Professional Level – Options Module

Advanced Financial Management (Singapore)

Thursday 4 December 2008

Paper P4 (SGP)

Time allowed
Reading and planning: 15 minutes
Writing: 3 hours

This paper is divided into two sections:

Section A – BOTH questions are compulsory and MUST be attempted

Section B – TWO questions ONLY to be attempted

Formulae and tables are on pages 6–10.

Do NOT open this paper until instructed by the supervisor.
During reading and planning time only the question paper may be annotated. You must NOT write in your answer booklet until instructed by the supervisor.
This question paper must not be removed from the examination hall.

The Association of Chartered Certified Accountants

The Institute of Certified Public Accountants of Singapore

Section A – BOTH questions are compulsory and MUST be attempted

1 It is now 1 December 2008. You have been hired as a financial consultant to the Blipton International Entertainment Group which is evaluating a proposal from its hotel division to build a 400-bedroom hotel in the East End of London. This area has developed rapidly over the last 15 years and the prospects have been further enhanced by the announcement that London is to host the 2012 Olympics. Blipton is based in Dubai and both reports and accounts for all its transactions in dollars. The current dollar/sterling spot rate is $1·4925/£. The operating costs for the hotel are expected to be £30 per occupied room per day (variable) and a fixed cost of £1·7 million per annum expressed in current prices. The proportion of bedrooms occupied, on the basis of opening for 365 days a year, is expected to be as follows:

Year ended	occupancy
31 December 2009	construction
31 December 2010	40%
31 December 2011	50%
31 December 2012	90%
31 December 2013	60%
31 December 2014	60%

UK inflation is currently projected by the Bank of England as 2·5% per annum and inflation in the United States is 4·8% per annum. These rates are expected to be constant over the term of the project. Blipton's real cost of capital is 4·2%. UK hotel property values within the London area are expected to rise in real terms by 8% per annum.

The construction cost for this hotel is estimated to be £6·2 million and it will be built over the 12 months to 31 December 2009. As part of the UK's Olympic Development Plan, a 50% first year capital allowance is available for tax purposes on building projects related to the Games. The balance of the capital expenditure can be claimed in equal instalments over the following three years. UK profit tax is 30% and is levied and paid on profits in the year they arise. There is no additional tax liability on remittance to or from Dubai. The company has sufficient UK profits on its other activities to absorb the capital allowances on this project.

In making investment decisions of this type the company operates the following procedure:

1. All cash flows including construction costs are assumed to arise at the end of the year concerned and are to be projected in nominal (money) terms over the six year period.
2. The residual value of the investment at the end of six years is assumed to be the open market value of the property less a charge for repairs and renewals.
3. The charge for repairs and renewals is expected to be £1·2 million in current prices payable on disposal.
4. The net present value of the project should be based upon a 100% remittance of net cash flows to Dubai and should be calculated in dollars.
5. Average room rates are set at the level required to recover variable cost plus 100%.

Required:

Prepare a report for management to include the following:

(a) A six year nominal dollar projection of the after tax cash flow for this project distinguishing between cash flows arising from its investment phase and those arising from its return phase. (12 marks)

(b) An estimate of the project's dollar net present value and the modified internal rate of return.

Note: you may use the following formula $MIRR = \left[\frac{PV_R}{PV_I}\right]^{\frac{1}{n}}\left(1 + r_e\right) - 1$

Where PV_R is the present value of the return phase of the project, PV_I is the present value of the investment phase and r_e is the firm's cost of capital. (8 marks)

(c) An assessment of the viability of the project with a summary of the relative advantages and disadvantages of the net present value and modified internal rate of return methods in investment appraisal. (8 marks)

Quality and presentation of the report. (2 marks)

(30 marks)

2 Rosa Nelson, the Chief Financial Officer (CFO) of Jupiter Co, has been in discussion with the firm's advisors about refinancing the capital of the firm. She is considering a scheme to repay current borrowings of $800 million and raise new capital through a bond issue of $2,400 million. The current debt consists of several small loans raised in the Euro market with differing maturities and carrying an average rate of interest of 5·6%. The average term to maturity of the existing debt is four years. The new debt would be in the form of 10 year, fixed interest bonds with half being raised in the Yen and half in the Euro market. The yield to maturity of an appropriate government bond and the relevant credit risk premium for a company of Jupiter's credit rating in the Japanese and the European market is shown below:

	Yield to maturity		Credit risk premium (basis points)	
	4 years	10 years	4 years	10 years
Japanese Government Bonds	1·00%	1·80%	35	50
European Government Bonds	4·20%	4·60%	45	85

Jupiter's current beta is 1·50. The current risk free rate is 4·0% and the equity risk premium is 3·0%.

The company currently earns a free cash flow to equity of $400 million after interest, tax and net reinvestment. The company consistently reinvests 30% of that free cash flow within the firm and makes the balance available for distribution to investors. The free cash flow to equity model has provided a reasonable estimate of the company's equity market valuation in the past. The current share price, based upon 500 million fully paid, 25¢ equity shares, is 1,380¢. The current rate of tax on corporate profits is 25%. Management is of the view that the additional borrowing will lead to the company being able to increase its earnings growth rate to 4%.

You may assume:
1. Interest on the firm's debt is paid annually.
2. The debt in issue and proposed has a zero beta.
3. The firm's share price will be unaffected by the alteration in gearing.
4. Foreign exchange risk may be ignored.

Required:

As Deputy Chief Financial Officer prepare a briefing note for Rosa Nelson. Your note should include:

(a) An assessment of the firm's current cost of debt, cost of equity and weighted average cost of capital. (6 marks)

(b) An assessment of the firm's expected cost of debt, cost of equity and weighted average cost of capital after the redemption of the existing debt and the issue of the new bonds. (8 marks)

(c) An assessment of the minimum rate of return that the company needs to earn on the new debt capital before interest is paid. (6 marks)

(d) A comparison of the proposed method of raising capital for investment purposes with alternative means of raising the debt finance required. (8 marks)

Quality and presentation of the briefing note. (2 marks)

(30 marks)

Section B – TWO questions ONLY to be attempted

3 Aston Co, a medium-sized internet trading company, has conducted a review of its monthly operating cash flow. Its monthly average operating cash flow has been $14,400 with an observed monthly volatility over the previous five years of trading of 13%. There has been no growth in the trend of operating cash flow over the last 12 months and there is great concern among the small group of shareholders about the credit risk to which the company is exposed. The company has $1·5 million of borrowing repayable in five years and pays an effective interest rate of 8% per annum on the debt. Interest is paid monthly. The company has $8,500 of cash in hand or on deposit. The bank has first call upon the assets of the firm. The company estimates the proportion of its loan that would be recoverable in the event of default to be 90% of the outstanding debt value including accrued interest. The inter-bank offered rate is 5·5% per annum and the bank normally seeks to recover a risk adjustment of 34 basis points above the spread required to compensate for the expected loss on the loan.

Required:

(a) On the basis of the annualised operating cash flow after interest and its volatility, estimate the probability of default within 12 months on the assumption that the company has no other lines of credit available.

(10 marks)

(b) Using the probability of default estimated in (a) discuss the issues that the bank would consider when making a loan of this type and demonstrate how an annual charge of 8% on this loan would be justified.

(10 marks)

(20 marks)

4 Solar Supermarkets, a listed company, is reviewing the approach that it should take to remunerating its executive directors and other senior managers. Over the years, the company's share price has performed well although there is now concern that price and cost competition from overseas entrants into the domestic market will have a significant impact on the firm's profitability. As a result, the directors believe that large investment in new technologies and markets will be required over the next five years. Traditionally, management has been rewarded by salary, a generous system of benefits, and a bonus scheme that has taken up to 4% of turnover. The directors are considering introducing a generous share option scheme with a five-year vesting period.

There is also a view, expressed by some of the company's principal equity investors, that the company should consider returning cash to them through the sale of its property holdings. The company has over 200 stores nationally and 15 overseas, of which all except five are owned by the company. In the domestic economy, growth in the value of commercial property has averaged 8% per annum in recent years whilst retail growth has remained static at 5·5%. A sale and leaseback, or the flotation of a separate property company that would rent the stores to Solar Supermarkets at commercial rates, are two suggestions that have been made at investor meetings. Either approach, it is suggested, would return value to investors and create a supply of capital for further expansion. There have been press rumours, possibly fed from sources within the investor community, that the company may be a target for a private equity acquisition. However, no formal approach has been made to the company.

The only other area of controversy to emerge about the company which has concerned the directors followed an announcement about the company pension scheme. Although the scheme is well funded the directors took the decision to close the current final salary scheme to new employees and to replace it with a money purchase scheme. Current employees would not be affected.

Required:

Discuss the strategic, financial and ethical issues that this case presents and the merits of the proposed share option and sale and leaseback schemes.

(20 marks)

5 Following a collapse in credit confidence in the banking sector globally, there have been high levels of volatility in the financial markets around the world. Phobos Limited is a Singapore listed company and has a borrowing requirement of $30 million arising in two months time on 1 March and expects to be able to make repayment of the full amount six months from now. The Managing Director of the central bank has suggested that interest rates are now at their peak and could fall over the next quarter. However, the chairman of the Federal Reserve in the United States has suggested that monetary conditions may need to be tightened, which could lead to interest rate rises throughout the major economies. In your judgement there is now an equal likelihood that rates will rise or fall by as much as 100 basis points depending upon economic conditions over the next quarter.

SIBOR is currently 6·00% and Phobos can borrow at a fixed rate of SIBOR plus 50 basis points on the short term money market but the company treasurer would like to keep the maximum borrowing rate at or below 6·6%.

Assume that short term Singdollar interest rate futures have a contract size of $500,000 and a tick size of $12·50. The open and settlement prices of three month futures contracts are shown below (settlement at the end of the month):

	Open	Settlement
March	93·800	93·880
June	93·870	93·940
September	93·890	93·970

You may assume that basis diminishes to zero at contract maturity at a constant rate over time and that time intervals can be counted in months.

Assume that options on short Singdollar futures have a contract size of $500,000 and the premiums (shown as an annual percentage) available against a range of exercise prices are as follows:

	calls			puts		
Exercise	March	June	September	March	June	September
93750	0·155	0·260	0·320	0·045	0·070	0·100
94000	0·038	0·110	0·175	0·168	0·170	0·205
94250	0·010	0·040	0·080	0·300	0·350	0·360

Required:

(a) Estimate the effective interest rate cost if the anticipated interest rate exposure is hedged:

(i) using the Singdollar interest rate futures; and
(ii) the options on short Singdollar futures. (14 marks)

(b) Outline the benefits and dangers to Phobos of using derivative agreements in the management of interest rate risk. (6 marks)

(20 marks)

Formulae

Modigliani and Miller Proposition 2 (with tax)

$$k_e = k_e^i + (1 - T)(k_e^i - k_d)\frac{V_d}{V_e}$$

Two asset portfolio

$$s_p = \sqrt{w_a^2 s_a^2 + w_b^2 s_b^2 + 2 w_a w_b r_{ab} s_a s_b}$$

The Capital Asset Pricing Model

$$E(r_i) = R_f + \beta_i (E(r_m) - R_f)$$

The asset beta formula

$$\beta_a = \left[\frac{V_e}{(V_e + V_d(1 - T))}\beta_e\right] + \left[\frac{V_d(1 - T)}{(V_e + V_d(1 - T))}\beta_d\right]$$

The Growth Model

$$P_o = \frac{D_o(1 + g)}{(r_e - g)}$$

Gordon's growth approximation

$$g = br_e$$

The weighted average cost of capital

$$WACC = \left[\frac{V_e}{V_e + V_d}\right]k_e + \left[\frac{V_d}{V_e + V_d}\right]k_d(1 - T)$$

The Fisher formula

$$(1 + i) = (1 + r)(1 + h)$$

Purchasing power parity and interest rate parity

$$S_1 = S_0 x \frac{(1 + h_c)}{(1 + h_b)} \qquad F_0 = S_0 x \frac{(1 + i_c)}{(1 + i_b)}$$

The Put Call Parity relationship

$$p = c - P_a + P_e e^{-rt}$$

Modified Internal Rate of Return

$$MIRR = \left[\frac{PV_R}{PV_I}\right]^{\frac{1}{n}} \left(1 + r_e\right) - 1$$

The Black-Scholes option pricing model	The FOREX modified Black-Scholes option pricing model
$c = P_a N(d_1) - P_e N(d_2) e^{-rt}$ Where: $d_1 = \frac{\ln(P_a / P_e) + (r + 0.5s^2)t}{s\sqrt{t}}$ $d_2 = d_1 - s\sqrt{t}$	$c = e^{-rt}\left[F_0 N(d_1) - XN(d_2)\right]$ Or $p = e^{-rt}\left[XN(-d_2) - F_0 N(-d_1)\right]$ Where: $d_1 = \frac{1n(F_0 / X) + s^2 T/2}{s\sqrt{T}}$ and $d_2 = d_1 - s\sqrt{T}$

Present Value Table

Present value of 1 i.e. $(1 + r)^{-n}$

Where r = discount rate
n = number of periods until payment

Discount rate (r)

Periods (n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0·990	0·980	0·971	0·962	0·952	0·943	0·935	0·926	0·917	0·909	1
2	0·980	0·961	0·943	0·925	0·907	0·890	0·873	0·857	0·842	0·826	2
3	0·971	0·942	0·915	0·889	0·864	0·840	0·816	0·794	0·772	0·751	3
4	0·961	0·924	0·888	0·855	0·823	0·792	0·763	0·735	0·708	0·683	4
5	0·951	0·906	0·863	0·822	0·784	0·747	0·713	0·681	0·650	0·621	5
6	0·942	0·888	0·837	0·790	0·746	0·705	0·666	0·630	0·596	0·564	6
7	0·933	0·871	0·813	0·760	0·711	0·665	0·623	0·583	0·547	0·513	7
8	0·923	0·853	0·789	0·731	0·677	0·627	0·582	0·540	0·502	0·467	8
9	0·941	0·837	0·766	0·703	0·645	0·592	0·544	0·500	0·460	0·424	9
10	0·905	0·820	0·744	0·676	0·614	0·558	0·508	0·463	0·422	0·386	10
11	0·896	0·804	0·722	0·650	0·585	0·527	0·475	0·429	0·388	0·305	11
12	0·887	0·788	0·701	0·625	0·557	0·497	0·444	0·397	0·356	0·319	12
13	0·879	0·773	0·681	0·601	0·530	0·469	0·415	0·368	0·326	0·290	13
14	0·870	0·758	0·661	0·577	0·505	0·442	0·388	0·340	0·299	0·263	14
15	0·861	0·743	0·642	0·555	0·481	0·417	0·362	0·315	0·275	0·239	15

(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	
1	0·901	0·893	0·885	0·877	0·870	0·862	0·855	0·847	0·840	0·833	1
2	0·812	0·797	0·783	0·769	0·756	0·743	0·731	0·718	0·706	0·694	2
3	0·731	0·712	0·693	0·675	0·658	0·641	0·624	0·609	0·593	0·579	3
4	0·659	0·636	0·613	0·592	0·572	0·552	0·534	0·516	0·499	0·482	4
5	0·593	0·567	0·543	0·519	0·497	0·476	0·456	0·437	0·419	0·402	5
6	0·535	0·507	0·480	0·456	0·432	0·410	0·390	0·370	0·352	0·335	6
7	0·482	0·452	0·425	0·400	0·376	0·354	0·333	0·314	0·296	0·279	7
8	0·434	0·404	0·376	0·351	0·327	0·305	0·285	0·266	0·249	0·233	8
9	0·391	0·361	0·333	0·308	0·284	0·263	0·243	0·225	0·209	0·194	9
10	0·352	0·322	0·295	0·270	0·247	0·227	0·208	0·191	0·176	0·162	10
11	0·317	0·287	0·261	0·237	0·215	0·195	0·178	0·162	0·148	0·135	11
12	0·286	0·257	0·231	0·208	0·187	0·168	0·152	0·137	0·124	0·112	12
13	0·258	0·229	0·204	0·182	0·163	0·145	0·130	0·116	0·104	0·093	13
14	0·232	0·205	0·181	0·160	0·141	0·125	0·111	0·099	0·088	0·078	14
15	0·209	0·183	0·160	0·140	0·123	0·108	0·095	0·084	0·074	0·065	15

Annuity Table

Present value of an annuity of 1 i.e. $\frac{1-(1+r)^{-n}}{r}$

Where r = discount rate
n = number of periods

Discount rate (r)

Periods (n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0·990	0·980	0·971	0·962	0·952	0·943	0·935	0·926	0·917	0·909	1
2	1·970	1·942	1·913	1·886	1·859	1·833	1·808	1·783	1·759	1·736	2
3	2·941	2·884	2·829	2·775	2·723	2·673	2·624	2·577	2·531	2·487	3
4	3·902	3·808	3·717	3·630	3·546	3·465	3·387	3·312	3·240	3·170	4
5	4·853	4·713	4·580	4·452	4·329	4·212	4·100	3·993	3·890	3·791	5
6	5·795	5·601	5·417	5·242	5·076	4·917	4·767	4·623	4·486	4·355	6
7	6·728	6·472	6·230	6·002	5·786	5·582	5·389	5·206	5·033	4·868	7
8	7·652	7·325	7·020	6·733	6·463	6·210	5·971	5·747	5·535	5·335	8
9	8·566	8·162	7·786	7·435	7·108	6·802	6·515	6·247	5·995	5·759	9
10	9·471	8·983	8·530	8·111	7·722	7·360	7·024	6·710	6·418	6·145	10
11	10·37	9·787	9·253	8·760	8·306	7·887	7·499	7·139	6·805	6·495	11
12	11·26	10·58	9·954	9·385	8·863	8·384	7·943	7·536	7·161	6·814	12
13	12·13	11·35	10·63	9·986	9·394	8·853	8·358	7·904	7·487	7·103	13
14	13·00	12·11	11·30	10·56	9·899	9·295	8·745	8·244	7·786	7·367	14
15	13·87	12·85	11·94	11·12	10·38	9·712	9·108	8·559	8·061	7·606	15

(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	
1	0·901	0·893	0·885	0·877	0·870	0·862	0·855	0·847	0·840	0·833	1
2	1·713	1·690	1·668	1·647	1·626	1·605	1·585	1·566	1·547	1·528	2
3	2·444	2·402	2·361	2·322	2·283	2·246	2·210	2·174	2·140	2·106	3
4	3·102	3·037	2·974	2·914	2·855	2·798	2·743	2·690	2·639	2·589	4
5	3·696	3·605	3·517	3·433	3·352	3·274	3·199	3·127	3·058	2·991	5
6	4·231	4·111	3·998	3·889	3·784	3·685	3·589	3·498	3·410	3·326	6
7	4·712	4·564	4·423	4·288	4·160	4·039	3·922	3·812	3·706	3·605	7
8	5·146	4·968	4·799	4·639	4·487	4·344	4·207	4·078	3·954	3·837	8
9	5·537	5·328	5·132	4·946	4·772	4·607	4·451	4·303	4·163	4·031	9
10	5·889	5·650	5·426	5·216	5·019	4·833	4·659	4·494	4·339	4·192	10
11	6·207	5·938	5·687	5·453	5·234	5·029	4·836	4·656	4·486	4·327	11
12	6·492	6·194	5·918	5·660	5·421	5·197	4·988	4·793	4·611	4·439	12
13	6·750	6·424	6·122	5·842	5·583	5·342	5·118	4·910	4·715	4·533	13
14	6·982	6·628	6·302	6·002	5·724	5·468	5·229	5·008	4·802	4·611	14
15	7·191	6·811	6·462	6·142	5·847	5·575	5·324	5·092	4·876	4·675	15

[P.T.O.

Standard normal distribution table

	0·00	0·01	0·02	0·03	0·04	0·05	0·06	0·07	0·08	0·09
0·0	0·0000	0·0040	0·0080	0·0120	0·0160	0·0199	0·0239	0·0279	0·0319	0·0359
0·1	0·0398	0·0438	0·0478	0·0517	0·0557	0·0596	0·0636	0·0675	0·0714	0·0753
0·2	0·0793	0·0832	0·0871	0·0910	0·0948	0·0987	0·1026	0·1064	0·1103	0·1141
0·3	0·1179	0·1217	0·1255	0·1293	0·1331	0·1368	0·1406	0·1443	0·1480	0·1517
0·4	0·1554	0·1591	0·1628	0·1664	0·1700	0·1736	0·1772	0·1808	0·1844	0·1879
0·5	0·1915	0·1950	0·1985	0·2019	0·2054	0·2088	0·2123	0·2157	0·2190	0·2224
0·6	0·2257	0·2291	0·2324	0·2357	0·2389	0·2422	0·2454	0·2486	0·2517	0·2549
0·7	0·2580	0·2611	0·2642	0·2673	0·2704	0·2734	0·2764	0·2794	0·2823	0·2852
0·8	0·2881	0·2910	0·2939	0·2967	0·2995	0·3023	0·3051	0·3078	0·3106	0·3133
0·9	0·3159	0·3186	0·3212	0·3238	0·3264	0·3289	0·3315	0·3340	0·3365	0·3389
1·0	0·3413	0·3438	0·3461	0·3485	0·3508	0·3531	0·3554	0·3577	0·3599	0·3621
1·1	0·3643	0·3665	0·3686	0·3708	0·3729	0·3749	0·3770	0·3790	0·3810	0·3830
1·2	0·3849	0·3869	0·3888	0·3907	0·3925	0·3944	0·3962	0·3980	0·3997	0·4015
1·3	0·4032	0·4049	0·4066	0·4082	0·4099	0·4115	0·4131	0·4147	0·4162	0·4177
1·4	0·4192	0·4207	0·4222	0·4236	0·4251	0·4265	0·4279	0·4292	0·4306	0·4319
1·5	0·4332	0·4345	0·4357	0·4370	0·4382	0·4394	0·4406	0·4418	0·4429	0·4441
1·6	0·4452	0·4463	0·4474	0·4484	0·4495	0·4505	0·4515	0·4525	0·4535	0·4545
1·7	0·4554	0·4564	0·4573	0·4582	0·4591	0·4599	0·4608	0·4616	0·4625	0·4633
1·8	0·4641	0·4649	0·4656	0·4664	0·4671	0·4678	0·4686	0·4693	0·4699	0·4706
1·9	0·4713	0·4719	0·4726	0·4732	0·4738	0·4744	0·4750	0·4756	0·4761	0·4767
2·0	0·4772	0·4778	0·4783	0·4788	0·4793	0·4798	0·4803	0·4808	0·4812	0·4817
2·1	0·4821	0·4826	0·4830	0·4834	0·4838	0·4842	0·4846	0·4850	0·4854	0·4857
2·2	0·4861	0·4864	0·4868	0·4871	0·4875	0·4878	0·4881	0·4884	0·4887	0·4890
2·3	0·4893	0·4896	0·4898	0·4901	0·4904	0·4906	0·4909	0·4911	0·4913	0·4916
2·4	0·4918	0·4920	0·4922	0·4925	0·4927	0·4929	0·4931	0·4932	0·4934	0·4936
2·5	0·4938	0·4940	0·4941	0·4943	0·4945	0·4946	0·4948	0·4949	0·4951	0·4952
2·6	0·4953	0·4955	0·4956	0·4957	0·4959	0·4960	0·4961	0·4962	0·4963	0·4964
2·7	0·4965	0·4966	0·4967	0·4968	0·4969	0·4970	0·4971	0·4972	0·4973	0·4974
2·8	0·4974	0·4975	0·4976	0·4977	0·4977	0·4978	0·4979	0·4979	0·4980	0·4981
2·9	0·4981	0·4982	0·4982	0·4983	0·4984	0·4984	0·4985	0·4985	0·4986	0·4986
3·0	0·4987	0·49987	0·4987	0·4988	0·4988	0·4989	0·4989	0·4989	0·4990	0·4990

This table can be used to calculate $N(d)$, the cumulative normal distribution functions needed for the Black-Scholes model of option pricing. If $d_i > 0$, add 0·5 to the relevant number above. If $d_i < 0$, subtract the relevant number above from 0·5.

End of Question Paper