

# **Frequently Asked Questions In Quantitative Finance**

**Paul Wilmott**



A John Wiley and Sons, Ltd., Publication

# Contents

	<b>Preface to the Second Edition</b>	<b>x</b>
	<b>Preface to the First Edition</b>	<b>xiii</b>
<b>1</b>	<b>The Quantitative Finance Timeline</b>	<b>1</b>
<b>2</b>	<b>FAQs</b>	<b>21</b>
<b>3</b>	<b>The Financial Modellers' Manifesto</b>	<b>253</b>
<b>4</b>	<b>Essays</b>	<b>259</b>
<b>5</b>	<b>The Commonest Mistakes in Quantitative Finance: A Dozen Basic Lessons in Commonsense for Quants and Risk Managers and the Traders Who Rely on Them</b>	<b>313</b>
<b>6</b>	<b>The Most Popular Probability Distributions and Their Uses in Finance</b>	<b>383</b>
<b>7</b>	<b>Twelve Different Ways to Derive Black–Scholes</b>	<b>401</b>
<b>8</b>	<b>Models and Equations</b>	<b>429</b>
<b>9</b>	<b>The Black–Scholes Formulæ and the Greeks</b>	<b>453</b>
<b>10</b>	<b>Common Contracts</b>	<b>459</b>
<b>11</b>	<b>Popular Quant Books</b>	<b>483</b>
<b>12</b>	<b>The Most Popular Search Words and Phrases on Wilmott.com</b>	<b>497</b>
<b>13</b>	<b>Brainteasers</b>	<b>507</b>
<b>14</b>	<b>Paul &amp; Dominic's Guide to Getting a Quant Job</b>	<b>557</b>
	<b>Index</b>	<b>579</b>

# Frequently Asked Questions

1. What are the different types of mathematics found in quantitative finance?	22
2. What is arbitrage?	27
3. What is put-call parity?	30
4. What is the Central Limit Theorem and what are its Implications for finance?	33
5. How is risk defined in mathematical terms?	38
6. What is value at risk and how is it used?	42
7. What is Extreme Value Theory?	46
8. What is CrashMetrics?	48
9. What is a coherent risk measure and what are its properties?	52
10. What is Modern Portfolio Theory?	55
11. What is the Capital Asset Pricing Model?	58
12. What is Arbitrage Pricing Theory?	62
13. What is Maximum Likelihood Estimation?	65
14. What is cointegration?	71
15. What is the Kelly criterion?	74
16. Why hedge?	77
17. What is marking to market and how does it affect risk management in derivatives trading?	83

18. What is the Efficient Markets Hypothesis?	87
19. What are the most useful performance measures?	90
20. What is a utility function and how is it used?	93
21. What is the difference between a quant and an actuary?	97
22. What is a Wiener process/Brownian motion and what are its uses in finance?	100
23. What is Jensen's Inequality and what is its role in finance?	103
24. What is Itô's lemma?	106
25. Why does risk-neutral valuation work?	109
26. What is Girsanov's theorem, and why is it important in finance?	113
27. What are the greeks?	116
28. Why do quants like closed-form solutions?	122
29. What are the forward and backward equations?	125
30. What is the Black-Scholes equation?	129
31. Which numerical method should I use and when?	132
32. What is Monte Carlo simulation?	141
33. What is the finite-difference method?	145
34. What is a Poisson process and what are its uses in finance?	150
35. What is a jump-diffusion model and how does it affect option values?	152
36. What is meant by 'complete' and 'incomplete' markets?	155
37. Can I use real probabilities to price derivatives?	160

38. What is volatility?	162
39. What is the volatility smile?	167
40. What is GARCH?	174
41. How do I dynamically hedge?	179
42. What is serial autocorrelation and does it have a role in derivatives?	185
43. What is dispersion trading?	188
44. What is bootstrapping using discount factors?	191
45. What is the LIBOR market model and its principal applications in finance?	196
46. What is meant by the 'value' of a contract?	200
47. What is calibration?	203
48. What is Option Adjusted Spread?	206
49. What is the market price of risk?	208
50. Can I reverse engineer a partial differential equation to get at the model and contract?	212
51. What is the difference between the equilibrium approach and the no-arbitrage approach to modelling?	216
52. How good is the assumption of normal distributions for financial returns?	219
53. How robust is the Black–Scholes model?	223
54. Why is the lognormal distribution important?	226
55. What are copulas and how are they used in quantitative finance?	229
56. What is asymptotic analysis and how is it used in financial modelling?	233

57. What is a free-boundary problem and what is the optimal-stopping time for an American option?	236
58. What are low-discrepancy numbers?	240
59. What are the bastard greeks?	245
60. What are the stupidest things people have said about risk neutrality?	248
61. What is the best-kept secret in quantitative finance?	250