The Expected Monetary Value (EMV) = likely cost of protection + expected losses when no protection

EMV = cost × number of rain forecast + loss × unforecast rain

Fc \ Obs	rain	dry
rain	a	b
dry	c	d

a + b = number of rain forecasts

c = number of unforecast rain

a + c = number of rain days = R
b + d = number of dry days = D

R + D = N

Decision based only on climate:

Never protect EMV = loss × number of rainy days = L × R

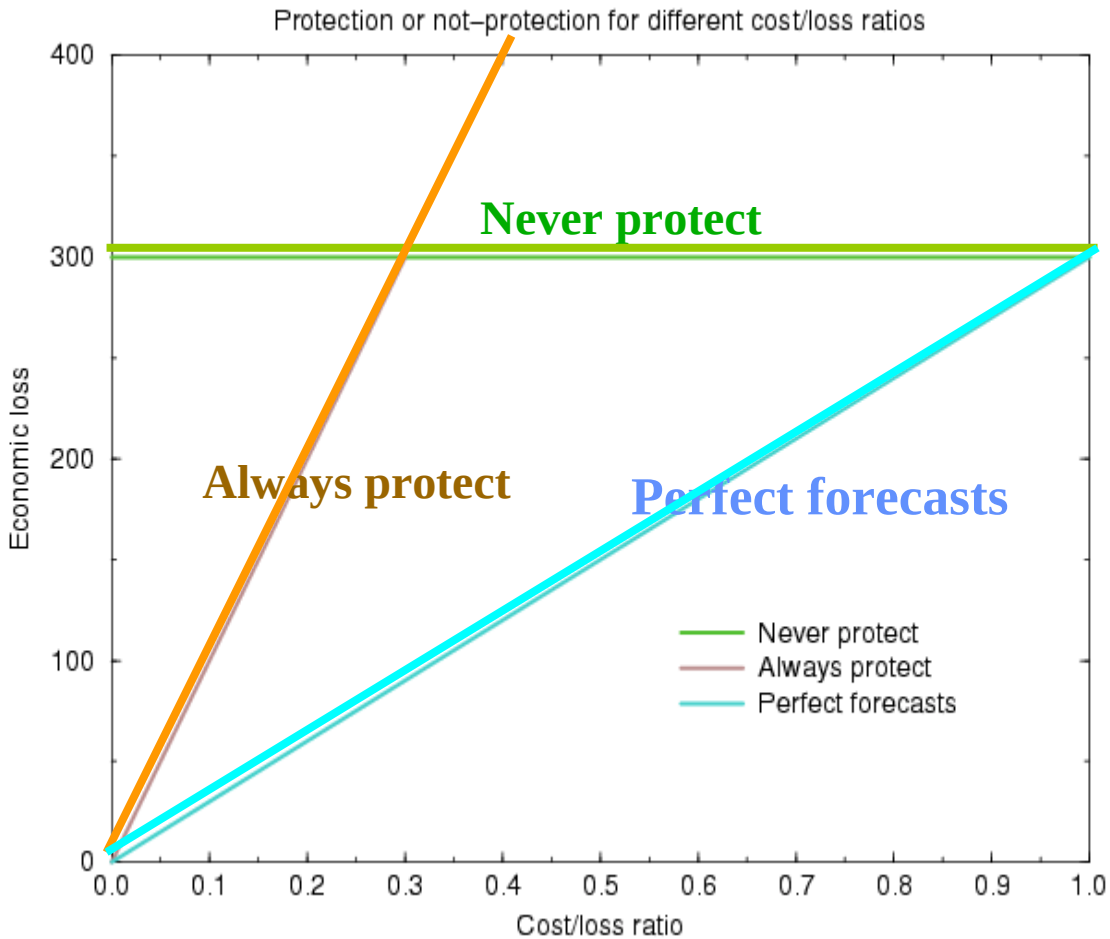
Always protect EMV = cost × days = C × N

Breaking point when L × R=C × N

Then C/L=R/N = the climatological probability

Action should be taken when the risk, either climatologically estimated or predicted exceeds the user's personal cost-loss ratio

Costs when no weather forecasts are available



Three weather services A, B and C compete in the same area where it rains on average 3 days out of 10

A

Fc \ Obs	rain	dry
rain	2	1
dry	1	6

Very good forecasts

B

Fc \ Obs	rain	dry
rain	3	2
dry	0	5

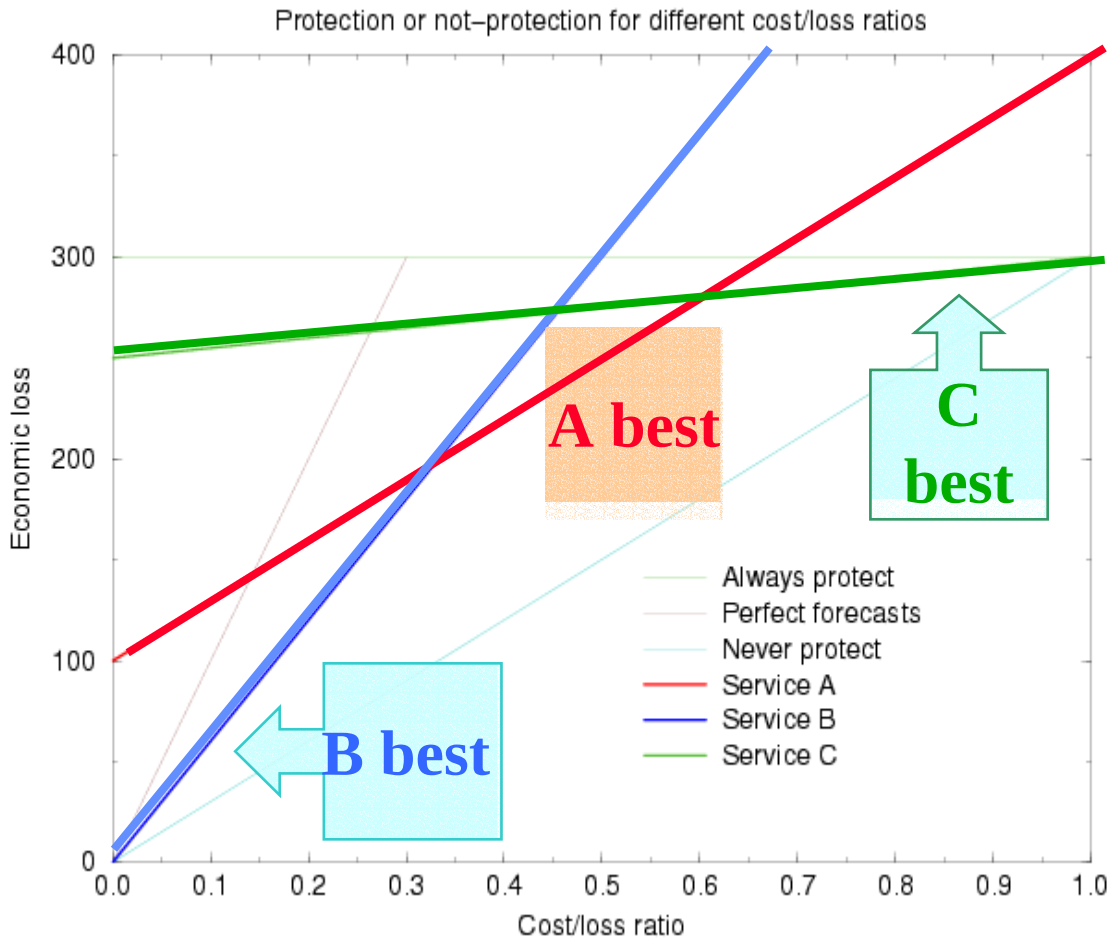
Over-forecasts

C

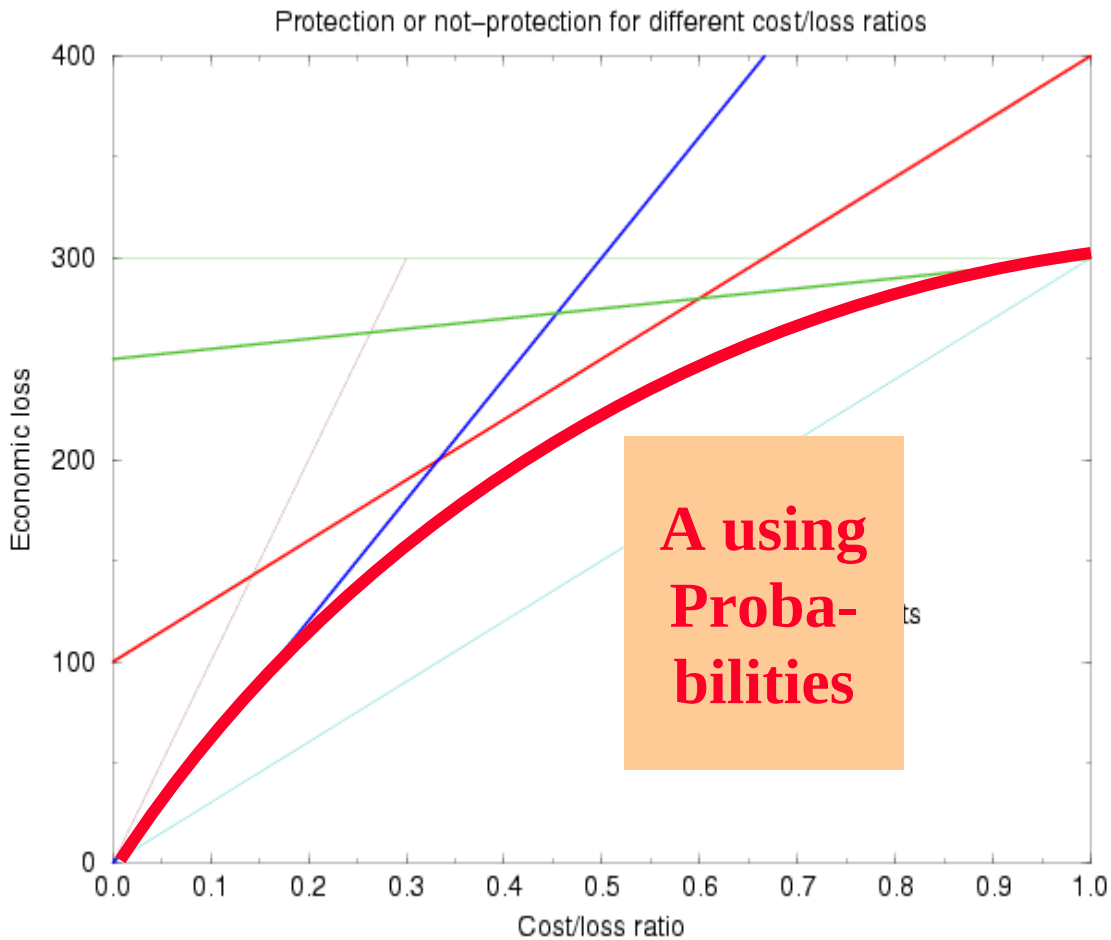
Fc \ Obs	rain	dry
rain	0.5	0
dry	2.5	7

Under-forecasts

Costs when weather forecasts are available



Costs when weather forecasts are available



Value of EPS over high-res deterministic forecast for financial weather-derivative trading based on Heathrow temperature (Roulston and Smith, London School of Economics, 2003)

WEATHER ROULETTE

TEMPERATURE AT HEATHROW
TABLE MAXIMUM: £100
ODDS SET BY HIGH RES. FORECAST
BETS PLACED ACCORDING TO ENSEMBLE

TEMPERATURE (°C)

25	26	27	28	29
20	21	22	23	24
15	16	17	18	19
10	11	12	13	14
5	6	7	8	9
0	1	2	3	4
−5	−4	−3	−2	−1

Decisions, utility and risk aversion

	Answer correct?	
	Yes	No
Take money	£500 000	£500 000
Give answer	£1 000 000	£32 000

- Will it rain on the golf course on Sunday morning?
- U(£500 000) > 0.5U(£1 000 000) + 0.5U(£32 000)
- Risk averse
  - Protect at lower probability threshold than C/L