

# Index

## A

**&**, 6

accounting equation, 110

accounting treatments, 99–101, 109–10, 117, 129

Activate, 206, 216–23

ActiveCell, 217–23

ActiveRange, 217–23

ActiveRegion, 217–23

ActiveSheet, 219–23

ad-hoc developments, bad models, 61, 67

**Add Output** icon, @RISK, 143

**Add Trendline**, 19–20

**Add-ins**

*see also* **Analysis ToolPak; Conditional Sum Wizard; Solver**

concepts, 25–6, 42, 43–7, 135, 177, 240, 252  
types, 43–7

additive processes, 148

**Advanced**, 66

**Advanced Filter**, concepts, 12–13, 15–16

aggregation, level of detail/aggregation, 55–60, 103

alerts, VBA, 229

**ALT**, 48, 95, 204, 207

alternative parameter methods, distribution  
selections, 150

American options, 181–2, 186–9, 244–6

*see also* options

binomial trees, 188–9, 244–6

optimal exercise, 188–9, 191–2

simulation techniques, 188

**Analysis ToolPak**, 8, 42, 43–7

*see also* **Add-ins**

concepts, 43–7

**Analysis ToolPak-VBA**, 43

analytic formulae, 187–8

**AND**

concepts, 3–6, 13–14

examples, 5

Application.Calculate, 241–3

**Apply...**, 66

arbitrage, 131, 187–8

arguments

*see also* parameters

VBA, 251–2

arithmetic operations, basic functions,  
1–3

array formulae

concepts, 35–40

examples, 36–43

arrays

*see also* data tables

concepts, 18–20, 21–9, 35–40, 46

examples, 36–43

VBA, 222–3, 241–3

asset turn *see* sales/operating assets ratio

asset values, growth rates, 9–10, 40–1, 44

assets

*see also* current...

accounting equation, 110

**Assign Macro**, 207, 248–9

audits of models, 62, 64, 80, 94–8

concepts, 94–8

corrections/improvements, 96–8

general overview development, 94–5

logical flows, 95–6

steps, 94–8

understanding the details/logical-flow,  
95–6

unintentional changes, 94

**AutoComplete**, 244

**Automatic** calculation method, 69–70

**AutoSum**, 48

average

*see also* mean

concepts, 138–9

**AVERAGE**, concepts, 1–3, 16–17

**AVERAGEIF**, concepts, 4–6

**AVERAGEIFS**, concepts, 4–6

**B**

balance sheets (BS)  
 balancing items, 107, 108, 109–10, 113, 117–18  
 concepts, 60–3, 99–101, 107–10, 170–1  
 deferred tax, 106, 117–18  
 depreciation, 61, 101, 104, 106, 116, 117–18  
 dividends, 106, 107, 108–9  
 equity, 107, 109–10  
 error-checks, 112–13  
 examples, 107  
 fixed assets, 107  
 forecast methods, 107–10  
 interest earned, 60, 72, 105  
 inventory, 107–8, 114–16  
 long-term debt, 107, 108–9, 112  
 multiple worksheet models, 62–3  
 payables, 107–8, 112  
 planned cash, 107–8  
 receivables, 107–8, 112, 116–17  
 retained earnings, 106, 107, 109  
 risk modelling, 170–1  
 short-term investments/debt, 107, 108, 112  
 tax, 107, 108  
 trial BS, 110, 119

balancing items, BS, 107, 108, 109–10, 113, 117–18

bankruptcies, 109, 122

Bayesian probability, 165–6, 199–200

best practices, modelling, 49–50, 60–2, 70, 97–8, 100–1

beta, 19, 123, 148, 149, 166–9, 240–3

biases, decision-making issues, 134

binomial distributions  
*see also* Poisson...  
 American options, 188–9, 244–6  
 beta distributions, 166–7  
 concepts, 147–8, 150–3, 158–9, 161–3, 164–7, 173, 176–8, 182–3, 184–8, 240–3, 244–6  
 examples, 151–2, 158–9, 182–3, 244–6  
 negative binomial distributions, 165, 173, 176–8  
 options valuations, 185–8, 244–6

Black–Scholes options pricing formula (BS)  
 concepts, 41–2, 68–70, 131, 181, 186–8, 191–2, 244–6  
 named ranges, 68–70  
 real options modelling, 191–2

bonds, 6–9, 27, 123–31  
 convertibles, 128–9  
 risk-free rates, 123–4

Boolean, 222–3

borders, 76–7

bounded distributions, 149–50

break-points, lists, 3

Brownian motion, 188

**Browse**, 204

BS *see* balance sheets; Black–Scholes options pricing formula

budgets, 55–9, 73–5, 116–20, 143–4, 167–8

building of models

comments, 49, 74–8, 99–101

concepts, 50, 74–85, 97–8, 136

formatting considerations, 61–2, 74–8, 86, 97–8, 101

risk modelling, 136

**Button**, 207

ByRef, 251–2

Byte, 222–3

ByVal, 252

**C**

Calculate, 231–2, 241–3

**Calculation Options**, 69, 71, 89

**Calculations**, 69, 89

Call, 250–2

call options, 68–70, 131, 181–5

*see also* options

capital asset pricing model (CAPM)

concept, 19, 122–31, 168–9, 183, 192

definition, 122–3

capital employed (CE), 115–16, 126–31

*see also* economic profit

capital expenditure (capex), 38, 40, 101, 104–5, 111, 121–31

capital expenditure (capex)/sales ratio, 128

capital investment/sales ratio, 114–16

CAPM *see* capital asset pricing model

cash

asset line, 105

BS, 107–8

waterfalls, 117–18

cash flow at risk (CaR), 169

cash flow statements (CFS)

concepts, 62–3, 99–101, 102–3, 105, 106, 110–12

direct/indirect presentation methods, 111

error-checking role, 111–13

examples, 111–12

financing cash flow section, 110–12

forecast methods, 110–11

interest expenses/income, 105, 110–11

investing cash flow section, 110–12

multiple worksheet models, 62–3

operating cash flow section, 110–12

tax, 110–11

cash flow valuations

adjustments, 121

concepts, 120–31, 242–3

discount rates, 120–31, 158, 168–9, 192–3

enterprise value, 128–31

- forecast horizons, 121, 124–8
- free cash flows, 109, 114, 120–31
- key steps, 120–1
- sensitivity analysis, 129–31
- terminal value calculations, 124–8
- time value of money, 120–31
- WACC, 122–31
- cash flows
  - discount rates, 88–9, 102–3, 120–31, 158, 168–9, 192–3
  - IRR, 6–9, 44, 123–4
- cash interest cover, 114–16
  - see also* NOPAT. . .
- CE *see* capital employed
- CELL**
  - concepts, 33–5, 37, 47, 93–4, 214–23
  - examples, 34–5, 37
- Cell Value**, 77
- Cells, 214–23
- Central Limit Theorem, concepts, 156–61
- CFS *see* cash flow statements
- CHINV**, 240–3
- China, GDP, 22, 41
- CHOOSE**, concepts, 21–9, 91–2, 248–9
- Circle Invalid Data**, 84–5
- circular references, 49, 60, 69–74, 95, 99–100, 117–18, 119–20
  - see also* structural issues. . .
  - advantages, 71
  - avoidance techniques, 72–4, 119–20
  - causes, 70–1
  - concepts, 69–74, 95, 99–100, 119–20
  - convergent circularities, 71, 72–3
  - disadvantages, 71
  - divergent circularities, 71, 72–4
  - financial statement modelling, 99–100, 117–18, 119–20
  - floating circularities, 71, 73–5
  - iterative techniques, 71, 72–4
- Class Module, 205–6
- Clear, 210
- ClearContents, 206, 209–10
- Code, 204–6
- colour-coding, 76–7, 95, 97, 101, 117
- COLUMN**, concepts, 21–9
- COLUMNS**, concepts, 21–9
- combinations, risk modelling, 134
- Comment**, 77–8
  - comments, concepts, 49, 74–8, 205–6, 220–3
- communication benefits
  - real options modelling, 190
  - risk modelling, 134
- compactness
  - see also* structural issues. . .
  - concepts, 60, 62–4, 97–8, 101
  - fragmented ownership problems, 63–4
  - linked workbooks, 63–4, 98
  - mirror worksheets, 63–4, 98
  - multiple worksheet models, 62–3, 97–8
- comparables approach, valuations, 129–31
- complex (compound) distributions, concepts, 137
- complex conditional sums, 45–8
- complex formulae, formula robustness needs, 79–85
- CONCATENATE**, concepts, 6–9
- conditional formatting, 76–7, 79–80, 83–4, 96, 112–13, 225–7
- Conditional Sum Wizard**, 4, 6, 13, 25, 43–8
  - see also* **Add-ins**
  - concepts, 43–4
  - examples, 45–8
- confidential data, multiple worksheet models, 63
- constant level of repayments required, 8, 11–12
  - see also* **PMT**
- construction costs, 51
- contingency planning, 143–4
- contingent claims, 135
- continuous distributions, concepts, 137, 161–2
- contract penalty clauses, 135, 194
- control of execution methods, VBA, 227–30
- convergent circularities, 71, 72–3
- conversion factors, 61, 62
- convertibles, 128–9
- corkscrew approaches, 108–9
- corrections/improvements, audits of models, 96–8
- correlated sampling relationships, simulation models, 144–7
- correlation
  - concepts, 16–20, 25–9, 45–7, 143–7, 244–6
  - types, 19, 146
- Correlation** tool, 45–7
- CORRELL**, concepts, 16–20, 25–6, 29, 145–6, 245–6
- cost allocations, 38–9, 41, 42
- cost budgets, 56–9, 73–5, 143–4, 167–8
- cost forecasts, IS, 103–4
- cost-of-capital calculations, 19, 115–16, 122–31
  - see also* capital asset pricing model; economic profit
- cost-of-debt, 122–31
  - see also* debt. . .
- cost-of-equity, 122–31
  - see also* equity. . .
- cost-to-sales ratio, 101
- COUNT**, concepts, 1–3, 14–15, 16–17, 79
- COUNTA**, concepts, 1
- COUNTIF**, concepts, 4–6
- COUNTIFS**, concepts, 4–6
- COVAR**, concepts, 16–20
- covariance, 16–20, 25–8, 40, 43, 45–7, 123–31

- Cox–Ingersoll–Ross model, 171
- Create Names**... , 68
- creditors *see* payables
- critical path analysis, 177
- cross-check rows, 112–13
- cross-tabulation reports, databases, 15–16
- CTRL+I**, 47, 76, 93
- CTRL+ARROW**, 47
- CTRL+C**, 47
- CTRL+ENTER**, 47
- CTRL+F**, 47, 64, 96
- CTRL+F3**, 64
- CTRL+HOME**, 48
- CTRL+SHIFT+ARROW**, 47
- CTRL+SHIFT+DOWN**, 14, 217
- CTRL+SHIFT+ENTER**, 35–7, 46, 244–6
- CTRL+V**, 47
- CTRL+X**, 47
- CTRL+Z**, 47
- cumulative curves, concepts, 137–8
- Currency, 222–3
- currency conversions, 23–5, 75–6
- current assets
- see also* cash; inventory; receivables
  - concepts, 2, 107–10, 114–16
- current assets/current liabilities *see* current ratio; quick ratio
- current liabilities
- see also* dividends; payables
  - concepts, 107–10, 114–16
- current ratio, 114–16
- CurrentRange, 217–23
- CurrentRegion, 217–23
- custom formatting, 76–7
- Customize**, 248–9
- cut-and-paste uses, model improvements, 98
- D**
- Data**, 14–15, 40, 42, 44, 45, 85–7
- Data Analysis**, 44–7
- data sets, concepts, 5–6, 12–16
- Data Table**, 9, 71, 80, 85–94, 96, 129, 184–5, 201, 234, 245, 248–50
- data tables, 3, 9, 14–15, 71, 80, 85–94, 96, 129, 184–5, 201, 234, 243, 245, 248–50
- common pitfalls, 87
  - concepts, 3, 9, 14–15, 71, 80, 85–94, 96, 129, 184–5, 201, 243, 245, 248–50
  - creation, 86–8
  - examples, 87–92
  - forms, 86–7
  - implementation methods, 87–8
  - limitations, 87, 88–92
  - lookup functions, 90–2
  - modifications, 86–8
  - real options modelling, 201
  - sensitivity analysis, 85–94, 129
  - data types, VBA, 221–3
- Data Validation**, 79–80, 83–5, 91–2
- data-driven selection approaches, probability distributions, 147–8, 153–5
- Database**, concepts, 4, 6, 12–16, 45–6
- databases
- modelling, 52–3, 65–6, 69, 71
  - named ranges, 69, 71
- Data/Filter**, 14–15
- Data/Sort**, 3
- Data/Subtotal(s)**, 2–3
- Date, 222–3
- DAVERAGE**, 13–14
- DCOUNT**, 13–14
- DCOUNTA**, 13–14
- debt finance, 100–1, 107, 108–9, 118–19, 122–31, 176–8
- see also* long-term...; short-term...
  - concepts, 100–1, 107, 108–9, 118–19, 122–31
  - cost-of-debt, 122–31
  - depreciation, 118–19
  - issuance, 122–3
  - tax shields, 109, 122
- debtors *see* receivables
- Debug, 207–8, 221
- debugging, VBA, 207–8, 221, 232–5
- decision trees, 133, 181, 188–9, 196–201
- decision–chance structure, 197–8
- decision–chance–decision structure, real options modelling, 197–8
- decision-making issues
- biases, 134
  - real options modelling, 189–201
  - risk modelling, 133–4
- deferred tax, 106, 117–18
- Define Correlations** icon, @RISK, 143
- Define Distribution** icon, @RISK, 142–3, 147–8
- Define Name**, 66
- density curves, concepts, 137–8
- dependencies
- risk modelling, 144–7
  - variables/dependencies considerations, 50–5, 144–7, 156–7, 220–3
- depreciation, 27, 38, 40, 61, 70–1, 72, 100–2, 104–5, 106, 111, 116, 117–18, 121–31, 176–8
- BS, 61, 101, 104, 106, 116, 117–18
- CFS, 111
- circular references, 70–1, 72
- debt schedules, 118–19
- depreciation/sales ratio, 114, 115–16
- FCF, 121–31
- IS, 61, 100–2, 104–5, 106

- derivatives, 41–2, 68–70, 128, 131, 181–201  
*see also* options  
 concepts, 181–201  
 definition, 181  
 real options modelling, 191–2  
 risk-neutral valuations, 181, 183–5  
 valuations, 41–2, 68–70, 131, 181–201
- design of models  
 concepts, 49–60, 99–120  
 granularity of the time axis, 59–60, 186–7  
 hypersensitive variables, 55  
 level of detail/aggregation, 55–60, 103  
 logical flows, 50–1, 60–2, 74–8  
 variables/dependencies considerations, 50–5, 220–3
- detail, level of detail/aggregation, 55–60, 103  
 determinant of a matrix, 39–40
- Developer**, 204–7
- Dim, 222–6
- direct insertion, 2–3
- direct/indirect presentation CFS methods, 111
- discounts, 22–3, 88–9, 102–3, 120–31, 158, 168–9, 183–5, 192
- discrete distributions  
*see also* Poisson...; user-defined...  
 concepts, 137, 147–8, 152–5, 161, 166–7, 172–3, 176–8  
 examples, 153–4, 172–3
- Display Equation on Chart**, 19–20
- DisplayAlerts, 229–30, 235
- Distribution Fitting** icon, @RISK, 143, 147–8, 153–5
- distribution of parameter uncertainties, science of probability distributions, 163, 165–7
- distributions of waiting times, science of probability distributions, 163–6
- divergent circularities, 71, 72–4
- dividends  
 Black–Scholes options pricing formula, 187–8  
 BS, 106, 107, 108–9, 181  
 dividend-forecasting valuation methods, 129  
 IS, 100, 106
- dividends-per-share, 106
- DMAX**, 13–14
- DMIN**, 13–14
- documented changes, modelling, 97–8
- Double, 221–3, 242–3
- double-counting problems, 2
- Do...Until, 229–30
- Dow Jones, 19, 37, 39
- Do...While, 229–30
- DSTDDEV**, 13–14
- DSTDDEVP**, 13–14
- DSUM**, concepts, 13–14, 46–8
- dual fuel machines, real options modelling, 195–7
- duplicate names, named ranges, 68
- DVAR**, 13–14
- DVARP**, 13–14
- dynamic models, 56
- dynamic ranges, 69, 71
- E**
- EBIT, 100, 105, 114–16, 121  
*see also* NOPAT...; operating profits
- EBIT/interest payable ratio, 114–16
- EBIT/operating assets ratio, 114–16
- EBIT/sales ratio, 114–16
- EBITDA, 100, 114–16, 121–2, 126, 130–1  
*see also* free cash flows  
 enterprise value-to-EBITDA ratio, 130
- EBITDA/interest payable ratio, 114–16
- economic production life, oil wells, 175–7
- economic profit  
*see also* cost-of-capital...; NOPAT...  
 concepts, 114–16, 126, 129–30  
 definition, 115
- Edit Comment**, 77–8
- Edit Links**, 96
- Editor**, 206, 221
- ElseIf, 229–30
- End..., 205–6, 211–12, 217–23, 229–30
- End Function, 205–6, 211–12
- End Sub, 205–37
- end with, 212–37
- ENTER**, 35–7, 66
- enterprise value, 128–31  
*see also* cash flow valuations
- enterprise value-to-EBITDA ratio, 130
- equity finance, 100–1, 107, 109–10, 122–31  
 BS, 107, 109–10  
 convertibles, 128–9  
 cost-of-equity, 122–31  
 issuance, 122–3
- equity risk premiums, 123–4
- error-checks  
 BS, 112–13  
 CFS role, 111–13  
 concepts, 87–8, 96–8, 111–16  
 financial statement modelling, 111–16  
 general tools, 111–13  
 IS, 113  
 VBA, 218, 220, 229–30, 234–5
- error-free aims, good models, 50, 60, 62–3, 70, 87–8, 96–8
- Errors**, 80, 95–6
- Euro Currency Tools**, 43  
*see also* Add-ins

- European options, 41–2, 68–70, 181–2, 185–8, 244–6  
*see also* options  
simulation techniques, 188
- Evaluate Formula**, 85
- event risk, 151  
*see also* binomial distributions
- Excel  
2003, 3, 8, 14, 15, 40, 42, 44, 64–70, 76–7, 83–9, 91, 93–8, 133, 177–9, 181, 203–52  
2007, 8, 12, 14–15, 34, 43, 44, 45–6, 64–7, 133, 181  
alerts, 229  
**Analysis ToolPak**, 8, 42, 43–7  
arithmetic operations, 1–3  
arrays, 18–20, 21–9, 35–40, 46, 222–3  
building blocks, 1–48  
concepts, 1–48, 177–9  
database functions, 12–16, 45–6  
features, 12–16  
financial calculations, 6–12  
function concepts, 1–48  
**GoalSeek**, 11–12, 40–3, 126, 203, 237–9  
information functions, 33–5  
limitations of traditional structures, 135, 177, 203–4  
logical operations, 3–6, 34  
lookup functions, 5, 20–9, 34, 40, 43, 45, 83–4, 86–7, 90–2, 95, 98, 104, 155  
matrix calculations, 25–6, 35, 39–40, 43, 45–7, 246–8  
reference functions, 5, 20–9, 39  
screen updates, 229–30  
selected functions/tools, 1–48  
short-cuts, 47–8  
**Solver**, 11–12, 40–4, 116, 126, 203–4, 237–9  
split screens, 207–8, 229–30  
statistical functions, 16–20, 36–7  
text functions, 29–33  
VBA, 203–52
- EXP**, concepts, 8–11  
expected returns, 122–31  
exponential distributions, 164–5, 173
- F**
- F1**, 22, 47, 224  
**F2**, 47, 66, 78–9  
**F3**, 15, 48, 65–6  
**F4**, 47  
**F5**, 48, 65, 80, 93, 95–6, 206–7, 235  
**F6**, 4  
**F7**, 4, 47  
**F8**, 207, 233–4  
**F9**, 73–4, 89, 231, 233, 234, 241
- F11**, 204  
factory capacity optimisation problems, 173–5  
fade periods, concepts, 125–31  
failure rate models, 174–6  
**FALSE**, concepts, 3–6, 22, 33–5  
fat tails, probability distributions, 140–2  
FCF *see* free cash flows  
feasibility checks, financial statement modelling, 111–16
- Field List**, 15–16  
**Field Settings**, 15–16  
**Filter**, 12–13, 15  
filtered data, 2, 12–13, 14–15  
financial calculations, basic functions, 6–12  
**Financial** category, 6  
financial modelling  
core functions, 1–12  
VBA, 42, 43, 65–6, 95, 135, 185, 203–52  
financial statement modelling, 2, 61–2, 99–131  
*see also* balance sheets; cash flow...; income statements  
accounting approaches, 99–101, 109–10, 129  
circular references, 99–100, 117–18, 119–20  
concepts, 99–131  
core points, 99–120  
error-checks, 111–16  
examples, 99–101, 107, 111–12, 127–8  
feasibility checks, 111–16  
generality additions, 116–20  
historic figures, 101–20  
inflation, 102–3  
ratio analysis, 99, 100, 113–16, 130  
risk modelling, 169–72  
financing cash flow section, CFS, 110–12  
financing ratios, 114–16  
**FIND**, concepts, 30–3, 64, 77–8, 96  
**Find and Select**, 65, 77, 96  
**FINV**, 240–3  
fitting approach, distribution fitting, 143, 147–8, 153–4  
fixed assets, 2, 101, 104–5  
*see also* depreciation  
BS, 107  
fixed costs, IS, 103  
floating circularities, 71, 73–5  
**For**, 227–30  
**for Each**, 224–7, 228–30, 239  
**Form Controls**, 207  
**Format Cells**, 47, 77  
**Format only cells that contain**, 76–7  
**Format only cells with**, 77  
**Format Paintbrush**, 76–7  
**Format Painter**, 47  
formatting considerations

- concepts, 61–2, 74–8, 86, 97–8, 101, 112–13, 225–7
- conditional formatting, 76–7, 79–80, 83–4, 112–13, 225–7
- custom formatting, 76–7
- modelling, 61–2, 74–8, 86, 97–8, 101, 112–13, 225–7
- Forms**, 207
- Formula Auditing**, 80, 85, 94–8
- Formula Bar**, 24, 33, 35–6, 37, 47, 65–6, 78–9, 84–5, 207, 234
- formula robustness needs
  - complex formulae, 79–85
  - concepts, 78–85
  - simple formulae, 78–9
- Formulas**, 25, 44, 48, 64–6, 69–71, 80, 94–6, 143
- Formulas Referring to Empty Cells**, 95–6
- fragmented ownership problems, compactness, 63–4
- free cash flows (FCF)
  - calculation methods, 121
  - concepts, 109, 114, 120–31
  - definition, 121
  - discount rates, 121–31
  - long-term debt, 109
  - WACC, 122–31
- FREQUENCY**
  - concepts, 18–20, 36–7, 39
  - examples, 36–7, 39
  - histogram of returns, 36–7, 39
- full referencing, VBA, 212–23
- full stops, VBA, 206
- Function, 205–6, 211–12, 243–52
- further reading, 253
- G**
- gamma distributions, 165, 166–7, 240–3
- GAMMAINV**, 240–3
- GDP, 22, 41
- gearing ratios, 114–16
- general frequency–severity models, 162–3, 172–4
- geometric distributions, 159–60, 164–5
- Go To Special**, 48, 65, 77, 93, 95–6
- GoalSeek**
  - concepts, 11–12, 40–3, 116, 126, 203, 237–9
  - examples, 40–4, 237–9
- goodwill, 116
- GoTo, 229–30, 235
- government bonds
  - concepts, 6–9, 27, 123–31
  - risk-free rates, 123–4
- granularity of the time axis, design of models, 59–60, 186–7
- growth rates, asset values, 9–10, 40–1, 44
- H**
- half-lives, 9–10
- hedge ratio, 183
- hedged portfolios, valuations, 181–3
- Help** menu, 1, 2, 22, 69, 139
- Help VBA menu, 204, 211, 224, 229
- Hide**, 93–4
- hiding/protecting methods, 92–4
- histogram of returns, 36–7, 39
- historic figures
  - distribution selections, 147–8, 154–5
  - financial statement modelling, 101–20
- HLOOKUP**
  - concepts, 21–9, 40, 43
  - constraints, 23–4
  - examples, 22–4, 26, 40, 43
- Home**, 47–8, 64, 65, 77, 93
- Home/Format as Table**, 14–15
- houses, renovation costs, 56–7
- hypersensitivities, variables, 55
- I**
- IF** statements
  - concepts, 3–6, 78–9, 110, 152, 188, 193, 196, 241
  - embedded statements, 3–4, 34
- IFERROR**
  - concepts, 12, 33–5
  - examples, 34, 36
- If...Then, 228–30
- Immediate, 207–8, 218–23, 233, 234
- imperfect information, real options modelling, 199–200
- implied volatility, 41–2, 45, 186–8, 237–9
  - see also* volatility
- improvements, audits of models, 96–8
- income statements (IS)
  - concepts, 61–3, 99–106, 169–70
  - cost forecasts, 103–4
  - depreciation, 61, 100–2, 104–5, 106
  - dividends, 100, 106
  - error-checks, 113
  - examples, 99–101
  - forecast methods, 99–106
  - inflation, 102–3
  - interest expenses/income, 100, 105, 109, 110–11
  - multiple worksheet models, 62–3
  - net income, 100, 105–6, 110–11
  - nominal/real values, 102–3
  - operating profits, 100, 105, 114–16
  - retained earnings, 100, 106
  - risk modelling, 169–70
  - sales forecasts, 51–5, 58–9, 61, 90–1, 102–3
  - tax, 100, 105–6, 118
  - taxable profits, 100, 105–6

- indented text, VBA, 220–3
- INDEX**, concepts, 20, 21–9, 34, 39, 91–2, 172–3, 185–6
- INDIRECT**
- concepts, 21–9, 31
  - examples, 28–9, 31
- indirect presentation CFS method, 111
- inflation, 102–3, 127
- information functions, concepts, 33–5
- input values, data validation restrictions, 83–4
- InputBox, 208, 210–23
- Insert**, 14–16, 77–8, 207, 244, 248–9, 250–2
- Insert, 205–6
- Insert/Module, 205
- Insert/PivotTables**, 15–16
- Insert/Table**, 14–15
- insurance, reinsurance models, 162–3, 172–4
- intangible assets, 116
- Integer, 221–3, 242–3
- intensity functions, 165–6
- interest cover, 114–16
- see also* EBIT. . .
- interest earned
- balance sheet cash, 60, 72, 105
  - circular references, 70–1, 72
  - IS, 100, 105
- interest expenses
- see also* debt. . .
  - CFS, 105, 110–11
  - FCF, 121
  - IS, 100, 105, 109, 110–11
  - tax, 109, 122
- interest rates, 8, 11–12
- internal rate of return, 6–9, 44
- see also* **IRR**
- Internet Assistant VBA**, 43
- see also* **Add-ins**
- inventory, BS, 107–8, 114–16
- inverse of a matrix, 39–40
- investing cash flow section, CFS, 110–12
- investment ratios, 113–14
- IRR**
- see also* internal rate of return
  - concepts, 6–9, 123–4
  - examples, 8–9
- IS *see* income statements
- ISERR**, concepts, 33–5
- ISERROR**, concepts, 33–5, 77, 96
- ISNUMBER**, concepts, 33–5, 78
- ISTEXT**, concepts, 33–5, 78
- Iterations** icon, @RISK, 143
- iterative techniques, circular references, 71, 72–4
- K**
- KeyTips (ToolTips)**, 48
- KURT**, concepts, 17–20, 142, 246–9
- kurtosis, concepts, 17–20, 141–2, 159–60, 244–50
- L**
- LARGE**, concepts, 17–20
- leases, 116, 128
- LEN**, concepts, 30–3
- leptokurtic distributions, concepts, 142
- level of detail/aggregation, design of models, 55–60, 103
- liabilities
- see also* current. . .
  - accounting equation, 110
- linear regression, 16–20
- see also* **SLOPE**
- linked workbooks, compactness, 63–4, 98
- liquidity issues, 103, 114–16
- liquidity ratios, 114–16
- List range**, 15
- lists, break-points, 3
- LN**
- concepts, 8–11, 18–19, 230
  - examples, 9–11
- loans, constant level of repayments required, 8, 11–12
- Locals, 207–8, 233
- Locked**, 93–4
- locked cells/worksheets, 92–4
- Log, 230–1
- logarithms, 8–11
- see also* **LN**
- Logical**, 80–1, 95–6
- logical flows
- see also* structural issues. . .
  - audits of models, 95–6
  - concepts, 50–1, 60–2, 74–8, 95–6, 100–1, 111–13
  - formatting considerations, 61–2, 74–8, 86, 97–8, 101, 112–13
  - good principles, 60–2
  - mixed formulae, 61
  - modular structures, 61–2
  - summaries, 62
- logical operations, basic functions, 3–6, 34
- LOGINV**, concepts, 18–20, 240–3
- lognormal distributions
- concepts, 18–20, 148, 156, 159–61, 167–8, 173, 175–7, 240–3
  - examples, 160–1, 175–7
- Long, 221–3, 242–3
- long-term debt
- see also* debt. . .
  - BS, 107, 108–9, 112
  - free cash flows, 109

long-term growth assumptions, cash flow valuations, 129–30

**Lookup**, concepts, 5, 20–9, 34, 40, 43, 45, 83–4, 86–7, 90–2, 95, 98, 155

**Lotus compatibility Settings for**, 66

## M

**Macro**. . . , 204, 235–7, 250–2

macros, 49, 204, 207, 235–9, 244, 248–52

**Manage**. . . , 42, 44, 76–7, 96

margins, 102–3, 113

market shares, 51, 55, 102–3

Markov chains, 153, 171–3

martingales, 18

## MATCH

concepts, 20, 21–2, 34, 39, 164–5, 172–3

examples, 21–5, 39

**Math & Trig** category, 1, 2–3, 6

matrix calculations, concepts, 25–6, 35, 39–40, 43, 45–7, 246–8

matrix multiplication, 25–6, 39–40, 43

**MAX**, concepts, 1–3, 16–17, 78–9, 81–3, 110, 188, 193, 196, 230–1

## MDETERM

*see also* matrix. . .

concepts, 39–40

mean, concepts, 138–9, 141–67

mean-reverting processes, 170–2

measure of peakedness, probability distributions, 141–2

measures of the central point, concepts, 138–42

measures of spread

*see also* standard deviation

risk modelling, 139–40, 145

median, concepts, 139, 141

mesokurtic distributions

*see also* normal distributions

concepts, 142

**MID**, concepts, 30–4, 85

**MIN**, concepts, 1–3, 16–17, 65–6, 67, 81–2, 110, 193, 196

mining output forecasts, 54–5

minority interests, 121, 128

## MINVERSE

*see also* matrix. . .

concepts, 39–40

mirror worksheets, 63–4, 98

mixed formulae, logical flows, 61

## MMULT

*see also* arrays; matrix. . .

concepts, 25–6, 39–40, 43

mode, concepts, 138–9, 141

model recalculations, VBA, 231–2

**Model Window** icon, @RISK, 143

model-as-you-read approaches, logical flows, 60–2, 70, 100–1

## modelling

*see also* building. . . ; design. . . ; planning. . . ; structural issues. . .

ad-hoc developments, 61, 67

audit trails, 62, 64, 80, 94–8

bad models, 49–50

best practices, 49–50, 60–2, 70, 97–8, 100–1

circular references, 49, 60, 69–74, 95, 99–100, 117–18, 119–20

comments, 49, 74–8, 205–6, 220–3

compactness, 60, 62–4, 97–8, 101

concepts, 47, 49–98

corrections/improvements, 96–8

data tables, 3, 9, 14–15, 71, 80, 85–94, 129, 184–5, 201, 234, 243, 245, 248–50

databases, 52–3, 65–6, 69, 71

documented changes, 97–8

error-free aims, 50, 60, 62–3, 70, 87–8, 96–8  
financial statement modelling, 2, 61–2, 99–131

formatting considerations, 61–2, 74–8, 86, 97–8, 101, 112–13, 225–7

good models, 49–50, 60–3, 100–1, 220–3

granularity of the time axis, 59–60, 186–7

hiding/protecting methods, 92–4

hypersensitive variables, 55

level of detail/aggregation, 55–60, 103

logical flows, 50–1, 60–2, 74–8, 100–1, 111–13

modular structures, 61–2

multiple worksheet models, 62–3, 97–8

named ranges, 48, 49, 60, 64–9, 79–80, 98, 212–32

objectives-driven benefits, 49–50

passwords, 93–5

pitfalls, 52–3, 56, 87

principles, 49–98

real options, 133, 135, 181, 188–201

results presentation, 85–94

risk modelling, 133–79, 188–90

robustness issues, 47, 49–50, 64–6, 78–85, 134, 220–3

sensitivity analysis, 49–50, 52–5, 58–9, 80–3, 85–94, 129–31, 133

simplicity benefits, 49–50, 60–2

variables/dependencies design considerations, 50–5, 144–7, 156–7, 220–3

VBA, 42, 43, 65–6, 95, 135, 185, 203–52

modular structures, logical flows, 61–2

**MsgBox**, 208, 210–12, 218–35

multiple worksheet models, compactness, 62–3, 97–8

multiplicative processes, 148

## N

**Name Box**, 64–6

**Name Define**, 64–5

**Name Manager**, 64–6, 69, 95, 218, 226, 242–3  
named ranges, 48, 49, 60, 64–9, 98, 212–39

*see also* structural issues...

benefits, 64–6

BS, 68–70

choosing names, 68–9

concepts, 64–9, 79–80, 98, 212–23

databases, 69, 71

duplicate names, 68

examples, 66–7, 68–71

potential disadvantages, 66–8

uses, 64–6, 79–80

**Names**, 221–3

negative binomial distributions, 165, 173, 176–8

negative numbers, 77, 101

net debt/EBITDA ratio, 114–16

net debt/equity ratio, 114–16

net income, IS, 100, 105–6, 110–11

net present value (NPV)

concepts, 8, 11, 44, 120–31, 139, 168–9,  
188, 190–1

real options modelling, 190–1

**New Rule**, 76–7

**Next**, 224–30

no-knowledge distributions *see* uniform

continuous distributions

nominal/real values, IS, 102–3

non-linear behaviours

real options modelling, 189–90

risk modelling, 135

**NOPAT**

concepts, 114–16, 120–31

FCF, 121–31

NOPAT/operating assets ratio, 114–16

NOPAT/sales ratio, 114–16

normal distributions, 13, 16–20, 69, 139–42,

148, 156–61, 163, 169, 174–6

*see also* probability distributions

concepts, 139–42, 156–61, 163, 169, 174–6

**NORMINV**, concepts, 18–20, 240–3

**NORMSINV**, concepts, 17–20, 240–3

**NOT**, concepts, 3–6

**NPV**

*see also* net present value

concepts, 8, 11, 44, 124, 168–9, 223

examples, 11, 168–9

**#NUM** error, 12

**Number**, 77

**Numbers**, 80–1

**O**

**Object**, 205–6, 221–3, 234–5

object-oriented methods, 204, 224–7

objectives-driven benefits, good models, 49–50

off-balance-sheet transactions, 128–9

**OFFSET**

concepts, 21–9, 47, 69, 71, 91–2, 98,  
118–19, 172–3, 214–23, 246–8

examples, 28–9, 30, 31, 32, 47, 69, 71, 91–2,  
172–3, 246–8

**Offset**, 214–23

oil, 158, 160–1, 175–7, 192

**On Error...**, 229–30, 234–5

one-off sensitivity analysis, concepts, 80–3

one-way data tables

*see also* data tables

concepts, 87–94

operating cash flow section, CFS, 110–12

operating free cash flows, 121

operating profits, 100, 105, 114–16

*see also* EBIT; NOPAT...

operating ratios, 113–16

opportunities, risk, 135–6

optimal exercise

American options, 188–9, 191–2

real options modelling, 191–2, 196–7

optimisation problems, risk modelling, 173–5

**Option Base...**, 223

**Option Explicit**, 205, 242

options, 41–2, 68–70, 128, 131, 133, 135,  
181–201, 244–6

*see also* American...; call...; European...;  
put...; real...

binomial distributions, 185–8, 244–6

Black–Scholes options pricing formula, 41–2,  
68–70, 131, 181, 186–8, 191, 244–6

concepts, 181–201

payoff calculations, 185–6

risk-neutral valuations, 181, 183–5

simulation techniques, 185–6, 191–6

valuations, 41–2, 68–70, 131, 181–201,  
244–6

**Options**, 19–20, 43, 64, 206, 221, 244

**OR**, concepts, 3–6, 13–14

overheads, 38–9, 41, 42

**P**

**Page Layout**, 65–6

**Page Setup**, 65–6

Palisade Corporation, 133, 177, 181, 196

parameter dependency relationships *see*

semi-dependence relationships

parameters, 53, 144–7, 163, 165–7, 251–2

distribution of parameter uncertainties, 163,  
165–7

variables, 53, 144–7

Pareto distributions, 148, 173

partial differential equations

*see also* Black–Scholes options pricing

formula (BS)

concepts, 186–7

- passwords, 93–5
- Paste List**, 66
- Paste Names**, 66
- pay-out ratios, 106
- payables
- BS, 107–8, 112
  - period, 114–16
- payoff calculations, options, 185–6
- PEARSON**, 20, 245–6
- Pearson Product Moment (linear) correlation, concepts, 19–20, 245–6
- pension obligations, 128
- percentiles, 139, 143–4, 147–8, 150, 169, 175–6
- perpetuity valuations, terminal values, 126–8
- Personal Macro Workbook**, 205, 235–7, 248–9, 252
- PERT distributions, concepts, 147–50, 157, 167–8
- phased projects, real options modelling, 190, 198–9
- PivotCharts**, 16
- PivotTables**
- concepts, 4, 13, 15–16, 45
  - examples, 15–16
- planned cash, BS, 107–8
- planning issues
- see also* structural...
  - concepts, 60–74
- platykurtic distributions, concepts, 142
- PMT**
- see also* constant level of repayments required
  - concepts, 8, 11–12
- Poisson distributions
- see also* binomial...
  - concepts, 148, 156–7, 158, 161–3, 164–7, 173–4
  - examples, 162–3
  - gamma distributions, 165, 166–7
- portfolio analysis, 3–4, 19, 27–8, 39–40, 42–3, 46, 176–8
- portfolio optimisation, 42–3, 46
- PPMT**, concepts, 8, 11–12
- pragmatic selection approaches, probability distributions, 147–53
- PrecisionTree, 133, 181, 196–201
- Preserve, 223
- price-to-earnings ratio, 130
- prices
- forecasting, 161–2
  - sales volumes, 51–5, 102–3
- Print, 233–5
- Print Area**, 65
- Private, 226–7, 244, 249–52
- probabilities, 1–2, 134, 137–67
- risk modelling, 134, 137–67
  - simulation techniques, 137–42
- probability distributions
- see also* normal distributions
  - concepts, 137–44, 147–67
  - data-driven selection approaches, 147–8, 153–5
  - fat tails, 140–2
  - kurtosis, 17–20, 141–2, 159–60, 244–50
  - measure of peakedness, 141–2
  - measures of the central point, 138–42
  - measures of spread, 139–40, 145
  - measures of symmetry, 139, 140–2, 148–9, 157, 167–8
  - pragmatic selection approaches, 147–53
  - scientific selection approaches, 147–8, 155–67
  - selection considerations, 147–67
  - skew, 17–20, 140–2, 148–9, 157, 159–60, 244–50
- Procedure, 205–6
- procedures executed from other procedures, VBA, 249–52
- PRODUCT**, concepts, 1–3
- product portfolios, 90, 176–8
- production costs, 100
- profit shares, circular references, 70–2
- profitability ratios, 114–16
- Project..., 204–5
- project evaluations, 6–9
- project schedules, risk modelling, 177–9
- project valuations, real options modelling, 189–90, 193–4, 196–7
- Properties, 205–6
- Protect Sheet**, 93–4
- Protect Workbook**, 93–4
- protecting/hiding methods, 92–4
- Protection**, 93–5
- Public, 207, 244, 249–52
- put options, 68–70, 181–5
- see also* options
- Q**
- quality controls, 174–6
- Quick Access Toolbar**, 207, 252
- quick ratio, 114–16
- R**
- R&D costs, 116, 189
- RAND**, concepts, 18, 205, 230, 231–2, 234, 240–3
- random numbers, 18, 205, 230, 231–2, 234, 240–3
- random walks, 170–1, 186, 195–6
- Randomize, 241–3
- Random/Static Recalculation** icon, @RISK, 143

- Range, 206–39
- RANK**, 17–20, 146, 244–6
- ratio analysis, 99, 100, 113–16, 130  
*see also individual ratios*  
 concepts, 99, 100, 113–16  
 feasibility checks, 113–16  
 types, 113–16
- re-sampling data-driven approach, distribution selections, 147–8, 154–5
- Read-only**, 94
- reading list, 253
- real options modelling, 133, 135, 181, 188–201  
 Bayesian analysis, 199–200  
 Black–Scholes options pricing formula, 191–2  
 communication benefits, 190  
 concepts, 188–201  
 data tables, 201  
 decision–chance–decision structure, 197–8  
 definition, 188  
 derivatives, 191–2  
 discount rates, 192  
 dual fuel machines, 195–7  
 examples, 192–201  
 imperfect information, 199–200  
 non-linearity element, 189–90  
 NPV, 190–1  
 optimal exercise, 191–2, 196–7  
 phased projects, 190, 198–9  
 postponed decisions, 190  
 project valuations, 189–90, 193–4, 196–7  
 risk modelling, 190–1  
 service level agreements, 189–90, 194  
 simulation techniques, 191–6  
 situational elements, 189–90  
 trees, 191, 196–201  
 uses, 189–92
- real/nominal values, IS, 102–3
- receivables, BS, 107–8, 112, 116–17
- Record Macro**, 235–7
- ReDim, 223, 234
- Reference**, 20–9, 39
- References, 205, 239, 252
- Refers to**, 66
- Refresh**, 15–16
- reinsurance models, concepts, 162–3, 172–4
- renovation costs, houses, 56–7
- REPLACE**, concepts, 30–3
- required growth rates, 40–1, 44
- responsibilities, risk modelling, 135
- results presentation  
 general remarks, 86  
 sensitivity analysis, 85–94
- ResultsArray, 222–3
- Resume, 235
- retained earnings, IS, 100, 106, 107, 109
- RETURN**, 33, 69–70
- return-on-capital, 101, 116, 125–31  
*see also ROCE*
- returned text strings, 4
- returns, histogram of returns, 36–7, 39
- revenue planning, uncertain timing, 176–8
- Review**, 77–8, 94–5
- Reviewing Toolbar**, 78
- @RISK, 133, 142–79, 181, 186–201  
 concepts, 133, 142–79, 181, 192–201  
 distribution selections, 147–67  
 examples, 143–4, 146–7, 167–79, 192–201  
 quick guide, 142–4  
 real options modelling, 192–201
- risk  
 beta, 19, 123, 148, 149, 166–9, 240–3  
 CAPM, 122–31, 168–9, 183, 192  
 cash flow valuations, 120–31  
 definition, 135–6  
 measures of spread, 139–40, 145  
 opportunities, 135–6  
 uncertainty contrasts, 136
- risk analysis, definition, 135–6
- risk identification/prioritisation, concepts, 136
- risk modelling  
*see also sensitivity analysis*  
 benefits, 133–5  
 BS, 170–1  
 building of models, 136  
 challenges, 135  
 combinations, 134  
 communication benefits, 134  
 concepts, 133–79, 188–90  
 contingent claims, 135  
 decision-making issues, 133–4  
 dependencies, 144–7  
 economic production life of oil wells, 175–7  
 financial statement modelling, 169–72  
 further example models, 167–79  
 general frequency–severity models, 162–3, 172–4  
 IS, 169–70  
 Markov chains, 153, 171–3  
 mean-reverting processes, 170–2  
 non-linear behaviours, 135  
 optimisation problems, 173–5  
 options, 41–2, 68–70, 128, 133, 135, 181–201  
 probabilities, 134, 137–67  
 processes, 135–6  
 project schedules, 177–9  
 quality control example, 174–6  
 real options modelling, 190–1  
 reinsurance models, 162–3, 172–4  
 responsibilities, 135  
 @RISK, 133, 142–4, 146–7, 167–79

- robustness benefits, 134
  - robustness issues, 134
  - simulation techniques, 136–47
  - uncertain timing in revenue planning, 176–8
  - variables, 136, 156–7
  - risk monitoring/controlling, concepts, 136
  - risk registers, 151–2
  - risk-free rates, concepts, 123–4, 181–2, 185–8, 191
  - risk-neutral valuations, 181, 183–5
  - RiskCompound**, @RISK, 173
  - RiskMean**, @RISK, 143–4, 168–9, 170–2, 175, 186, 193–4
  - RiskPercentile**, @RISK, 143–4
  - RiskSimtable**, @RISK, 174
  - RiskStatistics**, @RISK, 143
  - RiskStddev**, @RISK, 143
  - RiskTarget**, @RISK, 143–4, 168–72
  - Rnd, 230–1, 240–3
  - Rng, 219–23
  - robustness issues
    - modelling process, 47, 49–50, 64–6, 78–85, 134, 220–3
    - risk modelling benefits, 134
    - VBA, 220–3
  - ROCE, 126–31
    - see also* return-on-capital
  - ROW**, concepts, 21–9
  - ROWS**, concepts, 21–9
  - Run**, 207
  - Run Sub, 206–7, 250–2
  - run-time measurements, VBA, 230
  - running/using the VBA code, 206–23, 248–52
- S**
- sales
    - forecasts, 51–5, 58–9, 61, 90–1, 102–3, 169–72
    - volumes, 51–5, 102–3, 169–72
  - sales/operating assets ratio (asset turn), 113–16
  - sampling
    - see also* simulation techniques
    - concepts, 136–47, 240–3
    - re-sampling data-driven approach, 147–8, 154–5
  - Save As**, 93–4, 252
  - Scatter chart**, 19–20
  - scenarios
    - see also* simulation techniques
    - concepts, 40, 59, 85–94, 136–47
  - Scenarios Manager**, 91–2
  - science of probability distributions
    - concepts, 147–8, 155–67
    - distribution of parameter uncertainties, 163, 165–7
    - distributions of waiting times, 163–6
    - further aspects, 163–7
    - screen updates, VBA, 229–30
    - SEARCH**, concepts, 30–4, 85
    - Security**, 204
    - Select, 215–23, 229–37
    - Select/Entire PivotTable**, 16
    - Selection, 216–37
    - semi-dependence relationships, simulation models, 144–7
    - sensitivity analysis
      - see also* risk modelling
      - cash flow valuations, 129–31
      - concepts, 49–50, 52–5, 58–9, 80–3, 85–94, 129–31, 133
      - data tables, 85–94, 129
      - one-off approach, 80–3
      - results presentation, 85–94
      - switches, 90
      - time-series models, 53–5
    - service level agreements, real options modelling, 189–90, 194
    - Set, 217–23
    - Settings**, 84–5
    - shading, 76–7
    - shapes, subroutines, 248–9
    - share options, 128
    - Sheet**, 65–6, 93–4
    - Sheet, 205–6, 231–2
    - Shift+Tab**, 206, 221
    - short positions, 182–3
    - short-cuts, concepts, 47–8
    - short-term debt
      - see also* debt...
      - BS, 107, 108, 112
    - short-term investments, BS, 107, 108
    - Show All Comments**, 78
    - Show Formulas**, 48
    - simplicity benefits, good models, 49–50, 60–2
    - Simulation Settings** icon, @RISK, 143
    - simulation techniques, 16, 18–20, 136–47, 185–6, 191–6
      - see also* scenarios
      - American options, 188
      - concepts, 136–47, 185–6, 191–6
      - definition, 136–7
      - European options, 188
      - option valuations, 185–6
      - probabilities, 137–42
      - processes, 136–7
      - real options modelling, 191–6
      - VBA, 204, 240–3
    - Single, 221–3
    - SKEW**, concepts, 17–20, 246–9
    - skew, concepts, 17–20, 140–2, 148–9, 157, 159–60, 244–50

**SLOPE**

*see also* linear regression  
concepts, 16–20

**SMALL**, concepts, 17–20

**Solver**

*see also* **Add-ins**

concepts, 11–12, 40–4, 116, 126, 128,  
203–4, 237–9, 252

examples, 42–6, 237–9

sorting, concepts, 17–20

**SPACE**, 66, 205–6, 220

Spearman Rank Correlation

*see also* **RANK**

concepts, 19–20, 146, 244–6

**Special**, 48, 80, 93

split screens, 207–8, 229–30

Sqr, 230–1

SQRT, 230–1

standard deviation, 13, 16–20, 37, 40, 42, 43,  
139–42, 149–67, 185–6, 244–50

*see also* volatility

concepts, 139–42, 244–50

definition, 139

**Start Simulation** icon, @RISK, 143

static models, 55–6, 133–6, 189, 220

**Statistical** category, 1, 4, 13, 16–20, 36–7

**Status Bar**, 79

**STDEV**, concepts, 16–20, 139, 246–9

**STDEV**P, concepts, 16–20, 139, 247–9

Step Into, 207

stock *see* inventory

**Stop Recording**, 236

**Store macro in**, 236–7

String, 221–3

strings *see* text...

structural issues of models

*see also* circular references; compactness;  
logical flows; named ranges

concepts, 49–50, 60–74, 97–8, 135

limitations of traditional structures, 135, 177,  
203–4

Sub, 205–37, 242–3, 249–52

**Subfolders of This Location are Also Trusted**,  
204

subroutines, VBA, 205–12, 235–9, 248–52

**SUBTOTAL**, concepts, 1–3, 14–15

**SUM**

arrays, 36, 38, 230–1

concepts, 1–3, 14–15, 36, 38, 65–6, 70, 72,  
79

**SUMIF**

concepts, 4–7, 13, 45–6

examples, 5–7

**SUMIFS**, concepts, 4–6, 13, 45–6

summaries, 62

**Summary**, @RISK, 143

**SUMPRODUCT**

arrays, 36, 38

concepts, 1–3, 25–6, 36, 38

uses, 3, 36

**Swap functions**, @RISK, 143

symmetric distributions, concepts, 139, 140–2,  
148–9, 157, 167–8

**T**

T-distributions, 240–3

**Tab**, 206, 221

**Table**, 14–15

tables, data tables, 3, 9, 14–15, 71, 80, 85–94,  
96, 129, 184–5, 201, 234, 243, 245–8

tax, 81–2, 87–8, 100, 105–6, 107, 108,  
114–18, 122

BS, 106, 107, 108

CFS, 110–11

debt, 109, 122

IS, 100, 105–6, 118

taxable profits, IS, 100, 105–6

Taylor-series expansion, 186

terminal value calculations, 124–8

**Text**, 80–1, 95–6

concepts, 29–35

text functions, concepts, 29–33

text strings, 4

ThisWorkbook, 205–6

Time, 230–1

time axis

concepts, 26–7, 59–60

granularity of the time axis, 59–60, 186–7

time value of money, 120–31

time-series models, 53–5

sensitivity analysis, 53–5

Timer, 230

**TINV**, 240–3

**Tools**, 25, 40, 44, 91, 204–6, 221, 235–6

Tools/References, 205, 239, 252

**ToolTips**, 48

**Top Options**, 204

**Trace Dependents**, 95, 98

**Trace Precedents**, 95

**Transition formula entry**, 66

**TRANSPOSE**, concepts, 38–42, 104

trappable errors, 234–5

trees, concepts, 133, 181, 188–9, 191,  
196–201

trial BS, 110, 119

*see also* balance sheets

triangular distributions, concepts, 147–9,  
167–8

**TRUE**, concepts, 3–6, 22–3, 33–5

**Trust Center**, 204

two-dimensional lookups, 24–5

two-way data tables

- see also* data tables  
 concepts, 87–94  
**TYPE**, concepts, 33–5, 77
- U**
- uncertainty  
 distribution of parameter uncertainties, 163, 165–7  
 real options modelling, 189–201  
 risk contrasts, 136  
 timing in revenue planning, 176–8  
 uncertainty modelling *see* risk modelling  
 underlying  
*see also* derivatives  
 concepts, 181–201
- UNDERScore**, 205–6, 220
- uniform continuous distributions, concepts, 147–9, 154–5
- unlocked cells/worksheets, 92–4
- Unprotect Workbook**, 94–5
- updating labels, 34–5
- US GDP, 22, 41
- Use in Formula**, 65–6
- UsedRange, 217–23
- user-defined distributions  
*see also* discrete distributions  
 concepts, 152–3, 231–2
- user-defined functions, VBA, 204, 205–12, 231–2, 243–8
- UserForm, 205–6
- Utilities**, @RISK, 143
- V**
- valuations  
*see also* options  
 arbitrage approach, 131  
 Black–Scholes options pricing formula, 41–2, 68–70, 131, 181, 186–8, 191–2, 244–6  
 cash flow valuations, 120–31  
 comparables approach, 129–31  
 concepts, 120–31, 181–201  
 dividend-forecasting valuation methods, 129  
 hedged portfolios, 181–3  
 methods, 41–2, 68–70, 120–1, 129–31, 181, 186–8, 191–2, 244–6  
 options, 41–2, 68–70, 131, 181–201, 244–6  
 perpetuity valuations, 126–8  
 risk-neutral valuations, 181, 183–5  
 simulation techniques, 185–6
- VALUE**, concepts, 30–4, 36, 65, 85
- value at risk (VaR), 169
- ValueToUse, 251
- VAR**, concepts, 16–20
- variability, definition, 136
- variable costs, IS, 103
- variables  
 concepts, 50–5, 136, 156–7, 220–3  
 dependencies considerations, 50–5, 144–7, 156–7, 220–3  
 hypersensitivities, 55  
 parameters, 53, 144–7  
 risk modelling, 136, 156–7  
 variance, 13–14, 16–20, 25–8, 39–40, 43, 92–3, 139  
*see also* standard deviation  
 variance-covariance matrices (VCV), 25–8, 40, 43
- Variant, 221–3
- VARP**, concepts, 17–20
- VBA *see* Visual Basic for Applications
- VBE *see* Visual Basic Editor
- VDB (Financial)**, 38, 104
- View, 207–8
- View Code**, 204–5
- View Macros**, 207, 235–7, 244
- View/Code, 205
- Visual Basic** . . . , 204–5
- Visual Basic for Applications (VBA), 42, 43, 65–6, 95, 135, 185, 203–52
- add-ins, 252
- alerts, 229
- arguments, 251–2
- arrays, 222–3, 241–3
- bare essentials, 204–12
- building blocks, 212–23
- cash flow example, 242–3
- code basics, 204–12
- comments, 220–3
- concepts, 203–52
- control of execution methods, 227–30
- data types, 221–3
- debugging, 207–8, 221, 232–5
- errors, 218, 220, 229–30, 234–5
- examples, 208–12, 235–48
- Excel, 203–52
- full referencing, 212–23
- indented text, 220–3
- macros, 204, 207, 235–9, 244, 248–52
- model recalculations, 231–2
- names, 223
- object-oriented methods, 204, 224–7
- procedure types, 205–6, 249–52
- procedures executed from other procedures, 249–52
- ranges, 212–39
- robustness issues, 220–3
- run-time measurements, 230
- running/using the code, 206–23, 248–52
- screen updates, 229–30
- Set statement, 217–23
- simulation techniques, 204, 240–3
- structure and organisation, 248–52

- Visual Basic for Applications (VBA)  
*(Continued)*  
 subroutines, 205–12, 235–9, 248–52  
 user-defined functions, 204, 205–12, 231–2,  
 243–52  
 uses, 203–12  
 variables, 221–3  
 VBE, 204–7, 248–52  
 worksheets, 230–1
- Visual Basic Editor (VBE), 204–7, 248–52
- VLOOKUP**  
 concepts, 21–9, 91–2, 98  
 constraints, 23–4, 98
- Volatile, 231–2, 234
- volatility  
*see also* implied volatility; standard  
 deviation  
 Black–Scholes options pricing formula,  
 187–8, 191–2  
 concepts, 18–20, 40, 41–2, 43, 45, 183–5,  
 187–8, 191–2, 231–2
- volumes  
 discounts, 22–3  
 mining output forecasts, 54–5  
 prices, 51–3, 102–3
- W**
- WACC *see* weighted average cost of capital
- waiting times, distributions of waiting times,  
 163–6
- warrants, 128–9
- Watch Window**, 94, 96, 233
- Watches, 207–8, 233
- Weibull distributions, 164–5
- weighted average cost of capital (WACC),  
 concepts, 122–31
- weighted averages, 3–4
- What If Analysis**, 40, 85–94
- what-if scenarios, 40, 59, 85–94, 136–47
- with, 212–37
- wizard**, 15
- working capital  
 concepts, 2, 102–3, 111, 113–16, 121–31  
 FCF, 121–31  
 working capital/sales ratio, 113–16
- WSE, 218, 230–1
- X**
- XIRR**, concepts, 6–9, 44
- XLStart**, 236–7
- XNPV**, concepts, 8, 44
- Y**
- YEARFRAC**, concepts, 44
- YIELD**, concepts, 6–9, 44, 123–4
- yield analysis, 6–9, 44, 123–4