# SECURITIES & INVESTMENT INSTITUTE DIPLOMA

## WINTER 2008

## CHIEF EXAMINER'S REPORT - FINANCIAL DERIVATIVES

The pass rate for the winter 2008 examination was 36%, down from the 48% recorded for the summer 2008 examination. As seems often to be the case, many candidates appeared not to have prepared for the examination in a realistic manner. Eight of the candidates scored less than 40 marks. Again I cannot understand how candidates can do so poorly, when they have had a chance to review previous papers, see what type of questions come up, and make sure they can do such questions. I also reiterate the importance of good scores on Section A. The average mark of passing candidates was 15; the average mark of failing candidates was less than 10. It is crucially important for candidates to practise Section A questions, and assure themselves that they can answer successfully the various types of question most frequently set. I have, it seems, made identical comments in every Examiner's Report in living memory.

As in summer 1008, the same dichotomy is seen with Section B. The average passing score was 12 marks per Section B question; the average failing score was less than 8 marks. Again practice makes perfect. Candidates should constantly check themselves against previous Section B questions. The average score for all candidates for all questions in Section C was less than 10 marks. Even disregarding other questions, I would have thought anyone who kept abreast of financial markets in 2008 could have made a decent answer to Question 12.

None of the Section A questions in winter 2008 was particularly difficult. In question 1, it was important to understand that the delta will initially increase like a normal call, but will then become negative as the probability of knockout grows approaching the barrier. Accordingly, the gamma will also first be positive and then negative. Question 2 simply required the candidate to know that a 95% one-sided confidence interval is 1.65 standard deviations from the mean, that you get fortnightly volatility from annual volatility by dividing by $\sqrt{26}$, and then how to use delta and gamma to estimate an implied option price change. This is all standard stuff. However, only five candidates got the full 4 marks on this question. Question 3 simply needed candidates to remember that $N(d_2)$ in the B-S model is the probability of exercise in the B-S framework. Question 4 was very straightforward – the investor pays Libor and receives the capital gain/loss and the dividend yield. Finally Question 5 was a very simple gilt futures hedging question requiring candidates to know

$$\text{NUMBER OF CONTRACTS} = \frac{\text{POSITION SIZE}}{\text{GILT FUTURES SIZE}} \times \frac{\text{CHEAPEST TO DELIVER}}{\text{PRICE FACTOR}} \times \frac{\text{BPV OF HEDGED GILT}}{\text{BPV OF CTD}}$$

In Section B, Questions 6, 7, 8 and 10 proved the most popular, with relatively few candidates attempting the other two. Only five candidates attempted Question 11. Actually this was a very simple question involving a standard application of Black-Scholes – maybe the wording put people off. All that was required was the straightforward valuation of a forward position and a put option – nothing more. Question 9 should also have been straightforward for anyone with a reasonable knowledge of credit derivatives and interest rate derivatives. Points that should have been brought up include: the management of the credit pool in conventional and synthetic CDOs; the equivalence of asset swap spreads and CDS prices via arbitrage; and the different convexities of conventional and arrears swaps.

Question 6 was answered by half the candidates, and generally relatively successfully. Part (a) simply required a knowledge of the Margrabe model for exchange options, and that the volatility input for this type of model is given by:

$$\sigma_*^{\,2} = \sigma_1^2 + \sigma_2^2 - 2\sigma_1\sigma_2\rho_{12}$$

Where $\sigma_1$ = annual volatility of asset 1

$\sigma_2$ = annual volatility of asset 2

$\rho_{12}$ = correlation coefficient between returns on asset 1 and asset 2.

Part (b) was very easy since it is clear that the ownership of one asset plus an exchange option has exactly the same return profit as a best of share receipt. Part (c) simply required redoing the calculation in (a) for correlations of 0.45 and 0.55 and averaging the price impact. In part (d) the most obvious point was the possibility of hedging products whose price is inversely related to correlation with those where the price is positively related such as basket derivatives.

Question 7 was a completely standard hedging question concerned with short-term interest rate futures contracts. It was relatively well answered, as it should have been, by most candidates who attempted it. It required the construction of an implied six month rate from three month rates interpolated from the futures prices, and the construction of a standard hedge using spreads to hedge basis risk, interpolating the numbers of contracts, and tailing the hedge. Part (c) could mention the convexity of the position versus linearity of futures, role of margining, assumption that the futures price line will remain smooth, and rounding errors.

Question 8 was essentially a standard binomial option pricing model exercise, using standard assumptions and then increasing the price drift by a risk premium of 4%. Not surprisingly the inclusion of the risk premium would significantly increase the option price and its delta. For part (c), one needs to calculate the deltas at each node under the different assumptions, and assuming borrowing at the quoted continuously

compounded 5% and receipt of the 2% dividend yield, work out the net result of the hedge through the three periods.

Question 10 was again a straightforward interest rate and currency swap set of calculations. In (a) since the currency was not defined, a Euro or USD answer would be acceptable. The question required estimating the two year forward swap rate in periods 1 and 2 from the discount factors, and then determining the fixed rate equivalent. I obtain an answer of around 2.26% in USD and around 3.55% in Euros. Part (b) simply required working out the NPV of the fixed Euro payments, the fixed rate that gives an equivalent NPV in USD, and finally adding on 2 basis points for the basic swap. Part (c) required pyramid hedges of the total position cash flows with par USD and Euro swaps.

Question 12 was by far the most popular question in Section C, being answered by nearly 70% of the candidates. Most candidates answered the question relatively well, but there was a tendency to describe everything the candidates knew about credit derivatives, as opposing to focussing on how they contributed to the crisis. Important points that might have been discussed would include the role of CDOs and CDO squared and cubed structures, the loss of control of credit correlation in the crisis, the role of the rating agencies, role of sub-prime credits, and the credit pyramiding effect. By contrast, Question 13 was answered by only seven candidates, although rather well in five of the cases. However, the importance of liquidity risks tended to be rather underplayed, while the interrelationship of price jumps, volatility jumps and liquidity was inadequately dealt with. Question 14 was answered by only one candidate. I can only assume that the other candidates' knowledge of volatility and variance based derivatives is zero. This is a shame since such products are growing rapidly in importance. Finally answers to Question 15 tended to be weak. I would have looked for discussion of the types of restriction on short selling, role of synthetics and put and call options, role of equity swaps and forwards, spread betting products, reverse convertible strategies etc.