

## ***Aspects Concerning Modelling of a Risk-Free Investment in the Equity of a Company***

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**Abstract:** *In terms of the space available, the article make a summary of the assessment method of a company in terms of investment risk, developed by the author for being performed based on the accounting representation of a set of analytical trial balances, using the method of data envelopment.*

**Keywords:** *business valuation, investment risk, risk of operational control, risk of operational transfer, risk of operational balance*

### **Introduction**

The general concept of investment risk is related to the notion of economic potential benefit.

For the operational reality of an undertaking, given a value associated with a potential economic benefit it may be intended to operational control exercised through a regulated right or to the transfer having the destination to satisfy the debt claimed by a regulated contingent interest (statutory, commercial and/or tax).

Investment risk may be a risk of operational control, derived from the consequences of deviations from best practice for operational control, a risk for operational transfer, derived from the consequences of deviation from best practice of operational transfer or a risk of operational balance, derived from the consequences of deviation from best practice oriented to operational balance.

This is the theoretical foundation of an own method of assessment of an enterprise in terms of investment risk. The proposed method is based solely on information contained in the synthesis accounting document called, in the language used in accounting, analytical trial balance. The basic reference is the current accounting period, and the assessment is based on a retrospective reporting space comprising, in addition to the current accounting period, a variable number of retrospective accounting periods, functions of requests of applicants or the judgment of the financial analyst. Areas of assessment are the three alternatives presented above. It is considered that, in terms of timeliness actuality of economic reality, , a retrospective period the size of a financial year (12 monthly accounting period and 12 trial balances analytical) are, for the retrospective space, a sufficient and necessary dimension.

The evaluation method is based on data envelopment analysis. In the present article it will be presented a brief overview of the theoretical and analytical practice of the assessment method proposed.

## **1. The Substantiation of Valuation Method**

### **1.1. Documentary Material**

For the vast majority of accounting representation through the analytical balance verification for the operational activity, data are taken as such, in accordance with a specific reference set,  $A$ , in correspondence with to a variable number,  $n$ , of analytical accounts, and their accounting function,  $f(A)$ .

Form of the accounting data representation contained in the trial balance is pictured through the table of reference for analytical data (Table no. 1).

Exception from the accounting representation is only two analytical accounts,  $a_{pfr}^i$  and  $a_{pfc}^j$ , created to support the assessment purposes. The first account created analytical replace the accounting significance corresponding to retained earnings resulting with another new account called "carried forward financial performance, PFR". It sums the value of retained earnings resulting in previous years of the current financial exercise and the financial performance achieved in the belonging accounting periods of current financial year but in accounting periods previous the current reference accounting period,  $t = 0$ . The aim is to set up an information data on the own operational financial performance constituted as a source of funding (or improper resource, if are loss carried forward) available for initiating ongoing operational activity for current period. The second analytical account created,  $a_{pfc}^j$ , is a consequence of the transfer of financial performance in the current financial year previous account, being intended solely representation of the current period financial performance in terms of profitability, as the difference between total revenue  $\frac{rd_t^j}{v}$ , and the total spending for their achievement,  $\frac{rc_t^j}{ch}$ .

In terms of general reference, the picture of data reference is presented in Table no. 1

**Table no. 1 The reference data picture**

account analytical	function accounting	initial financial position		current operational activity		final financial position	
		$IS_t$		$R_t$		$FS_t$	
		debit	credit	debit	credit	debit	credit
$A$	$f(A)$	$ID_t$	$IC_t$	$RD_t$	$RC_t$	$FD_t$	$FC_t$
$a^1$	$f(a^1)$	$id_t^1$	$ic_t^1$	$rd_t^1$	$rc_t^1$	$fd_t^1$	$fc_t^1$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
$a_{pfr}^i$	$f(a_{pfr}^i)$	$id_{(pfr^-)_t^i}$	$ic_{(pfr^+)_t^i}$	$rd_{pfr^-}^i$	$rc_{pfr^+}^i$	$fd_{(pfr^-)_t^i}$	$fc_{(pfr^+)_t^i}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
$a_{pfc}^j$	$f(a_{pfc}^j)$	$id_{(pfc=0)_t^j}$	$ic_{(pfc=0)_t^j}$	$rd_{\frac{rd_t^j}{v}}^j$	$rc_{\frac{rc_t^j}{ch}}^j$	$fd_{(pfc^-)_t^j}$	$fc_{(pfc^+)_t^j}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
$a^k$	$f(a^k)$	$id_t^k$	$ic_t^k$	$rd_t^k$	$rc_t^k$	$fd_t^k$	$fc_t^k$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
$a^n$	$f(a^n)$	$id_t^n$	$ic_t^n$	$rd_t^n$	$rc_t^n$	$fd_t^n$	$fc_t^n$

Legend:

- $A$  set of analytical accounts for the accounting representation of the structure of an applicable accounting plan
- $a_{pfr}^i$  carried over financial performance
- $pfr^-$  carried over negative financial performance (operating loss carried over);
- $pfr^+$  carried over positive financial performance (operating profit carried forward);
- $a_{pfc}^j$  current financial performance
- $\frac{rd_t^j}{v}$  total revenues recorded in the accounting period of the current reference,  $t = 0$  ;
- $\frac{rc_t^j}{ch}$  total expenditure recorded in the accounting period of the current reference,  $t = 0$  ;
- $pfc^-$  negative current financial performance (loss resulting from current operating activities);
- $pfc^+$  positive current financial performance (profit resulting from current operating activities);
- $a^k$  general element of the set of analytical accounts, with indicative special to any arbitrary element.

## 1.2. The Principles of Assessment

The evaluation method is subordinate to principle of objectivity and to the principle of equity. According to them,

- any operational activity with a representation in the a balance sheet is the subject for an impartial analysis for the relation with every other operational activities;
- any operational activity,  $R_t$ , for the control,  $RD_t$ , or for operational transfer,  $RC_t$ , is treated fairly; from  $n$  operational activities belonging assessment area are not retained in the analytic space only those that were initiated by an initial financial position of debit at least equal with that of current operational activity, respectively those that were initiated by an initial financial position of credit not more than the current operational activity; thus, none of operational activities retained in the analytic space cannot take an advantage from higher operational resources,  $ID_t$ , or from an excess funding,  $IC_t$ ; from the set corresponding for operational retrospective,  $R$ , with subcomponents  $RD$  and  $RC$ , are not retained, through reference to the relation of preference for equity,  $\preceq$ , than those subject to the principle defined:  $\preceq R \cong (\preceq RD, \preceq RC)$ ;
- current operational control activity,  $\preceq RD_0$ , is analysed by binary relationship with all corresponding activities in the analytic space  $(\preceq RD_0, \preceq RD_t), \forall \preceq RD_t \subset \preceq RD$ ;
- current operational transfer activity,  $\preceq RC_0$ , is analysed by binary relationship with all corresponding activities in the analytic space  $(\preceq RC_0, \preceq RC_t), \forall \preceq RC_t \subset \preceq RC$ ;
- any operational activity belonging elementary current operational control,  $\forall \preceq rd_0^k \in \preceq RD_0$ , is analysed by binary relationship with all other operational activities within their area of operational possibilities,  $(\preceq rd_0^k, \preceq rd_t^k), \forall \preceq rd_0^k \in \preceq RD_0, \forall \preceq rd_t^k \in \preceq RD^k$ ;
- any operational activity belonging elementary current operational transfer,  $\forall \preceq rc_0^k \in \preceq RC_0$ , is analysed by binary relationship with all other operational activities within their area of operational possibilities,  $(\preceq rc_0^k, \preceq rc_t^k), \forall \preceq rc_0^k \in \preceq RC_0, \forall \preceq rc_t^k \in \preceq RC^k$ ;
- financial position of the current operational activity,  $R_0$ , is treated as a consequence of the financial position of specific operational activities,  $\preceq RD_0$  and  $\preceq RC_0$ .

Analytic space representation is given in Tables no. 2 and no. 3 and the representation of initial financial position of the current operational activity, in Figure 1.

Table no. 2 Area for analysis of operational control

$\preceq RD$			
0	t	T	
$\preceq rd_0^1$	$\preceq rd_t^1$	$\preceq rd_T^1$	$\preceq RD^1$
$\vdots$	$\vdots$	$\vdots$	
$\preceq rd_0^x$	$\preceq rd_t^x$	$\preceq rd_T^x$	$\preceq RD^i$
$\text{pfr}^-$	$\text{pfr}^-$	$\text{pfr}^-$	$\text{pfr}^-$
$\vdots$	$\vdots$	$\vdots$	
$\preceq rd_0^j$	$\preceq rd_t^j$	$\preceq rd_T^j$	$\preceq RD^j$
$\text{v}$	$\text{v}$	$\text{v}$	$\text{v}$
$\preceq rd_0^k$	$\preceq rd_t^k$	$\preceq rd_T^k$	$\preceq RD^k$
$\vdots$	$\vdots$	$\vdots$	
$\preceq rd_0^n$	$\preceq rd_t^n$	$\preceq rd_T^n$	$\preceq RD^n$
$\preceq RD_0$	$\preceq RD_t$	$\preceq RD_T$	
${}^i D_0$	${}^i D_t$	${}^i D_T$	${}^i D$

Table no. 3 Area for analysis of operational transfer

$\preceq RC$			
0	t	T	
$\preceq rc_0^1$	$\preceq rc_t^1$	$\preceq rc_T^1$	$\preceq RC^1$
$\vdots$	$\vdots$	$\vdots$	
$\preceq rc_0^i$	$\preceq rc_t^i$	$\preceq rc_T^i$	$\preceq RC^i$
$\text{pfr}^+$	$\text{pfr}^+$	$\text{pfr}^+$	$\text{pfr}^+$
$\vdots$	$\vdots$	$\vdots$	
$\preceq rc_0^j$	$\preceq rc_t^j$	$\preceq rc_T^j$	$\preceq RC^j$
$\text{ch}$	$\text{ch}$	$\text{ch}$	$\text{ch}$
$\preceq rc_0^k$	$\preceq rc_t^k$	$\preceq rc_T^k$	$\preceq RC^k$
$\vdots$	$\vdots$	$\vdots$	
$\preceq rc_0^n$	$\preceq rc_t^n$	$\preceq rc_T^n$	$\preceq RC^n$
$\preceq RC_0$	$\preceq RC_t$	$\preceq RC_T$	
${}^i C_0$	${}^i C_t$	${}^i C_T$	${}^i C$

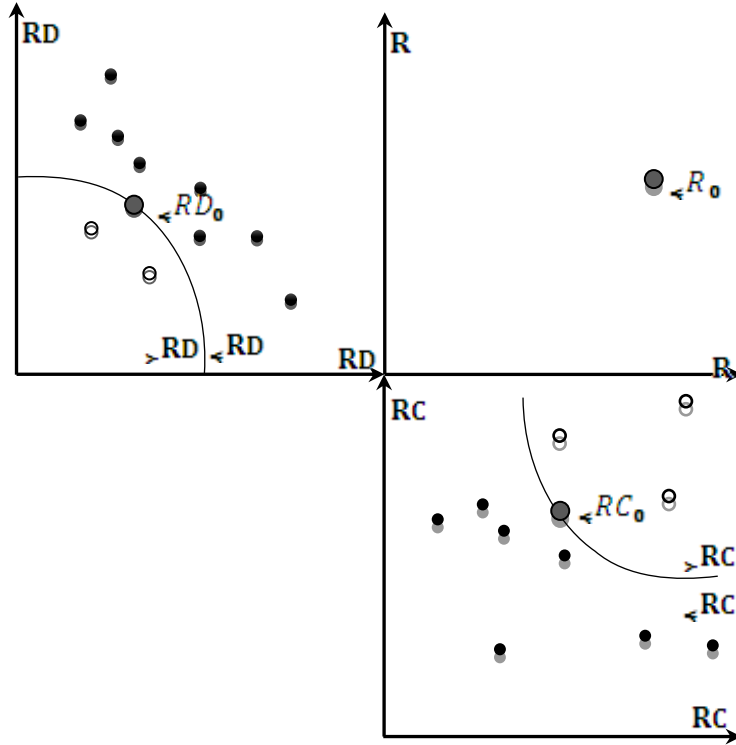


Figure no. 1: The initial financial position of the current operational activity in the analytic space

## 2. Description of the Analytical Process

### 2.1. Positioning Current Operational Activity Operational on the Indifference Curve

It's called fractional multiplier for debit,  ${}^{\text{RD}}m_t$ , the ratio of the highest aggregate value belonging to analytic space and the specific amount of each aggregate debit value included in the analytic space:

$${}^{\text{RD}}m_t = \frac{{}^{\text{RD}}D_{\max}}{{}^{\text{RD}}D_t} \geq 1, \forall {}^{\text{RD}}D_t \in {}^{\text{RD}} \quad (1)$$

It's called fractional multiplier for credit,  ${}^{\text{RC}}m_t$ , the ratio of the lowest aggregate value belonging to analytic space and the specific amount of each aggregate credit value included in the analytic space:

$${}^{\text{RC}}m_t = \frac{{}^{\text{RC}}C_{\min}}{{}^{\text{RC}}C_t} \leq 1 \quad (2)$$

Application of fractional multipliers on the elements contained in the subspace corresponding current operational activity impose their position on the indifference curve operational,  ${}^{\text{R}}$ , in the determination relation induced by the indifference curve for operational control,  ${}^{\text{RD}}$ , and indifference curve for operational transfer  ${}^{\text{RC}}$

$${}^{\text{R}} \cong ({}^{\text{RD}}, {}^{\text{RC}}) \left| \begin{array}{l} \forall {}^{\text{RD}}D_t \in {}^{\text{RD}} \\ \forall {}^{\text{RC}}C_t \in {}^{\text{RC}} \end{array} \right. \quad (3)$$

Analytic space representation is given in Tables no. 4 and no. 5 and the representation of financial position on the curve of indifference for current operational activity, in Figure no. 2.

Table no. 4 Area analytical of curve of indifference for operational control

$\approx RD$			
0	t	T	
$\llcorner rd_0^1$	$\llcorner rd_t^1$	$\llcorner rd_T^1$	$\llcorner RD^1$
$\vdots$	$\vdots$	$\vdots$	
$\llcorner rd_0^i$	$\llcorner rd_t^i$	$\llcorner rd_T^i$	$\llcorner RD^i$
$\llcorner pfr^-$	$\llcorner pfr^-$	$\llcorner pfr^-$	$\llcorner pfr^-$
$\vdots$	$\vdots$	$\vdots$	
$\llcorner rd_0^j$	$\llcorner rd_t^j$	$\llcorner rd_T^j$	$\llcorner RD^j$
$\llcorner v$	$\llcorner v$	$\llcorner v$	$\llcorner v$
$\llcorner rd_0^k$	$\llcorner rd_t^k$	$\llcorner rd_T^k$	$\llcorner RD^k$
$\vdots$	$\vdots$	$\vdots$	
$\llcorner rd_0^n$	$\llcorner rd_t^n$	$\llcorner rd_T^n$	$\llcorner RD^n$
$\approx RD_0$	$\approx RD_t$	$\approx RD_T$	
$\llcorner RD_m_0$	$\llcorner RD_m_t$	$\llcorner RD_m_T$	$\llcorner RD_m$

Table no. 5 Area analytical of curve of indifference for operational transfer

$\approx RC$			
0	t	T	
$\llcorner rc_0^1$	$\llcorner rc_t^1$	$\llcorner rc_T^1$	$\llcorner RC^1$
$\vdots$	$\vdots$	$\vdots$	
$\llcorner rc_0^i$	$\llcorner rc_t^i$	$\llcorner rc_T^i$	$\llcorner RC^i$
$\llcorner pfr^+$	$\llcorner pfr^+$	$\llcorner pfr^+$	$\llcorner pfr^+$
$\vdots$	$\vdots$	$\vdots$	
$\llcorner rc_0^j$	$\llcorner rc_t^j$	$\llcorner rc_T^j$	$\llcorner RC^j$
$\llcorner Ch$	$\llcorner Ch$	$\llcorner Ch$	$\llcorner Ch$
$\llcorner rc_0^k$	$\llcorner rc_t^k$	$\llcorner rc_T^k$	$\llcorner RC^k$
$\vdots$	$\vdots$	$\vdots$	
$\llcorner rc_0^n$	$\llcorner rc_t^n$	$\llcorner rc_T^n$	$\llcorner RC^n$
$\approx RC_0$	$\approx RC_t$	$\approx RC_T$	
$\llcorner RC_m_0$	$\llcorner RC_m_t$	$\llcorner RC_m_T$	$\llcorner RC_m$

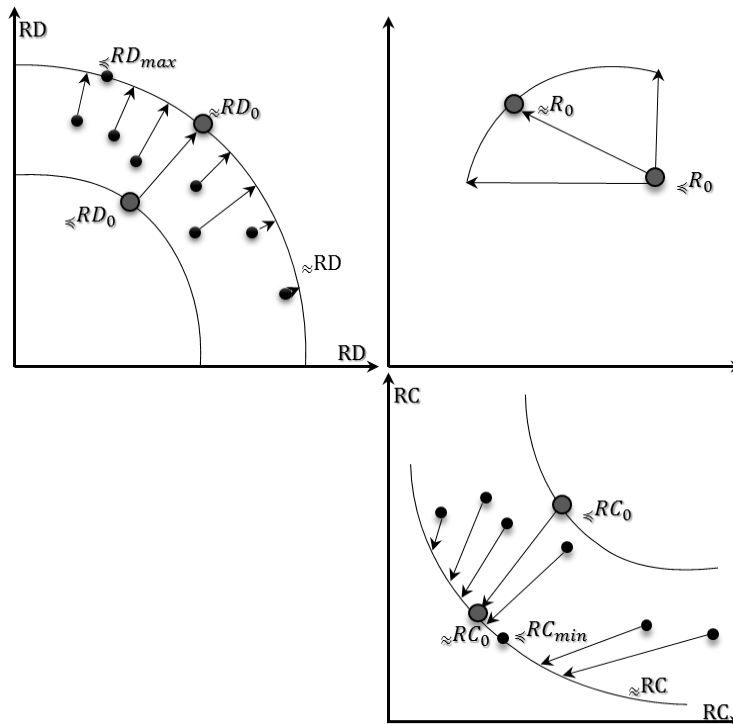


Figure no. 2 Financial Position of current operational activity on the curve of operational indifference

## 2.2. Placing Current Operational Activity on the Curves of Elementary Indifference Curves

It's called linear multiplier for debit,  $\llcorner rd^k_m_0$ , the ratio of the highest value belonging to analytic space of a specific elementary operational control and the corresponding value belonging to current operational control

$$\llcorner rd^k_m_0 = \frac{\llcorner rd^k_{max}}{\llcorner rd^k_0} \geq 1, \forall \llcorner rd^k_0 \in \approx RD_0 \quad (4)$$

It's called linear multiplier for credit,  ${}^{\leftarrow}rc^k m_0$ , the ratio of the lower value belonging to analytic space of a specific elementary operational transfer and the corresponding value belonging to current operational transfer

$${}^{\leftarrow}rc^k m_0 = \frac{{}^{\leftarrow}rd^k_{min}}{{}^{\leftarrow}rd^k_0} \leq 1, \forall {}^{\leftarrow}rc^k_0 \in {}^{\approx}RC_0 \quad (5)$$

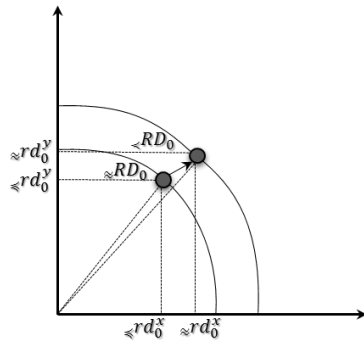
Applying linear flow rate multiplier,  ${}^{\leftarrow}rd^k m_0$ , on the operational activities elementary of operational control gives their value of indifference,  ${}^{\approx}rd^k_0 = {}^{\leftarrow}rd^k m_0 \cdot {}^{\leftarrow}rd^k_0$ . On the set of operational control activity,  ${}^{\approx}RD_0$ , is creating a lot of basic operational activities placed on their indifference curves

$${}^{\leftarrow}RD_0 = \{ {}^{\leftarrow}rd^k_0 \mid \forall {}^{\leftarrow}rd^k_0 \equiv {}^{\approx}rd^k_0 \} \quad (6)$$

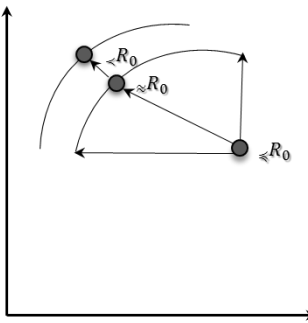
which can be the objective of strategic indifference in implementing a policy oriented toward the optimal operational control over the potential economic benefits.

**Table no. 6 Analytical area for construction of an indifference strategy on operational control**

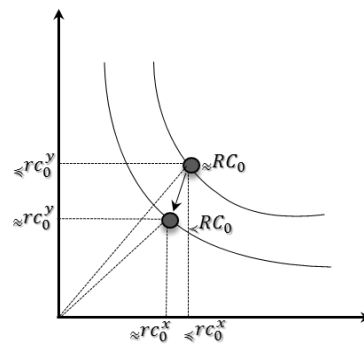
${}^{\leftarrow}rd^d m_0$	${}^{\leftarrow}rd^d_0$
${}^{\leftarrow}rd^i m_0$	${}^{\leftarrow}rd^i_0$
${}^{\leftarrow}rd^j m_0$	${}^{\leftarrow}rd^j_0$
${}^{\leftarrow}rd^k m_0$	${}^{\leftarrow}rd^k_0$
${}^{\leftarrow}rd^n m_0$	${}^{\leftarrow}rd^n_0$



**Table no. 7 Analytical area for construction of an indifference strategy on operational transfer**



${}^{\leftarrow}rc^d m_0$	${}^{\leftarrow}rc^d_0$
${}^{\leftarrow}rc^i m_0$	${}^{\leftarrow}rc^i_0$
${}^{\leftarrow}rc^j m_0$	${}^{\leftarrow}rc^j_0$
${}^{\leftarrow}rc^k m_0$	${}^{\leftarrow}rc^k_0$
${}^{\leftarrow}rc^n m_0$	${}^{\leftarrow}rc^n_0$



**Figure no. 3 The financial position of the company in between the two best alternative strategies, mutually exclusive**

Applying linear flow rate multiplier,  ${}^{\leftarrow}rc^k m_0$ , on the operational activities of elementary operational transfer gives their value of indifference,  ${}^{\approx}rc^k_0 = {}^{\leftarrow}rc^k m_0 \cdot {}^{\leftarrow}rc^k_0$ . On the set of operational control activity,  ${}^{\approx}RC_0$ , is creating a lot of basic transfer activities placed on their indifference curves

$${}^{\leftarrow}RC_0 = \{ {}^{\leftarrow}rc^k_0 \mid \forall {}^{\leftarrow}rc^k_0 \equiv {}^{\approx}rc^k_0 \} \quad (7)$$

which can be the objective of strategic indifference in implementing a policy oriented toward the optimal operational transfer for the potential economic benefits.

Analytic space representation is given in Tables no. 6 and no. 7 and the situation is represented in Figure no. 3.

### 2.3. Location Operational Activities at the Point of Best Operational Practices

The best final financial position of the current operational activity,

$$FS_0 \cong (\leftarrow RD_0, \leftarrow RC_0) \quad (8)$$

is given by solving optimization problems by linear mathematical programming  $\max \leftarrow RD_0$  or  $\min \leftarrow RC_0$ :

$$\max \left[ \left[ (C_1 < \cdot) RD \right]_{10} \mid \left[ (C_1 < \cdot) rd \right]_{10} \cdot 1 \geq \sum_1^S \min \left[ \left[ (C_1 < \cdot) RC \right]_{10} \mid \left[ (C_1 < \cdot) rc \right]_{10} \cdot 1 \leq \right. \quad (9)$$

The space of optimization is given in Tables 8 and 9 and local situation is represented in Figure no. 4

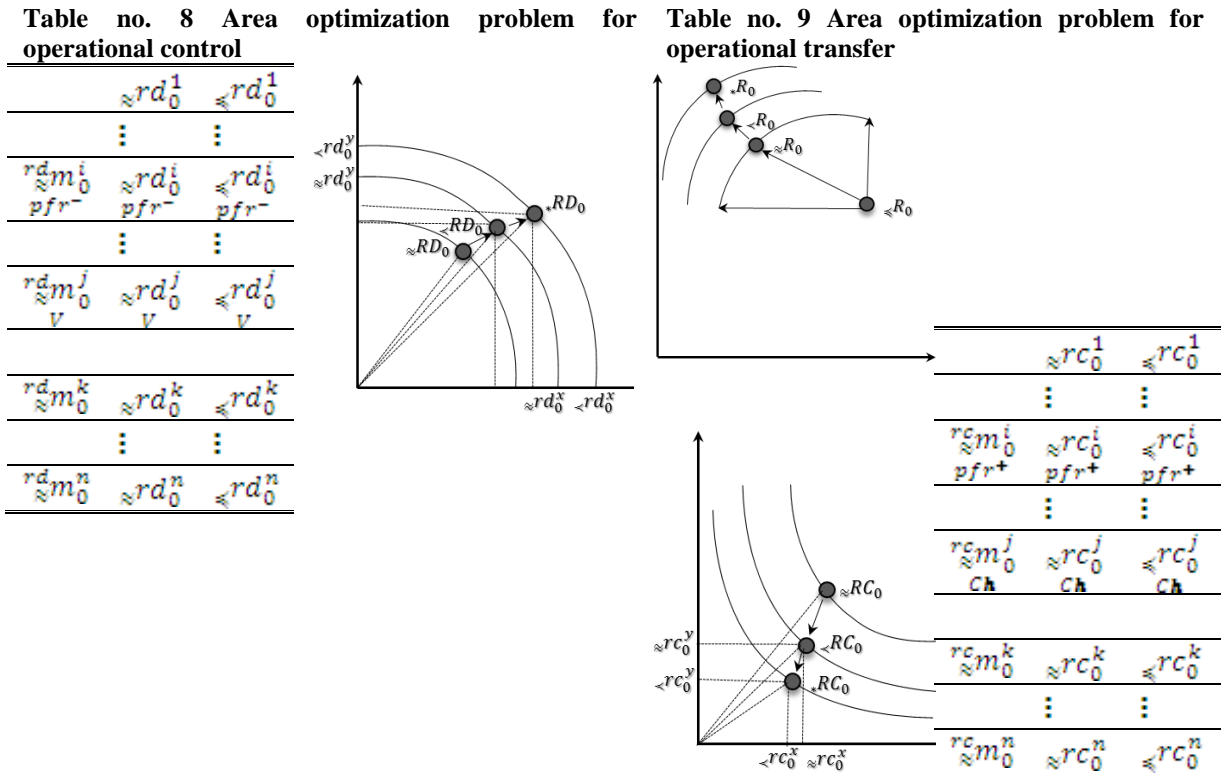


Figure no. 4 The best practice for operational activity

### Conclusions

Financial position optimal in terms of alternative strategies applicable,  $\leftarrow RD_0$  and  $\leftarrow RC_0$ , and financial position optimized current operational activity are used in the second stage of evaluation for determining the degree of risk associated with both overall  $\leftarrow RD_0$ ,  $\leftarrow RC_0$ ,  $\leftarrow FD_0$ ,  $\leftarrow FC_0$ , and associate for each specific operational activities,  $\forall rd_0^k \in RD_0$ ,  $\forall rc_0^k \in RC_0$ ,  $\forall fd_0^k \in FD_0$ ,  $\forall fc_0^k \in FC_0$ .

It also allows optimized based on final financial position, determining the optimal operational practice for the operational work of the accounting period following:  $\forall rd_{+1}^k \in RD_{+1}$ ,  $\forall rc_{+1}^k \in RC_{+1}$ .

### Supplementary recommended readings

- Cooper, W.W., Seiford, L.M., Tone, K., (2006), *Introduction to Data Envelopment Analysis and Its Uses*, Springer Science-Business Media Inc.
- Cooper, W.W., Seiford, L.M., Tone, K., (2007), *Data Envelopment Analysis*, Springer Science-Business Media Inc.
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