Simulation Model of International Factoring

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Abstract :
Most international trading transactions having as an aim the commodity flow, involve the financial flows that close the money-commodity/money cycle. In other words, the manufacturer who spends money amounts in order to manufacture and turn to good account certain products, cashes their equivalent value as profit. The flow of commodity can be directly transferred from manufacturer to end user or from manufacturer to a series of economic agents and finally to consumer. The existence of more chain links within the flow of commodity, from manufacturer to consumer, causes delivery delays and price growth (each economic agent adds a profit).
The financial management of this flow supposes to resorting to special financing forms of transactions or to using certain payment instruments as: risk, minimum time and cost. One of the specific form of financing the international transactions is factoring.

Keywords: *factoring, overdraft factoring, revolving factoring.*

1. Introduction

In the literature of specialty, there are numerous works describing the operating mode by means of factoring, as well as its forms of application. None of these forms provides the commodity payment in such a way to allow the commodity delivery in a relatively short time from manufacturer to end user. A solution we want to propose is the achievement of the network factoring. According to our information, we do not know such a theoretical or practical approach in Romania or in other countries. In order to outline the essence of such a transaction, we shall briefly recall two of the factoring forms, practiced by economic agents: *overdraft factoring and revolving factoring.*

Overdraft factoring supposes to cover the following stages: (1) The adherent assigns the invoices to factor and cashes the equivalent of 80% of their value; (2) the factor pays the difference of 20% on the deadline of the factoring contract; (3) monthly, on the last working day, the factor takes from the adherent's account the equivalent value of the commissions and interests stipulated by contract. If the adherent does not cash, at the begging of the contract, the sum stipulated on step 1, then, on the first day of each month, the factor collects the commissions for the not-cashed money. Additionally, if the money will be paid by factor in several installments, the factor will cash, for each installment, at the end of the month, the interest and the management commission, and when raising the first installment, also the arrangement commission; (4) The end-user makes the payments of invoices to factor in a collateral account opened by adherent, who (5) retails the adherent's respective account, if the paid off invoice is not assigned and (6) otherwise, the factor cashes the whole money amount; (7) If in the adherent's lei account, he will not find the necessary money for payments, the factor will resort to adherent's currency account for the not-cashed differences.

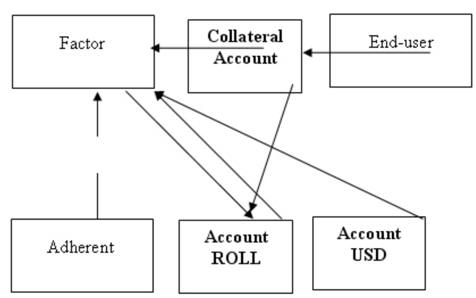

Figure 1. The carrying on of the overdraft factoring operation

The interest, management and arrangement commissions (*com_aranj*) are calculated as follows:

(com_aranj) are calculated as follows:

$$Interest = \frac{days\_month - day\_redraw}{360} * rate\_interest * amount\_redraw$$

$$Commission = \frac{days\_month - day\_redraw}{360}(com\_adm * amount\_redraw)$$

$$com\_aranj = rate\_com\_aranj * amount\_redraw$$

com_aranj = arrangement commission

The *revolving factor* supposes that the adherent assigns the invoices to factor, and allows him, according to the ceiling limit of 80% of the assigned invoices value, to make several redraws and deposits until concluding the contract (it functions like a credit).

This time, the end-user pays the adherent, who, until concluding the contract, must to repay the loan to factor.

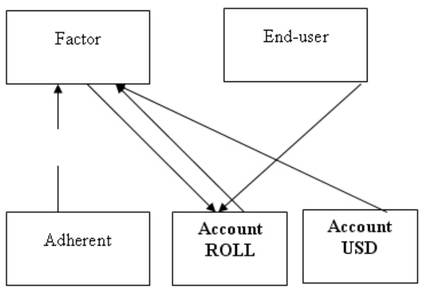

Figure 2. The carrying on of the revolving factoring operation

The network factoring has in view to achieve that mechanism of carrying on of a trade transaction, which to facilitate the synchronization of the commodity flow with the financial flow, under the conditions of observing the payment dead lines and of integrating into the market profit margin.

This financing modality was so-called, as an undertaker who purchased a commodity by means of factoring, can sell the same commodity to other buyer. The advantage is that the undertaker can do this thing without spending his own money.

The adherents can all resort to a single factor, this fact increasing their profits (the arrangement commission being zero and the management one much lower).

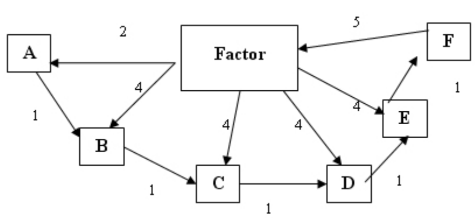

Figure 3. The carrying on of the network factoring with a factor

Legend

A – E are Adherents

F – End-user

1 – Commodity circulation

2 – The factor pays to the first user the equivalent value of the assigned invoices minus the perceived commissions and interests

4 – The factor pays the adherents the price difference minus the respective commissions and interests for operation.

5 – the end-user pays the factor the commodity equivalent value.

The adherents can resort to different factors, but the commission would be higher and consequently, lower profits.

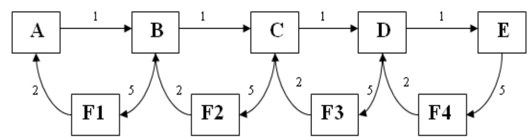

Figure 4. The carrying on of the network factoring with n factors

Legend

A – D are Adherents

E – end-user

F1 – F4 are Factors

1 – commodity circulation

2 – The factor pays to Adherent the equivalent value of the assigned invoices minus the respective commissions and interests for operation

5 – the user pays to Factor the commodity equivalent value.

In the network factoring operation we meet two different cases:

When all users have the same deadline or when all contracts have the same deadline length.

All users have the deadline on the first contract's deadline.

If the end-user agrees to pay the commodity equivalent value in a shorter time period than the period when the Adherent purchased it, then, the Adherent will gain a higher profit, than in case when the contracts have the same deadline length.

The carrying on of such a functioning diagram was already simulated with the aid of a procedural model that has as exogenous variables:

- Initial and concluding time of the first contract.
- Asked price (initial price)
- Maximum price (fixed amount or % of the initial price)
- Advance to be paid back after signing the contract of the first Adherent (price percentage – usually 80%)
- Interest (do), management commission (com_admin) and arrangement commission (com_aranj)
- Number of days after which the end-user concludes another contract (day_contr_new)
- How many days the commodity remains in stock after it has been resold (day_stock) and on what cost (cost_stock)
- Minimum time for signing a contract (d_min)

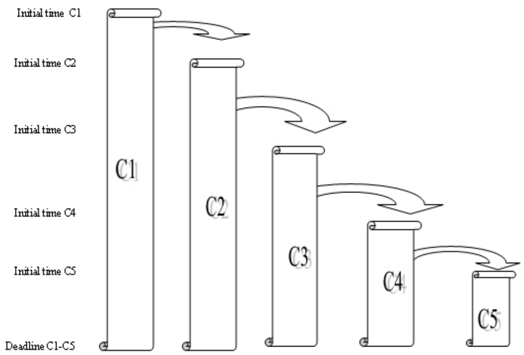

Figure 5. Network factoring – the contracts have the same deadline

The first user:

- on the date of signing the contract he gets the amount:

$$\Pr\_init * \frac{proc\_av}{100} * (1 - com\_arrang)$$

- on contract deadline he gets the amount:

$$(1 - \frac{proc\_av}{100}) * \Pr\_init(1 - \frac{com\_arrang}{100}) - \frac{proc\_av}{100} *$$

$$\Pr\_init * \left(\frac{days\_contract}{360} * (com\_manag \right.$$

For the n-th "player"[1]:

- the **profit** he intends to gain (fixed amount or a percentage of the selling price)

If there are not too many days left to begin a new contract

$$(data\_sf - data\_inc) - n * zi\_contr\_nou \geq d\_\min$$

then we calculate the price expected by n "player"

The money amount received by player n from factor will be:

$$S(n) = \frac{proc\_av}{100} P(n) - \frac{proc\_av}{100} P(n)$$

$$\left(com\_arj + (dob + com\_adm) * \frac{(data\_sf - n * data\_inc)}{360} \right) -$$

$$- \left(1 - \frac{proc\_av}{100} \right) P(n) \left(\frac{com\_ar}{100} - 1 \right)$$

and $P(n-1) = S(n) - \prod(n)$

We denote by:

$$A = \frac{proc\_av}{100} - \frac{proc\_av}{100} \left(com\_arj + (dob + com\_adm) * \frac{(data\_sf - n * data\_inc)}{360} \right) - \left(1 - \frac{proc\_av}{100} \right) \frac{com\_ar}{100}$$

$$\Rightarrow S(n) = A * P(n)$$

$$P(n) * A = P(n-1) + \prod(n)$$

$$\Rightarrow P(n) = \frac{P(n-1) + \prod(n)}{\frac{proc\_av}{100} - \frac{proc\_av}{100} \left(com\_arj + (dob + com\_adm) * \frac{(data\_sf - n * data\_inc)}{360} \right) - \left(1 - \frac{proc\_av}{100} \right) \frac{com\_ar}{100}}$$

$$\frac{P(n-1) + \prod(n)}{- \left(1 - \frac{proc\_av}{100} \right) \frac{com\_ar}{100}}$$

[1] The player has the significance of economic agent entering the business and who initially is just an end-user, without knowing if he could be also a seller.

If player n has in stock goods $\prod(n) = \prod(n) - \cos t\_stoc$

If the selling price of player n is higher than the maximum price

Then "player" n is an end-user (he can not sell further on by means of factoring)

Otherwise "player" n sells further on and the selling price and the profit are visualized

Otherwise "player" n can not sell further on by means of factoring.

(n-2) Adherents will participate in this network factoring operation, but none of them will spend his money and, despite this fact, the adherents gain profit.

Initially, the first seller will own goods in stock, then, from x to x players, namely considering the first seller, the (1+day_stock/day_contr_new)-th seller, the ((1+day_stock/day_contr_new)+day_stock_contr_new))- th seller and so on.

All contracts have the same time length till deadline.

It is possible, as the end-user, not to be able to pay the commodity equivalent value in a time shorter than the time when the Adherent has purchased it. That is why, the operating time could be longer than the above mentioned network factoring time.

In what follows we shall analyze such a case.

The carrying on of this financing diagram was simulated with the aid of a procedural model, including as exogenous variables:

- Initial and concluding time of the first contract
- Asked price (initial price)
- Maximum price (fixed amount or % of the initial price)
- Advance to be paid back after signing the contract of the first Adherent (percentage of price – usually 80%)
- Interest, management and arrangement commissions
- Number of days after which the end-user concludes another contract (day_contr_new)
- How many days the commodity remains in stock after it has been resold (day_stock) and on what cost (cost_stock)
- Minimum time for signing a contract (d_min)

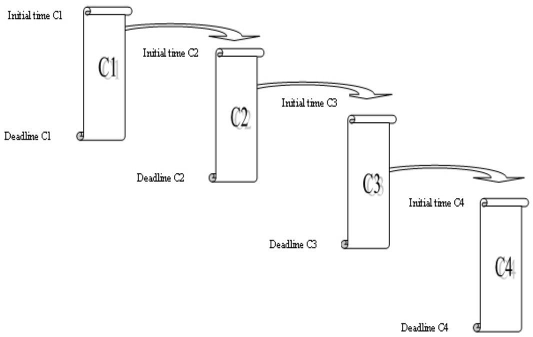

Figure 6. Network factoring – the contracts have the same time length up to deadline

The first seller:

- on date of signing the contract he gets the amount:

$$Pr\_init * \frac{proc\_av}{100} * (1-com\_aranj)$$

- on contract deadline, he gets the amount:

$$\left(1-\frac{proc\_av}{100}\right)*Pr\_init\left(1-\frac{com\_aranj}{100}\right)-\frac{proc\_av}{100}*Pr\_init*\left(\frac{zile\_contract}{360}*(com\_adm+dob)\right)$$

For the n-th "player" [2]

- he is asked about the **cost** he is going to pay
- higher the cost, lower the profit (the price will be also lower). The advantage is

that the Adherent will find much faster a client (lower price). The disadvantage is that he will gain a lower profit.

If the selling Price of "player" n (P(n)) is higher than the maximum Price

then, "player" n is an end-user (he can not sell further on)

otherwise, "player" n sells further on and Price (n) and Profit (n) are visualized.

The selling Price used by player n and the Profit gained by player n will be calculated according to formula:

$$P(n-1)=\frac{proc\_av}{100}P(n)\left(1-\frac{com\_aranj}{100}\right)+Cost$$

$$\Rightarrow P(n)=\frac{P(n-1)-Cost}{\frac{proc\_av}{100}*\frac{100-com\_aranj}{100}}$$

$$\prod(n)=P(n)*\left(1-\frac{proc\_av}{100}-\frac{proc\_av}{100}*\frac{com\_adm+dob}{100}*\frac{zile\_contract}{360}-\left(1-\frac{proc\_av}{100}\right)*\frac{com\_aranj}{100}\right)-cost-cost\_stoc$$

If "player" n owns commodity in stock, the stocking cost is subtracted from profit.

[2] The player has the significance of economic agent entering the business. Initially, we do not know if he is just an end-user or a seller too.

(n-2) Adherents will participate in this network factoring operation, but none of them will spend his own money, but in spite of this, the adherents gain profits.

Initially, the commodity will be in stock at the first seller, then from x to x players, namely, at first seller, at (1+day_stock/day_contr_new)-th seller, at ((1+day_stock/day_contr_new) +day_stock/day_contr_new)-th seller, and so on. For all those which own in stock commodity, the Profit = Profit – cost_stock.

We shall notice that, if Adherent prefers to enter the business with a cost higher than zero, then, his profit will be a little lower, but also the price will be lower, what will bring him an advantage, because he will find much faster a buyer.

$$\begin{cases} P(n-1)=\frac{proc\_av}{100}P(n)\left(1-\frac{com\_aranj}{100}\right)+cost \\ \prod(n)=P(n)*\left(1-\frac{proc\_av}{100}-\frac{proc\_av}{100}*\frac{com\_adm+dob}{100}-\left(1-\frac{proc\_av}{100}\right)*\frac{com\_aranj}{100}\right)-cost-cost\_stoc \end{cases}$$

$$\Rightarrow P(n)=\frac{P(n-1)-Cost}{\frac{proc\_av}{100}*\frac{100-com\_aranj}{100}} \quad \text{(We know P(n-1))}$$

In order to learn how much money we need to enter the "game" to gain zero profit, we replace P(n) in the second equation and denote by:

$$A=1-\frac{proc\_av}{100}-\frac{proc\_av}{100}*\frac{com\_adm+dob}{100}*\frac{zile\_contract}{360}-\left(1-\frac{proc\_av}{100}\right)*\frac{com\_aranj}{100}$$

$$\Rightarrow 0=\frac{P(n-1)-Cost}{\frac{proc\_av}{100}*\frac{100-com\_aranj}{100}}*A-cost-cost\_stoc$$

$$\Rightarrow cost+cost\_stoc=\frac{P(n-1)-Cost}{\frac{proc\_av}{100}*\frac{100-com\_aranj}{100}}*A$$

$$\text{We denote by: } B=\frac{proc\_av}{100}*\frac{100-com\_aranj}{100}$$

$$\Rightarrow cost+cost\_stoc=(P(n-1)-Cost)*\frac{A}{B}$$

$$\Rightarrow Cost+cost\_stoc=P(n-1)*\frac{A}{B}-Cost*\frac{A}{B}$$

$$\Rightarrow Cost\left(1+\frac{A}{B}\right)=P(n-1)*\frac{A}{B}-cost\_stoc$$

$$\Rightarrow Cost=\frac{P(n-1)*\frac{A}{B}-cost\_stoc}{1+\frac{A}{B}}$$

Cost = money amount, with which, if "player" n would enter the game, he would gain $\prod(n)=0$.

If the money amount that he enters the game would be higher than this Cost, the player begins to lose.

The system of simulation models was programmed in Java and designed under the form of a decision-assisted system for the economic agents interested in international transactions.

NOTIFICATION

We denoted by:
proc = percentage
av = advance
com = commission
aranj = arrangement
cost = cost
dob = interest
zile = days
contract= contract
cost = cost
stoc = stock

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