The Four Factor Model

Carlo Favero

The Four Factor Model

Understanding team performancing using regression analysis cannot be done simply by regressing WINS on all available statistics for two reasons:

- correlation among the different statistics
- lack of degrees of freedom

The Four Factor Model

The four factor model aggregates stats in 4 indicators to be used to evaluate Team Offense and Team Defense

- Shooting: Effective Field Goal Percentage
- Turnovers: Turnover per Possession
- Rebounding: Rebounding Percentage
- Free Throws and Fouls: Free Throws Rate

Effective Field Goal Percentage

EFG=(all field goals made+0.5*3p field goals made)/(all field goal attempts)
OEFG=(all field goals made by opp.+0.5*3p field goals made by opp.)/(all field goal attempts by opp.)
F1=EFG-OEFG

Turnovers

- TPP=(Turnovers)/(Employed Possession)
- OTPP= (Opp.Turnovers)/(Acq. Possession)
- F2=TPP–OTPP

Employed Possession= field goal attempts+ 0.45*free throws+turnover-off.rebounds

Acquired Possession= Opp.Turnovers+Def. Rebounds+Team Rebounds+Opp. field goal attempts+ 0.45* (Opp.free throws)

Rebounds

- ORP=(ORB)/(Total Missed Shots)
- DRP=1- (Opponents ORB)/(Total Opponents Missed Shots)
- F3=ORP+DRP

Free Throw Rate

- FTR=(Foul Shots Made)/ Field Goal Attempts
- OFTR=(Opp.Foul Shots Made)/ (Opp.Field Goal Attempts)
- F4=FTR-OFTR

Estimation

- unrestricted

$$
\begin{aligned}
W_{it} &= \beta_0 + \beta_1 EFG_{it} - \beta_2 OEFG_{it} + \beta_3 TPP_{it} - \beta_4 OTPP_{it} + \\
&\quad + \beta_5 ORP_{it} + \beta_6 DRP_{it} + \beta_7 FTR_{it} - \beta_8 OFTR_{it} + u_{it} \\
u_{it} &\sim N.I.D\left(0, \sigma^2\right)
\end{aligned}
$$

- restricted

$$
\begin{aligned}
W_{it} &= \beta_0 + \beta_1 \left(EFG_{it} - OEFG_{it}\right) + \beta_3 \left(TPP_{it} - OTPP_{it}\right) + \\
&\quad + \beta_5 \left(ORP_{it} + DRP_{it}\right) + \beta_7 \left(FTR_{it} - OFTR_{it}\right) + v_{it} \\
v_{it} &\sim N.I.D\left(0, \sigma^2\right)
\end{aligned}
$$