A MATHEMATICAL MODEL FOR ASSESSING THE FACTORING ACTIVITY

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Abstract

Originally – being over 4,000 years old – factoring was first used in the fertile territory of old Mesopotamia at a time when the famous Code of Hammurabi was drawn up. However, many years passed until the British colonists started to use it on a large scale at a time when the metropolis would pay them sums of money for the merchandise that colonists sent to the old continent until they collected the invoices.

In Romania factoring started to play a major role in financial operations for it led to the increase of liquidities on the market.

According to the Romanian legislation, factoring is a contract concluded between a party known as "the client", which supplies merchandise or provides services, and a banking institution or specialized financial institution known as "the factor", whereby the latter ensures the financing source, collects the receivables and protects credit risks, while the client assigns to the factor the receivables resulting from the sale of goods or the provision of services to third parties.

Keywords: factoring, non-recourse factor, accounts receivable, conventional subrogation of accounts receivable, assignment of accounts receivable, right of recourse, factoring commission, financing commission, irrevocable letter of credit, letter of bank guarantee.

Introduction

In international practice (according to[1] The Convention of Ottawa / May 1988 – The International Institute for Unification of Private Law in Rome) factoring is defined as a contract relationship between a seller and a factor, whereby:

a) The seller assigns to the factor all accounts receivable resulting from the sales contracts – provision of services by the former to different partners – (these receivables are different from the ones for personal consumption) and notifies debtors as to this assignment;

b) The factor is going to provide at least two of the following services:

- financing on the basis of invoices (in general 80% of the value);
- administering accounts receivable;
- collecting accounts receivable when they fall due;
- protecting against risk of non-payment.

The financing service ensures immediate financing to a proportion of maximum 80% of the counter value of each invoice for merchandise delivery / provided services, of which the factor's commissions are deduced and the rest (20%) is paid when collected.

The administration service for accounts receivable deals with: identification and management of accounts receivable resulted from a factoring contract through accounting; separate

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identification of financed invoices and invoices that surpass the non-payment risk-covering level; reporting invoices that have to be paid at the end of every month.

In its turn, the collecting service attempts to collect invoices when they fall due and to warn debtors who do not observe deadlines.

Finally, the non-payment risk coverage service against debtors is meant – in case of risk – to ensure that the factor generally covers the counter value of non-received accounts (20%) within 120 days after the accounts receivable fall due.

One has to remember that factoring is mainly created for companies which are interested in immediately obtaining liquidities for the increase of production and turnover and which use factoring for collecting accounts receivable, and protecting themselves against non-payment risk at specialized institutions (the factor). Consequently, while the credit may only grant financing, factoring offers a set of services: financing, surveillance, collecting, and protection against risk [4].

As regards credits, the analysis focuses on the creditworthiness of the borrower, while factoring mainly implies the analysis of the client's partners' creditworthiness. At the suggestion of its clients, the bank may pursue, as a factor, factoring operations for internal and external accounts receivable which are materialized in invoices that must be paid in RON and currency.

The selection of clients requires the analysis of the entire business and the deep understanding of all aspects involved by the business so that the factor might decide whether it is possible or not to pursue factoring operations.

The parties' obligations deriving from factoring operations are mentioned in the factoring agreement whereby the client assigns the accounts receivable to the factor who obliges himself to take over the activity of surveillance, collection, financing and protection against non-payment risk in exchange of a tax [2] (AGIO).

The assignment of accounts receivable is achieved through a conventional subrogation, through the simple sending of invoices, without any other formality, so that the factor becomes the owner of the accounts receivable.

As the owner of accounts receivable, the factor does not normally have the right of recourse against the client. The possibility to give up the right of recourse depends on: the indubitable existence of commercial receivables; the materialization of accounts receivable in effective provision of works and services or in certain sales of merchandise of the law of the negotiable instrument [1]; the lack of any financial links between debtors and the client; the lack of litigations, disputes between the two parties; the provision by the client of any information on the aspects that might affect the good pursuance of factoring operations once the client has received such information.

One should mention that the factor reserves the possibility – by a written notification – to withdraw the agreement or to modify the stipulated conditions for certain debtors that are specifically identified so that these decisions would not affect the already accepted receivables. In motivated situations the factor can refuse to agree with an accepted debtor's accounts receivable.

The factor does not guarantee the good pursuance of the economic agreement which lies with the client entirely.

As a condition prior to the pursuance of factoring operations, credit officers are obliged to check whether products were manufactured and delivered effectively.

Factoring operations can be pursued only if invoices have not been assigned with a view to reimbursing other debts and if these debts do not fall due within 180 days since they were issued. If invoices were credited from another source, financing through factoring can be granted only if the granted credit can be reimbursed with those sums.

The client is obliged to provide the factor all information that is relevant for him and for the good pursuance of the business, the invoicing procedures and the accounting evidence up to the complete liquidation of operations resulting from the factoring agreement.

The payment of accounts receivable is regularly made by the bank-factor in the currency stipulated in the economic agreement. If the client asks for the payment to be made in a currency which is different from the one provided in the economic agreement, he assumes the risks and costs incurred by the exchange rate.

As to AGIO operations, they include the factoring commission, the financing banking commission, as well as other commissions and charges as required by banks / international factoring societies. The financing commission is regulated when accounts receivable are collected depending on the financed sums and the effective number of days of financing.

If a debtor refuses to pay, the factor will inform the client while motivating the non-conformity of the sold product or the provided service, as regards the clauses of the commercial agreement, except for the situations in which the refusal to pay is motivated by a solvability problem.

If the litigation is not settled by the client within 30 days from the date he was informed about it, the factor will ask the latter to make a payment that represents the counter value of the contested accounts receivable; taxes which have already been charged are not included. If the client cannot make the payment, the value of the accounts receivable will be recorded as "past due accounts receivable" and it will probably be recovered through forced execution if necessary.

If certain invoices, whose ownership was previously transferred to the factor, prove to be litigious because of reasons that are different from the debtor's insolvability, the factor may withdraw – after 30 days since the litigation was notified – out of the subsequent invoices or the client's account a sum of money that is equal with the sum incurred by the litigious invoices.

Factoring operations are guaranteed with accounts receivable (the invoices), which through the factoring operation are transferred in the property of the bank or of the financial society that took them over.

All the obligations of the factor and his/her client are provided in the general conditions – annexed to the factoring agreement – and are completed with particular conditions stipulated by each party.

Clauses adopted for factoring operations (in RON, respectively in currency) will be specifically provided in factoring agreements concluded by banks and those who benefit from such operations, separately for RON and currency.

Literature review

1. Analysis of internal factoring in RON

The promotion by a bank or financial institution of factoring services in RON is generally accomplished as non-recourse factoring, but, however, if deemed necessary, it can be accomplished as recourse factoring, i.e. the factor provides only financial and administrative services for accounts receivable. Thus, the bank will have two reimbursement sources for the granted financing, that is from the debtor and, if the latter does not pay, from the client.

Each application for financing will imply two aspects:

- analyzing the credit risk;
- analyzing the "business factorability".

Since – no matter what type of operation is pursued: recourse or non-recourse factoring – the payment of the accounts receivable that the bank bought is made by debtors, it results that the credit risk assumed by the banks is directly linked to debtors. Thus, the bank will face credit risk in its relation to debtors within the factoring **coverage limit** upon which it agreed and within the risk limits it established. Credit risk would be double for the bank and it would artificially increase the bank credit portfolio if the applicant also faced credit risk. That is why the applicant's creditworthiness will be analyzed without increasing credit risk for him.

In order to benefit from factoring services, clients must produce and trade goods and services which pose the least possibility of any litigation to occur. Thus, the goods that require a high degree of finishing (complex machinery), accuracy in execution (high fidelity devices and products) or an exclusivist outlet (for unique products) are not fit for factoring services.

On the basis of the application for factoring and subsequent to the analysis of the information presented by the client, as well as on the basis of the client's history or relationship with partners, the number of past litigations in which he might have been involved, his capacity to ensure quality products and services, as well as the required quantity of products and services, credit officers from banks will select clients that intend to benefit from factoring services by submitting the factoring form filled in by the client to the Factoring Department within the Bank Central, accompanied by an analysis of the applicant's creditworthiness.

On the basis of the factoring form and accompanying documents, the Factoring Service is going to analyze the "business factorability".

If the business run by the client meets the factoring requirements, the specialty service is going to require bank units to analyze the debtors' creditworthiness and to assent coverage limit availability for each debtor separately.

If the Factoring Service considers that the business is not fit for factoring, the application is rejected and the client is informed about this.

Bank units will identify which debtors are the clients of the banks and which are not, will analyze in reports the creditworthiness and credit risk for each debtor on condition that debtors meet the following criteria: high financial standing, good duty service, payment capacity before due terms, and a credit rating of maximum 3 etc.

For debtors who are not clients of the factor bank, the analysis of creditworthiness and credit risk will be made on the basis of financial situations which they are required to present.

If required information and situations are not presented, accounts receivable will not be collected through factoring operations.

Once the debtors' creditworthiness is analyzed and approved by the management committees of the bank units, the Client Analysis Directorate together with the Factoring Service within the Bank Central will subject the whole transaction to approval by competent bodies within the Bank Central.

Every semester factoring exposure limits established for each debtor are going to be revised any time proposals are made for maintaining / modifying total exposure limit for the debtor.

These factoring limits are included in the exposure limit and (where the case may be) in the risk limit for the debtors.

Subsequent to the approval of the transaction, the bank is going to conclude a factoring agreement in RON with the client. Once the factoring agreement is signed, the client is bound to notify the debtors as to the existence of the contract and as to the fact that all payments are going to be made in the account of and in favor of the factor. Notification letters are written for each debtor separately. Debtors will have to sign the agreement statement which is adapted to the factoring operation (instead of credit contract, a factoring agreement will be mentioned and terms communicated by the bank will replace contractual terms) and send the original document to the client in order to have it delivered to the factor.

Once the debtor is notified, it is mandatory for all original invoices, including their copies, to include the following information:

"The present invoice is assigned in favor of the Commercial Bank …………. which is entitled to receive its counter value. The payment of the invoice shall be made by and in favor of the Commercial Bank …………(Central / Branch / Subsidiary) ……………… with premises in (address)…………telex, fax……………in the account……………opened at ……………, mentioning the number of the invoice and its issuer.

Any complaint or litigation related to this invoice shall be immediately communicated to the Commercial Bank ………, fax……….".

Invoices accompanied by supporting documents (such as: delivery note, consignment waybill etc.) and the subrogation receipt will be offered to the factor. The latter will accept or refuse – within the limit of the approved limits – the payment of the invoices.

If necessary, the factor will make use of the right of recourse against the client, and the exercise of this right is possible after 30 days passed since the accounts receivable fell due. The right of recourse will be mentioned in the factoring agreement.

Accepted invoices will be immediately financed in proportion of maximum 80% of their counter value, in accordance with the limits agreed upon for the debtor(s) and in conformity with the conditions stipulated in the annex to the factoring agreement; commissions to the bank will be deduced from this percentage. When collecting the accounts receivable, the economic agent will be offered the rest of 20% of the value of the accepted invoices.

A special IT program will be used for recording all invoices per debtors, due terms, history, including invoices which were accepted and unaccepted for payment and which were taken over when collection is made, as well as invoices that have to be paid and the paid invoices etc. At the end of every month, the factor is going to offer economic agents centralized reports regarding administered invoices.

For an enhanced protection of the bank against the risk incurred by factoring operations, the bank will require, if necessary, further security, such as: assignment of accounts receivable from other contracts, margin deposits created from retaining parts of the sums that are used in the factoring agreement and the issuance of blank promissory notes by the client in favor of the factor; the bank may also ensure itself against financial risk of non-payment with insurance and reinsurance companies.

If, when the term falls due, the factor does not entirely/partially collect one or more invoices that are part of the factoring operation, he/she will act as follows: a) in case of non-recourse factoring, the bank will pay the client the difference of 20% of the agreed counter value of the invoice within 120 days since the invoice fell due; in the meantime the bank will exercise due diligence for recovering the sums that were not paid by the debtor or by the insurance-reinsurance company with which the bank ensured the risk of non-payment for the invoices; b) in case of recourse factoring, after 30 days pass once the due term is over, the bank will recover from the client sums which were not collected through the exercise of the right of recourse or by leveraging security.

2. Analyzing export factoring in currency

Besides the provisions related to factoring in RON and currency, other regulations are applied for external factoring. Thus, in order to be accepted, external invoices must meet one of the following conditions: the commercial export contract or any other similar legal document must provide an insurance payment (letter of credit or bank letter of guarantee); the risk of non-payment incurred by external debtors must be covered by an international factoring company approved by the Bank Central; an Eximbank insurance must be concluded against the country risk (except for Countries falling within the A category as indicated by

Bank Central); it is also necessary for an insurance to be concluded against non-payment risk posed by external debtors with any other insurance-reinsurance company that the bank agrees.

External (invoices) accounts receivable required by the client from the factor will be accepted and paid by the latter only within the limits imposed for each debtor and within the exposure risk limits established for external banks and factoring societies.

On the basis of the data presented by the client, the bank will contact banks and partner factoring societies that will analyze the external debtors' payment capacity. Banks and partner factoring societies will communicate to the bank their agreement / disagreement to take over the debtors' risk, as well as the coverage limit established for non-payment risk established for each debtor. The bank will communicated the client the list of accepted debtors and any modification to the coverage limit made during the pursuance of the factoring operations.

The factor's client must inform his customers as to the factoring agreement concluded with the bank in currency through a "letter of notification" drawn up in accordance with the template imposed by the international factoring company / external bank or, as the case may be, by the bank; this letter will be accompanied by the subrogation receipt of his rights in favor of the factor. The factor may require the client any other document that would confirm or validate – in accordance with the law in force – the transfer of the accounts receivable through the factoring transaction, including the transfer of the accounts receivable to the international factoring company / the external bank.

As regards the irrevocable letters of credit and invoices [3] whose payment is guaranteed through a bank letter of guarantee, the financing will be made by the bank's client application, the subrogation receipt and the sales contract for accounts receivable in accordance with the exposure limits established by the General Directorate for Methodology and Risk Management.

Exceptionally, if the irrevocable letter of credit – accompanied by the documents required for payment by the external bank or accompanied by the delivered documents as provided for the letter of credit conditions and terms – is used as a the payment instrument, and, similarly, if payment is guaranteed through a bank letter of guarantee, the bank will be able to immediately pay all the accounts receivable (100%).

The factoring service monthly reports to the General Directorate for Methodology and Risk Management the situation regarding commitments for managing exposure limits approved for banks and factoring companies in relation to which the banks assumes a credit risk.

If, when the term falls due, the factor does not entirely / partially collect one or more invoices, which were the object of a factoring operation in currency, the factor will act as follows: a) the bank will pay the client the difference of 20% of the counter value of the accepted invoice within a period of 120 days that passed after the invoice(s) fell due; in the meantime, the bank will cash in the sum of money from the international factoring company; b) if the client concluded an insurance with Eximbank in order to be protected against the risk of non-payment due to external debtors and if the insurance policy was surrendered to the factor, the bank will pay the client the difference of 20% of the accepted counter value of the invoice after collecting damages from the insurer.

3. Proposal for a mathematical model applicable to the factoring activity

Trying to create a mathematical model applicable to the factoring activity is quite a difficult attempt. First of all, factoring implies operations of arbitrage which are meant to create liquidities. One can speak of a direct link between lack of liquidity and the necessity to resort to factoring. Thus, the total commission paid by the economic agent who benefits from the factoring operation is recorded as a cost incurred for obtaining immediate liquidities.

In consequence:

The total value of invoices = commission + liquidity
(1)

The factoring operation cannot be, however, motivated only as a company's attempt to create liquidities, but also as an attempt to reduce the risk of non-collection or delayed collection of invoices on a long term.

One must not ignore the fact that an acute lack of liquidities will make the economic agent accept a higher commission for the factoring operation or the fact that this lack will make the economic agent resort to factoring. The graphical representation of this phenomenon may be seen below (figure 1):

a) The ideal case

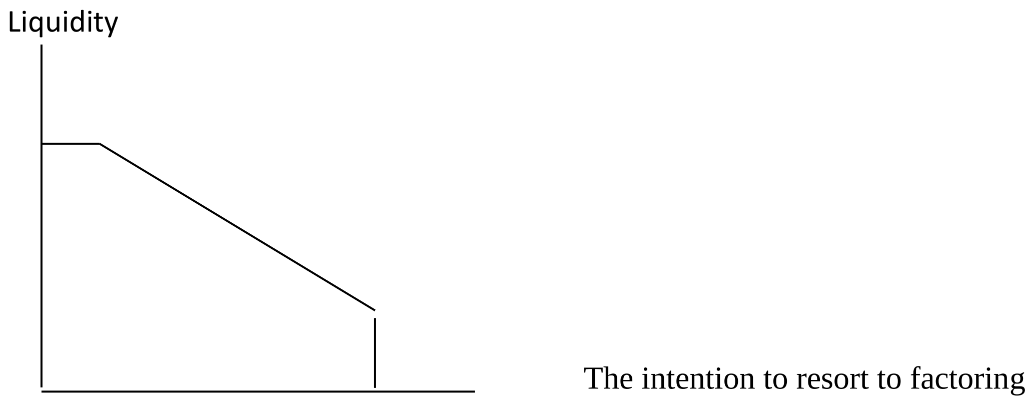

Fig. 1 The ideal case

However, there are other factors which can disturb the line, as one can see below:

b) The disturbed case

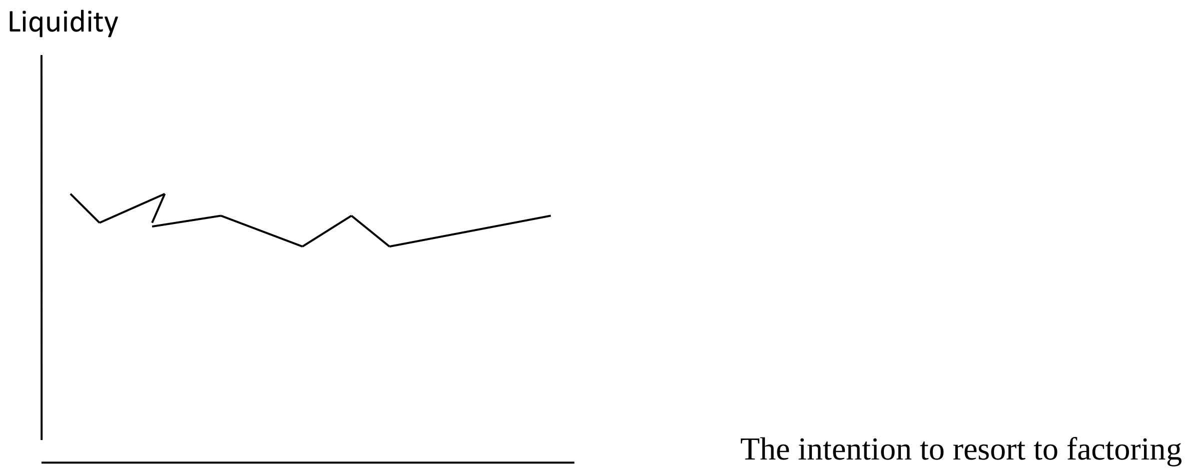

Fig. 2 The disturbed case

The factoring operation cannot be accomplished unless certain economic and social conditions are met.

In an instable economy regulated by an ever changing legislation, factoring cannot be accomplished in a proper way because the risk assumed by the factor would be too high.

On the other hand, the factoring operation would be ideal for firms lacking liquidities because they would pay the commission in order to immediately benefit from resources and transfer the risk of insolvency.

In a rational way, the economic agent will have to choose between liquidity and the cost of the factoring operation. This choice can be expressed as follows:

- Liquidity = F (1)
- Cost = F (c)
- F (1) ↓ = F (c) ↑   risk is diminished

If we consider that the relation is linear, it will be expressed as follows:

$$\left.\begin{array}{l} F\,(1) = + ax + b \\ F\,(c) = - ax + b \end{array}\right\} \quad \text{where “a” is the liquidity coefficient}$$

If

a < 0

F (1) ↓

F (c) ↑

the graphical representation will be as follows:

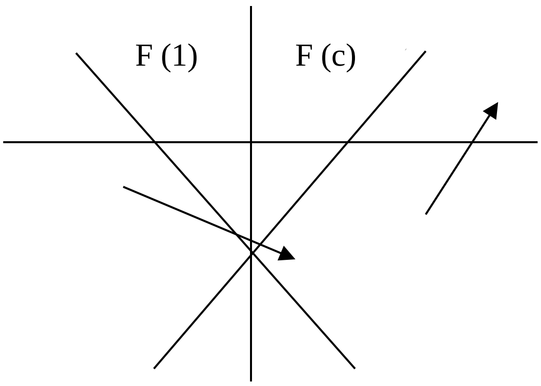

Fig. 3 The increase of cost and decrease of liquidity when liquidity coefficient is 0

If:

a<0

F (1) ↑

F (c) ↓

the graphical representation will be as follows:

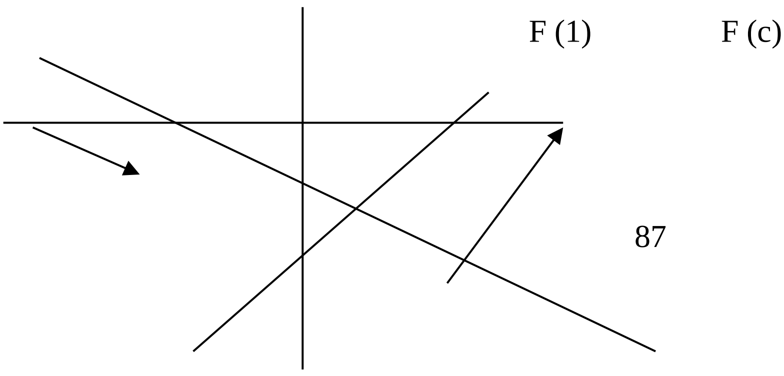

Fig.4. The increase of liquidity and decrease of cost in case the liquidity coefficient is higher than 0

In consequence, a positive liquidity coefficient indicates a proper level of liquidity, whereas the negative liquidity coefficient indicates a low level of liquidity if:

$$a = \frac{\text{liquid assets} - \text{current liabilities}}{\text{total assets}}$$

This relationship must be interpreted in relation to the premises we initially assumed. Thus, we have a linear function of liquidity and a linear function of cost. Lack of liquidity will determine the agent who must pay the invoices to accept a higher cost.

Considering the way functions were defined, one can notice that they are in inverse proportion.

The model presented above is an attempt to quantify the nature and intensity of the link between the two linear functions and to allow for a proper decision to be made to the interest of the economic agent who seeks to immediately obtain liquidities.

The following activities are not fit for factoring:

- building;
- ship repairing;
- manufacturing of fishing accessories;
- manufacturing of jewelry, fur coats and other luxury objects;
- manufacturing of cosmetics;
- services (except for international transport shipping services and services that allow the written confirmation of the beneficiary that the service was provided satisfactorily or that it will be provided entirely and in due time). One should also exclude from factoring those activities which imply:
- dependence on one debtor or on few debtors (maximum 30% of the turnover, except for sales in lohn); from one case to another, invoices presented by clients that depend on few debtors – depending on the existing security, quality certificates etc. – can also be accepted for financing;
- issuance of invoices before merchandise is delivered or before the service is provided;
- issuance of invoices which cover partially delivered merchandise and merchandise that is to be delivered;
- issuance of invoices that cover stages of execution within a project whose cancellation leads to the nullity of all previously issued invoices;
- issuance of invoices on the basis of contracts that forbid transfer / cession / subrogation thereof;
- issuance of invoices that compensate imported merchandise;
- issuance of invoices whose payment is made only if the merchandise is sold by an importer (payment that depends on selling);
- return of unsold merchandise;
- discounts that were not provided in contracts or that were provided with a higher value;
- issuance of post-dated invoices (which allow the issuance of invoices on a previous date and extend the debtor's credit term without requiring the modification of the contract);
- discounts of the counter value of the invoice as guarantee for good execution (especially in building), which will be returned when the warranty period expires;
- long term warranty for products (2-5 years);

- issuance of invoices for samples, which risk not to be paid if the partner does not order the merchandise;
- payments in advance or on delivery;
- overdue invoices or invoices whose payment has not been made for more than 180 days;
- selling through intermediaries, if the owner of the merchandise / the provider of the service cannot be identified and there are no close relations between the producer and the intermediary;
- shareholder relationship between the producer and the beneficiary.

Conclusion

The factoring system has proved to be a facile instrument which ensures immediate liquidity for companies, as well as the running of the economic cycle by avoiding the risk of not collecting receivables from debtors. This financing system is much simpler in comparison with the system of credits and it ensures immediate financial sources for firms.

The application of the mathematical model to calculate the liquidity and cost of the factoring operation determines firms to choose factoring because it optimizes the efficient use of this financing system through a relation of proportionality between the linear function of liquidity and the linear function of cost.

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