

ANNEX

INTERNATIONAL ACCOUNTING STANDARDS

INTERNATIONAL FINANCIAL REPORTING STANDARD 2

Share-based payment

Appendix B

Application Guidance

Estimating the fair value of equity instruments granted

B1 Paragraphs B2-B41 of this appendix discuss measurement of the fair value of shares and share options granted, focusing on the specific terms and conditions that are common features of a grant of shares or share options to employees. Therefore, it is not exhaustive. Furthermore, because the valuation issues discussed below focus on shares and share options granted to employees, it is assumed that the fair value of the shares or share options is measured at grant date. However, many of the valuation issues discussed below (e.g. determining expected volatility) also apply in the context of estimating the fair value of shares or share options granted to parties other than employees at the date the entity obtains the goods or the counterparty renders service.

Shares

B2 For shares granted to employees, the fair value of the shares shall be measured at the market price of the entity's shares (or an estimated market price, if the entity's shares are not publicly traded), adjusted to take into account the terms and conditions upon which the shares were granted (except for vesting conditions that are excluded from the measurement of fair value in accordance with paragraphs 19-21).

B3 For example, if the employee is not entitled to receive dividends during the vesting period, this factor shall be taken into account when estimating the fair value of the shares granted. Similarly, if the shares are subject to restrictions on transfer after vesting date, that factor shall be taken into account, but only to the extent that the post-vesting restrictions affect the price that a knowledgeable, willing market participant would pay for that share. For example, if the shares are actively traded in a deep and liquid market, post-vesting transfer restrictions may have little, if any, effect on the price that a knowledgeable, willing market participant would pay for those shares. Restrictions on transfer or other restrictions that exist during the vesting period shall not be taken into account when estimating the grant date fair value of the shares granted, because those restrictions stem from the existence of vesting conditions, which are accounted for in accordance with paragraphs 19-21.

Share options

B4 For share options granted to employees, in many cases market prices are not available, because the options granted are subject to terms and conditions that do not apply to traded options. If traded options with similar terms and conditions do not exist, the fair value of the options granted shall be estimated by applying an option pricing model.

B5 The entity shall consider factors that knowledgeable, willing market participants would consider in selecting the option pricing model to apply. For example, many employee options have long lives, are usually exercisable during the period between vesting date and the end of the options' life, and are often exercised early. These factors should be considered when estimating the grant date fair value of the options. For many entities, this might preclude the use of the Black-Scholes-Merton formula, which does not allow for the possibility of exercise before the end of the option's life and may not adequately reflect the effects of expected early exercise. It also does not allow for the possibility that expected volatility and other model inputs might vary over the option's life. However, for share options with relatively short contractual lives, or that must be exercised within a short period of time after vesting date, the factors identified above may not apply. In these instances, the Black-Scholes-Merton formula

may produce a value that is substantially the same as a more flexible option pricing model.

- B6 All option pricing models take into account, as a minimum, the following factors:
- (a) the exercise price of the option;
 - (b) the life of the option;
 - (c) the current price of the underlying shares;
 - (d) the expected volatility of the share price;
 - (e) the dividends expected on the shares (if appropriate); and
 - (f) the risk-free interest rate for the life of the option.
- B7 Other factors that knowledgeable, willing market participants would consider in setting the price shall also be taken into account (except for vesting conditions and reload features that are excluded from the measurement of fair value in accordance with paragraphs 19-22).
- B8 For example, a share option granted to an employee typically cannot be exercised during specified periods (e.g. during the vesting period or during periods specified by securities regulators). This factor shall be taken into account if the option pricing model applied would otherwise assume that the option could be exercised at any time during its life. However, if an entity uses an option pricing model that values options that can be exercised only at the end of the options' life, no adjustment is required for the inability to exercise them during the vesting period (or other periods during the options' life), because the model assumes that the options cannot be exercised during those periods.
- B9 Similarly, another factor common to employee share options is the possibility of early exercise of the option, for example, because the option is not freely transferable, or because the employee must exercise all vested options upon cessation of employment. The effects of expected early exercise shall be taken into account, as discussed in paragraphs B16-B21.
- B10 Factors that a knowledgeable, willing market participant would not consider in setting the price of a share option (or other equity instrument) shall not be taken into account when estimating the fair value of share options (or other equity instruments) granted. For example, for share options granted to employees, factors that affect the value of the option from the individual employee's perspective only are not relevant to estimating the price that would be set by a knowledgeable, willing market participant.
- Inputs to option pricing models
- B11 In estimating the expected volatility of and dividends on the underlying shares, the objective is to approximate the expectations that would be reflected in a current market or negotiated exchange price for the option. Similarly, when estimating the effects of early exercise of employee share options, the objective is to approximate the expectations that an outside party with access to detailed information about employees' exercise behaviour would develop based on information available at the grant date.
- B12 Often, there is likely to be a range of reasonable expectations about future volatility, dividends and exercise behaviour. If so, an expected value should be calculated, by weighting each amount within the range by its associated probability of occurrence.

- B13 Expectations about the future are generally based on experience, modified if the future is reasonably expected to differ from the past. In some circumstances, identifiable factors may indicate that unadjusted historical experience is a relatively poor predictor of future experience. For example, if an entity with two distinctly different lines of business disposes of the one that was significantly less risky than the other, historical volatility may not be the best information on which to base reasonable expectations for the future.
- B14 In other circumstances, historical information may not be available. For example, a newly listed entity will have little, if any, historical data on the volatility of its share price. Unlisted and newly listed entities are discussed further below.
- B15 In summary, an entity should not simply base estimates of volatility, exercise behaviour and dividends on historical information without considering the extent to which the past experience is expected to be reasonably predictive of future experience.
- Expected early exercise
- B16 Employees often exercise share options early, for a variety of reasons. For example, employee share options are typically non-transferable. This often causes employees to exercise their share options early, because that is the only way for the employees to liquidate their position. Also, employees who cease employment are usually required to exercise any vested options within a short period of time, otherwise the share options are forfeited. This factor also causes the early exercise of employee share options. Other factors causing early exercise are risk aversion and lack of wealth diversification.
- B17 The means by which the effects of expected early exercise are taken into account depends upon the type of option pricing model applied. For example, expected early exercise could be taken into account by using an estimate of the option's expected life (which, for an employee share option, is the period of time from grant date to the date on which the option is expected to be exercised) as an input into an option pricing model (e.g. the Black-Scholes-Merton formula). Alternatively, expected early exercise could be modelled in a binomial or similar option pricing model that uses contractual life as an input.
- B18 Factors to consider in estimating early exercise include:
- (a) the length of the vesting period, because the share option typically cannot be exercised until the end of the vesting period. Hence, determining the valuation implications of expected early exercise is based on the assumption that the options will vest. The implications of vesting conditions are discussed in paragraphs 19-21;
 - (b) the average length of time similar options have remained outstanding in the past;
 - (c) the price of the underlying shares. Experience may indicate that the employees tend to exercise options when the share price reaches a specified level above the exercise price;
 - (d) the employee's level within the organisation. For example, experience might indicate that higher-level employees tend to exercise options later than lower-level employees (discussed further in paragraph B21);
 - (e) expected volatility of the underlying shares. On average, employees tend to exercise options on highly volatile shares earlier than on shares with low volatility.

- B19 As noted in paragraph B17, the effects of early exercise could be taken into account by using an estimate of the option's expected life as an input into an option pricing model. When estimating the expected life of share options granted to a group of employees, the entity could base that estimate on an appropriately weighted average expected life for the entire employee group or on appropriately weighted average lives for subgroups of employees within the group, based on more detailed data about employees' exercise behaviour (discussed further below).
- B20 Separating an option grant into groups for employees with relatively homogeneous exercise behaviour is likely to be important. Option value is not a linear function of option term; value increases at a decreasing rate as the term lengthens. For example, if all other assumptions are equal, although a two-year option is worth more than a one-year option, it is not worth twice as much. That means that calculating estimated option value on the basis of a single weighted average life that includes widely differing individual lives would overstate the total fair value of the share options granted. Separating options granted into several groups, each of which has a relatively narrow range of lives included in its weighted average life, reduces that overstatement.
- B21 Similar considerations apply when using a binomial or similar model. For example, the experience of an entity that grants options broadly to all levels of employees might indicate that top-level executives tend to hold their options longer than middle-management employees hold theirs and that lower-level employees tend to exercise their options earlier than any other group. In addition, employees who are encouraged or required to hold a minimum amount of their employer's equity instruments, including options, might on average exercise options later than employees not subject to that provision. In those situations, separating options by groups of recipients with relatively homogeneous exercise behaviour will result in a more accurate estimate of the total fair value of the share options granted.
- Expected volatility
- B22 Expected volatility is a measure of the amount by which a price is expected to fluctuate during a period. The measure of volatility used in option pricing models is the annualised standard deviation of the continuously compounded rates of return on the share over a period of time. Volatility is typically expressed in annualised terms that are comparable regardless of the time period used in the calculation, for example, daily, weekly or monthly price observations.
- B23 The rate of return (which may be positive or negative) on a share for a period measures how much a shareholder has benefited from dividends and appreciation (or depreciation) of the share price.
- B24 The expected annualised volatility of a share is the range within which the continuously compounded annual rate of return is expected to fall approximately two-thirds of the time. For example, to say that a share with an expected continuously compounded rate of return of 12 per cent has a volatility of 30 per cent means that the probability that the rate of return on the share for one year will be between -18 per cent (12 % - 30 %) and 42 per cent (12 % + 30 %) is approximately two-thirds. If the share price is CU100 at the beginning of the year and no dividends are paid, the year-end share price would be expected to be between CU83,53 ($CU100 \times e^{-0,18}$) and CU152,2 ($CU100 \times e^{0,42}$) approximately two-thirds of the time.
- B25 Factors to consider in estimating expected volatility include:

- (a) implied volatility from traded share options on the entity's shares, or other traded instruments of the entity that include option features (such as convertible debt), if any;
- (b) the historical volatility of the share price over the most recent period that is generally commensurate with the expected term of the option (taking into account the remaining contractual life of the option and the effects of expected early exercise);
- (c) the length of time an entity's shares have been publicly traded. A newly listed entity might have a high historical volatility, compared with similar entities that have been listed longer. Further guidance for newly listed entities is given below;
- (d) the tendency of volatility to revert to its mean, i.e. its long-term average level, and other factors indicating that expected future volatility might differ from past volatility. For example, if an entity's share price was extraordinarily volatile for some identifiable period of time because of a failed takeover bid or a major restructuring, that period could be disregarded in computing historical average annual volatility;
- (e) appropriate and regular intervals for price observations. The price observations should be consistent from period to period. For example, an entity might use the closing price for each week or the highest price for the week, but it should not use the closing price for some weeks and the highest price for other weeks. Also, the price observations should be expressed in the same currency as the exercise price.

Newly listed entities

B26 As noted in paragraph B25, an entity should consider historical volatility of the share price over the most recent period that is generally commensurate with the expected option term. If a newly listed entity does not have sufficient information on historical volatility, it should nevertheless compute historical volatility for the longest period for which trading activity is available. It could also consider the historical volatility of similar entities following a comparable period in their lives. For example, an entity that has been listed for only one year and grants options with an average expected life of five years might consider the pattern and level of historical volatility of entities in the same industry for the first six years in which the shares of those entities were publicly traded.

Unlisted entities

B27 An unlisted entity will not have historical information to consider when estimating expected volatility. Some factors to consider instead are set out below.

B28 In some cases, an unlisted entity that regularly issues options or shares to employees (or other parties) might have set up an internal market for its shares. The volatility of those share prices could be considered when estimating expected volatility.

B29 Alternatively, the entity could consider the historical or implied volatility of similar listed entities, for which share price or option price information is available, to use when estimating expected volatility. This would be appropriate if the entity has based the value of its shares on the share prices of similar listed entities.

B30 If the entity has not based its estimate of the value of its shares on the share prices of similar listed entities, and has instead used another valuation methodology to value its shares, the entity could derive an estimate of expected volatility consistent with that valuation methodology. For example, the entity might value its shares on a net asset or earnings basis. It could consider the expected volatility of those net asset values or earnings.

Expected dividends

- B31 Whether expected dividends should be taken into account when measuring the fair value of shares or options granted depends on whether the counterparty is entitled to dividends or dividend equivalents.
- B32 For example, if employees were granted options and are entitled to dividends on the underlying shares or dividend equivalents (which might be paid in cash or applied to reduce the exercise price) between grant date and exercise date, the options granted should be valued as if no dividends will be paid on the underlying shares, i.e. the input for expected dividends should be zero.
- B33 Similarly, when the grant date fair value of shares granted to employees is estimated, no adjustment is required for expected dividends if the employee is entitled to receive dividends paid during the vesting period.
- B34 Conversely, if the employees are not entitled to dividends or dividend equivalents during the vesting period (or before exercise, in the case of an option), the grant date valuation of the rights to shares or options should take expected dividends into account. That is to say, when the fair value of an option grant is estimated, expected dividends should be included in the application of an option pricing model. When the fair value of a share grant is estimated, that valuation should be reduced by the present value of dividends expected to be paid during the vesting period.
- B35 Option pricing models generally call for expected dividend yield. However, the models may be modified to use an expected dividend amount rather than a yield. An entity may use either its expected yield or its expected payments. If the entity uses the latter, it should consider its historical pattern of increases in dividends. For example, if an entity's policy has generally been to increase dividends by approximately 3 per cent per year, its estimated option value should not assume a fixed dividend amount throughout the option's life unless there is evidence that supports that assumption.
- B36 Generally, the assumption about expected dividends should be based on publicly available information. An entity that does not pay dividends and has no plans to do so should assume an expected dividend yield of zero. However, an emerging entity with no history of paying dividends might expect to begin paying dividends during the expected lives of its employee share options. Those entities could use an average of their past dividend yield (zero) and the mean dividend yield of an appropriately comparable peer group.

Risk-free interest rate

- B37 Typically, the risk-free interest rate is the implied yield currently available on zero-coupon government issues of the country in whose currency the exercise price is expressed, with a remaining term equal to the expected term of the option being valued (based on the option's remaining contractual life and taking into account the effects of expected early exercise). It may be necessary to use an appropriate substitute, if no such government issues exist or circumstances indicate that the implied yield on zero-coupon government issues is not representative of the risk-free interest rate (for example, in high inflation economies). Also, an appropriate substitute should be used if market participants would typically determine the risk-free interest rate by using that substitute, rather than the implied yield of zero-coupon government issues, when estimating the fair value of an option with a life equal to the expected term of the option being valued.

Capital structure effects

- B38 Typically, third parties, not the entity, write traded share options. When these share options are exercised, the writer delivers shares to the option holder. Those shares are acquired from existing shareholders. Hence the exercise of traded share options has no dilutive effect.
- B39 In contrast, if share options are written by the entity, new shares are issued when those share options are exercised (either actually issued or issued in substance, if shares previously repurchased and held in treasury are used). Given that the shares will be issued at the exercise price rather than the current market price at the date of exercise, this actual or potential dilution might reduce the share price, so that the option holder does not make as large a gain on exercise as on exercising an otherwise similar traded option that does not dilute the share price.
- B40 Whether this has a significant effect on the value of the share options granted depends on various factors, such as the number of new shares that will be issued on exercise of the options compared with the number of shares already issued. Also, if the market already expects that the option grant will take place, the market may have already factored the potential dilution into the share price at the date of grant.
- B41 However, the entity should consider whether the possible dilutive effect of the future exercise of the share options granted might have an impact on their estimated fair value at grant date. Option pricing models can be adapted to take into account this potential dilutive effect.