest in the stock of BXB as it is providing a negative return with higher amount of risk that may affect the investment efficiency of the investor.

(c)

i).

Calculation of Exacted Return:

Risk free rate (government bond rate)  $R_F = 5.3\%$

Market premium ( $R_m$ ) = 5%

Beta for QTM ( $\beta$ ) = 1.08

Beta for BXB ( $\beta$ ) = 0.84

Beta for S&P 500 (MKT) = 1

The calculation of expected return by the capital asset pricing model will be –

$$\text{Expected return} = R_f + \beta * R_m$$

$$\text{Expected return (for QTM)} = 0.053 + 1.08 * 0.05$$

$$= \mathbf{10.7\%}$$

$$\text{Expected return (for BXB)} = 0.053 + 0.84 * 0.05$$

$$= \mathbf{9.5\%}$$

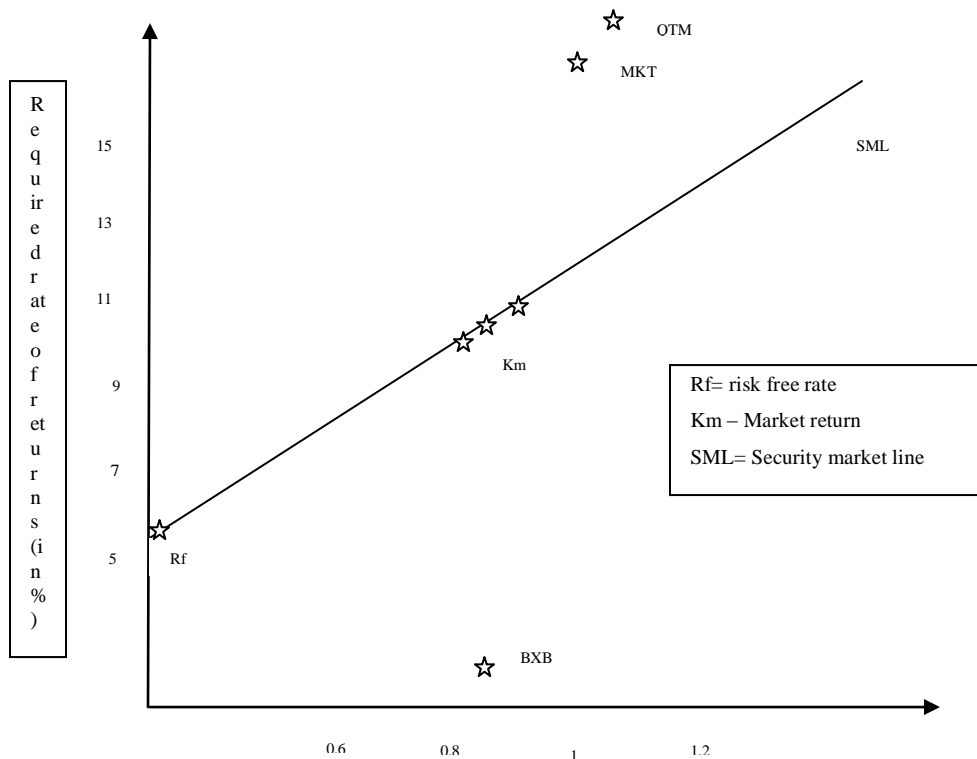
$$\text{Expected return (for S\&P 500)} = 0.053 + 1 * 0.05$$

$$= \mathbf{10.53\%}$$

(**Assumption:** The whole market (for the purpose S&P 500 is considered) is assigned a beta of 1).

ii).

The SML below shows that QTM and S&P 500 lie above the SML as they are providing a higher return than the expected by CAMP model after considering the non-diversifiable risks. On the other hand, BXB lies below the security line as it is providing negative return to investors than the expected return.



**iii).**

The return for QTM and BXB is 10.7% and 9.5% according the CAPM method, while the actual annual holding returns for both the securities are 40% and -0.29% respectively. The expected return for QTM is quite lower than it is providing that exhibits that QTM is underpriced as it has a potential to grow with higher rate. On the other hand, the expected return is quite higher for BXB, while it is providing a negative return to the investor (Groppelli & Nikbakht, 2006). It depicts that the share price of BXP is overpriced as it will down in future time period.