WACC in Commercial Real Estate Valuation

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Contents

Introduction

Commercial real estate valuation is a demanding process and one of its key elements is determining the rate of return. Depending on the adopted model and valuation technique, it will be the discount rate or the capitalization rate.

I believe that the best methods to determine rates of return for the purposes of real estate valuations are solutions based on the study of market evidence, i.e. data on sales transactions of similar properties. However, frequently this is not possible due to the local real estate market situation. In this case, valuers often use alternative methods such as additive method. Generally speaking, this method consists in determining the risk-free rate and increasing it by the risks associated with investing in the valued real estate. My research shows that real estate valuers in Poland most often assess these risks based on their own knowledge and market insight. Therefore, the disadvantage of this method is its subjectivity.

Another solution, which in my view is more objective, is to use the methods of determining discount rates used in business valuation. Such methods include the Weighted Average Cost of Capital (WACC). An additional objective is to present a proposal to adjust the WACC to the discount rate appropriate for the commercial real estate valuation – the proposal to convert WACC into a discount rate and a capitalization rate used in the valuation of real estate.

The author of this book is a real estate valuer and a researcher. In building the model described here, I tried to take into account the results of my scientific research as well as experience from business practice.

The book is addressed to people professionally involved in real estate valuation, therefore, the basics of commercial real estate valuation are not explained here.

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1. The concept of determining the discount rate using the WACC formula

From the point of view of the objectives of this study, the models of determining the discount rate used in the assessment of investment profitability and in the valuation of enterprises are particularly important. They include:

- weighted average cost of capital – WACC,
- capital asset pricing model – CAPM.

In the further part of the study, a model for calculating the discount rate for the purposes of real estate valuation based on the WACC is presented. However, determining the weighted average cost of capital also requires determining the CAPM. For this reason, both of the above-mentioned methods of calculating the discount rate are characterized below.

1.1 Specifics of determining the discount rate using the capital asset pricing model

The capital asset pricing model as a method for determining the discount rate used in enterprise valuation and assessment of tangible investments is widely described in the subject literature and has been recognized by economists[1].

Determining the discount rate using the CAPM model comes down to using the following formula:

$$CAPM = R_f + \beta_i(R_m - R_f) \qquad [1]$$

where:

CAPM – discount rate,

R_f – rate of return on the risk-free asset,

R_m – expected rate of return on the market portfolio,

$(R_m - R_f)$ – market risk premium,

β_i – beta coefficient of equity.

The CAPM, therefore, requires obtaining a series of data. The entire formula is based on the assumption that the rate used to assess the profitability of an investment (and determine its value accordingly) should exceed the rate of return on a risk-free asset. The risk-

[1] See, among others: A. Damodaran , *Corporate Finance…,* p. 314; *Mergers…* , ed. W. Frąckowiak, p. 311; K. Jajuga, T. Jajuga, *Investments, Financial Instruments…*, p. 337, K. Marcinek, *Financial Assessment of Investments…*, pp. 109–110; M. Sierpiński, T. Jachna, *Methods of Making Financial Decisions. Analysis of Examples and Cases,* PWN, Warsaw 2007, p. 397, M. Jerzemowska , *Shaping the Capital Structure in Joint-Stock Companies*, PWN Scientific Publishing House, Warsaw 1999, pp. 38–51; W. Tarczyński, *Capital Markets. Quantitative Methods. Part II* , Placet, Warsaw 1997, p. 122; K. Kowalke, *Fundamental analysis – use on the stock market in Poland* , CeDeWe , Warsaw 2016, p. 93.

free rate is usually assumed to be the yield on treasury bonds, considering these assets to be the safest, and therefore providing the possibility of obtaining a rate of return expressing the lowest degree of risk. An interesting alternative is the risk-free rate determined on the basis of a survey by P. Fernandez for individual countries [2]. P. Fernandez does not indicate the time horizon for which the rate in question is given, however, the rate is intended to determine the cost of equity used for the valuation of companies.

Another element of the formula that requires estimation is the risk premium. In the concept of estimating the discount rate presented by A. Damodaran, the premium expresses the risk assigned to a specific country [3]. A similar approach is presented by P. Fernandez [4]. A. Damodaran makes the risk premium dependent on the rating of a given country, given by agencies such as Standard & Poor's or Moody's [5]. P. Fernandez, on the other hand, determines the premium based on a survey conducted among scientists, analysts and company managers.

At the stage of determining the risk premium, there is no differentiation of risk by the sector in which the investment is to operate. A sector risk is taken into account by adopting the appropriate beta coefficient.

In the case of company valuation, the beta coefficient is also called the systematic risk coefficient for a given company. It is then treated as "(...) a measure of the risk of a given security against the risk of the market portfolio" (formula 2) [6]. In order to estimate the beta coefficient value for shares of companies listed on the stock exchange, a comparison of the change in the prices of given shares with the price changes on the entire market should be made (e.g. by comparing to indices illustrating changes in the stock exchange). In statistical terms, this will be the regression line of returns on shares compared to the stock exchange index [7].

$$\beta = \frac{cov(r_i, r_m)}{\delta^2(r_m)} \qquad [2]$$

where:

$cov(r_i, r_m)$– covariance of the rate of return on (r_i) a security and the rate of return of the market portfolio (r_m),

[2]P. Fernandez, V. Pershin, IF Acin , *Discount Rate (Risk-Free Rate and Market Risk Premium) Used for 41 Countries in 2017: a Survey* , IESE Business School, University of Navarra, Madrid 2017, pp. 3–4.

[3]A. Damodaran presents the results of his research on the website: http://pages.stern.nyu.edu/~adamodar/.

[4]P. Fernandez, V. Pershin, IF Acin , *Discount Rate…* , p. 3.

[5]A. Damodaran , *Corporate Finance…,* p. 323.

[6] *Mergers…* , ed. W. Frąckowiak, p. 316.

[7]A. Damodaran , *Valuation…* , p. 50.

$\delta^2(r_m)$– variance of the rate of return on the market portfolio.

A. Damodaran points out that the estimated values of the beta coefficient based on historical data are not very precise (statistical error must be taken into account). The author proposes using the beta coefficient for the entire sector. According to A. Damodaran, the beta coefficient in the sectoral approach is more precise than the model based on regression analysis, because averaging many beta indicators allows averaging the errors occurring in the estimates [8].

The beta coefficient can take the following values:

βi = 1 – the risk of investing in specific assets is comparable to the general level (risk premium unchanged),

βi > 1 – the risk of investing in specific assets is higher than the market level (higher risk premium),

βi < 1 – the risk of investing in specific assets is lower than the market level (lower risk premium).

The beta coefficient reflects the total risk of a given security or sector. This risk consists of operational risk and financial risk resulting primarily from the level of debt that has impact on the capital structure. In a situation where the capital structure in a company or similar companies (sector) is different than in the valued company, it is necessary to un-lever[9] the beta coefficient, sometimes called cleansing from financial risk [10].

Using the formula for the levered beta coefficient (the so-called Hamond formula)[11] (formula 3), one can derive the formula for the unlevered beta (formula 4).

$$\beta_L = \beta_U \cdot \left[1 + (1 - t) \cdot \frac{D}{E}\right] \qquad [3]$$

where:

β_L – levered beta coefficient,

β_U – unlevered beta coefficient (without leverage),

t – income tax rate,

D/E – debt to equity ratio (debt to equity).

$$\beta_U = \frac{\beta_U}{1+(1-t)\cdot\frac{D}{E}} \qquad [4]$$

[8] *Ibidem* .

[9] A. Damodaran , *Corporate Finance…,* p. 1177.

[10] *Mergers…* , ed. W. Frąckowiak, p. 317.

[11] A. Damodaran , *Corporate Finance…,* p. 339.

A. Damodaran publishes beta indicators (levered and unlevered) estimated for individual sectors, divided into world regions (e.g. Europe) and globally. Additionally, A. Damodaran's data also contain information on the average debt-equity ratio of companies from individual sectors [12]. It should be noted that the formula for levered beta, in addition to other components, also includes the income tax rate, which is different in individual countries.

As already indicated, the CAPM is usually necessary to determine the weighted average cost of capital.

1.2 Specifics of determining the discount rate using the weighted average cost of capital formula

Similarly to the CAPM model, the weighted average cost of capital as a method for determining the discount rate used in enterprise valuation and in assessing the profitability of investments is also described in the subject literature [13].

The weighted average cost of capital requires taking into account both the cost of equity and the cost of debt capital. The general formula for determining the WACC is as follows:

$$WACC = \frac{D}{D+E} \cdot R_d \cdot (1 - t_c) + \frac{E}{D+E} \cdot R_e \qquad [5]$$

where:

D – market value of debt,

E – market value of equity,

R_d – cost of debt,

R_e – cost of equity capital,

t_c – income tax rate.

The formula requires determining the share of debt in financing the investment, which is expressed as the quotient $\frac{D}{D+E}$and the share of equity, respectively. For the purposes of enterprise valuation, a constant, optimal financing structure is often assumed throughout the forecast period [14].

[12]http://pages.stern.nyu.edu/~adamodar/; 2017-05-02.

[13] See, among others: A. Damodaran , *Corporate finance…,* p. 314; *Mergers…* , ed. W. Frąckowiak, p. 311; K. Marcinek, *Financial assessment of investments…* , p. 110; M. Sierpiński, T. Jachna, *Decision-making methods…,* p. 397; K. Jajuga, T. Jajuga, *Investments, financial instruments…* , p. 337; M. Jerzemowska , *Shaping the capital structure…* , pp. 38–51; W. Tarczyński, *Capital markets…* , p. 122; K. Kowalke, *Fundamental analysis…* , p. 93.

[14] *Mergers…* , ed. W. Frąckowiak, p. 311.

The cost of debt capital determined for the purposes of enterprise valuation is most often expressed in the form of current interest or yield on quoted debt securities of the enterprise [15]. An alternative solution is indicated by A. Damodaran, who makes the cost of debt dependent on the interest rate on treasury bonds increased by an appropriate risk premium. He makes the risk premium dependent on the rating assigned to the valued company, which may result from the debt coverage ratio [16].

In the WACC formula, the cost of debt (foreign capital) is reduced by the benefits resulting from the tax shield created by financial costs (e.g. interest on a loan). The cost of equity should correspond to the rate determined using the CAPM [17].

To sum up the above, it should be stated that determining the discount rate using the WACC and CAPM formulas requires a lot of information, primarily from the capital market. Obtaining them requires analyzing many often difficult-to-access data, which can undoubtedly be a barrier to the application of these methods. Currently, economists, conducting and publishing the results of cyclical capital market studies of most countries in the world, have increased access to the necessary data, and thus, it seems, have contributed to the popularization of these methods.

As already indicated, in the case of limited market data is impossible to determine rates of return directly from similar real estate transactions, therefore, other methods based on risk assessment gain in importance. This study attempts to develop a model for determining the discount rate for the purposes of real estate valuation using the weighted average cost of capital (WACC) formula.

In the subject literature and in practice, as referred to above, it is indicated that both CAPM [18]and WACC can be used in real estate valuation [19].

In my opinion, the WACC is a much better solution. As stated before, both methods are used to determine discount rates used in the valuation of companies and the assessment of the profitability of investments. This also applies to companies from the real estate sector and investments in commercial real estate [20]. However, these rates are used to determine

[15] *Ibidem* , p. 314.

[16]A. Damodaran *, Corporate Finance…,* p. 353.

[17] *Mergers…* , ed. W. Frąckowiak, p. 315.

[18]See: A. Baum, N. Crosby *, Property Investment…* , p. 76; K. Jajuga, P. Cegielski, *Discount rate in real estate valuation, part V (last) – rates of return on the financial market* , "Nieruchomości CH Beck" 2004, vol. 3. Valuation…, ed. J. Hozer , p. 150; M. Prystupa , *Valuation of real estate and enterprises in the income approach* , ALMAMER, Warsaw 2008, pp. 150–151.

[19]See: GD Jude, DT Winkler, *The Capitalization Rate of Commercial Properties and Market Returns* , The Journal of Real Estate Research, No. 10/5, 1995, *European Standards Valuations 2016…* , p. 336; A. Baum, N. Crosby, *Property Investment…* , pp. 76–77.

[20]See: K. Marcinek, *Financial assessment of investments…* , pp. 109–111; J. Listkiewicz, S. Listkiewicz, P. Niedziółka, P. Szymczak, *Project implementation methods…* , pp. 35, 216, 229.

other categories of value. The rate determined using CAPM expresses the cost of equity capital and can be used to discount cash flows for equity (FCFE). In this case, the valuation result will express the value of equity (e.g. the value of the company after reducing by debt). On the other hand, the WACC includes both the cost of equity and the cost of debt capital and is used to discount cash flows for all capital providers (FCFF). The use of WACC implies the value of the asset being valued before debt service (e.g. the value of the company before debt reduction).

It is known that in practice, the valuation of real estate leads to determining its value before debt reduction. Even if the real estate is valued with a mortgage, the value of the debt is usually ignored. For this reason, a useful solution is the rate of return based on WACC, which enables us to determine the value before the debt is repaid.

GD Jude and DT Winkler attempted to derive a formula for determining the capitalization rate taking into account WACC already in 1995 [21], but their solution ignored many key issues, such as the principle of proportionality, differences in asset liquidity, or the specific risk of the valued real estate. It can be said that all these issues were reduced to one factor defined as the growth rate referred to as "g", which in its essence, as the authors themselves indicated, serves to transform the discount rate into the capitalization rate. The issue therefore remains unresolved.

Below, an attempt is made to apply WACC to real estate valuation, assuming that there is a relationship between the value of the company and the value of the commercial real estate. The justification for this reasoning is the practice of using so-called special purpose vehicles for real estate investment purposes. Special purpose vehicles are used by both developers and investors who invest capital in already operated real estate [22]. Such companies play an ownership role in relation to the real estate. They cannot undertake any other activities apart from those related to the real estate that constitutes its assets (such requirements are imposed by, among others, the bank granting the loan). As a rule, the assets of a company are one real estate (e.g. a shopping mall). The owner of such an enterprise (e.g. a shareholder in a limited liability company), when deciding to exit the investment, may sell the enterprise (the company owns the real estate) or the real estate itself, and then liquidate the enterprise. If the only asset of the enterprise is commercial real estate (e.g. an office building generating income from rent), its value is determined by the value of the real estate. Both business and real estate valuations use methods based on discounting cash flows. Therefore, if there is a relationship between the values of the company and the real estate, it

[21] GD Jude, DT Winkler, *The Capitalization Rate…* , p. 512.

[22]See, among others: A. Wojewnik-Filipkowska, *Project Finance in financing real estate investments – advantages and disadvantages of a special purpose vehicle* , "Świat Nieruchomości" 2004, No. 4 (66), p. 11; D. Trojanowski, G. Mikołajczyk, *Financing investment projects on the commercial real estate market based on Project Finance (experience of a development company)* [in:] *Investments and real estate. Decision-making procedures, Financing, Risk* , ed. K. Dziworska, E. Ostrowska, University of Gdańsk Publishing House, Gdańsk 2000.

is possible to build a valuation model using methods appropriate for business valuation and derive a formula for real estate valuation.

The above-mentioned purpose requires indicating the differences between the value of the enterprise and the value of the real estate, or more precisely – between the components of the assets that these categories include. Thus, the value of the enterprise includes, among others: land, buildings and structures, machines and equipment, working capital, cash surpluses and unnecessary assets. In turn, the value of the real estate includes, in particular: land, buildings and structures, machines and equipment permanently connected with the real estate.

Table 1. Main components of assets covered by the value of the enterprise and the value of real estate

Type of value	**Enterprise Value (before debt reduction)**	**Real Estate Value**
Components of the assets	Ground Buildings and structures Machines and equipment Working capital Surplus cash Redundant assets	Ground Buildings and structures Machines and devices permanently connected with real estate

Source: own study.

This means that the value of the company, unlike the value of real estate, includes all machinery and equipment, redundant assets (non-operating assets) and working capital and cash surpluses. As a result of applying the discounted cash flow (DCF) method to determine the value of the company and using the rate designated as the weighted average cost of capital, the value of the company before debt service will be obtained. To this value determined, the cash that the company has and the value of non-operating assets are added [23]. This part of the company's assets is therefore not included directly in the value resulting from discounted cash flows. Consequently, there is no need to make a correction in the real estate valuation account maintained using the rate based on WACC.

A special purpose vehicle, as mentioned earlier, usually has no other assets than a real estate. All machinery and equipment in most situations are components of the real estate. Such companies usually employ only the management, and all activities necessary to service the real estate and tenants are outsourced. Working capital in such a specific enterprise will therefore not include, for example, inventories. Typical lease agreements (in Poland) stipulate monthly rents paid in advance. Hence, the company, as the owner of the rented real estate, has cash at the beginning of each month that can be used to service liabilities. It should be noted that in the case of the sale of a special purpose vehicle, as well as the sale of a real estate, both receivables and current liabilities are transferred to the new owner.

[23] See A. Damodaran , *Corporate Finance…,* pp. 1167–1168.

To sum up the above, it can be stated that there is no need to make adjustments due to the differences between the components of the assets included in the real estate and the special purpose vehicle. However, it should be remembered that during the valuation, the final value of the company, understood as the value of equity, will be increased by the cash that will remain in the company and decreased by the debt that burdens it. In the case of determining the value of a real estate, such adjustments are not made.

Based on the findings and explanations provided so far, a procedure for determining the discount rate for real estate valuation using the WACC formula can be proposed. It is divided into four main stages:

1. Determination of the CAPM for investments in real estate companies.

2. Determination of WACC for investments in real estate enterprises.

3. Adjusting the WACC rate to the real estate valuation.

4. Taking into account the specific risk of the real estate being valued.

The rest of the book discusses the actions that must be taken at each stage of the procedure.

The development of the procedure required the adoption of certain assumptions:

1. In real estate valuation, one constant rate is used to discount operating income for all periods covered by the forecast [24]. Therefore, the specified discount rate should be an average value for all forecast periods. The risks included in it should refer to a long period, which is justified by classifying real estate as a long-term investment [25].
2. The discount rate should take into account the current state of the market and investors' current expectations about the future.

In accordance with the adopted course of action, the attention was focused, first of all, on determining the CAPM for investments in the real estate sector.

[24]In business valuation practice, different discount rate values are sometimes adopted for individual projection periods (variable rate).

[25]See, among others, K. Jajuga, P. Cegielski, *Discount rate in real estate valuation, part III…* , p. 35.

2 Determination of CAPM for real estate investments

To determine the CAPM for real estate investments, it is necessary to estimate the risk-free rate, the beta coefficient and the risk premium.

The specific elements of the CAPM model should be defined one by one. The formula for defining the CAPM is presented above, in section 1.1 of this book.

2.1 Risk-free rate

The risk-free rate should reflect the long time horizon of real estate investment. It should also take into account current investor assessments of future risk changes. In the opinion of the author of this study the currently justified solution is to adopt the yield on 10-year treasury bonds as the risk-free rate. It is important to take into account the yield, not the interest rate. This is because the yield will include investors' expectations regarding the future. The interest rate is, in a way, imposed by the issuer. The yield on 10-year treasury bonds is used to examine one of the convergence criteria established in Maastricht [26]. This results in the need for the State Treasury to issue such bonds in order to ensure the possibility of conducting the assessment. This is an additional argument in favour of adopting the yield on such bonds as the risk-free rate for European countries (bonds of this type are issued systematically). Moreover, in practice, the yield on real estate investments is often compared with the yield on 10-year treasury bonds [27].

Many publications provide gross and net yields on treasury bonds. Net yields express the rate of return reduced by capital gains tax. The income generated by a company in the form of dividends is also subject to taxation. For this reason, gross yields should be used to determine the discount rate. The yields on 10-year treasury bonds issued by individual European Union member states are published, among others, on the websites of central banks and the European Central Bank.

2.2 Beta Coefficient

2.2.1 Sector beta

Like S. Listkiewicz, the author of this study expresses the view that the beta coefficient is in practice the most difficult parameter to determine in the CAPM model [28]. This results from the laboriousness of the estimates, the wide range of input data and the difficulty in accessing information. For this reason, it is necessary to use the data containing beta coefficients for individual sectors, which are published on A. Damodaran 's website [29]. They

[26] Ł. Jabłoński, *Human capital and economic convergence* , CHBeck , Warsaw 2012, p. 18.

[27] See among others *International Property Handbook: 2017 trends and a look back at 2016* , Deloitte, 2017, p. 19.

[28] J. Listkiewicz, S. Listkiewicz, P. Niedziółka, P. Szymczak, *Project implementation methods…* , p. 220.

[29] http://pages.stern.nyu.edu/~adamodar/.

also concern companies belonging to the real estate sector listed on European stock exchanges. Given that we look for the beta that takes into account the specifics of the real estate market, a review of the data developed by A. Damodaran was made. Among the analyzed sectors, one can find groups of companies related to the real estate market, i.e. housing developers, real estate funds – REITs, commercial developers, companies with diversified activities on the real estate market and companies dealing with real estate market services. The groups and selected Polish companies included in these groups are presented in Table 2.

Table 2. Groups of real estate companies listed on European stock exchanges included in A. Damodaran's research

Activities of companies (groups)	**Number of companies listed on European stock exchanges included in the research**	**Examples of Polish companies included in the research**	**Activities and selected risks of companies included in the group**
Home building	46	Dom Development SA, JHM Development SA, Robyg SA	Development activity, risks associated with real estate development.
REIT	126	Lack	Investment activity on the real estate market, risks related to the operational activity of the real estate in use, to a lesser extent, risks related to the development of real estate
Real estate development	59	JW Construction Holding SA, Polnord SA, Rank Progress SA	Development activity, risks associated with real estate development.
Real estate general / diversified	70	Czerwona Torebka SA, Efekt Economic Corporation SA, MLP Group SA, LC Corp SA, Kleba Invest SA	Development activity, investment activity on the real estate market, activities not related to the real estate market, risks related to real estate development, real estate operating activities, risks not related to the real estate market.
Real estate operations & services	207	Emmerson Realty SA, Partner-Nieruchomości SA, Property Lease Fund SA	Real estate brokerage activity, debt financing of real estate, risks related to real estate service activities.

Source: own study based on data from : http://pages.stern.nyu.edu/~adamodar/; May 2, 2017.

The estimated discount rate applies to the commercial real estate that generates or can generate income. They are, therefore, in a state of development that enables their owners

to earn profits from operating them. Companies conducting development activities are burdened with the risk of real estate development (the risk of project preparation and implementation). Although developers often keep completed projects in their assets and earn profits from their operation, the risks that affect their activities differ significantly from those taken by the owners of properties already in use. Therefore, beta coefficients resulting from the prices of shares of development companies have limited usefulness for determining discount rates for valuing real estate in the income approach [30]. Companies dealing with real estate services should also be excluded from the available business groups. The risk of their activities refers to services such as brokerage and real estate management and does not directly translate into the risk associated with investing in real estate. That being the case, the available business groups comprise companies conducting various forms of activities related to real estate and real estate funds (REITs). The overview of companies that are included in the group called *real estate general / diversified* indicates that there are companies that own commercial real estate and gain profit from rents, but also others, including those that deal exclusively with development activities or those for which investing in real estate is one of many forms of business activity. On the other hand, real estate funds - REITs (*real estate investment trust*) are entities investing in real estate, but they are subject to special regulations. REITs "(...) are special purpose companies or investment funds established to invest in the commercial real estate market for rent. They operate on the basis of special regulations and take advantage of tax preferences granted by a given country" [31]. U. Gierałtowska and E. Putek -Szeląg define REITs as "(...) special purpose companies that buy real estate and issue securities on the basis of the accumulated capital, and pay dividends to investors" [32]. In the authors' opinion, investments in REITs are "(...) safer than other financial instruments due to the structure of income, the source of which are rents and long-term rental of commercial, office or service space" [33]. G. Mizerski presents a broader definition and explains that "(...) *Real Estate Investment Trusts* (REITs) are investment vehicles operating on the real estate market characterized by unique attributes that distinguish them from other common forms of business activity. REITs are corporations, trusts or associations established for the purpose of purchasing and managing commercial real estate. These entities may be exempt from corporate income tax (*pass -through organisation*). However, this exemption is only possible in the case of payment of a specified level of profit in the form of a dividend" [34]. REITs usually invest in real estate that is being used. In some countries, they can also invest

[30]Beta indicators for a group of development companies may be useful for the purposes of applying the residual method for valuing development properties.

[31] *What REITs will change on the Polish commercial real estate market.* EY report summary, Warsaw 2017, p. 4.

[32]U. Gierałtowska, E. Putek -Szeląg, *Indirect investing in real estate market* , "Scientific Papers of the Faculty of Economics and Management of the University of Szczecin. Finance, Financial Markets, Insurance" 2015, no. 75, p. 164.

[33] *Ibidem.*

[34]G. Mizerski, *Real Estate Investments Trusts (REITs) – effective investing in the real estate market* , CeDEWu , Warsaw 2016, pp. 63–64.

capital in development real estate (development projects). However, such investments are significantly limited [35]. REITs can also grant mortgage loans or invest in debt securities secured by mortgages on real estate. The activity of so-called mortgage REITs will also be related to the risk of the real estate market by linking the value of the shares of such an entity to the market value of loans and bonds held by it. This in turn will depend on the value of the real estate that constitutes their mortgage backed.

The selection of the appropriate group of companies is primarily intended to provide the most accurate indication of the beta coefficient for the purposes of determining the discount rate in the commercial real estate valuation process. Generally speaking, this coefficient should characterize the risk of a given sector in relation to the average of various sectors in which listed companies operate.

From the discussion so far, it appears that development and real estate management companies should be excluded from further considerations. In turn, companies belonging to the group *real estate general/diversified* operate on very different markets (including non-real estate markets, table 2). For this reason, often the risk of these companies' operations will not be correlated with the risk of the real estate market.

Considering the activities of REITs, it can be assumed that the risk associated with investing in shares of such entities will be related to the risk of the commercial real estate market. However, the specificity of REIT activities requires some commentary.

In most countries that have regulations for REIT operations, a mandatory annual level of payments from the profit generated by the funds (usually at the level of 80-85%) in the form of a dividend has been introduced [36]. Thus, investing in shares of such a specific fund is similar to a direct investment in commercial real estate, in the case of which the owner also receives periodic income resulting from rents paid by tenants.

Also, the income tax exemptions that REITs are subject to are intended to equalize the tax treatment of investors purchasing real estate (direct investments) and those purchasing shares in a REIT fund (indirect investments). An entity directly investing in real estate will usually pay income tax on the profit generated by the asset held only once. In turn, in the case of investing in shares of a special purpose vehicle, income tax (in the absence of exemptions) will be paid twice: once by the company on the profit generated, and then by the investor (shareholder) on the capital gain in the form of dividends. Hence, it can be assumed that due to tax exemptions, investing in REIT shares is similar to direct investment in real estate.

As already indicated above, in selected countries REITs can also invest in development projects, but to a limited extent, which results in their low share in the funds' investment portfolios [37].

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[35] More on this topic is written by G. Mizerski, *Real Estate Investments Trusts (REITs)...* , pp. 258–265.

[36] *What will REITs change on the Polish market…* , p. 2.

[37] G. Mizerski *, Real Estate Investments Trusts (REITs)...* , pp. 264–265.

It should be noted that not all EU countries have regulations that allow this type of fund to operate. Poland is one of these countries, while in Germany REITs have been operating since 2007. Although there are no typical Polish REITs yet, foreign entities of this type also invest in the Polish real estate market [38]. Therefore, the risk of the Polish real estate market is also represented in the beta indicator determined by A. Damodaran for European REITs.

To sum up the above, it should be stated that of all available groups of companies, only REITs will relatively most accurately reflect the risk associated with the real estate sector [39]. An additional justification for adopting data from REITs for further calculations is also a significant number of observations taken into account by A. Damodaran (in 2024, these were 142 entities listed on European stock exchanges).

2.2.2 Unlevered and levered beta

The data provided by A. Damadorana contain information on various indicators used in estimating the cost of capital, specified for individual groups of companies (sectors) divided into geographical regions (such as: US, Europe, Japan, Emerging Markets , Global) [40].

A. Damodaran provides values of sector beta coefficients for levered and unlevered [41]. As indicated earlier, levered beta takes into account operational risk and financial risk. If the debt structure used to estimate sector beta differs from the debt structure of the company being valued, then the unlevered beta should be re-levered taking into account the debt structure of the company being valued. In the case of adapting the beta coefficient to estimate the discount rate for the purposes of real estate valuation, the appropriate solution seems to be to adopt the optimal financing structure (the average of all companies examined), i.e. the one that is already included in the levered beta provided by A. Damodaran. One of the components of formula 3 (levered beta formula) is the corporate income tax rate, which in the beta provided by A. Damodaran is included as an average tax value, calculated for companies operating in different countries (e.g. European countries). In the case of REITs, there is an additional problem of income tax exemptions, which was described above. It is

[38]Foreign institutional investors investing their capital in the Polish real estate market are discussed by, among others: U. Gierałtowska, *REIT Funds – World Experiences and the Polish Market* , "Zeszyty Naukowe Wydziału Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego. Finanse, Rynek Finansowe, Ubezpieczenia" 2017, no. 2(86), p. 444; *Investments in the Real Estate Market* , ed. H. Henzel , Akademia Ekonomiczna w Katowice, Katowice 2004, p. 54; *International Property Handbook …* , p. 19.

[39]However, this is not a perfect fit, among other things, due to the development activities conducted by some REITs, which carry different risks than investing in operated real estate.

[40] In A. Damodaran's data, the so-called total beta is also indicated . *Total* beta reflects not only market risk, but also company-specific risk. It is recommended to use total beta for the valuation of unlisted, low-liquidity companies (A. Damodaran , *Corporate finance…,* pp. 350–351). The use of this indicator to determine the discount rate used for real estate valuation implies values that significantly differ from the market levels of discount rates used by property valuers in e.g. Poland. It also does not meet the input assumptions adopted for the study.

[41]Explanations and formulas of the indicators are presented in Chapter 4 of this study.

known that the estimated discount rate should be used for the valuation of real estate in e.g. Poland and that it should refer to FCFE, determined taking into account taxes paid according to the local regulations. For this reason, it is necessary to adopt the unlevered beta from A. Damodaran's data and re-lever it using the optimal debt structure and the CIT (*corporate income tax) rate* binding in the country where the real estate being valued is located.

2.3 Risk premium

Another important parameter in the real estate valuation process is the risk premium, which is the excess between the rate on risky assets, such as shares of companies listed on stock exchanges, and the risk-free rate. The risk premium should be adopted for the country in which the company / real estate being valued operates.

A. Damodaran makes the amount of the premium dependent on the ratings assigned to a given country (Treasury bonds). The starting level is the market premium for a country with a mature economy, such as the USA. The premium for the USA can be calculated based on historical data as the difference between the yield on shares listed on the stock exchange (measured by the change in the index) and the yield on Treasury bonds (risk-free rate). This premium is increased accordingly for countries that are characterized by a higher risk than the USA. The risk of a given country can be calculated as the difference (*spread*) between the yield on Treasury bonds of a given country denominated in USD (or EUR) and US Treasury bonds [42]. Another solution is to obtain information on CDS [43]spreads for a given country. In the absence of data for a given country, the average value of the spread for other countries in the same rating class should be assumed. Additionally, A. Damodaran takes into account the relative volatility of equity, which is calculated according to formula 6[44].

$$R_{zkw} = \frac{SD_A}{SD_O} \qquad [6]$$

where:

R_{zkw} – relative volatility of equity,

SD_A – standard deviation of the stock market in a given country,

SD_O – standard deviation of the long-term bond market in a given country.

A. Damodaran assumes one averaged index of relative volatility of equity calculated for all countries based on the standard deviation of the *S&P Emerging BMI index value* , reflecting the stock prices of public companies on emerging markets (SD_A) and the standard

[42] A. Damodaran , *Corporate Finance…,* p. 323.

[43]CDS (*credit default swap) default swap) – swap* contracts are classified as credit derivatives. In this contract, one party (A) pays a fixed premium to the other party (B) at regular intervals. In turn, party B pays a fixed sum of money in the event of a credit event causing a loss to party A due to non-payment of obligations by a third party. CDS may apply to debt instruments, such as treasury bonds. A. Damodaran , *Corporate Finance…,* p. 68.

[44] A. Damodaran , *Corporate Finance…,* p. 323.

deviation for *the BofA Merrill Lynch Public Sector* index value *US Emerging Issuers Markets*, relating to the yields on government bonds of countries classified as emerging markets (EM).

Finally, the risk premium is calculated using formula 7.

$$(\mathrm{Rm} - \mathrm{Rf}) = P_{USA} + P_K \cdot R_{zkw} \qquad [7]$$

where:

(Rm – Rf) – risk premium,

P_{USA} – risk premium for a country with a mature economy,

P_K – risk premium of a given country.

As already indicated, the alternative to A. Damodaran's data is the results of P. Fernandez's research.

Due to the need to maintain the consistency of all data for further calculations, I recommend adopting the risk premium indicated by A. Damodaran.

The next stage of determining the discount rate in accordance with the proposed procedure is to determine the WACC for investments in real estate enterprises.

3. Determination of WACC for real estate investments

The weighted average cost of capital (WACC) is expressed by formula 5. It requires determining the cost of debt and capital structure. The method of determining individual parameters is described below. The formula to calculate WACC also includes a parameter called the cost of equity. However, it does not require additional determination, because it will be expressed by the CAPM value, discussed above.

3.1 Cost of debt

Determining the long-term cost is possible using various solutions discussed below, such as:

- corporate bond yields,
- mortgage interest rates,
- determination of the ratio of debt capital to equity capital based on A. Damodaran's data .

When determining WACC for the valuation of a specific company, it is justified to assume the cost of debt as the yield on corporate bonds issued by the company being valued. The ideal solution would be the yield on long-term (e.g. 10-year) bonds with a fixed interest rate. Such a rate will express both the current cost of obtaining debt for the company and the expectations of investors (buyers of bonds) regarding the risk associated with the repayment of debt by the company in the future.

In the case of determining the discount rate for real estate valuation, one should not base it on a specific company. It would be more appropriate to make use of the data on the yields on corporate bonds issued by the companies whose purpose is to finance the purchase of commercial real estate. In many European countries, access to this type of data is insufficient (e.g. in Poland).

Another way to determine the cost of debt capital is to refer to the cost of loans granted for investments in commercial real estate. Loan costs are primarily determined by the interest rate and commission. The interest rate in Polish conditions is most often set as a variable rate. As a rule, the interest rate consists of two elements: a fixed margin and a variable base rate, which in the case of PLN loans is based on WIBOR [45], and in the case of EURO loans is based on EURIBOR. While the loan margin includes current and future risks related to the financed asset, the variable WIBOR/EURIBOR includes current risks. The bank as a lending entity does not have to consider the level that WIBOR/EURIBOR will reach in the future, because under the conditions stipulated in the loan agreement this rate will be adjusted to the market levels at which it can borrow money from another bank.

[45]WIBOR (*Warsaw Interbank Offered Rate*) – the average interest rate on deposits on the interbank market; K. Jajuga, T. Jajuga, *Investments, financial instruments…* , p. 26.

As I have previously indicated, the discount rate used to value a real estate is a fixed rate for the entire projection period. This means that a base rate such as WIBOR or EURIBOR does not meet the required assumptions, because it generally takes into account only the current market assessment and ignores the risk of volatility that will occur in the future.

It is therefore necessary to look for another solution that eliminates the disadvantages of the variable rate. One solution would be to adopt the average WIBOR or EURIBOR rate from current forecasts for the coming years. Such forecasts are provided by central banks for 3 years ahead [46]. This is a short period, considering the time horizon of investing in real estate and financing it. Another solution is to base the rate on the interest rate swap[47]. This type of contract is used to exchange a variable rate for a fixed rate. When granting a loan with a fixed interest rate, banks set the interest rate based on the IRS interest rate. IRS quotations are provided on Internet portals, in reports published by banks and financial information services.

The level of margins and commissions [48]applied by banks for investment loans (granted to finance the purchase of commercial real estate) should be obtained from direct analyses or reports of consulting companies [49]. Currently, banks in Poland offer loans with margins from 1.5 to 3%, while in Germany from 1 to 2%. The bank (preparatory) commission is required at the level of 1 to 2% in Poland and from 0.5% to 1% in Germany.

While the loan margin can be added directly to the interest rate resulting from the IRS quotations, the commission, as a one-time fee, should be added as an average value spread over the loan repayment period [50].

The easiest and most effective solution for determining the cost of debt capital seems to be using A. Damodaran's calculations. In addition to a number of data contained on the website, Damodaran places information on the determined average CAPM rates (cost of debt capital) and the average cost of debt for individual sectors and regions. On this basis, it is therefore possible to calculate the relationship between the cost of debt capital and the cost of equity capital according to the formula presented below. When valuing investments/real estate, it is therefore necessary to calculate the cost of equity capital using the CAPM model, and then multiply the result by the established indicator determined by formula (8), transforming the current cost of equity capital into the cost of debt. This method has its drawbacks, the biggest of which is the timeliness of Damodaran's data in relation to the valuation date.

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[46]http://www.nbp.pl/home.aspx?f=/polityka_pieniezna/dokumenty/projekta_inflacji.html; 2017/07/19.

[47]The use of the IRS in financing real estate investments is discussed, among others, by K. Marcinek, *Finansowa recenzja inwestycje…* , pp. 83–84.

[48]In addition to the one-off commission, banks often apply additional commissions and fees that should also be taken into account when determining the cost of debt capital.

[49]E.g. *From the Lenders Perspective. Real Estate Financing in Poland* , JLL, Warsaw 2015.

[50]If the typical loan repayment period is 7 years, then at a commission of 2.5% the interest rate should be increased by 0.36%.

$$\frac{R_d}{R_e} \qquad [8]$$

Taking into account the cost of debt capital in the WACC also requires adopting an income tax rate that allows for mapping the benefits that the borrower receives from the tax shield, namely, interest on the loan. In this case, one should adopt the tax rate appropriate for corporate entities. Most special purpose vehicles are established in the form of a limited liability company and are subject to CIT. If changes in the income tax rate are forecasted, the formula should include an average value for the time horizon appropriate for real estate investments, e.g. 10 years.

To determine the appropriate capital weights in the WACC formula, their structure must be determined.

3.2 Capital structure

Capital structure comes down to determining the share of equity and debt in financing investments. Capital structure is used to determine the capital weights used in the WACC formula.

As a rule, when financing real estate investments, banks, when granting a loan, most often expect an LTV (*loan to value*) ratio [51]of up to 70% [52], and there are also loans set at 100% of the property value [53]. It should be noted that such a share of the loan in the financing of the investment will occur at the beginning of the repayment period. In subsequent periods, it will decrease with the repayment of the debt. The discount rate, as an average for the entire period covered by the forecast, should take into account the average debt status. A good solution that is the one that takes into account changing market conditions is to adopt the optimal debt structure provided by A. Damodaran . In the case under study, the share of debt in REIT capital for Europe should be assumed, adequately to the data used to determine the CAPM. The average debt (LTV) for REITs in Europe is also indicated by G. Mizerski [54]. Current data for LTV ratios for European funds are also provided by the European Public Real Estate

[51]LTV – an indicator used in assessing credit risk. It indicates the ratio of the loan value to the value of the property. *The Appraisal of Real…* , p. 506.

[52] *From the Lenders …* , p. 8.

[53]G. Główka, *The residential real estate financing system in Poland. Experiences and directions of changes* , Warsaw School of Economics, Warsaw 2012, p. 90.

[54]G. Mizerski, *Real Estate Investments Trusts (REITs)…* , p. 226.

Association (EPRA) [55]. Another way is to calculate the average debt over the period defined by the investment horizon for real estate [56].

In my opinion, the best solution is to adopt the optimal debt structure resulting from A. Damodaran's data for determining WACC. This is supported by the consistency of Damodaran's data with the data previously used to determine CAPM.

The next step in determining the discount rate is to adjust the WACC rate to the real estate valuation.

[55] www.epra.com , 3 June 2017.

[56] If in a given year the LTV typically required by banks is 70% and the loan amortization is 5% per year, the average debt over a 10-year period will be 48%.

4. Adjusting the WACC rate to the real estate valuation

The weighted average cost of capital (WACC), determined in accordance with the arrangements described above, will represent the rate for a diversified investor that can be applied to the valuation of a listed company investing in real estate. The rate determined in this way can be used to discount FCFF. Using WACC to value real estate therefore requires adjusting this rate in terms of:

- liquidity of assets,
- result categories in the valuation account.

Deriving the discount rate for the real estate market requires adjusting the WACC coefficient to the valuation of an object that is less liquid than the shares of companies listed on stock exchanges. The specialist literature on company valuation also notes the problem of liquidity in determining the value of companies not listed on regulated stock exchanges. W. Frąckowiak indicates that in the case of companies listed on a regulated stock exchange in the USA and sold on the over-the-counter market, the discount on value for low liquidity is about 25% [57]. On the other hand, S. Pratt indicates that when acquiring entire companies, the discount due to liquidity is between 10 and 25% [58]. A. Damodaran notes that "in practice, it is difficult to determine this discount in a measurable way - it is usually assumed in an arbitrary way, most often at the level of 25-30%" [59]. The author calls this discount level "standard". At the same time, A. Damodaran notes that "(...) a company whose assets are mainly real estate and securities for trading should have a lower discount related to the lack of liquidity than a company owning mainly factories and equipment" [60]. In practice, attention is also paid to the relationship between liquidity and the size of the company [61]. The larger the company, the lower the discount due to liquidity should be, and vice versa. The size of the discount due to this at the level of 25% is often used in business practice and recommended in the literature on the subject [62]. Calculating the discount due to liquidity is difficult even on markets as developed as the ones in the USA. For this reason, I propose adopting a standard discount at the level of 25-30% for European conditions. For typical commercial real estate (e.g. office buildings, shopping centers, warehouses, hotels) the discount should be lower, for non-standard real estate, e.g. of a manufacturing nature, the discount should be higher.

When estimating the value of an enterprise, the correction for low liquidity is applied at the end of the entire valuation process, reducing the value by the established discount rate.

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[57] *Mergers…* , ed. W. Frąckowiak, p. 371.

[58] SP Pratt, *Cost of Capital: Estimation and Applications* , 2nd ed., John Wiley & Sons, New Jersey 2002, p. 173.

[59] A. Damodaran , *Corporate Finance…,* pp. 1172–1173.

[60] *Ibidem,* p. 1173.

[61] Valuation book, *Global Rating* , Warsaw 2015, p. 7.

[62] B. Cornell, *Corporate Valuation: Tools for Effective Appraisal and Decision Making* , Business One Irwin, Homewood 1993, pp. 144–146, after: *Mergers …* , ed. W. Frąckowiak, p. 371.

Another solution is to translate the risk related to low liquidity into the discount rate. In this case, if we use a discount of 25%, the discount rate should be multiplied by the factor 1.25. This indicator will be further on referred to as W_{DP}.

As previously indicated, when determining the value of real estate, the valuation calculation comes down to determining the NOI. Therefore, the rate determined at the level of WACC should be adjusted precisely to the level of the resulting NOI. It is therefore necessary to determine the appropriate indicator that will reduce the rate determined by the WACC formula to the level of the result, which is NOI. If WACC is used to discount FCFF, and the discount rate r_{dw} is required to discount NOI, then it can be determined from proportions and is expressed by the formula [63]:

$$r_{dw} = \frac{WACC \cdot NOI}{FCFF} = WACC \cdot \frac{NOI}{FCFF} \qquad [9]$$

Thus, it can be assumed that the result adjustment index can be expressed by the following formula:

$$W_{DW} = \frac{NOI}{FCFF} \qquad [10]$$

The result adjustment factor can be determined by performing a full valuation calculation from NOI to FCFF and the obtained data will be applied to Formula 10.

The simulations conducted by the author for the conditions of the Polish real estate market show that this indicator should be in the range of 1.2 to 1.3.

Therefore, the formula for adapting the WACC used in the valuation of public companies to the valuation of real estate (r_{dn}) is as follows:

$$r_{dn} = WACC \cdot W_{DP} \cdot W_{DW} \qquad [11]$$

The discount rate defined in this way will express the average nominal discount rate for investments in the commercial real estate market in a given country. It should be noted that this rate will include the profitability and risk of investing in real estate, which may be of interest to investors such as REITs. Funds of this type operating in Europe have different specializations. The European Public Real Estate Association in its reports indicates the occurrence of REITs operating in particular in the office, retail, warehouse and residential markets[64]. A significant part of the funds does not have a specific specialization and is classified as diversified (multifunctional) entities. REITs also invest in more specialized properties, such as hotels, entertainment facilities, health care facilities or even forests[65]. However, typical

[63] A similar solution is indicated by M. Prystupa. M. Prystupa , *Real estate and enterprise valuation in the income approach* , ALMAMER, Warsaw 2008, p. 147.

[64] *Loan to Value* , European Public Real Estate Association, 2017, p. 46.

[65] G. Mizerski , *Real Estate Investments Trusts (REITs)...* , p. 193.

commercial properties prevail. Funds often have portfolios of properties also diversified in terms of location or standard of facilities.

It follows from the above that the rate determined by formula 11 must be adjusted to the specific risk of the real estate being valued.

5. Specific risks of the real estate being valued

As indicated above, the adjusted WACC represents the average [66]discount rate applicable to commercial real estate investments and takes into account both systematic and specific risks at an average level. The application of the rate to the valuation of a specific real estate requires taking into account its specific risks related in particular to:

- real estate market sector (type of market),
- general location,
- detailed location,
- standard (class),
- contract terms and quality of tenants (customers),
- technical condition of buildings.

The discount rate determined according to the principles described above will correspond to the average levels of specific risk, also within the above-mentioned categories. For example, to simplify, let's assume that in the office real estate sector we can distinguish facilities of class (standard) A, B or C, then the rate in question will express the risk appropriate for the average class, i.e. B. Therefore, a lower rate should be applied to the valuation of properties with better parameters (less risky), and a higher rate to properties with worse features.

Differentiation of rates in terms of individual specific risk categories requires analysis of various market data. Examples of risk differentiation are presented below. The analysis of market data should be carried out using the *ceteris paribus principle* (other things being equal), which is applied in property valuation using the comparative approach.[67]. In the further part of this work, the adjustment rate indicator expressed as WACC for the specific total risk of the valued real estate is referred to as W_{DSR}.

5.1 Real estate sector risk in the discount rate

The possibility of differentiating the discount rate by sector is provided by data on *prime capitalization rates* published by consulting companies or banks. Such reports are published quarterly or semi-annually and contain information on capitalization rates for the real estate market, most often for the office, retail, residential and warehouse sectors. As indicated above, these are the sectors in which REIT funds invest. The table below indicates the values of capitalization rates for 2023. Based on the data, the average value was

[66] The discount rate described here is different from the so-called *prime yield* , among others, that the *prime rate The yield* represents the level of profitability and risk appropriate for the best, least risky properties, while the discount rate described in this work represents the profitability and risk appropriate for properties with average, medium-sized characteristics.

[67] Data accepted for analysis should differ in the scope of the examined variable (feature), and the remaining features should be constant. M. Prystupa , *Real estate valuation using a comparative approach…* , p. 37.

determined as the middle of the range (max value plus min value divided by 2), and then the deviation of individual capitalization rates from this average.

Table 3. Capitalization rates for individual sectors in Poland along with deviations from their average value (Q2 2024)

Type	Yield	Deviation
Office	6.00%	0.00%
Shopping Center	6.25%	4.17%
Industrial	6.50%	8.33%
Residential	5.50%	-8.33%
Average (middle of the range)	**6.00%**	

Source: consulting firm and bank reports.

Similarly, it is possible to calculate the deviation for general location risk and tenant quality (see tables below).

Table 4. Capitalization rates for shopping centers for individual locations in Germany along with deviations from their average value (Q2 2024)

Type	Yield	Deviation
Berlin	5.00%	8.11%
Dusseldorf	5.00%	8.11%
Frankfurt	4.85%	4.86%
Hamburg	4.50%	-2.70%
Cologen	5.00%	8.11%
Munich	4.25%	-8.11%
Stuttgart	4.80%	3.78%
Average (middle of the range)	**4.63%**	

Source: consulting company reports.

Table 5. Capitalization rates for warehouses for individual types of lease agreements, tenant quality along with deviations from their average value

Type	Yield	Deviation
rate for lower quality contracts and tenants (extrapolation)	5,75%	9,52%
rate for standard contracts and tenants	5,25%	0,00%
rate for long-term contracts (10 years) and first-class tenants	4,75%	-9,52%
Average (middle of the range)	**5,25%**	

Source: consulting company reports.

Detailed localization risk is discussed 5.2.

5.2 Detailed location risk in the discount rate

Investors also differentiate risk based on detailed location, understood as location within a given city or region. In the case of the office building sector, the so-called central business area is often distinguished, which is the location most expected by tenants and investors. In this area, rents are the highest, and the investment risk is perceived as the lowest.

Rates of return on real estate are a derivative of the income that is obtained from them. Therefore, the differentiation of rent rates based on the detailed location is also reflected by the variability of rates of return. However, this reflection does not have to be direct, for which reason this type of solution will always be burdened with a certain error. However, in the absence of other reliable data, the solutions presented are one of the alternatives.

One possible solution is to divide office zones in a given location according to the criteria presented by consultants Rolfe Judd and CBRE [68]. Due to the location, the city area can be divided into three classes:

- A, i.e. prime locations, in the center of business districts, the most important and prestigious business parks. These locations must guarantee not only direct car access, but also excellent pedestrian access (from 5 to 7 minutes from a public transport hub) and access by at least two means of public transport. A characteristic feature of class A is the availability of a wide range of services in the vicinity;
- B, or secondary locations, on the outskirts of central districts or in post-industrial or office areas. This is a good location, providing efficient transport and access to services;
- C, i.e. other locations, not defined as class A or B.

The table below presents rents for the highest standard office space in the Tri-City, differentiated by location class, along with specific deviations from the median.

Table 6. The highest rents for office zones in Tricity in 2024 with deviations of their values (with the opposite sign) from the average

Type	Edge EUR/m2	- Deviation
Class A location	15.00	-7.14%
Class B location	14.00	0.00%
Class C location	13.00	7.14%
Average (middle of the range)	**14.00**	

Source: own study.

The application of the differentiation of rates of return resulting from the detailed location established on the basis of rent rates for individual zones requires a change of sign. The best location has the highest rents, therefore the deviation from the average is positive. On the other hand, the best location should be characterized by the lowest rate of return, therefore the average rate should be reduced to take into account the lower risk of such a location.

In a similar way, it is possible to calculate the deviation for the building standard risk, understood as the quality of the building. Of course, if it is possible, it is better to use prime

[68] *Modern Office Standards …* , p. 12; M. Williams, D. Bienias, Ł. Kałędkiewicz , *Modern Office Standards Poland, Guidelines for the design and development of specifications for modern office buildings and spaces* , Judd Rolfe , CBRE, Warsaw 2011, p. 25.

yield determined for different classes of objects while maintaining the *ceteris paribus principle.*

The table below shows the calculation of deviations due to building standard risk.

Table 7. The highest rents for office building classes in Tricity in 2024 with deviations of their values (with the opposite sign) from the average

Type	Edge EUR/m2	- Deviation
Class A	15.00	-11.11%
Class B+	14.00	-3.70%
Class B	13.00	3.70%
Class C	12.00	11.11%
Average (middle of the range)	**13.50**	

Source: own study.

The way of differentiating the discount rate based on the risk of the building technical condition is presented in the chapter below.

5.6 Building technical condition risk in the discount rate

The risk of investing in real estate is also influenced by the technical condition of its development. If the real estate is in good technical condition, the risk is relatively low and usually the rate will not require additional correction. The need for repairs (or renovation) of real estate increases the risk. This risk is sometimes combined with the risk associated with real estate repositioning. Real estate repositioning may include various activities aimed at increasing the value of the real estate by changing its "image". In addition to activities related to renovation and reconstruction, there are marketing activities, which include: changing the class of the facility (e.g. changing from a shopping center to an outlet center), its brand, its functional division and the tenant structure.

JLL consultants indicate that for facilities requiring renovation or repositioning, financing institutions (e.g. banks) require a higher margin compared to stabilized properties[69]. The table below contains indicators that allow for the discount rate adjustment due to the risk of the building technical condition (including repositioning).

The discount rate was calculated based on data for REIT funds. As indicated above, such funds are usually required to pay dividends annually. This means that their portfolios must primarily include stabilized properties that provide the possibility of generating surpluses. It can therefore be assumed that properties requiring repositioning or renovation do not have a large share in REIT assets, and therefore the risk represented by the beta indicator does not apply to them. For this reason, in the example described in Table 8, the discount rate adjustment was calculated as an increase indicator, understood as the

[69] *From the Lenders …* , p. 10.

percentage increase in the rate over the rate for a stabilized facility (building does not require renovation).

Table 8 Margins and the rate of return growth for commercial real estate reflecting the risk of technical condition for the valuation in PLN

Type	Credit Margin	Base Interest Rate	Interest Rate	Increase to the typical situation
building does not require renovation	2.25%	4.12%	6.37%	0.00%
building requires repositioning	2.75%	4.12%	6.87%	7.85%
building requires renovation	3.00%	4.12%	7.12%	11.78%

Source: own study based on information obtained from banks.

The next chapter describes the real estate valuation procedure applying discount rates determined using the WACC formula.

6. Real estate valuation procedure applying the discount rate determined using the WACC formula

The final formula for determining the discount rate for real estate valuation based on WACC is as follows:

$$r = WACC \cdot W_{DP} \cdot W_{DW} \cdot (1 + W_{DSR}) \qquad [12]$$

where:

r – discount rate for real estate valuation,

WACC – weighted average cost of capital for valuing real estate companies,

In $_{DP}$ – liquidity adjustment ratio, which takes the value of 1.25 or 1.3,

In $_{DW}$ – result adjustment indicator,

In $_{DSR}$ – an indicator of adjustment to the specific risk of the valued real estate.

The discount rate calculated with the WACC formula can be applied to the valuation of commercial real estate using the discounting cash flow technique. The WACC as a rate used for valuing companies is adjusted to explicit discount cash flow model[70]. In this type of model, market changes are taken into account directly in the income forecast. Figure 1 below illustrates the procedure leading to determining the discount rate and its application to the valuation of real estate.

Figure 1. Real estate valuation procedure using the WACC formula for the explicit model

Phase I Preparing a NOI projection

1. Determining NOI resulting from concluded lease agreements
2. Determining NOI resulting from market conditions
3. Determining expected changes in rents and OPEX resulting from the real estate condition
4. Determining expected changes in rents and OPEX resulting from market expectations

Phase II Determining WACC

1. Determining Rf as the nominal yield of 10-year treasury bonds
2. Determination of levered Beta for REIT for country conditions
3. Determining the risk premium for the country
4. Determining the cost of equity according to the CAPM formula
5. Determining the share of debt and equity for investment for REIT

[70]Even in the case of valuation in real terms (without inflation), the forecast includes, for example, the forecasted growth in revenues or costs, if it exceeds inflation. The growth rate of revenues or costs will express the value above inflation.

6. Determining the cost of debt

Phase III Adjusting the WACC to the real estate valuation

1. Determining liquidity adjustment ratio
2. Determining result adjustment indicator

Phase IV Adjusting the discount rate to the real estate-specific risk

1. Sector risk
2. General location risk (city, region)
3. Detailed location risk
4. Building technical condition risk
5. Risk of lease terms and tenant quality
6. Building standard risk

Phase V Determining the residual value (RV)

1. Determination of the growth rate
2. Determination of the representative income

Phase VI Discounting NOI and RV

Phase VII Determination of the value of the real estate as the sum of discounted NOI and RV

Source: own study.

It should be noted that although the method described above is used to determine the discount rate for real estate valuation purposes in the explicit model, it is possible to transform this rate so that it will also useful in the implicit model. The capitalization rate can also be derived from the discount rate.

The Polish legal system allows valuers to determine the discount rate, in the absence of data from the real estate market, based on the profitability of safe, long-term deposits on the capital market, taking into account the degree of risk when investing in real estate similar to the real estate being valued. According to the formula described in the book, in order to determine WACC it is necessary to determine the CAPM (capital asset pricing model), which takes as a starting point the so-called risk-free rate, which is identified with the profitability of treasury bonds. Therefore, the WACC is also based on the profitability of safe, long-term deposits from the capital market. The derived formula (after appropriate transformation) can also be used to determine the premium understood as the "degree of risk when investing in real estate similar to the real estate being valued".

The method of setting the discount rate based on adjusting the WACC to the real estate valuation remains an alternative for real estate valuers. It can be particularly useful in the absence of market evidence that would allow the rate to be derived directly from transactions involving similar properties.

Conclusions

The dynamic development of the real estate market and changing conditions require enriching and improving the research workshop of real estate valuers. This seems necessary, especially in the commercial real estate sector, where appropriate information, or rather its lack, can decide about the success or failure of often highly capital-intensive investments. For this reason, expanding theoretical knowledge with new solutions that can be applied in real estate valuation can make it possible to overcome obstacles occurring in complex processes related to real estate management.

The author's research intention was to implement selected business valuation rules, especially those for determining the discount rate, into the commercial real estate valuation process.

The method of determining the discount rate presented in this book is based on the formula of the weighted average cost of capital and is largely based on the data provided by A. Damodaran. To this end, a formula has been derived to transform the WACC determined for the valuation of a company from the real estate sector into a discount rate appropriate for the valuation of a commercial real estate (formula 12). This formula, in addition to the WACC, includes, among others, a liquidity adjustment indicator. The rate determined on the basis of the weighted average cost of capital refers to the valuation of companies listed on stock exchanges. Assets not listed on stock exchanges have lower liquidity, which is why they are assigned a higher risk. The WACC is known to be used to discount cash flows for all capital providers, and as shown in this work, in the case of real estate valuation, net operating income is discounted. Hence, the principle of proportionality requires that the rate be adjusted to the appropriate level of the result of the valuation account. For this reason, the formula comprises a result adjustment indicator. The discount rate estimated in this way, based on the WACC model, is an average rate also in terms of risk resulting from, among others, real estate sectors, general and detailed location, building standard, contract terms, tenant quality and technical condition of buildings. The study also presents proprietary methods for determining the index of adjustment to the specific risk of the valued real estate.

So far, economists, including GD Jude and DT Winkler, have advocated adopting WACC determined, among others, on the basis of capital market data directly as the rate of return used to value real estate. The formula I have proposed allows to adjust the determined rate of return to the specifics of the real estate valuation calculation, and thus fills the gap between objective methods based on market evidence (such as the transaction statement method) and methods burdened with the flaw of subjectivity based on the experience of a specific valuer (such as the additive method).

The proposed method of determining the discount rate is hoped to become an important tool supporting the process of real estate valuation in conditions of market imperfections. This will enable the expansion of the already available objective methods for determining the discount rate. This solution, as justified in the study, can be widely used in valuations based on both explicit and implicit model. The capitalization rate can also be derived from the discount rate and used in the appropriate technique.

The further development of the real estate market, variability of its operating conditions, implementation of technical and technological innovations, new management techniques, etc. require continued research aimed at providing new tools, methods and models supporting the process of commercial real estate valuation. The research included in the book is an element of scientific discussion on the dilemmas related to determining the value of commercial real estate.