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(DEA)

TFP

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Decision Making Unit

(DMU) .

TFP

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(Alirezaei et al. 2007) .

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(Alirezaei et al. 2005) .

(DEA)

(Abbasiyan and Mehregan 2007) .

(DEA)

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DEA/AHP CEM‹A&P .

(Safaie Qadyklaye et al. 2005) .)

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Data Envelopement Analysis

.(Azar et al . 2005)

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.(Farrell 1957)

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

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$$i = 1, 2, \ldots, n \quad r = 1, 2, \ldots, s$$
$$j = 1, 2, \ldots, m$$

u_{ro}:   O

.

v_{io}:   O

Y_{ro}:   O

X_{io}:   O

Y_{rj}:

.

X_{ij}:

r,i,j:

.

(Edwardo)   (Cooper)

r, i, j

(Charnes)

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CCR

CCR .(Charnes etal. 1978)

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

‹(Banker)

BCC

.

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

$$\lambda \succ 0$$

CCR

.(Banker etal. 1984) .

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

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λ $N \times 1$

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

$\theta \leq 1$ DEA

CCR .

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

DEA

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$$Min \quad \theta$$
$$S.t \quad -\sum_{r=1}^{s} u_r Y_{ro} + \sum_{r=1}^{s} \lambda_j Y_{ij} \geq 0$$
$$\theta \sum_{i=1}^{m} v_i X_{io} - \sum_{i=1}^{m} \lambda_j X_{ij} \geq 0 \qquad (\ )$$
$$NI'\lambda \leq 1$$
$$\lambda \succ 0$$

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CCR

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BCC   DEA   CCR   :

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CCR   BCC   .

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:   DMU   (   )

DMU   :   .

DMU

$$Min \quad \theta$$
$$S.t \quad -\sum_{r=1}^{s} u_r Y_{ro} + \sum_{r=1}^{s} \lambda_j Y_{ij} \geq 0$$
$$\theta \sum_{i=1}^{m} v_i X_{io} - \sum_{i=1}^{m} \lambda_j X_{ij} \geq 0 \qquad (\ )$$
$$NI'\lambda = 1$$
$$\lambda \succ 0$$

DMU

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DMU

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$$MaxD_k$$
$$s.t:$$
$$-D_k Y_{11} + (Y_{11}\lambda_1 + Y_{21}\lambda_2 + ...) \geq 0$$
$$...$$
$$-D_k Y_{1j} + (Y_{1j}\lambda_1 + Y_{2j}\lambda_2 + ...) \geq 0 \qquad ( )$$
$$X_{11} - (X_{11}\lambda_1 + X_{21}\lambda_2 + ...) \geq 0$$
$$X_{1i} - (X_{1i}\lambda_1 + X_{2i}\lambda_2 + ...) \geq 0$$
$$\lambda_t \geq 0$$
$$t = 1,2,3....$$

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K   DMU   =D

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$= \lambda$

DMU   j   =Y$_{1i}$

DMU   i   =X$_{1i}$

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CCR

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