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Employee Share Options Modelling and Accounting

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Employee share options

- What are employee share options
- The new accounting rules
- What has this got to do with actuaries
- Option valuation models
- Practical issues

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What are employee share options

- Call option...
- … with strings attached
  - exercise period
  - service conditions
  - performance conditions
  - conditions on selling shares
  - phantom options

Why provide options

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- Incentivise key employees
- Align shareholder and employee interests
- Recruitment and retention
- "Free" perk

Old accounting rules (UK)

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- P&L charge = intrinsic value at grant
- Set strike price = market price at grant
- Intrinsic value = 0
- No P&L expense
- ShareSave schemes exempt

New accounting rules ASB, IASB, FASB(?)

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- FRED31/ED2
- Direct P&L charge from 2004
- Fair value at grant date
- Attribute over vesting period
- Equity settled / cash settled
- Awards since November 2002

Example

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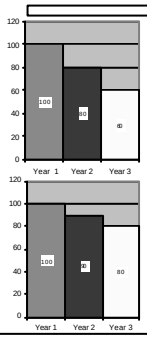

- Option value = 100 x 60% = 60
- Units of service = 240
- Value per unit = 0.25

- Actual units = 270
- Total P&L charge over 3 years = 270 x 0.25 = 67.50

Does it matter?

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THE TIMES **BUSINESS**

Union fury over share save threat

What has this got to do with actuaries

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- Simple concept
- Lots of complications
- Modelling human behaviour
- Experience with other accounting standards

Measurement of value

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- Fair value:
  "The amount for which an asset could be exchanged, a liability settled, or an equity instrument granted could be exchanged, between knowledgeable, willing parties in an arm's length transaction"
- If not traded then use a model
- FRED31/ED2 mention Black-Schöles and Binomial models

Models

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- Black-Schöles
- Traditional binomial model
- Actuarial binomial model
- Stochastic valuation

Black-Schöles

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- Explain Black-Schöles in one easy sentence

$$c = se^{-qt}\Phi(d_1) - xe^{-rt}\Phi(d_2)$$

$$d_1 = \frac{\log(s/x) + (r - q + \sigma^2/2)t}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

s = the ***price*** of the underlying stock

x = the ***strike*** price

r = the continuously compounded ***risk free interest rate***

q = the continuously compounded ***annual dividend yield***

t = the ***time*** in years until the expiration of the option

s = the implied ***volatility*** for the underlying stock

F = the standard normal cumulative distribution function

Black-Schöles: Limitations

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- Cannot hedge more complex options
- Cannot hedge "human factors"
  - leaving the employer
  - early exercise
  - financially "irrational" - though personally rational - decisions
- But we can **value** human factors using actuarial techniques

Binomial model

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Option details	
Price	£100
Strike price	£100
Interest rate	5%
Time	2 years
Volatility	40%
Dividend yield	2%

2 years hence

Price	£170
Strike price	~~£100~~
Option value	~~£70~~

2 years hence

Price	£60
Strike price	~~£100~~
Option value	~~nil~~

Binomial model

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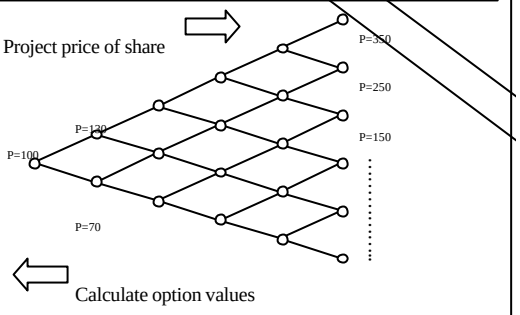

Actuarial Binomial model

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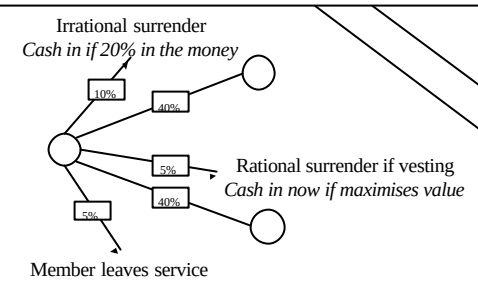

Actuarial Binomial model

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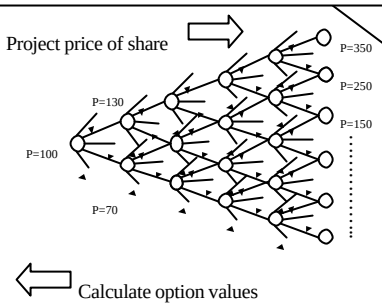

Actuarial Binomial model

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- Consistent with Black-Schöles
- Allows for vesting and exercise periods
- Allows for human factors
  - leaving the employer
  - financially “irrational” - though personally rational – decisions
- Allows for most vesting criteria

Stochastic model

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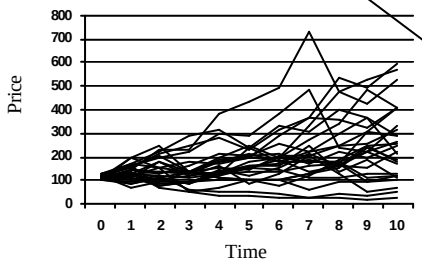

Case study

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- Swiss FTSE 100 equivalent
- Stock option plans for executives in Switzerland, France, Italy, UK…
- Stock purchase/loan plan in Switzerland
- All cash-settled or employee choice of settlement

Issues

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- Complex administration
- Severe downside risk on stock purchase plan
- Potential ED2 charge
- P&L and balance sheet volatility

Actuarial advice

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- Various scenario tests
- Balance sheet liability CHF50m, could increase to CHF100m
- P&L charge between CHF(20m) credit and CHF110m charge
- Equity-settled charge CHF50m
  - more predictable and reducing

Client action

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- Convert all options to equity-settled
- Cancel stock purchase loans - communication exercise
- New central administration
- Revisit later in the year