$$\min_{x \in \mathbb{R}^n} f(x) = -\sum_{ij} w_{ij} x_{ij} \quad (f(x) \Rightarrow \text{Expected Value})$$

s.t. $g_1(x) = \sum x_i c_i - 815 \leq 0$

$h_1(x) = \sum x_i - 11 = 0$

$h_2(x) = \sum x_{i,1} - 1 = 0$

$g_2(x) = \sum x_{i,2} - 5 \leq 0$

$g_3(x) = -\sum x_{i,2} + 3 \leq 0$

$g_4(x) = \sum x_{i,3} - 5 \leq 0$

$g_5(x) = -\sum x_{i,3} + 2 \leq 0$

$g_6(x) = \sum x_{i,4} - 3 \leq 0$

$g_7(x) = -\sum x_{i,4} + 1 \leq 0$

$x_i \Rightarrow$ No. of players/team
$w_i \Rightarrow$ team level projection
$\Rightarrow$ position level projection
$c_i \Rightarrow$ team level cost

| | |
|---|---|
| $3 \leq DEF \leq 5$ | 2 |
| $1 \leq FWD \leq 3$ | 4 |
| $2 \leq MID \leq 5$ | 3 |
| $GK = 1$ | 1 |

2 DEF → 8m
1 GK → 4m
1 FWD/MID → 4.5

% bench cost

second variable to make this NLP

- 80% — starting
- 15% — bench
- 5% — not in squad

m — avg. min

$x_{i,j}$

| Team | #GK / team | #DEF/ team | # MID/ team | #FWD/ team |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| . | | | | |
| . | | | | |
| . | | | | |
| 20 | | | | |

$xMin = 0.8 \times M + 0.15 \times \frac{3}{8}$

Change this to 2-outcomes
plays ⇒ 90% doesn't play = 10%
Assuming every player in XI has p % chance of playing,

$EV = (p) \sum_{ij}^{11} w_{ij} x_{ij} + (1-p) B_1 + (1-p)^2 B_2 + (1-p)^3 B_3$

$$\min_{x \in \mathbb{R}} f(x,c) = \sum_{i,j} w_{i,j} x_{i,j} c_{i,j}$$

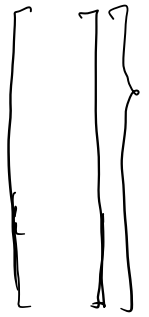
player → $w_{i,j}$ EV

p → p%

(x min)

$w_{i,j} \Rightarrow$ team level proj.

$c_{i,j} \Rightarrow$ bench / starting xi split



$x_{i,j} \Rightarrow$

$p \Rightarrow$ probability vector

s.t. $g_1(x,c) = \sum x_i c_i - 100 \leq 0$

$h_1(x) = \sum_i \sum_j x_{i,j} - 15 = 0 \Rightarrow$ inactive

$h_2(x) = \sum x_{i,j} - 2 = 0$

$h_3(x) = \sum^{15} x_{i,2} - 5 = 0$

$h_4(x) = \sum^{15} x_{i,3} - 5 \leq 0$

$h_5(x) = \sum^{15} x_{i,4} - 3 \leq 0$

$g_2(x) = \sum^{11} x_{i,2} - 5 \leq 0$

$g_3(x) = -\sum^{11} x_{i,2} + 3 \leq 0$

$g_4(x) = \sum^{11} x_{i,3} - 5 \leq 0$

$g_5(x) = -\sum^{11} x_{i,3} + 2 \leq 0$

$g_6(x) = \sum^{11} x_{i,4} - 3 \leq 0$

$g_7(x) = -\sum^{11} x_{i,4} + 1 \leq 0$

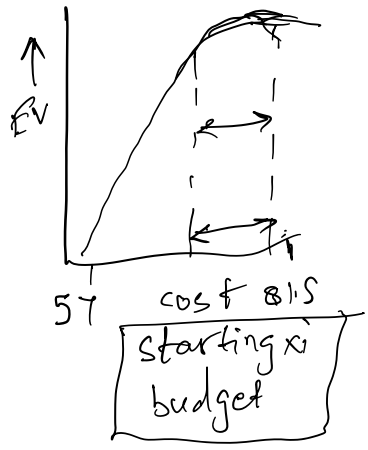
$g_8(x) = \sum x_{1,j} \leq 3$

$\vdots$

$g_{27}(x) = \sum x_{20,j} \leq 3$

cost X P

cost 4



- Introduction ⇒ (JK)

(FPL – 30s
EV model)

10pm
10/11

- Problem statement ⇒
  (problem statement)
  - → objective fn. (AJ)
    (w matrix)
  - → x & c → 2 variables NLP (JW)
  - → constraints (AR)