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ABSTRACT

In this paper, we shall expose the risks inherent to leasing operations, undertaken by the lessor, and their influence on establishing the debtor installment afferent to these operations. Within the theoretical works regarding the establishing of periodic rental payments, two types of risks were identified: the credit risk and the residual value risk. The influence of risks inherent to leasing operations, for the lessor, will be analyzed by means of two models: Miller and Upton's model and Grenadier's model. This analysis will allow us to notice the heterogeneity of lessors' offers, which justify, on the one hand, through the different profile of the lessee enterprises, and, on the other hand, through the nature of the asset financed.

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1. Introduction

Unlike the classical crediting operation, the lessor (in its position of financer) remains the owner of the asset throughout the entire duration of the leasing operation. This security determined by the ownership over the asset allows the lessor that, in case of non-payment of the rental payments by the lessee, to take over the leased asset, for the purpose of selling or re-renting it. Therefore, this allows it to fully or partially recover its liability. Still, in order to conclude a leasing contract, the lessor must determine and ensure the lessee's solvency, even if the asset has sufficient market value, which would allow the recovery of its liability at any time. The asset quality is, hence, an important determinant of the decision to offer financing and it may counterbalance, in certain cases, the lessee's weaker financial solvency. The quality of the asset, as defined by the lessor, is a complex notion whose appreciation is indissolubly connected to the brand of the asset, the supplier's reputation, the degree of obsolescence, and the more or less specific character of the asset.

Within the theoretical works regarding the establishing of periodic rental payments, two types of risks were identified: the credit risk and the residual value risk. As indicated Capiez [2], the residual value risk is considered as being given by the fluctuations of the asset's residual value, determined by the depreciation or by an unforeseen obsolescence, or by the unforeseen variations of the interest rate and of the general level of prices, which make the asset's exploitation flow stochastic.

The influence of risks inherent to leasing operations, for the lessor, will be analyzed by means of two models: Miller and Upton's model, in which the only risk considered by the lessor id the residual value risk, and Grenadier's model, in which, in addition to the first risk source, the credit risk exhibited by the lessee is also integrated.

In this paper, we shall successively present the two analysis models for establishing the debtor installment afferent to leasing operations.


The explanatory valence of the Miller and Upton's model pertains, on the one hand, to understanding the elements that influence the debtor installment requested by the lessor and, on the other hand, to the justification of the equivalence between leasing and borrowing, within a perfect capital market*. They base their theories on the following hypotheses: absence of trading costs and of the tax on profits, perfect information, homogenous forecasts of investors and efficiency of the financial market. Their model directly derives from the existence of the residual value risk, which is incurred by the lessor in case of leasing operations, due to the irrevocable nature of the contract throughout the leasing duration.

For a single-period leasing (leasing run for a single period - for instance, minimum one year), the expected yield on the lease can be expressed as follows:

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where: $L_n$ represents the rental payment; 
$V_{it}$ is the value of asset; 
$Am$ is the asset's rate of economic depreciation. This is considered as being, in fact, the expected rate of economic depreciation of asset $E(Am)$, corrected with an abnormal depreciation, which affects the flows generated by the economic activity.

Using the Capital Assets Pricing Model (CAPM), the evaluation of the expected yield on the lease is given by the following relation:

$$E(R_{it}) = R_f - \beta_{it} \left[ E(R_m) - R_f \right]$$

(2)

where:
$\beta_{it}$ represents, in fact, the non-diversifiable risk of the asset that makes the object of the leasing operation, and it is analyzed, hence, as the loss of value of the asset on the market, due to unforeseen depreciation or obsolescence. It is kept with the sign minus in equation (2) because it expresses the depreciation of the venal value of the asset.

Volatility coefficient $\beta_{it}$, as determination manner, is computed on the basis of the ratio between, on the one hand, the covariance between market profitability and the asset’s depreciation rate and, on the other hand, the dispersion of market profitability, as follows:

$$\beta_{it} = \frac{\text{cov}[E(Am), E(R)]}{\sigma^2(E(R))}$$

(5)

It is negative, considering the inversely proportional evolution between the asset’s market value and market profitability

In a leasing operation, the only risk incurred by the lessor is the one related to the uncertainty over the residual value of the asset at the end of the contract. Therefore, this factor is taken into account in determining the yield on the lease. Using relations (1) and (2), the equilibrium rental payment (also called the normal rental payment) on a single-period financial lease can be determined, depending on the risk-free rate of interest, on the normal rate of depreciation of the asset and on a risk premium corresponding to the non-diversifiable risk of the asset:

$$L_n = \left[ E(R_{it}) + E(Am) \right] V_{it} = \left[ R_f - \beta_{it} \left[ E(R_m) - R_f \right] + E(Am) \right] V_{it}$$

(3)

Under these conditions, the equivalence between leasing and borrowing is clear: by purchasing the asset, the lessee saves the rental payment ($L_n$), but incurs the opportunity cost of the capitals invested ($R_f$) and the asset depreciation (both the anticipated and the unforeseen depreciation, which determines the variation of cash-flows generated by the economic activity), which actually corresponds, to the equilibrium (normal) rental payment within the model. The residual value risk affects the lessor, but only at the end of the leasing contract and only if the venal value of the asset is very low. Throughout the contract term, the person exposed to this risk is the lessee, because the loss of the asset’s productive capacity will affect the exploitation cash-flows, exactly as if he were the asset owner.

McConnell and Schallheim [5], resorting to the technique for valuing risky cash flow, expanded the model proposed by Miller and Upton [6] and developed a multi-period framework.

In their analysis also, the equilibrium (normal) yield is a function of the multi-period risk-free rate of interest and the non-diversifiable end-of-lease risk associated with the residual value of the asset.

The equilibrium condition for a multi-period non-cancellable financial lease can be written as:

$$V_{it0} = \sum_{i=0}^{n-1} \frac{L_{it}}{(1 + R_f)^i} + VR_{t0}^{n}$$

(4)

where: $VR_{t0}^{n}$ is the current market value of the residual value of the leased asset at the maturity date of the lease (i.e., at time n).

McConnell and Schallheim [5] expressed residual-value as follows:

$$VR_{t0}^{n} = \frac{\chi_i V_{t0}}{(1 + R_f)^n}$$

(5)

where: $\chi_i = \left[ 1 - E(Am) \right] e^{\text{cov}(l,y)}$

in which: $E(\text{Am})$ is the expected rate of economic depreciation of leased asset and $\text{cov}(l,y)$ is the covariance between the log of one minus the random rate of economic depreciation of the asset $(l)$ and a random „market factor” $(y)$. This term can be interpreted as approximately equal to the traditional measure of an asset’s systematic risk, but withheld with the sign minus.

In this analysis, the risk-free rate, the expected rate of economic depreciation, and the covariance term are assumed to be constant over time, so the time subscript $(t)$ can be omitted.
Thus, as in the single-period case, risk enters into determination of the equilibrium rental rate of a financial lease only because the end-of-lease residual value of the asset is uncertain. Furthermore, only the non-diversifiable risk associated with the asset’s residual value is relevant to the determination of the rental payments on the lease. However, because the lessor bears the residual-value risk only at the termination of the lease, only the discounted value of residual-value risk is relevant to the determination of the rental payment ($L_i$).

To calculate the yield of a multi-period lease, equation (4) can be written as:

$$V_{i0} = \sum_{t=0}^{n-1} \frac{L_i}{(1+y)^t} + \frac{E(VR^0)}{(1+y)^n}$$

where: $E(VR^0)$ is the expected residual value of the leased asset at time $n$, and the lease payment $L_i$ is constant across time.

Equation (6) is solved iteratively for $y$.

Because $L_i$ is a positive function of $R_b$, the yield on the lease is also a positive function of $R_b$. Furthermore, because $L_i$ is a negative function of covariance risk, $y$ is also a negative function of covariance risk.

In case of the operating lease, which can be terminated at any time, Miller and Upton [6] showed that the lessor, to the extent to which the lessee has the capacity to terminate the contract when noticeable unforeseen depreciation or obsolescence of the asset occurs, exclusively incurs the residual value risk.

The model proposed by Miller and Upton [6] does not integrate the purchasing option mechanism. McConnell and Schallheim [5] indicates that the net advantage of leasing compared to borrowing could reside in the presence of the option to purchase at the end of the contract. This determines the asset’s purchase by the lessee when, due to lower depreciation than expected, the asset’s residual value at the end of the contract is superior to the anticipated residual value.

Even if the yield requested by the lessor incorporates the residual value risk considered as uncertainty over the asset’s market value at the end of the contract, due to abnormal depreciation, both Miller and Upton [6], and McConnell and Schallheim [5] do not integrate the lessor’s exposure to the leasing applicant’s credit risk. This implied the fact that, for a certain type of asset, the equilibrium (normal) rental payment is identical, whatever the credit risk exhibited by the debtor.

Or, as underlined by Capiez [2], although the lessors are better protected than the other chirographer creditors, the asset recovery in case of lessee’s bankruptcy is not always immediate, fact which brings about opportunity costs for the lessor. Also, the recovery of the outstanding rental payments is problematic. Therefore, the credit risk is not null and justifies, in fact, the integration of an additional risk premium. Grenadier [3] proposed a model that integrates the two risk sources of the leasing operation, for the lessor: credit risk and residual value risk.

### 3. Grenadier’s model

Grenadier [3] supplied an evaluation of the equilibrium (normal) rental payment that integrates, apart from the residual value risk, the lessee’s credit risk. The model developed by the author is based on different hypothesis.

A first hypothesis is that both the causes and the consequences of the lessee’s bankruptcy are stochastic. The non-payment of obligations (in our paper, we use the concept of non-payment of the obligations to designate the situation of financial difficulty of the enterprise, being aware of the fact that it can take different shapes. Financial difficulties, non-payment of obligations, insolvency, bankruptcy, are distinct situations, if we consider the consequences they bring for the enterprise and its creditors.) by the enterprise occurs when the level of cash flow from exploitation falls below a $K$ threshold.

The second hypothesis is that, in case of non-payment, the lessor can take over the asset, request the payment of the outstanding rental payments, and renew the leasing contract with other lessees. To the extent to which the lessee’s bankruptcy will determine damages for the lessor, the bankruptcy costs are reflected by the partial recovery of its liability, in a proportion equal to $(1-\omega)$, $\omega$ representing the loss anticipated by the lessor in case of lessee’s bankruptcy.

Grenadier [3] evaluates the risk premium afferent to the credit risk through the difference between the rental payment asked for a risky lessee and the rental payment asked in case the lessee is risk-free. Its magnitude depends on several factors: contract term, loss anticipated by the lessor in case of lessee’s bankruptcy, the lessee’s insolvency risk, the bankruptcy probability for the lessee enterprise and the residual value risk.

The estimation of the risk premium asked by the lessors has lead to the highlighting of different relations. It seems that the risk premium is positively connected to the contracts maturity, increasing as the lessor’s exposure to the lessee’s bankruptcy risk is for a longer period. Also, the higher the loss anticipated by the lessor in case of lessee’s bankruptcy, the higher the risk premium afferent to the credit risk.

According to Grenadier [3], the consequences of lessee’s bankruptcy on the lessor are variable, depending on the lessor’s size and on the number of other lenders of the enterprise. In fact, the higher the number of the
The lessor’s customers, the easies it will be for it to incur the loss brought about by the bankruptcy of one lessee, carrying this loss forward, in fact, unto its other customers. Also, when the number of enterprise creditors is large, the lessor will have to agree with the creditors whose priority in recovering the liabilities could case it damages. It is especially the case of creditors guaranteed with real guarantees, which entitle them to satisfy their liability with the asset set aside for the guarantee, prior to any non-guaranteed creditor and prior to other creditors whose real guarantees have an inferior priority right. Thus, if the number of creditors involved is directly proportional to the indebting degree, a positive relation could be seen between the lever of indebting and the risk premium afferent to the credit risk.

The risk premium afferent to the credit risk is, at the same time, inversely connected to the value of the ratio \( X/K \), factor which allows the appraisal of the enterprise’s bankruptcy risk and which expressed the minimum cash flows the enterprise must perform in order to be able to cope with all contractual payments.

Finally, the risk premium depends on the interaction existing between the economic flow generated by the leased asset and the level of flows of the enterprise. The author considers that the economic flow generated by the leased asset may influence the enterprise’s final results. Also, enterprise bankruptcy could be caused by the reduction of flows generated by the leased asset or, on the contrary, could be explained by the influence of exogenous factors (indebting excess, bankruptcy of a customer etc.).

The asset quality simultaneously influences its productive capacity and its market value, throughout the leasing contract. A low quality asset could not be resold on the secondary market in case of lessee’s bankruptcy, under favourable conditions, and, therefore, does not constitute efficient guarantee for the lessor, due to its low venal value. The analysis performed by Grenadier [3] allowed, as a consequence, a better understanding of the leasing offer. The setting of the debtor payment afferent to the leasing operations is determined by two non-dissociable factors: debtor quality and asset quality.

In this case, the implications are several. According to Grenadier [3], the risk premium asked, for instance, for airline companies when the object of the leasing contract is represented by planes should be higher than the one asked for an enterprise that presents the same exploitation risk, but which performs its activity in a different sector. Therefore, financial solvency of an enterprise is not taken into account singularly when granting a leasing financing, because the asset quality will also condition the level of cash flows of the enterprise and will influence, favourably or not, the conclusion of the contract. Finally, the author shows that the risk of the lessor’s activity is reduced if it diversifies its offer, both in the nature of the assets financed, and in the activity sectors of the lessee enterprises. If the lessor is not a specialized leasing company, then it can transfer the consequences of the bankruptcy of one lessee on the other lessees. Operating in other sectors of activity, and whose level of activity may favour a leasing supra-taxation.

4. Conclusions
The analysis of the leasing operations’ risk and the lessor’s ability to be able to perform them without the need for additional guarantees [in case financing is limited to good quality assets] indicate that the leasing operations differ fundamentally from a classical credit operation. The lessor must, indeed, master the credit risk and the residual value risk, but, as indicated by Capiez [2], “the lessor is a creditor who anticipated all possible changes that could affect its incomes and who protected itself in advance through the very form of the leasing contract, which leaves it with ownership over the asset”.

References