9\12\2007

# Production Problem

penalty $\pi$ per unit of unfilled demand

Demand is not known exactly

Probability demand in period $n$ is $d$ $= P_{n,d}$

Minimise expected cost

$$f_n(h) = \min_x \left[ c(x) + \sum_{d=0}^{\infty} P_{n,d} \left\{ \pi (d-x-h)^+ + f_{n+1}\left( (h+x-d)^+ \right) \right\} \right]$$

current stock level

Assume demand is not known when we decide production level.

Minimise expected cost

$$\hat{f}_n(h) = \sum_{d=0}^{\infty} p_{n,d} \min_{x} \left\{ C(x) + \pi (d-x-h)^{+} + \hat{f}_{n+1}\left( (h+x-d) \right) \right\}$$

current stock level

Assume demand is known when we decide production level.

$$\hat{f}_n(h) \le f_n(h)$$

$$E\left(\min_x\right) \le \min_x E\left( \quad \right)$$

Alternatively we can produce enough to meet demand with $\geq 90\%$ probability

$$f_n(h) = \min_x \left[ C(x) + \sum_{d=0}^{\infty} P_{n,d} \left\{ \pi(d-x-h)^+ + f_{n+1}((h+x-d)) \right\} \right.$$

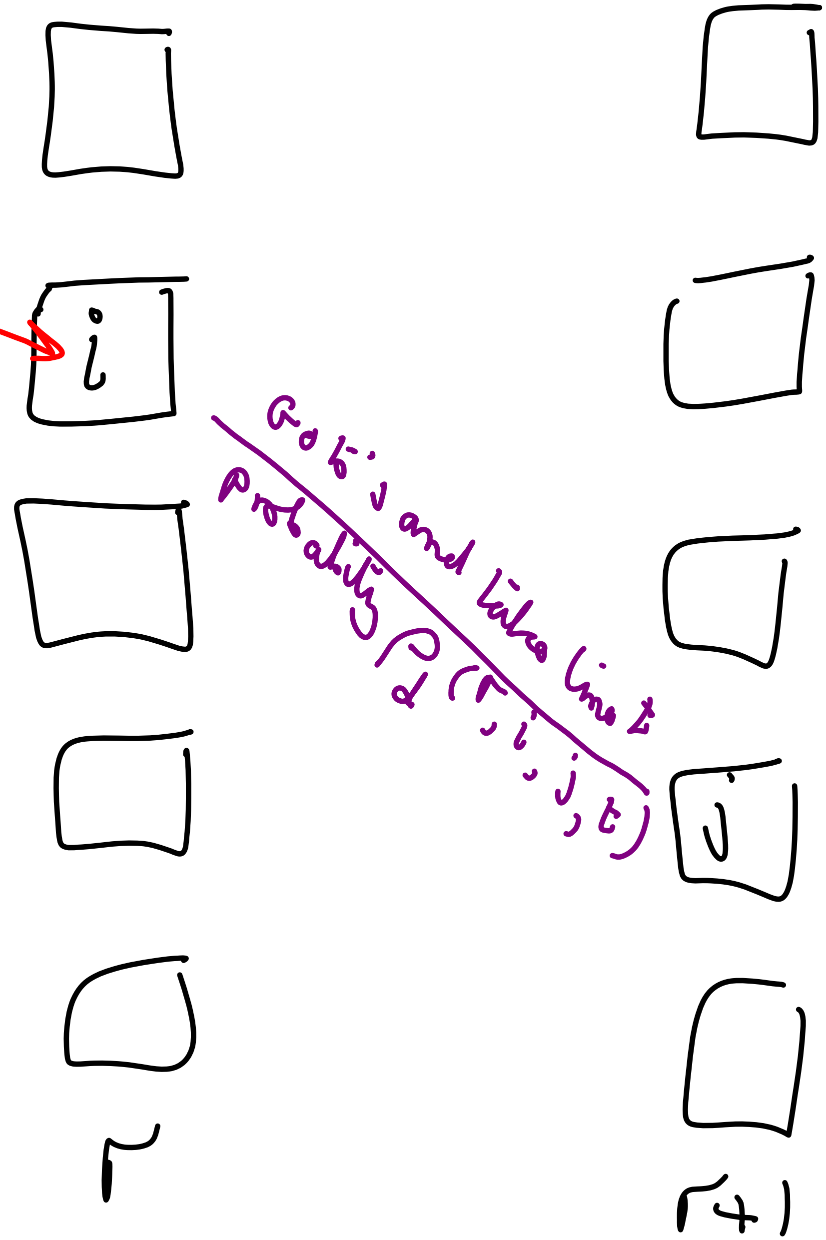
$$x \geq \alpha_h$$

where

$$\alpha_h = \min_{\alpha} : \sum_{d \geq \alpha + h} P_{n,d} \leq .1$$

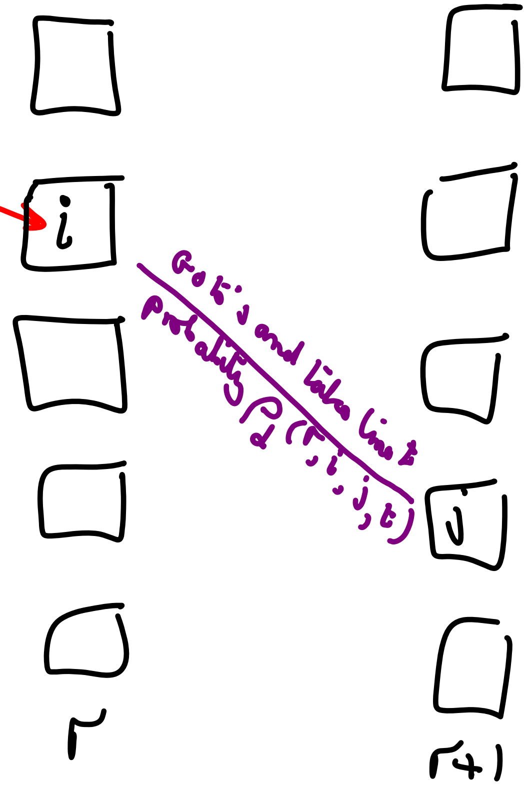
Minimise time to arrive at F

$D_{i,r}$ = Set of possible decisions.



Minimise time to arrive at F

$D_{i,r}$ = set of possible decisions.




$$f_r(i) = \min_{d \in D_{i,r}} \left[ \sum_{t,j} p_d(r,i,j,t) \left[ t + f_{r+1}(j) \right] \right]$$

minimum expected time to reach F, from (r,i)