

options, below we spend considerable effort in order to show how it can be done.

Yet another class of path-dependent options which gained popularity in the past few years includes the so-called volatility and variance swaps and options on realized volatility and variance. As their name suggests, these options are written on the volatility or variance of returns on foreign currency. For example, the buyer of a variance swap receives some fixed amount and has to pay the realized variance of returns on foreign currency multiplied by some notional amount. Since all other options depend on volatility, options on volatility are interesting not only in their own right but also as important hedging instruments for a portfolio of options.

## 1.6 References and further reading

The key original contributions mentioned in this chapter are as follows (in alphabetical order): Arrow (1971), Bachelier (1900), Black (1976), Black, Derman and Toy (1990), Black and Karasinski (1991), Black and Scholes (1973), Boness (1964), Boyle (1977), Brace, Gatarek and Musiela (1997), Brennan and Schwartz (1978), Cox, Ingersoll and Ross (1985), Cox, Ross and Rubinstein (1979), Debreu (1959), Delbaen and Schachermayer (1994), Garman and Kohlhagen (1983), Harrison and Kreps (1979), Harrison and Pliska (1981), Heath, Jarrow and Morton (1992), Ho and Lee (1986), Hull and White (1990), Lintner (1965), Margrabe (1978), Markowitz (1990), Merton (1973), Modigliani and Miller (1958), Mossin (1966), de Pinto (1771), Ross (1976), Rubinstein and Reiner (1991), Samuelson (1965), Schwartz (1977), Sharpe (1985), Sprengle (1961), and Vasicek (1977). Details on empirical distributions of returns of forex and other asset classes are discussed by many authors, for example, by Duffie and Pan (1997). An overview of the subjects covered in this chapter can be found in Lipton-Lifschitz (1999), and Lipton (2000 a).

There are many (some would say too many) books on financial engineering. Here are the books which the present author finds particularly useful for his purposes: Avellaneda and Laurence (2000), Baxter and Rennie (1996), Dixit and Pindyck (1994), Dothan (1990), Duffie (1996), Cox and Rubinstein (1985), Fama and Miller (1972), Huang and Litzenberger (1988), Hull (2000), Hunt and Kennedy (2000), Ingersoll (1987), Jarrow and Rudd (1983), Karatzas and Shreve (1998), Lamberton and Lapeyre (1996), Luenberger (1998), Malkiel (1990), Merton (1990), Musiela and Rutkovsky (1997), Nielsen (2000), Pliska (1997), Shimko (1992), Shiryaev (1999), Wilmot *et al.* (1993), Wilmott *et al.* (1995), and Zang (1997).