THEME

ESG Integration: Redefining value in a changing world

Unlocking Precision: Advancements in the Build-up Method for Capitalization Rate Estimation

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Abstract

In the sixties of the last century the relationship between risk and return of a stock in exchange trading has been proven statistically. Later, when formulating the build-up method, these ideas were transferred without any justification to the valuation of real estate and enterprises that do not list their securities on the stock exchange. In other words, the formulae commonly used in the build-up method are not precise. In the paper an advancement of the build-up method is proposed in order to increase its precision. An analogy with I. Fisher's equation of returns was used as a methodological basis. A set of four independent risk metrics is given for use in the build-up method in general case: risk-free rate, country risk premium, industry risk premium, and asset risk amendment. Recommendations are given on finding the risk-free rate for various currencies, on calculating the country risk premium with examples from Belarus, India, Russia and other countries, as well as the industry risk premium and the asset risk amendment.

Keywords: Discount Rate, Build-Up Method, Valuation Currency, Risk-free Rate, Country Risk Premium, Asset Risk Amendment, Industry Risk Premium.

1 Introduction

Among the standard approaches to property valuation (IVS, 2021) the income approach stands out for its popularity and importance in use, especially for income properties (see, e.g., (French & Gabrielli, 2018).

The first implementations of this approach were known as early as the 19th century (Fuhrer, 1944). In expressions for calculating the value by the direct capitalization there is an interest rate of capitalization (cap rate), usually defined as the ratio of the net annual income of a valuation subject asset to its value. With the formulation at the beginning of the last century of the concept of net present value (Fisher, 1930)

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and, thus, the use of the discount cash flow method, the term "discount rate" appears in valuation practice. Consideration of identity or difference between the concepts of "cap rate" and "discount rate" is not included in the task of this paper and is not essential for it. Note only that in the IVS (2021, p.41) stated that: “Although there are many ways to implement the income approach, methods under the income approach are effectively based on discounting future amounts of cash flow to present value.”

Previously, appraisers around the world most often used market value for their calculations. At least, this is stated in the study (Horsley, 1992), carried out at the end of the last century. In the new century, the use of the income approach has increased. In a recent paper (Trifonov, 2020) it was noted that, after the past financial crises, the economy is no longer responding requirements for determining market value. This led to the desire of the customers of the valuation to turn from clarification values in exchange as market value and others to the clarification values in use, as investment value (Sayce a. o., 2006).

This is especially true for inherently heterogeneous markets such as real estate, especially capital real estate, enterprises and investment projects. At the heart of the calculations of values in use, such as investment value, is the income approach.

Capitalization rate (or discount rate) ***R*** presents in the expressions of the income approach, as well as in various formulae for the capital budgeting techniques of an investment project. In the absence of the use of borrowed funds, a magnitude of the discount rate can be determined, in particular, by build-up method (IVS, 2021, p. 46). At the same time, the traditional form of build-up method has no reasonable justification. The purpose of the paper is to clarify the formulae used in this case.

2 Literature Review

The direct relationship between risk and return has been known to mankind for a long time on an intuitive level. For example, in the Russian Empire from about the 18th century there was a saying "Who does not take risks, he does not drink champagne!". According (Damodaran, 2012), in Chinese the concept of "risk" is written with two characters the first of which means danger, and the second one means opportunity. In the middle of the last century, these thoughts would have been formalized in the calculations of the profitability of a share in the stock market.

In work (Sharp, 1964), supplemented, as shown in (Fama, 1968), by in (Lintner, 1965), on the basis of the portfolio selection theory (Markowitz, 1959) the behavior of an investor in the exchange market was described, choosing between investing in a more profitable (and, therefore, much risky) stock and in a stock with less risk and less income. In these works, the foundations of the build-up method were created in the form of separating the so-called "risk-free" rate R_0 from the total rate of return R on any stock included in the market portfolio, and thus forming the capital asset price model (CAPM). When calculating the rate of return R in this model, a formula is usedthat includes the multiplier β_i, which is the magnitude of the systematic risk of the stock of the i-th enterprise under consideration (Sharp a. o., 1998):

$$R = R_0 + \beta_i (R_m - R_0) \tag{1}$$

$$\beta_i = \sigma_{im} / \sigma_m^2 \tag{2}$$

where R_m is the rate of return on the entire market portfolio of investments, σ_{im} is the covariance of the return of the i-th enterprise with the return of the market portfolio, σ_m^2 is the dispersion of the return of the market portfolio.

The next forerunner of the build-up method was the paper (Ross, 1976), where describes the arbitrage pricing model (APM), in which the risk premium on the whole market scale was proposed to be decomposed into separate risk premiums caused by various economic factors, exempli gratia, on a regional scale or industry one. In this model, the expected rate of return on an asset is written as follows:

$$R = R_0 + \beta_1 (R_1 - R_0) + \beta_2 (R_2 - R_0) + \ldots + \beta_n (R_n - R_0) \tag{3}$$

where R_i is the expected rate of return of the portfolio under the influence of only the i-th factor (i = 1, 2, …, n), which corresponds to the multiplier β_i.

Models (1)-(3) were of a rather strict logical nature and their parameters were based on the statistical data of stock exchange trading. Later, for use in cases of appraising enterprises that do not list their securities on a stock exchange, including due to the lack of securities, an empirical "build-up method" was offered (Schilt, 1982). In it, ***without proper statistical justification***, the discount rate R was also proposed to be written as the sum of interest rates:

$$R = R_0 + R' \tag{4}$$

where R' is the risk premium, or, similar to (3), premiums, made up of interest rates related to risks caused by various economic factors associated with the subject asset and its environment. By the end of the last century, among members of the American Society of Appraisers (Dukes & Bowlin, 1993) the most popular method of calculating the discount/capitalization rate was "a risk-free rate plus a risk premium". Based on this form, the build-up method is actively used to the day.

3 Research Methodology

As a tool, the paper uses the equation of returns for one year, since annual interest is used, which is expressed through parameters that need to be interconnected.

As an example, if it is necessary to find a connection between the nominal (that is, without taking into account an inflation) rate $\boldsymbol{R_n}$ and the real (that is, observed on the market) rate $\boldsymbol{R_r}$ in the presence of constant annual inflation of $\boldsymbol{r}$ percent, the amounts are equated to each other, accumulated over the year, on the one hand, at the nominal rate and, on the other hand, at the real rate, taking into account the effect of inflation. The result expression is called the Irwin Fisher equation:

$$\mathbf{1} + \boldsymbol{R_n} = (\mathbf{1} + \boldsymbol{R_r})\,(\mathbf{1} + \boldsymbol{r}). \tag{5}$$

Eq. (5) is an expression for recalculating the nominal rate into a real one or vice versa, taking into account the effect of inflation. Having expressed the real rate from it, we obtain the formula (Fisher, 1930):

$$\boldsymbol{R_r} = (\boldsymbol{R_n} - \boldsymbol{r}) \,/\, (\mathbf{1} + \boldsymbol{r})$$

The theoretical foundation of the valuation process is the valuation principles (Friedman & Ordway, 1989) developed on the basis of previously observed models of people's economic behavior. One of these principles is the principle of dependency, it is associated with the market environment surrounding the valuation subject. It is generally accepted that location is one of the most important factors affecting the value of a property or business. The quality of the location depends on how well the parameters of the property correspond to the legal norms accepted in its surroundings, the type of land use and proximity to the economic environment. All these characteristics make up the situs, or economic (or legal) environment.

In its general form the principle of dependency looks like this: "the value of the property depends on its situs and itself influences it". It indicates that the valuation subject should be considered not only in conjunction with its geographical environment, but also with its connections with the legal and economic environment. These connections, in turn, determine the scale of the property, that is, those boundaries of the environment that should be taken into account when valuing it.

4 Advancement of the build-up method – The basis

4.1 Main Formula

The relationship between the parameters included in empirical expression (4) is approximate. It is more accurate to write down an equation of returns of type (5) for them. Equating the amounts accumulated during the year, on the one hand, under the action of the rate $\boldsymbol{R}$, and on the other hand, under the simultaneous action of the risk-free rate $\boldsymbol{R_0}$ and the risk premium $\boldsymbol{R'}$, we get:

$$\boldsymbol{R = (1 + R_0)\,(1 + R')} \tag{6}$$

from which the exact formula for calculating the discount rate with the selection of the risk-free rate follows in this form:

$$\boldsymbol{R = R_0 + R' + R_0\,R'}$$

It differs from traditional equation (4) by the usually neglected quadratic term $\boldsymbol{R_0R'}$, which may lead a significant deviation into the result.

The specific ***magnitudes of premiums*** related to the above-mentioned risks will ***depend on*** the chosen ***valuation currency*** (see, e.g., (Damodaran, 2012; Trifonov, 2008). Also, in accordance with the valuation scope of work, these magnitudes should take or not take into account an inflation, if necessary, by recalculation according to Fisher (5).

4.2 Risk-free Rate

The risk-free rate $\boldsymbol{R_0}$ is determined by analyzing the return on risk-insured securities. Usually, the interest rate of the most reliable securities, such as long-term government bonds or similar monetary investments, is used as the risk-free rate.

When valuation currency is US dollars, the risk-free rate should be looked up in the statistics of the US Federal Reserve System (The Fed). For this, it is necessary to choose securities with a lifespan comparable to the lifespan of the valuation subject asset (Copeland a. o., 1995). As example, for real estate, one should be guided by the magnitude of rate for the US treasury government securities with a 30-year (maximum) maturity, and for enterprises should be guided by a treasury constant maturity comparable to the forecasting depth used in valuation calculations with the desired discount rate. A similar consideration applies to capital budgeting techniques for an investment project.

When valuing in euros, one can use the information of the European Central Bank, etc. In general, when valuing in a national currency, the value of the risk-free rate should be determined based on the least risky alternative monetary investments in the national currency. These may be long-term government bonds denominated in the national currency.

There are recommendations to choose as a risk-free rate for any currency the appropriate rate of return on term deposits in the country where the valuation is made. This can be objected to as follows. Investing in a commercial bank is much risky than investing in government securities. In addition, it can difficult to find a bank term deposit comparable in volume to the value of the appraised real estate asset and for a period comparable to the economic life of the subject asset.

5 Impact of asset country – CRP

5.1 Main Formula

The origin of the build-up method took place in the United States, where the valuation was carried out in US dollars, the currency issued in this country. But when extending the method to a valuation carried out in foreign currency (e.g., when valuing a property from India in US dollars), it becomes necessary to take into account the impact of foreign currency. This is done by introducing a country risk premium.

The country risk premium, ***CRP***, is an additional return due to the risk of investing funds in a certain foreign currency in the country under consideration. This risk is associated with the possible loss (total or partial) of asset due to the action of factors of a general economic, financial and socio-political nature that are present in the country, regardless of the subject asset.

It is also assumed that the risk-free rate is chosen in relation to this foreign currency. That is, the subject asset is located in a country that does not issue the currency selected for valuation. Note again, that the country risk premium, like all other components of the discount rate, must be determined precisely against the valuation currency. For another currency, in general, it will be different.

Country risk premium (against some foreign currency) can be interpreted as a ***cross-country difference in the investment return of the currency***.

The inclusion of the country risk premium in consideration entails specification of eq. (6) in the form:

$$R = (1 + R_0)(1 + CRP)(1 + R'') - 1 \qquad (7)$$

in which the risk premium R'' in the case of a foreign currency valuation and, as a result, the use of a country risk premium, will differ from the previously introduced risk premium R'. In the case of valuation in national currency, there is no country risk premium, and

$$R'' = R'$$

The calculation of ***CRP*** for any country can be based on data on the yield R_b of long-term government bonds of this country, denominated in US dollars, on global stock markets. Such data provide a market view of the attitude towards investment in the country, aggregating all types of risk included in ***CRP***.

Since country risk premium is calculated in terms of the US dollar, the calculations also use the Fed's information on the current yield of long-term US treasury constant maturities, giving the magnitude of the risk-free rate for this calculation. It is logical to choose the term of the US maturities comparable to the term of the bonds of the country under consideration. In calculating the country risk premium, an expression based on eq. (6) is used and has the following form (Trifonov, 2021):

$$CRP = (1 + R_b) / (1 + R_0) - 1. \quad (8)$$

Note that an expression similar to eq. (8) for calculating the magnitude $(R_m - R_0)$ in eq. (2) was used 25 years ago in the fundamental guide to the US stock markets (Ibbotson, 1996).

5.2 CRP as Indicator of the Country's Investment Attractiveness

It should be noted that, in addition to being included in various valuation formulae, ***CRP*** can also act as an independent ***indicator of the country's investment attractiveness***. Since 2004, the author has been monthly calculating and publishing the country risk premium for the Republic of Belarus and other countries.

As an illustration, the change in the magnitude of the country risk premium for the Republic of Belarus in recent years is shown in Fig. 1.

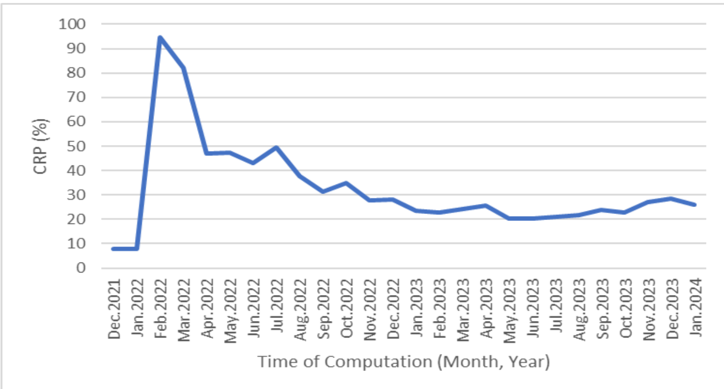

Fig. 1. Dynamics of the country risk premium of the Republic of Belarus against USD

Source: Author's Computation

In January 2022, the ***CRP*** for Belarus was equal to 8,0%, in the end of February 2022 it increased sharply to 94,5% (!) due to the emerging political factor: the indirect involvement of Republic of Belarus in the military confrontation between neighbouring Russia and Ukraine. On January 31, 2024 Belarus ***CRP*** = 26,0%.

A similar chart for the Republic of India, calculated on government bond maturing in June 2027, the longest life bond issued by the Government of Republic of India, gives an almost straight line with small fluctuations of 1%. Last figures in this line are: on June 30, 2023 the India ***CRP*** is 5,14%, on January 31, 2024 the India ***CRP*** = 5,27%.

For comparison, ***CRP*** on January 31, 2024 for Russia is 12,7%, for Turkey is 6,30%, for Ukraine is 31,6%.

6 Other components of the risk premium – IRP and ARA

6.1 General Considerations

To calculate the risk premium ***R”*** from eq. (7), it must include the risks associated with the subject asset. In some sources following eq. (3), it is proposed to do this in the form:

$$R'' = R_1 + R_2 + \ldots + R_n,$$

moreover, the nature and number ***n*** of risk premiums, as, indeed, in formula (3) of APM, are characterized by the art of the appraiser.

Two issues should be considered here:

- the number of risk premiums and
- their form of accounting in the expressions for the discount rate

An answer the second query is given above in formulae (6)-(7). The question of a reasonable number of risk premiums will discuss below.

In (Schilt, 1991) the following risks premiums are proposed in this series: industry risk premium, equity risk premium and company-specific risk premium. Others also suggested considering: price increase risk premium, illiquidity risk premium, insolvency risk premium, etc. Such risks can be interrelated, that is, dependent on each other, as, e.g., equity risk and company-specific risk. It can be assumed that such a choice of risks will give distortions associated with their possible interdependence. In other words, ***for the correct use*** of the build-up method, ***it is necessary to choose*** only ***risks*** that ***are independent of each other***.

Analysing this circumstance, a classification of risk premiums based on one of the principles of real estate valuation, the principle of dependency (Friedman & Ordway, 1989), was proposed (Trifonov, 2008, 2021). This principle indicates the significance of the impact of the situs, or economic location, on the asset value.

The main component of the situs, the valuation currency, and the risk-free rate associated with it, were considered above. In the case, when the valuation currency is foreign against the location of the subject asset, a country risk premium appears. It was discussed earlier. The next in proximity to the subject asset should be considered an industry (or branch) risk premium, which is caused by the way in which the subject asset generates its income in a number of similar assets.

6.2 Industry Risk Premium - IRP

The industry risk premium, ***IRP***, is determined by the average (by branch of industry) magnitude of the risk of the activity that ensures the profitability of the asset subject. It can be determined empirically based on previous statistics. For example, in Belarus, the magnitude of the investment risk premium (against US dollars) in real estate-related industries ranged from 0,2***CRP*** to 0,5***CRP***.

In cases where there is a statistically sufficient number *n* enterprises listing their shares on the stock exchange in the industry of interest, it is proposed (Trifonov, 2021) to use the above (2)-(3) capital asset price model (CAPM) in the form of:

$$IRP = \beta\,(R_m - R_0) \tag{9}$$

where the multiplier β of the systematic risk of the industry is calculated as the average of the multipliers of reference enterprises:

$$\beta = \sum \sigma_{im} / (n\sigma_m^2) \tag{10}$$

where i is the current reference enterprise number, $i = 1, n$.

But it should be noted that the possibility of such a method of calculating the magnitude of industry risk premium is limited by the existence of a developed stock market for securities related to the industry of the subject asset.

6.3 Asset Risk Amendment - ARA

The asset risk amendment, ***ARA***, is directly related to the subject asset and depends on its physical characteristics and management. Usually, this amendment ***ARA*** does not exceed half of the industry risk premium [19]. ***The asset risk amendment takes into account the difference between the subject asset and the industry average*** and can be positive (if the indicators of the subject asset are lower than the industry average) or negative (if the subject asset is better than the industry average). An asset typical for the industry has no asset risk amendment (***ARA*** = 0).

7 Discussions and Findings

Using for the calculation of the capitalization rate (or discount rate) the method with the allocation of the risk-free rate and premiums for various risks associated with the valuation subject asset, traditionally called the build-up method, the ***risk parameters*** included in it ***should not be added***, but equations of return of the type (6) or (7) should be used.

As a result, in the most general case of valuation in any country against foreign currency, the formula for the rate obtained by the build-up method may look like this (***Trifonov's four-parameter formula***):

$$R = (1 + R_0)(1 + CRP)(1 + IRP)(1 + ARA) - 1. \qquad (11)$$

In the case of valuation against national (local) currency, the formula for the rate obtained by the build-up method may look like this (***Trifonov's three-parameter formula***):

$$R = (1 + R_0)(1 + IRP)(1 + ARA) - 1. \qquad (12)$$

Again, note that the numerical magnitudes of the risk-free rate and other parameters in formulae (11)-(12) will be different for different currencies selected for calculation.

To illustrate how the advancements in the build-up method impact on precision of valuation, an example of the method applied to a real estate asset is offered. An administrative building in the city of Minsk, the capital of Belarus, was chosen as valuation subject. The building with a total area of 3577,2 sq.m belongs to a foreign company and is rented out.

The purpose of valuation is the sale. Valuation currency is US dollars. The valuation is made as of August 31, 2023 using the DCF method. The forecasting period is 3 years, for clarity, the example assumes that constant rental payments ***NOI*** are collected once a year, on July 1, the discount rate ***R*** is unchanged throughout the calculation and is the same for rental cash flow and the terminal value (reversion), the market over time forecasting is stable, that is, the value of the terminal sale is equal to the present value ***V***, and the reversion ***kV*** takes into account the coefficient ***k***=0,9 for the costs of sale. Then

$$V = NOI[(1+R)^{-0.5}+(1+R)^{-1.5}+(1+R)^{-2.5}]/[1-k(1+R)^{-3}]. \qquad (*)$$

The net operation income ***NOI*** from the annual lease payments is $ 277 152.

In that condition the calculation of the discount rate is carried out according to the formula (11). Its components as of August 31, 2023 are as follows. The risk-free rate among 30-year US treasury constant maturities $\boldsymbol{R_0}$ = 1,96%. The country risk premium ***CRP*** for Belarus, calculated using formula (8) based on exchange data on the yield of the government bond of the Republic of Belarus, denominated in US dollars and having the latest maturity among Belarusian bonds (February 2031), is ***CRP*** = 21,68%. Formula (9) cannot be used to calculate the industry risk premium due to the absence of a real estate-related securities market in Belarus. Based on previous experience statistics, it is known that office buildings in Minsk have an industry risk premium of 0,2***CRP***. Based on this, ***IRP*** = 4,34%. The valued asset is a typical office building, average in its parameters. There-fore, it should be assumed that ***ARA*** = 0. Substituting the obtained magnitudes of the variables into formula (11), the required discount rate for the valuing building is obtained: ***R*** = 29,44%.

Finally, from (*) the number 986 641,7 is computed, rounding which, so as not to exceed the accuracy of the calculation, the value of the building being valued on August 31, 2023 is $ 987 000.

If one use old formula (5) the magnitude for discount rate will be 1,96%+21,68%+4,34%=27,98%, from (*) one gets 1 026 895,7 rounding which one will obtain a value of $ 1 027 000. Difference between unprecise and precise results is

$ 1 027 000 - $ 987 000 = $ 40 000.

8 Conclusion

Summarizing the main achievements achieved in the extension method, the following should be noted. The paper shows that, from the point of view of careful use of the tools of financial mathematics, in order to obtain accurate values of the capitalization rate, one should not add the risks that determine it among themselves, but use the corresponding the equation of returns in the form of Trifonov's four- or three-parameter formulae. The resulting gain in the accuracy of valuation depends on the property parameters and can reach a significant magnitude.

The application of the build-up method in the advanced form will allow for more accurate property valuation, especially in countries where the market is opaque or where is not a lot of activity. The departure from the original version of the build-up method with empirical "justification", which after more than 30 years of application has become almost universally accepted, indicates a certain maturity of the valuation theory and will allow more effective appraisal of property, such as capital real estate or business.

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