

Mathematical Methods for Estimating the Value of a Commercial Bank

By

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Abstract:

With the development of market relations in Iraq, the most important factor in the competitiveness of domestic enterprises and organizations in the long term is the existence of a fundamental goal of business development - an increase in its real value and building an effective management system aimed at achieving this goal. The experience of many countries tries to show that the positive dynamics of the value of a bank (business) predetermines its long-term and sustainable functioning, its contribution to the growth of the welfare of society, and the socio-economic development of the country as a whole. With the development of market relations in the country, there are more and more situations in which it becomes necessary to use bank valuation technologies. The rapid growth of the real estate market has created a demand for an assessment of its market value.

Keywords : Crisis, modeling, econometrics, Iraq.

Introduction

The mathematical model is very important in the markets to simulate the determine the variables which are effects in these markets. Our motivated is to attempt to model these variables to make the best model that is represented the markets. Therefore, this paper will build up the modeling to represent the variables for forecasting a while.

In addition to development of credit, insurance, lease relations, purchase....so on. It is machinery and equipment, development of business plans for investment projects, mergers and divisions of enterprises, auctions, and competitions for the sale of blocks of shares of enterprises, bankruptcy proceedings and other situations arising in economic practice. It needs for a reliable assessment of property in each case.

The bank's management has used to assess the value of a business making possibility to monitor the development of the bank. It is position in the market taking timely measures to prevent decreasing in the market value of the bank.

The principles of market's management require valuation of various property objects (bank, business, intellectual properties). The outcomes of diverse property valuations serve as the foundation for decision-making in both the private and governmental sectors of the economy.

The cost of estimation provides a reasonable picture according to whether the business. It can work next time such as all stakeholders, particularly owners, employees, purchasers, suppliers, bankers, tax, insurance specialists.... so on. The bank's value is a valuable tool in the toolkit of a professional Soviet entrepreneur, economist, or leader.

In a market economy, it is difficult for an entrepreneur, a government official to do without knowledge of the tools of valuation activity. The assessment of market value enables the seller to complete a clear benefit on the fair worth of the item. Since valuation incorporates do not only individual costs and expectations, but also the market as a whole, growth forecasts, the economic condition, and public response to the issuer's objective. Evaluation aids in making sound investment decisions while lowering conventional expenses.

The organized of this paper as follows: Section 2 is the principles of the market and the mathematical model. Section 3 is the application of our mathematical model. Finally, Section 4 represents some Conclusions, recommendations, and future work.

Body

A professional appraiser has the necessary special professional knowledge and skills to carry out appraisal work. Valuation of a bank (business) is carried out by expert appraisers who have undergone special training.

When ordering an appraisal from a professional evaluator, the customer concludes a legal contract with him, which establishes the rights and obligations of the parties. The appraiser bears a certain responsibility for the quality of the work performed, the risk of incorrect assessment is the problem of the expert, not the customer.

Valuation of a bank (business) is a monetary expression of the market value, taking into account the potential and real income that it brings at any given time. The market value of the appraisal object is defined as the most likely price at which this appraisal object can be alienated on the open market in a competitive environment, when the parties to the transaction act reasonably, have all necessary information, and any extraordinary circumstances are not reflected in the transaction price.

A feature of the valuation process is its market nature. The assessment is not limited to take into account only the costs of creating or acquiring an object. The assessment process necessarily takes into account market factors, such as time and risk, market conditions (supply and demand for appraised objects), the level of competition, various features of the appraised object, etc.

A variety of purposes for determining the worth of a bank (enterprise): improving the efficiency of current management of an enterprise, making an informed investment decision, buying, and selling securities on the stock market, determining the value of a bank in the event of its sale and purchase in whole or in part, restructuring a bank, developing a development plan (forecast) bank, determining the creditworthiness of a bank and the value of collateral in lending, etc. Today, for determining the worth of a bank (enterprise), there are numerous methodologies and procedures that are used in its composition: Approaches include the income strategy (revenue method), the income method (equity strategy), and the competitive (market) attitude (market approach) [5].

The income approach is a set of methods, procedures, and techniques for estimating the value based on predicting the expected income from the object of assessment and bringing them to current prices [2].

The income technique is used to evaluate the present worth potential revenue generated by the use of land (capital) and the possibility of its later sale. Thus, when analyzing a firm using the income technique, the determining element is income, which impacts the object's worth. The higher the worth of an object's market value, the more money it generates (*ceteris paribus*). The length of income creation in potential revenue generated by the use of land (capital) and the possibility of its later sale

The income approach uses the estimated principles of expectation and substitution. Within the framework of this approach, the discounted cash flow (DCF) method is used to assess the value of enterprises that did not manage to earn enough large profits to be capitalized in additional income but have competitive advantages (the capitalization method is used less often).

The discounted cash flow approach compares the value of an asset to the present value of the asset's predicted future cash flows. This method is the basis for all the others. For example, when valuing assets using an option pricing model, discounted cash flows are often valued first. There are various discounted cash flow models.

The value of the bank can be determined in parts. In this case, the valuation begins with an estimate of the cost of the bank's equity capital, assuming that the bank's financing comes from equity only. The value added or subtracted by non-equity debt is then determined. This is the adjusted present value (APV) model [1]:

APV=SPSK+PSV+OSB, (1) where

- ❖ **APV** is the value of the bank.
- ❖ **SPSK** - the cost of the bank, taking into account only equity capital.
- ❖ **PSV** is the present value of tax winnings.
- ❖ **OSB** is the expected cost of bankruptcy.

If comparable cash flows and discount rates are utilized, the three approaches produce equivalent estimations of value. When a bank's cash flows are discounted at the cost of equity, the bank is undervalued. The cost of equity is exaggerated if earnings to capital are valued at the return on capital. Typical accounting rate of return models assess an asset by computing the present value income produced by the item at a reasonable discount rate.

Surplus income (excessive cash flows) models exist, wherein cash inflows received in excess of the required income are judged value-creating. The market price of these overflow streams may be added, and the solution deposited in an asset to estimate its value. The results of the valuation using standard discounted cash flow models and discounted excess cash flow models are identical. But discounted excess cash flow models show that it is not income that creates value, but only income that exceeds the required return.

The cost approach is a set of methods, procedures, and techniques for estimating the value based on the analysis of the costs of acquiring, reproducing, or replacing the object of assessment at current prices, less losses from cumulative impairment [2].

The use of cost approach methods is justified in a balanced market when there is a long-term fairly stable balance between supply and demand. In this case, the cost is close to the market value. The situation on the real estate market in Iraq at the moment is a vivid example

of market imbalance.

Today, the rates of return on capital in real estate in Iraq range from 11% to 25% per annum and tend to decrease.

Profitability reaches hundreds of percent, which is explained by the instability in the economy, characterized by a huge demand for housing.

Comparative (market) approach - a set of methods, procedures and valuation techniques based on the calculation of the value of the appraised object, based on a comparison of its characteristics with the characteristics and prices of similar property, for which there is information about recent sales on the open market of this type of property, when in a transaction typical buyers and typical sellers are involved, while making independent decisions [2].

Comparative valuation is based on finding the price of similar items standardized by some common variable such as profit, cash flow, revenue.

The industry-average price/earnings multiplier, the price/book value multiplier, and the average price/sales multiplier may all be used to determine a bank's worth. It is thought that other banks in the sector are equivalent to the one being evaluated, and that the market rates these banks accurately but makes errors when pricing individual assets. The benefits of utilizing multipliers are their simplicity and convenience of use.

The problem is that the multiplier is chosen subjectively since the appraiser may select a collection of related businesses to support his views about the bank's worth. The application of a multiplier based on comparable enterprises may result in mistakes - enterprise overvaluation or undervaluation.

Because it is based on the bank's growth rates and cash flows, the discounted cash flow technique is less susceptible to market mistakes in valuing a bank.

Each of the above approaches contains several methods that can be applied. These approaches have certain advantages, disadvantages, and have a scope of expedient application. At the same time, when assessing the value of a business in order to increase the reliability of calculations, an appraiser usually uses several approaches and methods that complement each other.

More and more widely over the past 20 years, options pricing models have been used in theory and modern valuation practice. This is because, in some cases, the value of an asset is greater than the present value of expected cash returns, which depend on the occurrence or non-occurrence of an event. Initially, these models were used exclusively for option pricing.

It can be assumed that natural resource reserves, patents are options, and therefore should be valued as options, and not according to traditional valuation models.

For example, an oil bank will only develop a field when oil prices rise and will not develop a field if oil prices fall. An option or contingent claim is a claim that is paid only under certain conditions.

Such conditions occur when the underlying asset's value exceeds the call option's

predetermined value or falls below the put option's predetermined value. Financial theory methods will be used to assess the cost of any asset that has choices characteristics.

F. Black and M. Scholes created the first option pricing model in 1972. The cost of an option can be estimated using variables such as its present value, option strike price, time to expiration of the option, and risk-free interest rate.

If the payoffs on put and call options are proportional to the underlying asset's value, then the asset can be valued as an option.

An asset can be defined as a call option if, when the value of the underlying asset rises above a predetermined level, the difference in value between them is erased, and when the value of the underlying asset decreases, the option loses its value to zero. An asset can be valued as a put option if its value increases when the value of the underlying asset falls below a predetermined value, and it is worthless when the value of the underlying asset exceeds a predetermined level [1].

Conclusions:

Most options are based on financial assets (stocks, bonds), as well as fixed income securities that can be redeemed ahead of schedule.

- Such options are traded, for example, on the Chicago Board Options Exchange. Merchandise, property investment, and asset classes are examples of real assets, and can also be used to back options. They are referred to as genuine choices. Options on tradable assets are easier to evaluate since the source data for option pricing models may be received directly from the financial market. Warrants are one example of such an option.
- Other options, which are based on real assets, are not traded on the market. These are oil reserves, gold deposits, undeveloped land, licenses, copyrights, patents, and projects. They are more difficult to assess since inputs pertaining to the underlying assets are unavailable.
- Real options are frequently exercised in advance. To account for early exercise of the option, an updated Black-Scholes model might be utilized. When compared to the Black-Scholes. The factorial choice price structure provides a broad variety again for asset value price movements. Some assets, although having some features of options, are not considered options.

Recommendations:

For example, equity may be regarded as a possible callable bond depending on the firm's valuation. The striking price is represented by the face amount of the loan, and the maturity of the debt indicates the term of the option. When the investment expenses necessary to accomplish the project exceed the strike price of the option, a patent might be considered as an option to acquire a product. The patient's life is the period until the option expires.

When utilizing Lengthy choices on nonreadable goods are valued using choice pricing models, there are several restrictions. The magnitude of dividends and their volatility with respect to long-term options might vary substantially. The underlying assets worth cannot be

obtained on the financial market; it must be calculated. As a result, when evaluating long-term options using a pricing model, more mistakes are probable than when valuing short-term options.

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