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PROTECTED COLLATERAL VALUE: AN APPROACH TO VALUATION OF COMMERCIAL PROPERTIES FOR LOAN GUARANTEES

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Abstract

The valuation of commercial properties for the guarantee of loans is extremely relevant for financial institutions, since it directly impacts the calculation of the loan to value ratio (LTV). However, despite the vast literature on the subject, the choice of methodological basis and the definition of the type of value to be employed are not pacified issues among researchers and practitioners. In this sense, the main objective of this paper is to present a methodological approach, as well as a suggestion of the type of value for the valuation of commercial properties bound collateral.

The main methods and types of values related to the valuation of bound collateral commercial properties are presented below. Next, we propose a refinement of the income method, based on the concept of the value of the investment opportunity and under the principle of value at risk. Finally, we promote a case study with data from the Brazilian market to illustrate the application of the proposed approach.

Based on the case study, it was evidenced that the valuation approach proposed in this paper, anchored in the potential of the income generation of the property, reduces the risk of exposure to banks' credit.

Key words: *Valuation, Commercial property, Loan guarantee, Loan to value, Income approach, Value at risk.*

JEL Classification: *C15, C51, D46, D81, O22.*

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1. Introduction

Commercial property (also called commercial real estate, investment or income property) refers to buildings intended for trade or service use, with the purpose of generating income. Commercial property includes office buildings, medical centers, hotels, malls, warehouses etc.

It appears that the analysis of credit operations whose loan guarantee is a commercial property by financial institutions has become increasingly common. For this reason, the valuation of the property becomes extremely relevant, since it directly impacts the calculation of the loan to value ratio (LTV).

Although the LTV ratio is usually associated with housing credit, which relates the value of the loan to the value of the mortgaged property itself, it is also used in credit analyses involving the most diverse real estate guarantees, whether directly from the loan benefiting or not. The LTV ratio is one

of the most important indicators that the lender can use to determine the risk of a long-term credit operation, and is expressed as:

$$\text{LTV}(\%) = \frac{\text{TOTAL LOAN AMOUNT}}{\text{APPRAISED VALUE OF PROPERTY LINKED IN LOAN GUARANTEE}}. \quad (1)$$

For estimating the value of commercial properties, three value approaches are usually employed: the market approach, income approach and cost approach. From the application of these methodologies, the following values usually result for loan guarantee purposes: patrimonial value, market value, investment value and mortgage lending value (MLV).

This paper argues that the income approach adapted to the concept of value of the investment opportunity and under the principle of value at risk, constitutes the most appropriate approach to estimating the value of a commercial property for loan guarantee, hereinafter called the protected collateral value.

2. Overview – valuation approaches and types of value

The methods for the valuation of commercial properties are, in fact, based on the roots of value that individuals use to establish the value range in which there would possibly be a transaction, namely: root of cost (cost approach), root of exchange (market approach) and root of use (income approach).
In the case of valuating commercial properties using the cost approach, it is advised that not all costs necessarily add value in the same proportion to the property. On this, we exemplify that adding a constructed area to a hotel unit, which represents costs, without admitting either a higher use tariff, or the expectation of a higher occupation rate as a counterpart, will mean cost without value. For that reason, the use of the concept of cost reproduction for estimating the value of commercial properties is not considered satisfactory.

In the case of valuation of commercial properties based on the comparative method, we argue that this approach is not adequate, because it is necessary to identify, within the market universe, transactions of goods that bear similarity to the property under valuation, so that it is possible to construct a representative sample sufficient to infer that the item under assessment may be the subject of a transaction of a value comparable to that of the sample. Moreover, as many have come to understand, commercial properties are unique and subject to discrete transactions, whose physical and performance characteristics would hardly allow efficient sampling.

For the Appraisal Institute (2013), analyses of the valuation of hotels, malls and similar properties should consider the added value associated with the responsibility of the activity conducted in the property, represented by the intangible gain of value for the business operation. In this case, real estate physical assets are only an integral part of the business in progress.

Thus, for the specific case of commercial properties that have limited comparative market data available, the income method is more adequate in that it is able to reflect the true value of the property (Jansen van Vuuren, 2016).

It happens that the use of the income method for the analysis of the value of a commercial property when we aim to estimate what is called investment value in conditions of fair trade, has been widely explored in the literature and there is little to add to the already good existing texts, as portrayed in Blackledge (2009).

Nevertheless, many authors have criticized these customary approaches, mainly after the global financial crisis in 2008. D'Amato (2013) argues that "By considering a stable net operating income in a real estate market heaving a cyclical behavior may overestimate the property value in the recession phase of the market and underestimate it in the expansion phase." The paper considers general concepts related to cyclical capitalization as being a more appropriated valuation methodology for taking into consideration the real estate market cycle.

Following the same direction, D'Amato and Amoruso (2018) focus their criticism on the basic assumption of income perpetuity, without considering the effects of the property market cycle on leasing contracts. By analyzing the London office market, they highlighted strengths and weaknesses of cyclical capitalization valuation methodology.

D'Amato (2017) talks of the necessity of a clear improvement of the role of the property market cycle in the valuation process, once again demonstrating the strong and weak points of the cyclical capitalization approach.

Other authors, like Michaletz and Artemenkov (2018) and Michaletz and Artemenkov (2019),

recommend improvements in the transactional assets pricing approach (TAPA) within the valuation theory for valuing illiquidity assets as well. They have developed adjustments using Taylor series expansion and, by using a simulation technique, outline the performance of this new income capitalization approach in relation to TAPA. The authors pointed out the importance of developing tools which can be employed by appraisers in their daily practice and professional work.
In such a manner, RICS (2018) has been paying more attention to the cyclical behavior of the real estate market and its impacts on the most common valuation techniques, especially in what concerns Bank lending valuations and mortgage lending value.

On the other hand, when it comes to the valuation of collateral bound commercial properties, it should be kept in mind that any commercialization of the property by a financial institution will take place through an auction, typically different from fair trade conditions. In addition, there is usually an excessively long period between the time of assuming the operation and the effective negotiation of the property in an auction. Ignoring these circumstances and promoting the estimation of investment value based on the income method, as a benchmark of the value of the guarantee for coverage purposes, comprises providing the financial institution with a value recommendation that can deviate greatly from what would be an adequately protected value, especially in what concerns income risk, as treated in Nawrocka (2018), related to rents and vacancy, also see Kucharska-Stasiak (2014).

For that reason, when the evaluation of a commercial property is intended as an estimate of value for the purpose of guaranteeing a credit operation, a relevant issue being the subject of controversy among researchers and practitioners is what kind of value to adopt.

According to IVS standards (2017), the recommended value base for the valuation of properties for guarantee is that of market value or that the estimate is made under the hypothesis of forced liquidation, that is on the condition of a compulsory sale or in a shorter term compared to the average market absorption. We note, however, that the IVS standard (2017) does not discriminate how to estimate the value of forced liquidation, theoretically resulting from specific market conditions and the liquidity of the asset.

In the United States, market value remains the most common valuation basis for loan guarantee valuation purposes (see Betts and Ely, 2005). However, the use of the market value approach also has its critics in the context of collateral. Borio et al. (2001) and Barrel et al. (2009) point to the fact that market value accompanies economic cycles, and may be influenced by previously inflated prices and the expansion of bank credit.

On the other hand, in Europe, see Baranska (2013), especially in countries such as Austria, France and, predominantly, in Germany, the search for specific definitions and procedures for the estimation of value for guarantee are intensely diffused in the academic and business sphere, especially among financial institutions. One example of this is the introduction of the concept of mortgage lending value (MLV) by Germanic law (PfandBG) for mortgage lending and covered bonds. Specifically, for commercial properties, the MLV is determined from the combination of the cost approach, which results in patrimonial value, and the income approach, which results in investment value.

In EVS (2016), section EVGN 2, Valuation for Lending Purposes, The European Group of Valuer's Association establishes that mortgage lending value has particular relevance for credit institutions in what concerns the assessment of the collateral value of property. The sustainability assessment of long term value should be considered in the valuation process. An important point that arises from this is whether a mortgaged property provides sufficient collateral to secure a loan over a long period.

Analogous preoccupations can be found earlier, in a work by Panagopoulos and Vlamis (2008). The authors call for the reinforced prudence of regulation in order to consider the property market ups and downs and its impact on the real value of properties, especially when it comes to MLV purposes.

Bienert and Brunauer (2007) had the same critical view in relation to MLV general concepts in German standard valuations for lending purposes. They endorsed that a value-at-risk approach and the implementation of simulations help to understand the concept of MLV. Their results also indicate that the German system of calculating the MLV has to be improved.

Crosby and Hughes (2011) also examined the impacts of commercial property market downturns on the basis of the valuation used in the property lending process in the UK. The paper concluded that new approaches of property valuation must be enhanced, primarily including the monitoring of asset price variations.

Either way, Crosby et al. (2000) warn that the concept of MLV is full of ambiguous and subjective expressions, such as "careful valuation", "sustainable aspects" and "speculative elements", as well as the spread of a commercially incompatible economic concept to the real estate market: that the value of a property is constant in the long run.

In addition, we note that the MLV comes from a calculation routine without any economic bases of value, being determined from a set of "practical rules", in which fixed rates and predetermined parameters are employed in technical manuals, as in those used in the discount rate and asset depreciation. In fact, Kucharska-Stasiak and Zrobek (2015) argue that the accuracy of the valuation process should be based on the knowledge of economic principles.

Having said that, we can see that the discussion and proposal of mechanisms for the valuation of commercial properties for loan guarantee is relevant to both financial institutions, regarding credit risk management, and borrowers, who wish to avoid the presentation of subsidiary guarantees other than those strictly necessary to cover the loan.

3. Describing the method

D'Arcy et al. (2005) have pointed out that, in the property sector, the main valuation process is based on the uncertain Discounted Cash Flow (DCF) model. Thus, "the valuation will be affected by uncertainties: uncertainty in the comparable data available; uncertainty in the current and future market conditions and uncertainty in the specific inputs for the subject property. These input uncertainties will translate into an uncertainty with the output figure, the estimate of price." The paper discusses ways in which uncertainty can be incorporated into the DCF model.

In the same line of argumentation, French and Gabrielle (2004) define valuation as "the process of estimating price in the market place. Yet, such an estimation will be affected by uncertainties." They say that the whole process encloses uncertainties due mostly to inputs assumed according to market activity level; the more active a market, the more credence will be given to the input information, and vice-versa.

Other papers, like Ward and French (1995), Crosby et al. (1997), and French (2006) bring similar issues related to valuation techniques based on DCF models. Both have highlighted the essential fuzzy component in the DCF technique, originated from different risk profiles and various subjective predictions of cash flows.

Fundamentally, the most modern and more technically advanced methods of value analysis of commercial properties involve discounting cash flows and are derived from financial market adaptations, mainly from the capital market, as we can infer from Pagourtzi et al. (2003). However, these adaptations turn out to be inefficient in relation to particular characteristics of the sector, among others regarding the cycles of analysis, asset depreciation and operational procedures.

In this sense, in the real estate sphere, Rocha Lima Júnior (2013) suggests that the valuation of commercial properties is only reliable when supported by the investment opportunity value (VOI).

The VOI concept was proposed by Rocha Lima Júnior (1993) and resembles, with respective adjustments, the estimation of the investment value using the discounted cash flow method, according to the income approach.

As detailed in Rocha Lima Júnior et al. (2011), the value of a commercial property in the concept of VOI, at the beginning of the operational cycle (VOI_0), is equal to:

$$VOI_0 = \frac{VOI_n}{(1+tad)^n} + \sum_{k=1}^{n} \frac{RODi_k}{(1+tad)^k}, \quad (2)$$

where:

n - the operational cycle extension. The operational cycle corresponds to the period in which the results required to obtain a return on investment are generated, and the horizon is set for a period of about 20 to 25 years. That is, the operational cycle comprises the period during which the commercial property is exploited, taking into account the objective for which the property was built, that is, with stable income patterns;

k - time counter;

tad - discount rate arbitrated by the appraiser;

$RODi_k$ - available operational result of the commercial property operation at each period k of the operational cycle. It corresponds to the result between the gross operating revenue and related expenses of paying the operating, management, charges accounts, and the funds required to

cover the continuous updating of the building;

VOI_n - investment opportunity value that a risk-unverifiable universal investor would pay for the commercial property, at the end of the operational cycle, willing to invest the resources needed to recycle the commercial property, to ensure safe and cost-effective operation for another cycle of equal length.

From what was mentioned, we can deduct from Equation (2) that, in order to calculate the value of a commercial property at any time within the operational cycle, the following Equation (3) can be used:

$$VOI_t = \frac{VOI_n}{(1+tad)^{n-t}} + \sum_{k=t+1}^{n} \frac{RODi_k}{(1+tad)^{k-t}}, \quad (3)$$

in which VOI_t is the investment opportunity value for the commercial property at a given moment t of the operation, within the operational cycle.

Thus, the VOI_t estimate will determine the price that is recommended as convenient to pay for the commercial property, within a certain sectoral and general economic scenario, always assuming that the market is oriented by fair trades and that the resulting estimated value constitutes the so called investment value.

4. Presentation of the guarantee value

In order to present the commercial property value for loan guarantee purposes, we suggest an adjustment in the calculation procedure described above. The proposed adaptation is based on the premise that, in the case of partial or total default of the borrower, the financial institution will seek credit recovery via judicial execution and respective commercialization of the commercial property at an auction, which is typically characterized by a distancing from the conditions of fair trade.

For that reason, it is necessary for the appraiser to assume the position of the financial agent and assume a conservative profile, because it is through this that information is given to the financial institution on the degree of security that protects it. Therefore, the conservative profile should portray the bank's reserves about future expectations for the possible variables to intervene in value estimation, so that the estimated value measure accommodates for protection from risks of performance degradation of the commercial property.

Therefore, we propose that the value of the guarantee of commercial property be estimated, at any t time within the operational cycle, based on the format of the [i] scenario of stressed behavior and [ii] protected value marking under the principle of value at risk, as described in the stages below:

[i] Generate, from the Monte Carlo simulation method, a sample of values, calculated on the basis of Equation (4), based on a stressed scenario of random behavior across boundaries, with respect to the key variables that may influence the value of commercial property. Resulting from this is a family of values for the commercial property, portrayed by a probability density function $f(VGOI_t)$, as shown in Figure 1.

$$VGOI_t = \frac{VGOI_n}{(1+tad)^{n-t}} + \sum_{k=t+1}^{n} \frac{RODi_k}{(1+tad)^{k-t}}, \quad (4)$$

being:

$VGOI_t$ - value of guarantee, at any given t time, within the operational cycle.

$VGOI_n$ - value of guarantee at the end of an operational cycle.

We emphasize that Equation (4) was rewritten based on Equation (3), adjusting the notation in order to evidence the estimate of the commercial property value for loan guarantee purposes;

[ii] Arbitrate the limit of confidence in order to mark the protected collateral value, here represented by $VGOI_{t_{\inf}}$. This limit of confidence must be established by the financial institution and depends on the risk policy practiced by the bank regarding risk propensity, especially in view of the history of losses in credit concessions established under similar conditions;

[iii] Establish $VGOI_{t_{\inf}}$ based on the probability density function $f(VGOI_t)$ resulting from step [i] and the degree of risk protection established by the financial institution in step [ii]. To obtain, for example, $VGOI_{t_{\inf}}$ with 95% loss protection, we use the percentile rank 5 of the sampled values. This means that $VGOI_{t_{\inf}}$ corresponds to taking the [0.05 (n)]-th element of the ordered set, which, for practical purposes, implies that there is a 5% probability that the value of the commercial property is lower than that considered, as exemplified in Figure 1.

It is important to clarify that the Monte Carlo simulations were applied to all key variables that

produce operational results coming from the commercial property, and therefore the sample of related values derives an implicit normal distribution, otherwise the Value at Risk technique wouldn't be effective.

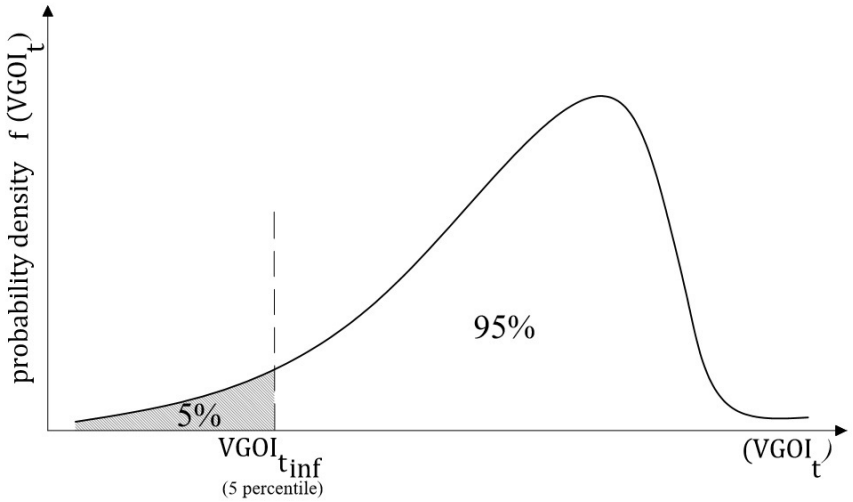

Fig. 1. Example of the probability density function $\boldsymbol{f(VGOI_t)}$ and the marking of $\boldsymbol{VGOI_{t_{inf}}}$ under the principle of value at risk. *Source*: own study.

Moreover, the boundaries of all key variables stressed in the Monte Carlo simulation were set based on time series of data longer than 20 years in order to allow the proper use of the technique.

Having said that, we have it that $VGOI_{t_{inf}}$, estimated in the concept of the investment opportunity value and under the principle of value at risk, corresponds to the estimate of the most protected value from the risks of variation of the environment, market and performance variables of the commercial property established in the stressed behavior scenario. In other words, it reflects how convenient it would be for the financial institution to receive a commercial property as collateral for the loan, given the conditions simulated by the model.

We emphasize, however, that the use of this approach does not indicate that total protection will be achieved as a result of risk-free value estimation, nor that it goes from uncertainty to certainty; on the contrary, there will always be a streak of risk.

5. Case study and results

To demonstrate the application of the methodological approach proposed in this paper, we present a case study observed in the Brazilian market, whose maximum LTV usually established by financial institutions is at 77%, according to Brazil Central Bank (2009).

In this case study, an entrepreneur is claiming from the bank a loan of R$ 56,000,000[1] for the expansion of a hotel and, as collateral for the loan, offers the financial institution an office building which has been in operation for 5 (five) years, with a gross leasable area (GLA) of 15,500.00 m², located in the city of São Paulo.

Moreover, all data related to the São Paulo`s office market came from Buildings (2018). The market value of the land where the office building is located is R$ 18,000,000, and the depreciated reproduction cost of the buildings that make up the physical base of the property is estimated at R$ 37,926,359. We note that the calculations that gave rise to these estimates will not be presented here because they are not the subject of this article, and only the discussion stemming from these records is relevant.

As described in Section 3, for the estimate of $VGOI_{t=5}$ -- where t = 5, meaning the office building is in the fifth year of its operational cycle, it is necessary that the performance of the commercial property be simulated from a mathematical model that is based on the projection of the scenario of stressed behavior.

In this sense, we present, in Table I, a summary of the scenario of stressed behavior established in this paper, with the identification of the key variables chosen to integrate the analysis model, as well

[1] Current exchange rate of 1 Eur = 4.7 Reais (R$) – source: Brazil Central Bank (www.bcb.gov..br)

as their associated fluctuation boundaries and probability distributions.

We clarify that the costs involved in the operational cycle and considered in the stressed behavior scenario described in Table I were: [i] owner costs with commercial property management and administration (% of gross income), [ii] R$/m2 of GLA/monthly), [iii] cost of collecting the asset replacement fund (% of gross income) and [iv] brokerage costs, (whenever a new contract is signed), all based on data coming from Buildings (2019).

Table 1

Scenario of stressed behavior: key variables, fluctuation boundaries and probability distributions

Key variables	Scenario of the conjuncture (year 5)	Distribution	year 6 to 8		year 9 to 11		year 12 to 20	
			Min.	Max.	Min.	Max.	Min.	Max.
Rent price (R$/m2 of GLA/monthly)	105,00	Uniform	75.00	90.00	70.00	90.00	60.00	90.00
Occupation rate	90%	Uniform	70.0%	80.0%	65.0%	80.0%	60.0%	80.0%
Owner costs with management and administration (% of income)	5%	Uniform	5.5%	6.6%	5.5%	6.6%	5.5%	6.6%
Vacancy costs (R$/m2 of GLA/monthly)	18.50	Uniform	18.50	22.20	18.50	22.20	18.50	22.20
Brokerage costs on rent (nº of rents)	1	Constant	1	1	1	1	1	1
Asset Replacement Fund (FRA)	3.0%	Constant	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Discount rate (annual, in effective terms)	7.50%	Normal	9.00%	0.99%	9.00%	0.99%	9.00%	0.99%

Source: own study.

In relation to the other variables, the following were considered: [i] rent price (R$/m2 GLA/monthly), occupancy rate (% of GLA) and discount rate (annual, in effective terms).

Thus, based on the stressed behavior scenario described in Table 1 and from the simulator model, we generated a sample of 10,000 values for the office building, based on the Monte Carlo simulation method, in accordance with Equation (4). The histogram and the resulting probability density function, as well as the main descriptive statistics for the simulated values for $VGOI_5$ are presented in Figure 2 and Table 2, respectively.

In order to estimate protected collateral value $(VGOI_{5_{\inf}})$, under the principle of value at risk and in accordance with the routine described in Section 3.1, we admitted that the degree of loss protection defined by the financial institution was 95%. Thus, as shown in Figure 3, we estimate $VGOI_{5_{\inf}}$ at R$ 78,691,838, implying that there is a 5% probability that the value of the office building will be lower than this one.

Therefore, we note that, for the configuration presented in this case study, in which the entrepreneur claims a R$ 56,000,000 loan from the bank, the use of the cost approach leads to the estimation of the patrimonial value of the office building as R$ 55,926,359, which is the sum of the

depreciated reproduction cost of commercial property (R$ 37,926,359) plus the market value of the land (R$ 18,000,000). In this context, the LTV ratio results in 100%, over the maximum ratio established by the financial institution, which is at 77%.

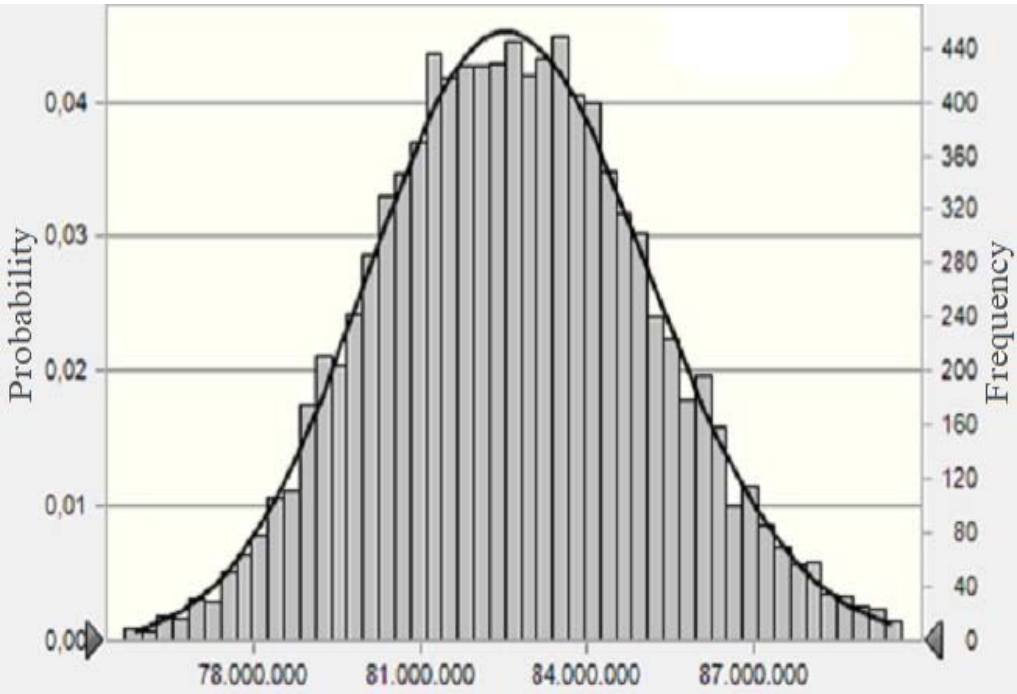

Fig. 2. Histogram and adjustment of the probability density function for the simulated values of $\boldsymbol{VGOI_5}$. *Source*: author (extracted from Crystal Ball).

Table 2

Main statistics of simulated values for $\boldsymbol{VGOI_5}$

Statistics	**Forecast values**
Mean	82,661,095
Median	82,620,136
Standard deviation	2,492,015
Asymmetry	0.0961
Kurtosis	2.96
Coefficient of variation (%)	3.01
Minimum	73,455,906
Maximum	91,808,442
Range	18,352,536

Source: own study.

On the other hand, from the methodological basis presented in this paper, we estimate that the protected collateral value for the office building is R$ 78,691,838, which implies an LTV ratio of 71%, under the maximum limit stipulated by the financial institution.

We consider worth noting that, between the two types of values estimated for the office building, the only one that effectively comes from the use of a methodological approach that protects the financial institution and is anchored in the commercial property income generation capacity is the

protected collateral value.

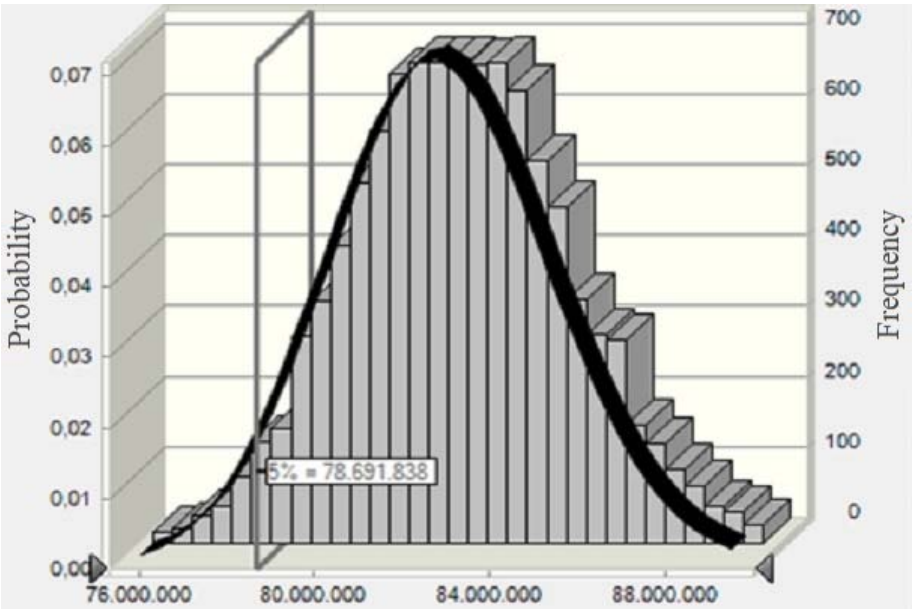

Fig. 3. $\boldsymbol{VGOI_{5_{inf}}}$ to a degree of loss protection at 95%. *Source*: author (extracted from Crystal Ball).

6. Conclusion

In this paper, we proposed a coherent, complete and practical methodological approach for the valuation of commercial property bound collateral. We have improved on the income method founded on the concept of investment opportunity value, based on the format of the scenario of stressed behavior and the marking of protected value under the principle of value at risk.
The proposed valuation technique absorbs the conservative profile of the financial institution, so that the estimated value already carries a risk protection component capable of supporting unfavorable market conditions and reducing the risk of exposure to bank credit in loan operations.

From the case study, we showed that the use of the cost approach for the valuation of property bound collateral in loans can create a pseudo blind of risk exposure, distorting the decision-making process. More specifically, if the decision were made solely on the basis of the LTV ratio determined by the cost approach, the financial institution would possibly require the client to provide additional guarantees in order to reach the LTV maximum of 77%. If they were not presented, the credit transaction would probably not be contracted or would be adjusted in terms of the financing value. On the other hand, on the basis of the proposed approach, we found that there was no need for a supplementary guarantee and that the financial institution was satisfactorily protected in the event of a default by the debtor.

We can therefore conclude that the suggested valuation procedure might be a useful tool to support decision-making in credit operations guaranteed by commercial properties, mainly because it allows the financial institution to actively manage the degree of risk exposure, making it possible to exploit it in order to gain competitiveness and profitability.

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