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APPLICATION OF WACC TO COMMERCIAL REAL ESTATE VALUATION

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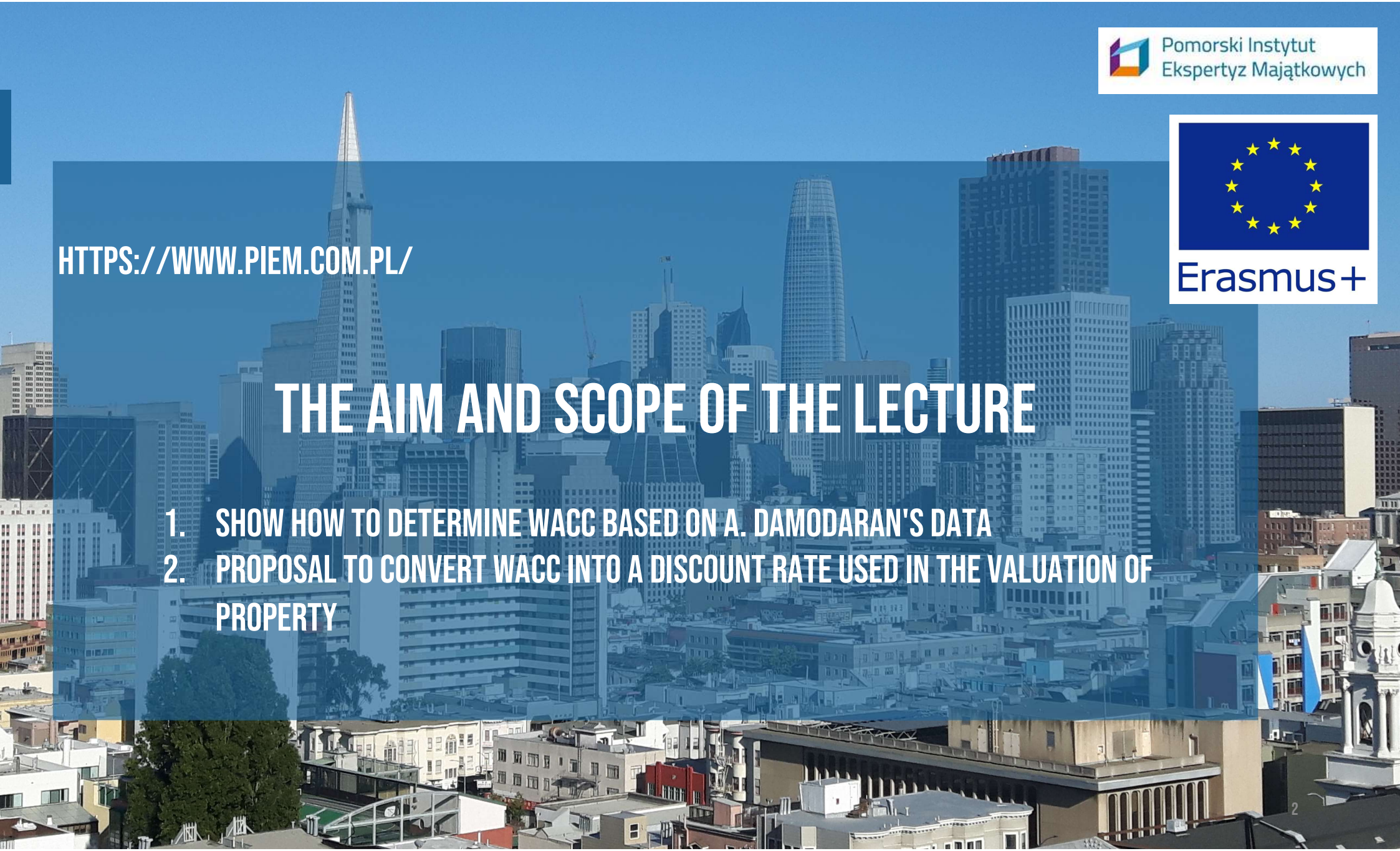

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THE AIM AND SCOPE OF THE LECTURE

1. SHOW HOW TO DETERMINE WACC BASED ON A. DAMODARAN'S DATA
2. PROPOSAL TO CONVERT WACC INTO A DISCOUNT RATE USED IN THE VALUATION OF PROPERTY

VALUATION - INCOME APPROACH

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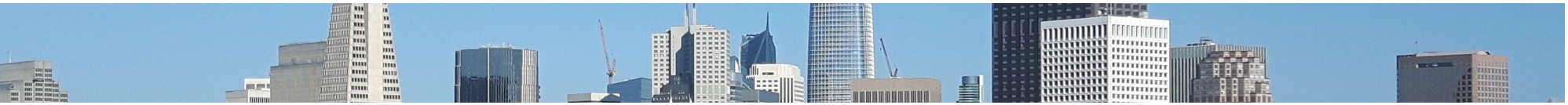

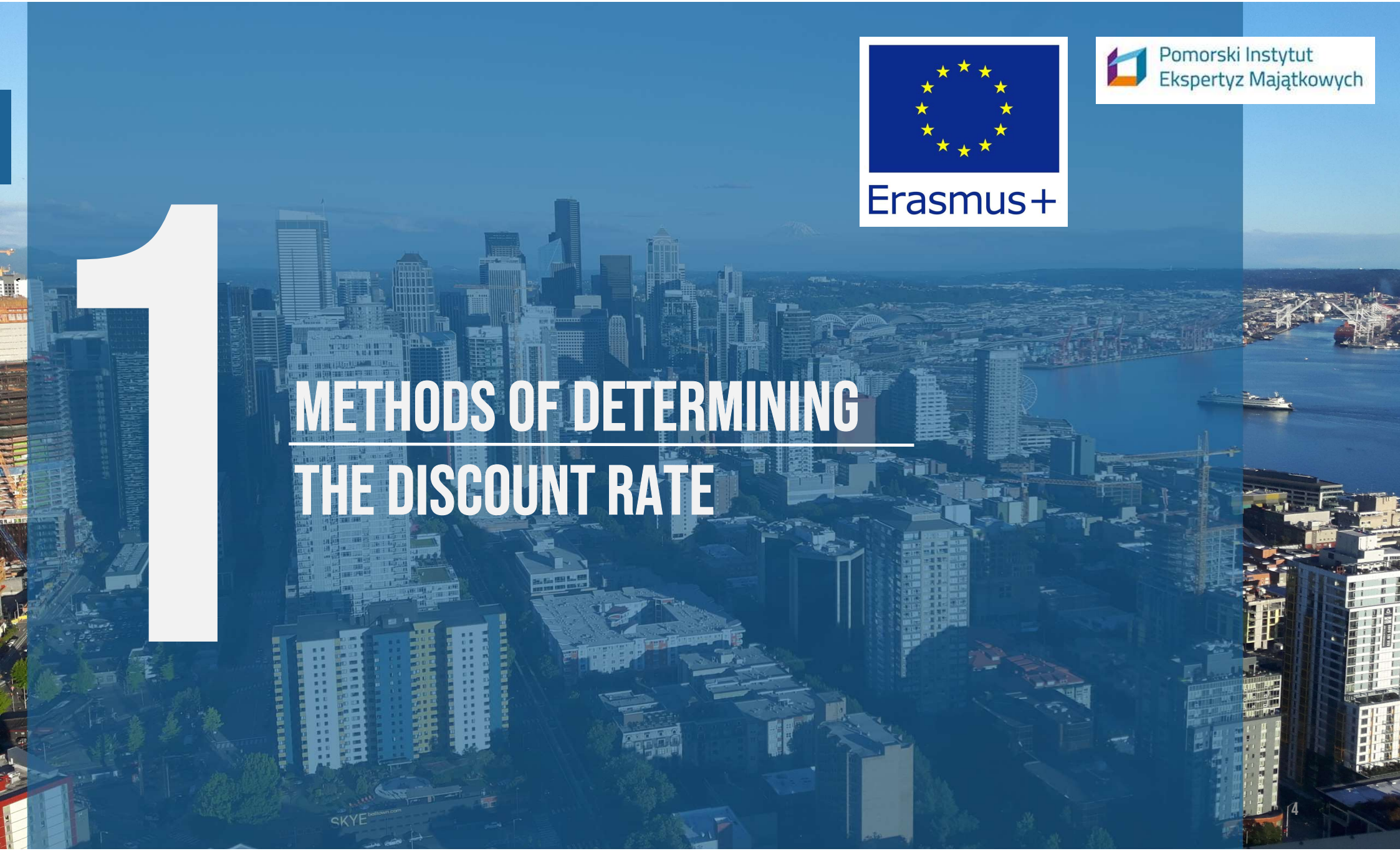

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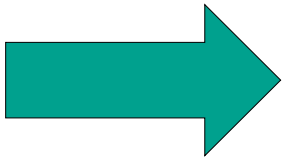
1

METHODS OF DETERMINING THE DISCOUNT RATE

TYPES OF METHODS

DISCOUNT RATE

- market evidence
- additive method

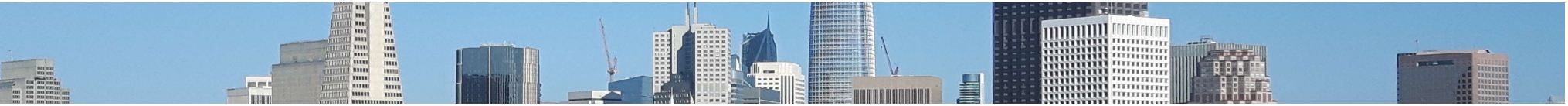


$$r = R_f + P_s$$

R_f – base rate,

P_s – risk premium.

- CAPM - Capital Asset Pricing Model
- WACC - Weighted Average Cost of Capital



BUSINESS VALUATION

FCFF

Potential Gross Income
Rent Income (Estimated Occupancy)
Service Charge Income (Estimated Occupancy)
Effective Gross Income (EGI)
Operating Expenses
Other expenses
Total Expenses
Net Operating Income
Administrative and general expenses
EBITDA
Depreciation
EBIT
Tax
NOPAT
Depreciation
Capital expenditure (CAPEX)
Other outflows
FCFF

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2

CAPM

DISCOUNT RATE FOR EQUITY

CAPM - CAPITAL ASSET PRICING MODEL

$$Re = \ CAPM = R_f + \beta_i(R_m - R_f)$$

CAPM – discount rate, cost of equity

R_f – risk-free rate,

R_m – expected rate of return on the market portfolio,

$(R_m – R_f)$ – market risk premium,

β_i – beta equity ratio.

$$WACC = \frac{D}{D+E} \cdot R_d \cdot (1 - t_c) + \frac{E}{D+E} \cdot \boldsymbol{R_e}$$

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CAPM - CAPITAL ASSET PRICING MODEL

RISK-FREE RATE

- government bond yield
- long period and fixed interest rate

- 10-year bonds

- https://www.ecb.europa.eu/stats/financial_markets_and_interest_rates/long_term_interest_rates/html/index.en.html

CAPM - CAPITAL ASSET PRICING MODEL

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CAPM - CAPITAL ASSET PRICING MODEL - MARKET RISK PREMIUM

$$CAPM = R_f + \beta_i(\boldsymbol{R_m - R_f})$$

$$(R_m - R_f)$$

A. Damodaran makes the amount of the premium dependent on the ratings assigned to a given country (treasury bonds).

http://pages.stern.nyu.edu/~adamodar/

CAPM - CAPITAL ASSET PRICING MODEL

BETA -> SECTOR BETA

Damodaran points out that the estimated beta values based on historical data are not very precise (you need to take into account the statistical error). The author proposes to use the beta coefficient for the entire sector. According to A. Damodaran, the beta coefficient in terms of sectors is more precise than the model based on regression analysis, because the averaging of many beta indices allows to average the errors in the estimates.

$\beta i = 1$ – then the risk of investing in specific assets is comparable to the overall level (risk premium unchanged),

$\beta i > 1$ – the risk of investing in specific assets is greater than the market level (the risk premium is higher),

$\beta i < 1$ – the risk of investing in specific assets is lower than the market level .

CAPM - CAPITAL ASSET PRICING MODEL

BETA

The Beta ratio reflects the total risk of a given asset or sector, which consists of operational risk and financial risk resulting mainly from the level of indebtedness, which translates into the capital structure. In a situation where the capital structure in the company or similar companies (sector) is different than in the enterprise being valued, it is necessary to deduct the Beta ratio, sometimes referred to as financial risk clearance.

Using the formula for the leveraged Beta coefficient (the so-called Hamond formula), one can derive the formula for the leveraged Beta.

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

$$\beta_U = \frac{\beta_L}{1 + (1 - t) \cdot \frac{D}{E}}$$

β_L – Leveraged Beta,

β_U – Unlevered Beta,

t – tax rate,

D/E – debt to equity ratio.

TAX RATE IS THE ISSUE

DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

SECTORS – DAMODARAN'S DATA

Publishing & Newspapers	21	
R.E.I.T.	193	
Real Estate (Development)	17	
Real Estate (General/Diversified)	11	
Real Estate (Operations & Services)	60	

DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

REIT ?

REITs (real estate investment trusts) are real estate investment entities, however, they are subject to special regulations. REITs "(...) **are special purpose vehicles or investment funds created to invest in the commercial real estate market for rent.** They operate on the basis of specific regulations and benefit from tax preferences granted by the state concerned".

U. Gierałtowska and E. Putek-Szeląg define REITs as "(...) special purpose vehicles that purchase real estate and, based on the accumulated capital, issue securities and pay dividends to investors". According to the authors, investments in REITs are "(...) safer than other financial instruments due to the structure of income, the source of which are rents and long-term lease of retail, office or service space".

DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

REIT ?

G. Mizerski presents a broader definition and explains that "(...) Real Estate Investment Trusts (REITs) are real estate investment vehicles characterised by unique attributes that distinguish them from other business forms encountered. 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 if a certain level of profit is distributed, in the form of dividends'.

Co REIT-y zmienią na polskim rynku nieruchomości komercyjnych. Streszczenie raportu EY, Warszawa,s. 4.

U. Gierałtowska, E. Putek-Szeląg, *Indirect investing in real estate market*, „Zeszyty Naukowe Wydziału Nauk Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego. Finanse, Rynki Finansowe, Ubezpieczenia" 2015, nr 75, s. 164.

G. Mizerski, *Real Estate Investments Trusts (REITs) – efektywne inwestowanie na rynku nieruchomości*, CeDEWu, Warszawa 2016, s. 63–64.

3

WACC

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WEIGHTED AVERAGE COST OF CAPITAL (WACC)

FORMULA

DEBT

EQUITY

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

D – debt,

E – equity,

R_d – cost of debt,

R_e – cost of equity (CAPM),

t_c – tax rate.

WEIGHTED AVERAGE COST OF CAPITAL

COST OF DEBT AND CAPITAL STRUCTURE

$$WACC = \frac{D}{D+E} \cdot \boldsymbol{R_d} \cdot (1 - t_c) + \frac{E}{D+E} \cdot R_e$$

1. Yield on corporate bonds is perfect but …

2. Data from Damodaran website - good solution -> Cost of Debt/Cost of Equity

CAPM

3. Based on information from banks

- WIBOR, LIBOR – floating interest rate
- IRS - „Interest Rate Swap”, **fixed interest rate**
- loan margin from the market
- loan commission and other costs – amortization

$$WACC = \frac{\boldsymbol{D}}{\boldsymbol{D+E}} \cdot R_d \cdot (1 - t_c) + \frac{E}{D+E} \cdot R_e$$

- optimal financing structure –> Damodaran

4 ADJUSTED WACC

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DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

FORMULA

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

r – discont rate for real estate valuation,

WACC – Weighted Average Cost of Capital for companies in the real estate sector,

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

W_{DW} – result adjustment ratio,

W_{DSR} – indicator of adjustment to the specific risk of the valuated property.

DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

PROCEDURE

1. Determination of the CAPM for investments in real estate companies (listed).
2. Determination of the WACC for investment in real estate companies (listed).
3. Adjustment of the WACC to the property valuation.
4. Adjustment of the discount rate to the specific risk of the valued property.

DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

THE LIQUIDITY ADJUSTMENT RATIO

$$r = WACC \cdot \boldsymbol{W_{DP}} \cdot W_{DW} \cdot (1 + W_{DSR})$$

W_{DP} –1,25 or 1,3

W. Frąckowiak indicates that for companies listed on a regulated stock exchange in the US and sold on the over-the-counter market, the value discount for low liquidity is approximately 25%. S. Pratt, on the other hand, indicates that when acquiring entire companies, the liquidity discount is between 10 and 25%. A. Damodaran notes that "in practice it is difficult to quantify this discount in a measurable way - it is usually assumed arbitrarily, usually at 25-30%". **The author calls this level of discount "standard".** At the same time, A. Damodaran notes that "(...) a company whose assets are mainly real estate and marketable securities should have a lower illiquidity discount than a company with mainly factories and equipment".

Fuzje…, red. W. Frąckowiak, s. 371.

S.P. Pratt, *Cost of Capital: Estimation and Applications*, 2nd ed., John Wiley & Sons, New Jersey 2002, s. 173.
A. Damodaran, *Finanse korporacyjne…,* s. 1172–1173.

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DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

RESULT <- ADJUSTMENT RATIO

$$r = WACC \cdot W_{DP} \cdot \boldsymbol{W_{DW}} \cdot (1 + W_{DSR})$$

$$W_{DW} = \frac{NOI}{FCFF}$$

C	**Potential Gross Income**	**A+B**	**EUR**	**26 400 000**	
D	Rent Income (Estimated Occupancy)		EUR	21 945 000	
E	Service Charge Income (Estimated Occupancy)		EUR	3 135 000	
F	**Effective Gross Income (EGI)**	**D+E**	**EUR**	**25 080 000**	
G	Operating Expenses		EUR	3 300 000	13,16%
H	Other expenses		EUR	0	0,00%
I	**Total Expenses**	**G+H**	**EUR**	**3 300 000**	**13,16%**
J	**Net Operating Income**	**F-I**	**EUR**	**21 780 000**	**86,84%**
K	Administrative and general expenses			111 628	0,45%
N	**EBITDA**	**J-M**		**21 668 372**	**86,40%**
O	Depreciation			2 750 000	10,96%
P	**EBIT**	**N-O**		**18 918 372**	**75,43%**
T	Tax	19%		3 594 491	14,33%
U	**NOPAT**	**P-T**		**15 323 881**	**61,10%**
W	Depreciation			2 750 000	10,96%
Y	Capital expenditure (CAPEX)			435 600	1,74%
Z	Other outflows			0	0,00%
X	**FCFF**	**U+W-Y-Z**		**17 638 281**	**70,33%**
	Income level adjustment ratio (NOI/FCFF)	**J/X**		**1,23**	

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DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

FORMULA

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

DIVERSIFIED RATE FOR REAL ESTATE IN THE COUNTRY

ADAPTATION TO THE SPECIFIC RISKS OF THE VALUED PROPERTY

How does it differ from the Prime Yield?

DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

ADJUSTMENT RATE TO THE SPECIFIC RISK OF THE VALUED PROPERTY

- Sector (e.g. office, shopping center)
- General location (region, city)
- Detailed location (district)
- Standard (e.g. office building class)
- Lease terms and quality of tenants
- Technical condition of the building

$$r = WACC \cdot W_{DP} \cdot W_{DW} \cdot (\mathbf{1} + \boldsymbol{W_{DSR}})$$

The rate takes into account the averaged risk arising from these factors and should therefore be adjusted by increasing or decreasing its value.

DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

ADJUSTMENT RATE TO THE SPECIFIC RISK OF THE VALUED PROPERTY – FOR THE GENARAL LOCATION

Location		
Type	**Yield**	**Deviation**
Berlin	5,00%	8,11%
Dussledorf	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%**	

5%/4,63% - 1= 8,11 %

DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

ADJUSTMENT RATE TO THE SPECIFIC RISK OF THE VALUED PROPERTY – FOR THE DETAILED LOCATION

BEST RATES FOR INDIVIDUAL DISTRICTS
WHAT IF NO SUCH DATA IS AVAILABLE?

The application of the variation in returns due to the location of the detail determined by the rents for each zone requires a change of sign. The best location has the highest rents, therefore the variation from the average is positive. In contrast, the best location should have the lowest rate of return, so the average rate should be reduced to take account of the lower risk of such a location.

Type	Rent 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**	

- (15//14)- 1= - 7,14 %

5 EXCEL MODEL

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DISCOUNT RATE DETERMINATION MODEL BASED ON THE WACC FORMULA

EXCEL MODEL

WE WILL TRY TO DETERMINE THE RATE FOR:

- a shopping centre in Berlin
- an office building in Warsaw

Źródło: raporty firmy doradczej Cushman ….

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THANK YOU FOR YOUR ATTENTION

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