



Institute
and Faculty
of Actuaries

EXAMINERS' REPORT

SP6 - Financial Derivatives

Specialist Principles

September 2023

Introduction

The Examiners' Report is written by the Chief Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

For some candidates, this may be their first attempt at answering an examination using open books and online. The Examiners expect all candidates to have a good level of knowledge and understanding of the topics and therefore candidates should not be overly dependent on open book materials. In our experience, candidates that spend too long researching answers in their materials will not be successful either because of time management issues or because they do not properly answer the questions.

Many candidates rely on past exam papers and examiner reports. Great caution must be exercised in doing so because each exam question is unique. As with all professional examinations, it is insufficient to repeat points of principle, formula or other text book works. The examinations are designed to test "higher order" thinking including candidates' ability to apply their knowledge to the facts presented in detail, synthesise and analyse their findings, and present conclusions or advice. Successful candidates concentrate on answering the questions asked rather than repeating their knowledge without application.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

Sarah Hutchinson
Chair of the Board of Examiners
November 2023

A. General comments on the *aims of this subject and how it is marked.*

The aim of Financial Derivatives Principles (SP6) is to develop a candidate's ability to understand different types of financial derivatives and their uses, the markets in which they are traded, methods of valuation of financial derivatives, and the assessment and management of risks associated with a portfolio of derivatives. It builds on material covered in earlier subjects, particularly Loss Reserving and Financial Engineering (CM2).

Candidates are reminded to ensure that their answers are sufficiently detailed to demonstrate their understanding, as well as to make sure that more obvious points are still made to be awarded full marks. The model solutions are intended to reflect the level of detail that a well-prepared candidate might be able to produce. For many questions there are more marks available than the question requires to achieve full marks. This reflects that the examiners will give credit for valid alternative solutions, particularly in questions focussed on higher level skills.

Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

B. Comments on *candidate performance in this diet of the examination.*

Overall, this paper was well attempted by most candidates who were able to make a good attempt at most questions. In general, candidates demonstrated good knowledge of the core reading material and its application to a range of situations.

To achieve a good pass mark, candidates must not only state points of principle and make a basic analysis. Candidates are also required to synthesise their application into advice which considers best options, pros and cons, and otherwise demonstrate the higher order thinking skills as required by the questions.

Questions 1, 2, 3, 6 and 7 were well answered by the majority of candidates. Questions 4, 5 and 8 proved to be the most challenging with only a select number of candidates scoring highly in these questions. Further comment on the individual questions is provided below.

C. Pass Mark

The Pass Mark for this exam was 60.
45 candidates presented themselves and 27 passed.

Solutions for Subject SP6 - September 2023

Q1

(i)

A hedger may use FX forwards to reduce risk [½]
 This risk might be present from foreign currency holdings [½]
 Or future FX receipts or payments due [½]
 A hedger can lock in the forward FX rate by entering into a FX forward [½]
 The hedger would hedge foreign FX back to its home currency [½]
 For example, a UK company knowing to receive USD in 3 months' time might
 hedge this by purchasing GBP forward to the amount of USD to be received
 (any other reasonable example) [½]

[Marks available 3, maximum 2]

(ii)

The European company would have sold USD to receive EUR forward [1]
 The contract will oblige the hedger to pay USD 1,000,000 and receive
 EUR 976,700 at maturity [½]
 At the now prevailing spot rate of 0.9523 it would only be able to receive
 EUR 952,300 in the open market [½]
 Therefore, the contract has a positive value / gain of EUR 24,400 [1]
 Since the forward is used to hedge, the positive payoff will offset the loss the
 value of the receivable in US Dollar [1]

[Marks available 4, maximum 3]

(iii)

Theoretically the hedge seems perfect [½]
 It could be that the timing of the payment received and the forward maturity does
 exactly coincide [1]
 Or it could be that the amount of payment is not exactly USD 1,000,000 [1]
 Each of these examples would lead to some basis risk [½]
 (Other valid examples to receive 1 mark each)

[Marks available 3, maximum 2]

(iv)

Forward contracts and currency options can both be used to hedge foreign
 exchange risk [1]
 A forward contract does not require a premium, an option does [1]
 A forward contract can eliminate the FX risk, an option is more insurance like [1]
 A forward contract eliminates upside risk, an option can maintain some exposure [1]
 Options might be a better choice if the company thinks that the spot rates are
 volatile and would like to have the flexibility to either exercise or not, at the
 expense of the upfront premium [1]
 An American option might be better if the timing is uncertain, using such an
 option would eliminate one of the basis risks [1]
 There are also other operational differences, such as liquidity, markets traded on,
 exchange traded versus OTC etc. [1]

[Marks available 7, maximum 4]

[Total 11]

This question was well answered with most candidates scoring high marks in each part.

Q2

(i)

Inflation swaps are unfunded, so they release capital	[1]
Inflation swaps are more flexible, including LPI, and more precise dates	[1]
Inflation swaps might give access to a lower cost of inflation	[1]
Inflation swaps do not exposure to government/corporate bond default risk	[1]
Inflation swaps might be more liquid in certain markets	[1]
Inflation swaps might give access to longer maturities	[1]
Inflation swaps hedge inflation only, whereas bonds also hedge interest rate risk	[1]
[Marks available 7, maximum 3]	

(ii)

The pension fund would receive a floating rate at maturity (in 20 years' time) as it is hedging	[1]
And hence pay a fixed rate at maturity (in 20 years' time)	[½]
The two final payments would be netted, so dependent on market moves there will be a final maturity payment or receipt	[1]
As the swap is zero-coupon there are no cash flows during the term	[½]
At outset there would not be a cash flow if the swap is set with zero initial MTM	[½]
If the swap is struck slightly out of the money, there might be an initial payment/receipt.	[½]
There would be cashflows for the margining of the contract, which might involve initial and daily variation margin, which depends on the specifics of the contract	[1]
[Marks available 5, maximum 3]	

(iii)

Speculators – a Speculator, such as a hedge fund manager	[½]
Might use inflation swaps to express their views on future inflation rising beyond what is priced in to achieve their objective of adding alpha	[1]
Arbitrageurs – an Arbitrageur, such as the inflation desk of an investment bank	[½]
Might use inflation swaps to exploit relative value between index-linked bonds and inflation swaps and benefit from the margin between the two instruments	[1]
<i>(1½ marks for each example, ½ mark for stating the user and 1 mark for how they might use swaps)</i>	

[Total 9]

This question was also well answered with candidates scoring well in each section.

In part (iii), most candidates did not provide sufficient detail on the specific users, i.e., who the arbitrageur / speculator is, to score full marks.

Q3

(i)

Equilibrium models for the short rate usually build on some economic assumptions [½]
 Such as volatility of short rates, speed of mean reversion and long-term averages [½]
 And then build a process on this [½]
 Which generates a certain term structure [½]
 Which is not necessary arbitrage free [½]
 And may not price underlying bonds correctly [½]
 No-arbitrage models aim to be consistent with today's term structure [½]
 And hence price underlying bonds correctly against market prices [½]
 The term structure is therefore an input [½]

[Marks available 4½, maximum 3]

(ii)

By definition this is 0.03, the level of b [1]

(iii)

$$a = 0.1$$

$$b = 0.03$$

$$\text{Sigma} = 0.01$$

$$r = 0.02$$

$$T = 10$$

$$P(10) = A(10) \exp(-B(10)*0.02)$$

$$B(10) = (1 - \exp(-0.1*10)) / 0.1$$

$$B(10) = 6.321206 \quad [2]$$

$$A(10) = \exp[((B - 10)(0.01*0.03 - 0.01^2/2))/0.01 - ((0.01^2*B^2)/0.4)]$$

$$A(10) = \exp[-0.09196975 - 0.009989]$$

$$A(10) = 0.903066 \quad [1]$$

$$P(10) = 0.795819 \quad [1]$$

So the price of the zero-coupon bond is \$79.58 [1]

(iv)

The current rate is 2%, whereas the mean reversion rate is 3%, this means that rates are on average rising [1]

The parameter a is the speed of mean reversion [1]

So if a increases, rates are rising faster [1]

So if a increases, then the average rate over the term of the bond is expected to be higher [1]

and hence the present value or price of the bond to be lower [1]

The relationship only holds in the specific example, with $r < b$ [1]

[Marks available 6, maximum 4]

[Total 13]

Question 3 was also well answered by the majority of candidates who showed good understanding of the short rate models.

Q4

(i)

An American put option cannot, in general, be valued analytically, [½]
 so a numerical method is required to be used. [½]

A binomial tree procedure works backwards through the binomial tree from the
 expiry date to the purchase date. [½]

This enables the modelling of whether or not to exercise the option before the expiry
 date. [½]

(ii)

Warrants are options issued by a company or financial institution. [1]

(iii)

As the market is small there is potentially a high level of liquidity risk. [1]

As there is no expiration date the decision of when to exercise the option is
 complicated. [1]

There is a risk that the warrant is exercised at the wrong time, or
 that they are held forever without becoming profitable. [½]

There may be elements of credit risk in that the underlying stock does not exist in
 perpetuity. [1]

For an investor who works for the company and purchases these warrants then they
 may be an incentive for the company not to perform well, a conflict of interest. [½]

[Marks available 4½, maximum 3]

(iv)

The Black-Scholes differential equation for an American put option with a fixed
 expiry date is:

$$\frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS \frac{\partial V}{\partial S} - rV = 0 \quad [½]$$

As V has no explicit time dependence it is only a function of the form: $V(S)$. [½]

Hence $\frac{\partial V}{\partial t} = 0$, [½]

and the partial derivatives become derivatives of a function of a single variable, S. [½]

(v)

The payoff from exercising an American put option with strike price K and
 underlying stock price S is: $\max(K-S, 0)$. [½]

This is also the same pay-off for the warrant given in the question if it is exercised
 when the stock price is S. [½]

As $S \rightarrow \infty$ the pay-off tends to 0, and [½]

therefore it is expected that $V(S) \rightarrow 0$. [½]

As both r and σ are positive then for $V(S) \rightarrow \infty$ as $S \rightarrow \infty$, [½]

it is required that $A=0$. [½]

(vi)

Suppose $V(S') > K - S'$ then this would imply that the value of the warrant is
 greater than the exercise pay-off. [½]

Therefore, it would not make sense to exercise the warrant as it could be sold for

more. [½]

Instead suppose $V(S') < K - S'$. In this case on exercise the pay-off received would be $\max(K - S', 0) = K - S' > 0$ (as $S' < K$). [1]

In this case the warrant could be bought and exercised immediately for a riskless profit, which would present an arbitrage opportunity. [½]

Hence the only case left is $V(S') = K - S'$. [½]

(vii)

Using the information from parts (v) and (vi):

$$V(S) = BS^{-2r/\sigma^2}, \text{ and} \quad [½]$$

$$V(S') = K - S' = BS'^{-2r/\sigma^2}. \quad [½]$$

Rearranging this last equation:

$$B = (K - S')/S'^{-2r/\sigma^2}. \quad [½]$$

This can be used to eliminate B in the first equation:

$$V(S) = (K - S') \left(\frac{S}{S'} \right)^{-2r/\sigma^2}. \quad [½]$$

By the definition of S' this should maximise the warrant's value at any time before exercise. [½]

Differentiating $V(S)$ with respect to S' and setting it equal to 0:

$$\frac{\partial V(S)}{\partial S'} = \frac{1}{S'} \left(\frac{S}{S'} \right)^{-2r/\sigma^2} \left(-S' + \frac{2r}{\sigma^2} (K - S') \right) = 0. \quad [½]$$

This results in: $S' = \frac{K}{1 + \sigma^2/2r}$. [½]

Hence:

$$V(S) = \frac{\sigma^2}{2r} \left(\frac{K}{1 + \sigma^2/2r} \right)^{1+2r/\sigma^2} S^{-2r/\sigma^2}. \quad [½]$$

[Total 18]

Question 4 proved to be the most challenging question with only a limited number of candidates scoring well.

Parts (vi) and (vii) proved to be the most challenging.

Some candidates also struggled with part (iii) due to the unfamiliar nature of the put warrants.

Q5

(i)

The Greeks are partial derivatives of an option value with respect to a risk factor or variable/parameter which needs to be hedged against, for example time to maturity. [1]

A Monte Carlo simulation is used to calculate an estimate for the value of the option. [½]

If the parameter or variable of interest is x , then a small increase is made to the value of x of Δx . [1/2]

The Monte Carlo simulation is then run again but this time with everything else being equal apart from the parameter x now having a value of $x + \Delta x$, this results in a new estimate to the option value of f^* . [1/2]

An estimate for the Greek is then given by: $\frac{\partial f}{\partial x} = \frac{f^* - f}{\Delta x}$. [1/2]

(ii)

Over a short time interval assume $S_{t+\Delta t} - S_t = dS_t$. [1/2]

Under this assumption $dt = \Delta t$, [1/2]

and $dW_t = W_{t+\Delta t} - W_t$. [1/2]

Recall the definition of Brownian motion then $W_{t+\Delta t} - W_t \sim N(0, \Delta t)$. [1]

From the properties of the normal distribution: $N(0, \Delta t) = \sqrt{\Delta t}N(0, 1)$. [1/2]

If a sample is taken from a $N(0, 1)$ distribution, labelled ϵ , then an approximation can be obtained for $S_{t+\Delta t} - S_t$ from the approximation just determined for dS_t : [1/2]

$S_{t+\Delta t} - S_t = \mu S_t \Delta t + \sigma S_t \epsilon \sqrt{\Delta t}$. [1/2]

(iii)

The standard error of the estimated option value is: ω / \sqrt{N} . [1]

Here N is the number of trials in the Monte Carlo simulation, and [1/2]

ω is the standard deviation of the option values calculated from the Monte Carlo simulation. [1/2]

(iv)

From part (ii) the standard error is given $5.99 / \sqrt{4000} = 0.09471$. [1/2]

From the tables or via calculation the 99%, the Z-value is 2.576. [1/2]

The 99% confidence interval is then $(11.15 \pm 0.09471 \times 2.576)$. [1/2]

This is then: (10.91, 11.39). [1/2]

(v)

One way to reduce the confidence interval is to increase the number of trials. [1]

The standard error of the estimate scales with $1 / \sqrt{\text{Number of trials}}$. [1/2]

There are problems with this approach as it can take a considerable increase to the number of trials, for example to reduce the confidence interval by approximately half would take a quadrupling of the number of trials. [1/2]

In the case given in the question this would increase the number of trials from 4,000 to 16,000. [1/2]

This would increase the runtime of the Monte Carlo simulation, potentially quadrupling it at least, and lead to the greater use of computing resources. [1/2]

This could be partially mitigated by using variance reduction techniques. [1/2]

For example: antithetic variable approaches or control variate techniques. [1/2]

Another approach could be to use another numerical method, for example a binomial tree or a finite difference method. [1]

The success of using other methods depends on the type of option to be valued

and the number of stochastic variables to be simulated. [½]

For example, if there are three or more stochastic variables to be simulated then Monte Carlo methods are generally more efficient. [½]

In the case of a basic option with one or two stochastic variables to be simulated then a binomial tree may produce more accurate results for a given level of computing resources. [½]

(Other suitable examples, up to ½ mark each)

[Marks available 7, maximum 5]

[Total 16]

Most candidates made a good attempt at Question 5 and were able to score some marks in each part.

However, only a few candidates were able to score full marks in part (ii) and many candidates failed to generate a sufficient number of distinct points in part (v) to score highly.

Q6

(i)

Floating lookback options provide a payoff which is dependent on the minimum or maximum asset price experienced during the life of the option. [1]

For a floating lookback call option, the purchaser will receive the difference between the final asset price and the minimum price during the life of the option. [½]

For a floating lookback put option, the purchaser will receive the difference between the maximum price during the life of the option and the final value. [½]

(ii)

Set up two simultaneous equations:

$$f = 1.0905 \varphi + \psi * B0 * \exp(rdt)$$

$$g = 0.9170 \varphi + \psi * B0 * \exp(rdt) \quad [1]$$

Solving,

$$f - g = (1.0905 - 0.9170) \varphi = (0.1735) \varphi \quad [½]$$

$$\dots \varphi = 1/0.1735 (f - g) = 5.764 (f - g) \quad [½]$$

And

$$f = 1.0905 * 5.764 (f - g) + \psi * B0 * \exp(rdt)$$

$$\psi = (f - 6.285(f - g)) / (B0 * \exp(rdt)) \quad [1]$$

In uptick:

$$V = 5.764(f - g) * 1.0905 + B0 \exp(rdt) * (f - 6.285(f - g)) / (B0 * \exp(rdt)) \quad [½]$$

$$= 6.285 (f - g) + (f - 6.285(f - g))$$

$$= f \quad [½]$$

In downtick,

$$V = 5.764 (f-g) * 0.9170 + B_0 \exp(rdt) * (f - 6.285(f-g)) / (B_0 * \exp(rdt))$$

$$= 5.285 (f-g) + (f - 6.285(f-g)) = g$$

[1/2]
[Marks available 4½, maximum 3]

(iii)

$$\text{Sup} = \exp(30\% * \sqrt{1/12}) = 1.0905$$

$$\text{Sdown} = \exp(-30\% * \sqrt{1/12}) = 0.9170$$

$$q = (\exp(0.03/12) - 0.9170) / (1.0905 - 0.9170) = 0.493$$

$$1 - q = 0.5072$$

[1/2]
[1/2]
[1/2]
[1/2]

Stock price movements, S

		118.91
	109.05	
100		100.00
	91.70	
		84.10

[1/2]

Payoffs

$$UU = 118.91 - 100 = 18.91$$

$$UD = 100 - 100 = 0$$

$$DU = 100 - 91.70 = 8.3$$

$$DD = 84.10 - 84.10 = 0$$

[1/2]

Call option =

		18.91
	9.30	
6.63		0
		8.30
	4.08	
		0

$$9.30 = \exp(-0.03/12) * 0.493 * 18.91$$

$$4.08 = \exp(-0.03/12) * 0.493 * 8.30$$

$$\exp(-0.03/12) * (0.493 * 9.30 + 0.507 * 4.08) = 6.63$$

[1]

- (iv)
- Cost [1/2]
- Lookback options will be expensive due to the high potential returns that they offer [1/2]
- Expertise [1/2]
- Including lookback options in an investment strategy requires specialist expertise which the pension schemes may not have [1/2]
- Regulatory/investment policy [1/2]
- There may be restrictions on the use of derivatives e.g., in the SIP [1/2]
- Availability [1/2]
- Pension scheme may not have access to exotic options / they may not be sufficiently liquid in the desired asset class [1/2]

[Marks available 4, maximum 2]

[Total 11]

Question 6 was well answered by most candidates.

Q7

(i)

Arbitrage is the ability of market participants to make risk-free profits... [½]
 by simultaneously purchasing and selling offsetting assets / exposures [½]
 Or in other words, having the possibility of making a profit with zero
 risk / downside [½]

[Marks available 1½, maximum 1]

(ii)

The intrinsic value of an option is the value of the option if it were to be closed
 immediately [1]
 It does not take into account of any time value of the option [½]
 For a call it is the maximum of 1) the difference between the current price of the
 underlying asset and the strike price and 2) zero [½]
 For a put it is the maximum of 1) the difference between the strike and the current
 price of the underlying asset and 2) zero. [½]

[Marks available 2½, maximum 2]

(iii)

An insurer may use equity options:
 Using puts to hedge the downside risk on an equity portfolio [½]
 E.g. as short term tactical protection against market movements [½]
 It may be using options to hedge its liability exposures [½]
 E.g. variable annuities [½]
 Using calls to gain equity market exposure [½]
 E.g. if it has a view on future market direction [½]
 It may be using options to optimise its solvency requirements [½]
 It may not be permitted to invest in certain companies directly [½]
 It may be cheaper to use options to take a position [½]

[Marks available 4½, maximum 3]

(iv)

Increases in the risk-free rate will increase (/decrease) the value of European call
 (/put) options and vice versa for decreases in risk-free rates [1]

(v)

Lower bound for a non-dividend paying call option is $S_t - K \cdot \exp(-r(T-t))$
 Therefore the lower bound for the option is $110.5 - 115 \cdot \exp(-0.15) = \11.52 .
 To create risk-free profits, an investor could
 Sell the stock for \$110.50 and buy a call option (\$8.43) invest the remaining
 proceeds in cash (\$102.07) [1]

After three years, the cash would have accumulated to $102.07 \cdot \exp(0.15) = 118.59$ [½]

The investor can then purchase the stock, either:

Using the call option for \$115 if stock price is above \$115 [½]

Or directly in the market, if stock price is below \$115 [½]

Therefore, the investor would have a risk-free profit of at least \$3.59. [½]

[Total 10]

Question 7 parts (i) to (iv) were well answered with candidates being able to score well. However, part (v) proved to be challenging with only a select number of candidates scoring full marks.

Q8

(i)

A credit default swap is a derivative which transfers the credit risk of a debt instrument [½]

The CDS purchaser pays a recurring premium to the CDS seller [½]

in return for compensation if a default or predefined credit event occurs [½]

The CDS is based on a notional amount [½]

CDS can be cash settled or physically settled [½]

[Marks available 2½, maximum 2]

(ii)

The private wealth fund could sell CDS protection on the bond.. [½]

to give it exposure to the insurer's credit spread.. [½]

And purchase an interest rate swap [½]

to gain exposure to the bond's interest rate risk [½]

The notional value of the CDS and interest rate swap should be chosen to be consistent with the desired level of the bond investment [½]

The private wealth fund should also invest the notional principal into assets which will generate the required risk-free rate returns (e.g., SONIA / SOFR / Euribor). [½]

[Marks available 3, maximum 2]

(iii)

Using CDS allows the PWF to separate the different elements of the expected return [1]

e.g., it may wish to gain exposure to the insurers credit spread but not the interest rate risk [½]

Using CDS also allows the PWF to take a leveraged position [1]

this is because the CDS will require less upfront capital than investment in a bond [½]

It may be cheaper to sell CDS than to invest in physical bonds [½]

There could be tax or regulatory requirements which make CDS beneficial to the PWF [½]

It may be quicker to sell CDS than investing in physical bonds. [½]

(Other suitable answers can also be awarded at ½ mark each)

[Marks available 5, maximum 2]

(iv)

CDS seller will be exposed to the credit risk of the reference entity i.e. the insurer	[½]
CDS buyer will be exposed to the counterparty credit risk of the CDS seller	[1]
This would occur if the insurer defaulted on its debt, creating a positive value for the derivative for the CDS buyer and at the same time, the PWF defaulted on its obligations under the CDS contract.	[½]
CDS buyer will also have funding risk as they will need to meet the ongoing premiums	[½]
Both the CDS buyer and seller would potentially be exposed to other risks:	
Operational risks in pricing models or administration of contracts	[½]
Legal risk if documentation is contractually binding	[½]
Concentration risks if transacting with a single counterparty	[½]
Settlement risk if there are disputes about valuation, settlement terms etc	[½]
	[Marks available 4½, maximum 3]

(v)	
ISDA Master agreements reduce counterparty credit risk	[½]
Because they stipulate that all derivatives must be netted in the event of a counterparty default which reduces the counterparty credit risk to the aggregate exposure of all transactions between the counterparties	[½]
The Credit Support Annexes reduce counterparty credit risk	[½]
By facilitating the collateralisation process between the two counterparties	[½]
Although, these may have been superseded by CCP requirements	[½]
ISDA Master agreements reduce operational and legal risks	[½]
And settlement risks.	[½]
because they are standardised legal documents which can be referenced for almost all OTC derivative transactions between two counterparties once the documentation is signed	[½]
	[Marks available 4, maximum 3]
	[Total 12]

Candidates again made a good attempt at question 8 and showed understanding of CDS.

However, only well-prepared candidates were able to apply that knowledge and generate good responses to parts (ii), (iii) and (v).

[Paper Total 100]

END OF EXAMINERS' REPORT



Institute and Faculty of Actuaries

Beijing

14F China World Office 1 · 1 Jianwai Avenue · Beijing · China 100004
Tel: +86 (10) 6535 0248

Edinburgh

Level 2 · Exchange Crescent · 7 Conference Square · Edinburgh · EH3 8RA
Tel: +44 (0) 131 240 1300

Hong Kong

1803 Tower One · Lippo Centre · 89 Queensway · Hong Kong
Tel: +852 2147 9418

London (registered office)

7th Floor · Holborn Gate · 326-330 High Holborn · London · WC1V 7PP
Tel: +44 (0) 20 7632 2100

Oxford

1st Floor · Belsyre Court · 57 Woodstock Road · Oxford · OX2 6HJ
Tel: +44 (0) 1865 268 200

Singapore

5 Shenton Way · UIC Building · #10-01 · Singapore 068808
Tel: +65 8778 1784