

:

jrezaea@yahoo.com :

:

:

:

// :

// :

:

:

()

:

:

:

/

:

/

:

:

()

(DEA)

TFP

Decision Making Unit

(DMU)

TFP

(Alirezaei et al. 2007) .

(Alirezaei et al. 2005) .

(DEA)

(Abbasiyan and Mehregan 2007) .

(DEA)

)

(

DEA/AHP CEM•A&P

(Safaie Qadyklaye et al. 2005) .

)

(

Data Envelopment Analysis

.(Azar et al . 2005)

()

:

:

» :

«

()

"

"

()

.(Farrell 1957)

$$u_{ro}, v_{io} \geq 0$$

$$i = 1, 2, \dots, n \quad r = 1, 2, \dots, s$$

$$j = 1, 2, \dots, m$$

$$0 \quad :u_{ro}$$

$$0 \quad :v_{io}$$

$$0 \quad :Y_{ro}$$

$$0 \quad :X_{io}$$

$$:Y_{rj}$$

$$:X_{ij}$$

$$:r, i, j$$

(Cooper)

(Edwardo)

(Charnes)

CCR
CCR (Charnes et al. 1978)

()

$$\text{Min } \theta$$

$$S.T \quad - \sum_{r=1}^s u_r Y_{ro} + \sum_{r=1}^s \lambda_j Y_{rj} \geq 0$$

$$\theta \sum_{i=1}^m v_i X_{io} - \sum_{i=1}^m \lambda_j X_{ij} \geq 0 \quad (2)$$

$$\lambda > 0$$

(Banker)

BCC

CCR

(Banker et al. 1984)

$$j = 1, 2, \dots, m$$

$$N \times 1 \quad \lambda$$

$$\theta$$

DEA

$$\theta \leq 1$$

CCR

$$\text{MAX } \frac{\sum_{r=1}^s u_{ro} Y_{ro}}{\sum_{i=1}^n v_{io} X_{io}}$$

$$S.T \quad \frac{\sum_{r=1}^s u_{ro} Y_{rj}}{\sum_{i=1}^n v_{io} X_{ij}} \leq 1$$

()

DEA

$$\text{Min } \theta$$

$$\text{S.t. } - \sum_{r=1}^s u_r Y_{ro} + \sum_{r=1}^s \lambda_j Y_{rj} \geq 0$$

$$\theta \sum_{i=1}^m v_i X_{io} - \sum_{i=1}^m \lambda_j X_{ij} \geq 0$$

$$\begin{aligned} NI'\lambda &\leq 1 \\ \lambda &> 0 \end{aligned}$$

()

)

(
CCR

BCC DEA

CCR

CCR

BCC

DMU

()

DMU

DMU

$$\text{Min } \theta$$

$$\text{S.t. } - \sum_{r=1}^s u_r Y_{ro} + \sum_{r=1}^s \lambda_j Y_{rj} \geq 0$$

$$\theta \sum_{i=1}^m v_i X_{io} - \sum_{i=1}^m \lambda_j X_{ij} \geq 0 \quad ()$$

$$NI'\lambda = 1$$

$$\lambda > 0$$

DMU

DMU

$$Max D_k$$

$$s.t :$$

$$-D_k Y_{11} + (Y_{11}\lambda_1 + Y_{21}\lambda_2 + \dots) \geq 0$$

$$\dots$$

$$-D_k Y_{1j} + (Y_{1j}\lambda_1 + Y_{2j}\lambda_2 + \dots) \geq 0 \quad ()$$

$$X_{11} - (X_{11}\lambda_1 + X_{21}\lambda_2 + \dots) \geq 0$$

$$X_{1i} - (X_{1i}\lambda_1 + X_{2i}\lambda_2 + \dots) \geq 0$$

$$\lambda_t \geq 0$$

$$t = 1, 2, 3, \dots$$

K DMU

=D

= λ

DMU

j

=Y_{1i}

DMU

i

=X_{1i}

CCR

BCC

DEA

()

()

()

% /

% /

%

/...



References

Abbasiyan, A. and Mehregan, N., 2007. measured Total factors productivity the country's economic sectors by method data envelopment analysis, *Economic Research Spring*, pp.153-176. [In Persian].
Adel, A., Anvar Rostami, A.A. and Rostami, M.R., 2005. Measuring the relative efficiency of the company present in stock exchange covering data

analysis approach (information technology indices); *Studies of accounting and auditing*, Winter: **14**(50): pp: 119-138 [In Persian].
Alirezaei, MR., Afsharian, M. and Analuyi B., 2007. Calculated total factor productivity growth models to help Non paramtric method data envelopment analysis; a case study in the power

- industry, *Economic Research Spring*-(78), pp :177-206 [In Persian].
- Alirezaei, MR., Keshvari, A. and Hashemi, SM., 2005. evaluate productivity growth index analysis envelopment Malmkuyist approach, *International Journal of Engineering Sciences, Summer*; **16**(2) pp:145-154 [In Persian].
- Banker, RD., Charnes, A. and Cooper, WW., 1984. Some Models For Estimating Technical Scale Efficiencies in Envelopment Analysis. *Management Science*. **30**(9), pp. 1078-1092.
- Charnes, A., Cooper, WW. and Rhodes, E., 1978. Measuring the Efficiency of Decision Making Units. *European Journal of operational Research*, **2**, pp. 429-444.
- Farrell, M., 1957. The Measurement of Productive Efficiency. *Journal of the Royal Statistics Society ,SeriesA*, **120**(3), pp. 253-281.
- Safaie Qadyklayy, A., born Far, M. and Shokouhi, B., 2005. Investment companies measure performance using data envelopment analysis (DEA) in Tehran Stock Exchange, *Journal of Humanities and Social Summer*, **7**(25), (Special Management), pp:97-120 [In Persian].