Research on the popularity and methods of using the international CAPM model in Poland in 2010 – 2023

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Abstract— **The aim of this publication was to examine the state of knowledge and methods used by specialists to estimate the cost of capital (discount rates) when assessing international investments in Poland. An element of novelty included in the publication are the results of own research (survey) diagnosing the state of knowledge on this subject in Poland among people dealing with this subject. The publication provides information about the methods and solutions used and their frequency in commercial enterprises. The main conclusion from the research is that the iCAPM model is known, although its basic forms, but a large part of the solutions are based either on predetermined levels of the cost of capital or data from news services.**

Keywords— iCAPM, cost of capital, economics

I. INTRODUCTION

The capital asset pricing model is over 50 years old, having been independently developed between 1960 and 1966 by John Treynor (1965), William Sharpe (1964), John Litner (1965) and Jan Mossin (1966). Although empirical research does not provide clear evidence that this model works in practice, it is widely used to estimate the cost of equity capital because the model is logical and rational. Moreover, apart from the three-component or five-component model by Fama and French (1992) (which are treated as only extensions of the CAPM model), we do not have a better model allowing us to estimate what rate of return investors should receive as an equivalent of the risk they bear (in given market conditions).

The CAPM model appears in virtually every book on corporate finance. However, many years of economic practice have developed the CAPM model towards its extension to unlisted enterprises and internationalization. Presenting selected concepts regarding the mentioned extensions became the topic and goal of this chapter.

1.1. Internationalization of the CAPM model

In the era of globalization and free flow of capital, it is often necessary to estimate a fair return on invested capital for international investments. To achieve this, it is necessary to include the issue of internationalization in the CAPM model.

It is very difficult to determine who first proposed the adaptation of the CAPM model to international investments and most publications do not try to find the original author of this concept. Typically, international CAPM models are treated as a kind of adaptation of the CAPM model to the increased risk of such investments. The main reasons for the increased risk are usually:

- risk related to exchange rate changes between countries (direct and indirect exposure),
- risk related to unexpected political changes in the country of investment,
- potentially high transaction costs,
- in the case of developing markets, the risk of not being able to sell portfolios due to low market liquidity,
- problems with access to information,
- foreign brokers may not have appropriate knowledge, ethics and competences, or legal protection for the transactions concluded,
- especially developing markets may have a huge amplitude of both increases and decreases in the value of financial

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instruments listed on these markets,

- potentially weaker or no legal protection for foreign investors,
- different rules may apply on foreign markets than on the investor's domestic market.

Some of these risks can be secured by appropriate legislation in the country of investment and appropriate international agreements, but not all of them and this necessitates modifying the base CAPM model to the described situation (Stulz, RM, 2022). In addition, research shows that in the case of crises, the correlation between markets increases, which does not allow for effective geographic diversification (Ball, C. and W. Torous , 2000).

Over the decades of the existence of the CAPM concept and research on it, at least two groups of models have been built that go beyond the local CAPM concept: the global CAPM (GCAPM) and the international CAPM (ICAPM).

Internationalized CAPM models provide a better perspective on investment between different countries because they address the following issues:

1) Global risk perspective: The ICAPM model assumes that global financial markets are interconnected. What happens in one part of the world can affect investments in other parts of the world. For example, changes in interest rates in the United States may affect investments in emerging markets such as Brazil. Given this global perspective, ICAPM helps investors assess the overall risk of their international portfolios.

2) Exchange rate risk: Foreign exchange rate fluctuations are a critical concern for international investors. The ICAPM model takes into account exposure to exchange rate risk. Assesses how changes in currency values may affect returns on international investments. For example, if a U.S. investor holds Japanese stocks, the depreciation of the Japanese yen could reduce profits when converted back to U.S. dollars.

3) Country-Specific Risk: Different countries have unique economic, political and social factors that may affect investment returns. ICAPM allows investors to quantify the risks associated with investing in specific countries. For example, investing in a stable economy such as Switzerland may involve less risk compared to investing in a politically unstable country.

4) Asset-specific risk: Not all assets in a given country or region carry the same risk. The ICAPM model takes into account the risk associated with individual assets, such as stocks or bonds. For example, in the UK, a technology startup may have a higher risk profile compared to an established energy company.

5) Systematic and unsystematic risk: ICAPM helps distinguish between systematic (market-wide) and unsystematic (asset-specific) risk. Diversification can help reduce unsystematic risk by spreading your investments across different assets and regions. An example of this concept is where a portfolio combines various international assets to reduce the impact of an adverse event on the single market.

6) Risk-free rate and market risk premium: iCAPM uses the risk-free rate, often based on U.S. Treasury bonds, as a benchmark for expected returns. The model also includes a market risk premium, which is the additional return an investor should expect for taking on market risk. These factors are key to estimating the expected returns on international investments.

7) Beta Coefficients: Beta coefficients measure the sensitivity of an asset to market movements. In the context of ICAPM, an asset's beta reflects its correlation with the overall global market.

Although theoretical studies are full of various approaches and concepts, two models are most frequently cited: international CAPM (iCAPM) and global CAPM (gCAPM).

Not every country has a big difference between CAPM, iCAPM and GCAPM. Relatively small differences between CAPM, iCAPM and GCAPM: Mishra and O'Brien (2001), Koedijk et al. (2002), Harris et al. (2003), Koedijk and van Dijk (2004a,b), Dolde et al. (2011, 2012), Krapl and Giaccotto (2015), as well as Krapl and O'Brien (2016). Nevertheless, for some countries there are differences and there are studies showing how large these differences are. For example, such research was conducted by Koedijk et al (2017) and showed empirical differences in discount rates for countries outside the US and the differences that exist for these countries between the local CAPM, iCAPM and GCAPM (from the perspective of the US dollar for 15 countries).

1.2. International CAPM

The international CAPM model takes into account 2 risk premiums: the first one is based on the global capital markets index and the second one is based on the wealth-weighted index of all currencies. weighted foreign currency index).

$$RP_i = \beta'_i * [RP_G] + \gamma'_i * [RP_X] \qquad (1)$$

Where:

i – financial instrument for which the expected rate of return is estimated, RP_i – expected rate of return on the shares of the selected company i;

β'_i – sensitivity coefficient of changes in rates of return on shares of a selected company in relation to changes in the market index;

R_G – rate of return on the international capital markets index;

RP_G – risk premium for investing in shares for the global capital market;

$RP_G = E(R_G) - r_f$;

γ'_i - sensitivity coefficient of changes in rates of return on shares of the selected company in relation to changes in the currency index weighted by financial assets;

RP_X – premium for currency risk related to investments in country X;

$RP_X = E(R_X) - r_f$;

R_X – rate of return on the currency of country X in relation to the index of foreign currencies weighted by financial wealth, in other words R

coefficients β'_i and γ'_i are partial systematic risk sensitivity coefficients that are calculated as coefficients of a multiple

(multivariate) regression of historical rates of return on the instrument and depending on R_X and R_G, this regression takes into account the interaction between R_X and R_G.

$\beta_i = cov(R_i, R_G)/\sigma 2_G$

$\beta_i' = [cov(R_i, R_G)*\sigma 2_X - cov(R_i, R\sigma 2_X - cov(R_G, R_X)2]$

$\gamma_i = cov(R_i, R_X)/\sigma 2_X$

$\gamma_i' = [cov(R_i, R\sigma 2_X - cov(R_G, R_X)2]$

After substituting appropriate formulas for risk premiums, the following formula is obtained:

$RP_i = \beta_i' * [E(R_G) - r_f] + \gamma_i' * [E(R_X) - r_f]$	(2)

It is also worth adding a few practical comments regarding the estimation of this model. It is usually estimated using the differences between the rates of return on a given stock and the risk-free rate as the dependent variable, and on the other side there are risk premiums calculated, of course, for historical data. As for the index of foreign currencies weighted by financial wealth, when estimating the model for a given country, the currency of the country for which iCAPM is calculated should be eliminated from the index.

Each currency in the index of all financial wealth-weighted currencies has its rate of return calculated as the risk-free rate plus the risk premium plus the percentage change in the exchange rate of this currency in relation to the reference currency (Ejara D. et all, 2020). Each risk premium is equal to the exchange rate of that currency in relation to the reference currency that would occur in a state of market equilibrium plus the difference in the level of the risk-free rate (the risk-free rate of the foreign currency minus the nominal risk-free rate of the reference currency) (Ejara D., et all., 2020). The risk premium of the financial wealth-weighted all-currency index is the weighted average of the risk premiums of all foreign currencies considered separately before being averaged. The weight of the financial assets of a given economy refers to the financial assets of investors from a given country, which is not the same as the capitalization of all shares of companies from a given country. For example, the capitalization of US companies may represent 40% of the world's capitalization, but only 30% of the financial wealth of the entire world.

The value estimates for Poland for the global market index and the index of all foreign currencies weighted by financial assets for the years 1999 - 2016 were (Ejara D., et all . 2020):

at H = 0.3; σG = 13.2% ; σX = 11.4%; γG = 0.28; βX = 0.39; RP G = 3.61% ; RP X = -0.71% ;

1.3. Global CAPM

The Global Capital Asset Pricing Model (GCAPM) assumes the existence of only one risk factor, the level of which is measured by the beta indicator calculated against the global capital markets index, a good approximation of which is, for example, Morgan Stanley International All Countries World Index.

This model (GCAPM) is considered a simplified, one-factor version of ICAPM, without a directly given factor related to currency risk. GCAPM has the same form as CAPM but is calculated relative to a global market index instead of a local one. This form is proposed by (Najmudin N., et all. 2017),

among others: Mishra and O'Brien (2001), Bruner et al. (2008), Arouri et al. (2012).

$RP_i = \beta_i * [RP_G]$	(4)

where:

RP G – risk premium on the global financial market, β_i – is the beta of the instrument i calculated relative to R_G : $\beta_i = cov(R_i, R_G)/\sigma 2_G$

The GCAPM model, as it does not directly take into account currency risk, according to researchers, should be used when there is certainty that purchasing power parity exists for the currency (country) in question (e.g. Sercu (1980), Ross and Walsh (1983)) or if research has shown , that there is no significant difference (for a given country) between local CAPM and ICAPM (Stulz 1995).

According to Damodaran, due to the nature of the global financial market index, the smaller the country, the smaller its share in the index and this results in the lower the beta coefficient it will obtain (Damodaran 2021) . As a result, companies from developing economies, despite high country risk, will have low beta coefficients, which shows that the GCAPM does not correctly reflect the risk associated with a given country. However, Damodaran (2021) suggests that practitioners get around this problem by calculating the beta coefficient for a company from a developing economy in relation to the index from their home country (e.g. the USA) and multiplying it by the local beta coefficient. For example, if a company on the local market has a beta of 0.9 and the beta of the same company calculated in relation to the US stock index is 1.5, practitioners would calculate the global beta as their product, i.e. 0.9 x 1.5 = 1.35.

1.4. Extended internationalized CAPM model

1.4.1. Extension for unlisted companies

The next version of the CAPM model taking into account internationalization is an extended model, taking into account not only international issues but also the entity's liquidity (in particular situations when the entity is not listed on the stock exchange) and its size.

The simplest method of using CAPM in such situations was based on the so-called Hamada formula. Beta coefficients were first calculated for listed companies from a given industry in a given country, and then they were de-leveraged (the debt effect was removed) using either the Hamada formula or the Brealey - Myers formula.

$\beta_a = \beta_E * MV_E/(MV_E + MV_D*(1-T)) + \beta_D*MV_D*(1-T)/(MV_E + MV_D*(1-T))$	(5)

After assuming that the debt beta coefficient is 0, we obtain the Hamada formula:

$\beta_a = \beta_E * MV_E/(MV_E + MV_D*(1-T))$	(6)

After deleveraging, you can additionally make an adjustment for cash (this is suggested on Aswath 's website Damodaran), then such coefficients can be averaged for a given industry:

$\beta_u = \beta_a / (1 - Cash/(MV_E + MV_D))$	(7)

Where:

MV E – market value of equity, MV D – market value of debt, T – effective income tax rate, β_E – beta coefficient of

equity, β D – beta coefficient of debt, Cash – cash and short-term investments.

The beta coefficient can then be re -leveraged with the new level of cash and debt of a specific company. The beta coefficient obtained in this way was introduced into the traditional CAPM formula.

However, the well-known organization involved in training investment advisors, CFA, suggests that this approach is not sufficient either for listed companies or for small companies. In the case of listed companies, they suggest expanding the CAPM model to the following form:

$r_e = r_f + \beta_{similar}(ERP) + SP + IP + SCRP$	(8)

Where:

r f – risk-free rate,

SP – (English size premium) premium for size,

IP – (industry risk premium) bonus for the industry,

SCRP – (specific-company risk premium) company-specific risk premium.

The model can also be used for small companies, or alternatively, a build-up approach can be used approach) in which the beta coefficient for small companies is assumed to be one.

$R_e = r_f + ERP + SP + IP + SCRP$	(9)

Regardless of the model version, ERP in the case of international investments, according to the CFA, should consist of two elements: the average risk premium that an investor would bear in his or her own country (assumed to be a developed one) plus the risk premium for investing in a developing economy, calculated as λ * CRP (CRP – country risk premium – premium for the risk associated with investing in a country other than the home country, representing the risk of a specific country).

$R_e = r_f +$ (risk premium in the investor's country of origin + λ * CRP of the country where the investment will be made) + SP + IP + SCRP	(10)

1.4.2. CAPM extension for unlisted companies for international investments
1.4.2.1. Spread method

One of the methods of calculating this premium (CRP) is the sovereign bond yield spread method yield spread). The method consists in first comparing the yield of comparable in terms of life (as long as possible) treasury bonds between the investor's country (by default - developed) and the investment country (by default - developing) - often by simply subtracting these yields from each other. Such a difference can already be considered a country risk premium.

For Poland in 2021, such a difference compared to the USA was 0.28% (Damodaran 2021) (Poland's rating was then A2, the yield on 10-year government bonds was on average 1.75% in Poland and 1.47% in the USA , and on December 26, 2023, the yield on Polish 10-year government bonds was 5.026%).

However, Damodaran, whom CFA refers to, suggests making sure that there has not been a significant change in the country's risk profile, which may not yet have been reflected in the described spread on bonds using spreads on CDSs , i.e. spreads on credit default swaps (Ismailescu 2007). Firstly, CDS spreads can assure the investor that there has been no change in the risk level, and secondly, as an alternative to the bond spread,

the CDS spread can be used as CRP (Ismailescu 2007).

If spreads on CDSs widen, this suggests a deterioration in country risk, which may, with a delay, affect the spread between the bonds of a given country (investment) and the investor's country.

It is worth explaining that the word " spread " in the case of credit default swaps has a different meaning than for the bonds described earlier - the spread for CDS is the percentage of the value of the bonds that the investor wants to secure and what percentage must be paid to buy the security against the fact that their issuer (defined country) will declare default on its debt. Such information is available on news portals such as Bloomberg and Reuters, but slightly delayed data is also available on the Internet.

For example, for Poland at the end of 2021 the spread was 38.60 basis points, and on September 8, 2022 the spread was 166 basis points. One basis point is 1/100 of a percent. On December 26, 2023, the 5-year CDS quotation for Poland was 151.00 bps . and the implied probability of Poland declaring default on its debt was 2.52%. 151 basis points means that for concluding a swap agreement the hedging swap will pay 1.51% each year of the hedged amount (in Polish government bonds).

According to Damodaran (2021), regardless of whether investors base on spreads on government bonds or spreads CDSs , you can either rely on current values, average historical values, or implied values, e.g. for countries that have not issued bonds, use spreads for countries with the same credit rating. According to Damodaran (2021), at the end of 2021 the implied values were as shown in Figure 1.

CHART 1. DEVELOPMENT OF THE SPREAD FOR GOVERNMENT BONDS AT THE END OF 2021 DEPENDING ON THE CREDIT QUALITY OF THE COUNTRY
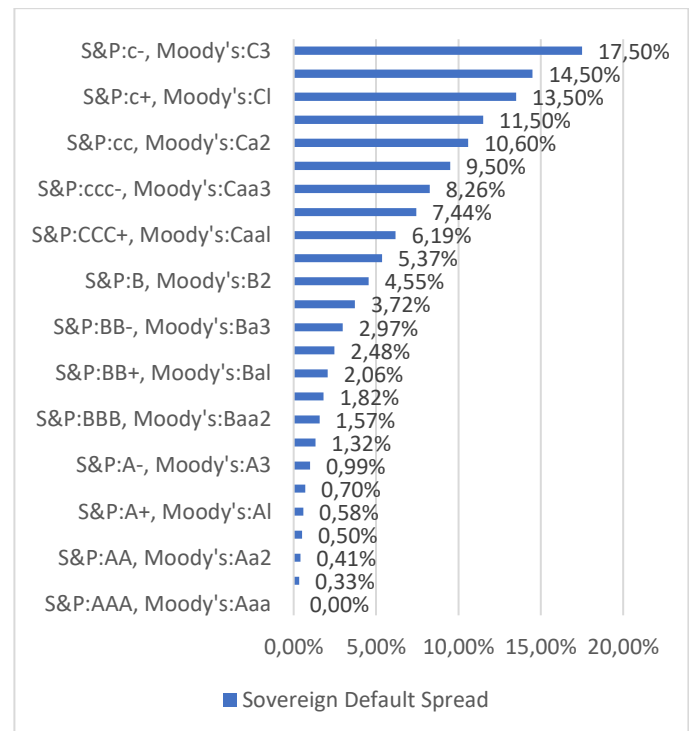
Source: study own on based on Damodaran, Aswath, Country Risk: Determinants, Measures and Implications - The 2021 Edition (July 5, 2021). NYU Stern School of Business Forthcoming, Available at SSRN, http://dx.doi.org/10.2139/ssrn.3879109

Due to the relatively small differences, Damodaran proposes instead of the spread for government bonds (he had 81 observations) to use the spread for corporate bonds, assuming that a credit quality assessment at a certain level means the same risk whether we are talking about corporate bonds or government bonds (Chart 2).

CHART 2. DEVELOPMENT OF THE SPREAD FOR CORPORATE BONDS AT THE END OF 2021 DEPENDING ON THE CREDIT QUALITY OF THE ENTERPRISE
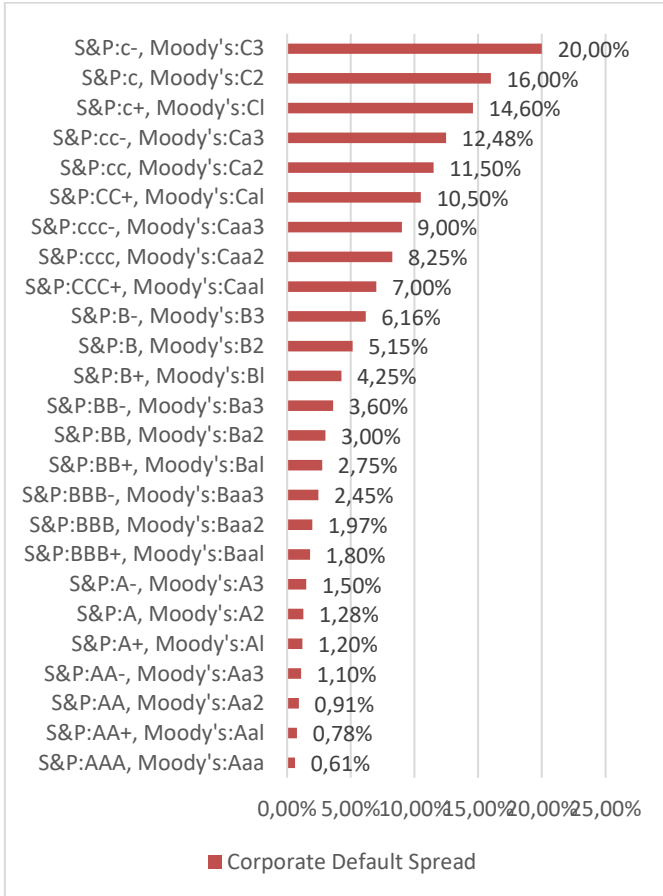
Source: study own on based on Damodaran, Aswath, Country Risk: Determinants, Measures and Implications - The 2021 Edition (July 5, 2021). NYU Stern School of Business Forthcoming, Available at SSRN: https://ssrn.com/abstract=3879109 or http://dx.doi.org/10.2139/ssrn.3879109 . Analysts using spreads add them to both the cost of equity and the cost of debt. Another option is to add this spread to the risk premium in the investor's home country and multiply the result by the international beta.

1.4.2.2. Relative standard deviation method

Another option is to use the so-called relative standard deviations. According to Damodaran , the relative standard deviation is calculated as the standard deviation in the country of investment divided by the standard deviation in the investor's country of origin (usually the USA).

deviation of the stock index in country X (investment country, index expressed in the currency of country	(11)

Then, the market risk premium (ERP – Equity Risk Premium) can be calculated using the formula:

Market risk premium for investments in country X (ERP) = US market risk premium * relative standard deviation of country X (investor's home country)	(12)

The country risk premium (CRP) if someone wanted to calculate it would be:

CRP for country X = Market risk premium for investments in country	(13)

1.4.2.3. Basic spread plus relative standard deviations method

The third approach suggested by Damodaran is also recommended by the CFA as a good method of taking into account the additional risk associated with investing in a given country (CRP).

CRP for country X = spread for country X * standard deviation % of changes in the stock index in country X (expressed in the currency of country on an annual basis)	(14)

According to Damodaran, to calculate the total risk premium associated with investing, the CRP calculated in this way should be added to the market risk premium for investments in the investor's country of origin (usually the USA).

Market risk premium for investments in country X (ERP) = US market risk premium + CRP for country X	(15)

If exact calculations are not possible, you may consider calculating the standard deviation for the Moody's index for developing economies (for stock markets) and the standard deviation for the BAML index for bonds issued by developing countries.

1.4.2.4. Method based on the lambda coefficient

Yet another concept for taking into account the risks associated with international investments is the method using the lambda coefficient.

Expected rate of return on investment in shares of a company from country X = r_f + β * [Risk premium for a developed economy, i.e. the economy from which the investor comes] + λ * [CRP for country	(16)

Lambda in the equation denotes the sensitivity of a given company to exposure to country X risk.

Lambda can be calculated in several ways. The first method is the quotient of two quantities. The first one is what percentage of the analyzed company's sales is made in country X. The divisor is the percentage of sales in country X of an average company listed in this country. Another option is to calculate a similar indicator, but based on assets, and yet another option is to calculate what percentage of transactions the company carries out in the currency of country X compared to other companies.

II. RESEARCH METHOD

In order to examine the popularity and knowledge of the international CAPM model, a research survey was prepared and sent among managers of large commercial enterprises in Poland using the Internet and data from graduates and former seminarians of the authors of the publication. The survey was modified twice because the initial version turned out to be too theoretical and went beyond the knowledge of most respondents. Ultimately, after consultations, a survey was prepared consisting of 12 questions, which concerned the broadly understood international approach to the cost of capital in the case of international investments. The investments concerned both tangible and portfolio investments, as well as portfolio valuations. Of the 750 surveys sent, 37 complete

responses were received, which corresponded to an approximately 5 percent response rate to email inquiries . The survey was sent out in the form of a Google poll .

The questions asked to respondents were as follows:

1) Experience in international transactions (up to 10 years/from 10 to 20 years/over 20 years),
2) Type of international investment experience (securities, swaps , financial markets/enterprises or branches/mergers and acquisitions/various experience)
3) Experience in assessing international projects (between Poland and the USA/between Poland and other EU countries/other (other))
4) Knowledge of investment project evaluation methods (I have appropriate competences/project evaluation causes some difficulties/project evaluation is a challenge)
5) Preferred method of estimating the cost of capital (cost calculated for a given company/cost calculated for the industry/discount rate applicable in the company/subjectively determined cost/other)
6) Determining the risk-free rate (risk-free instruments in the investment country/risk-free instruments in the investor's country/other approaches0
7) Type of model used to estimate the cost of capital (single-factor domestic/single-factor but internationalized/multi-factor)
8) Significance of cost of capital determinants (from 1 - unimportant to 5 - very important) (unexpected inflation/differences in taxation/political risk/country insolvency risk/currency risk/debt)
9) What elements were taken into account when estimating the country risk premium? (standard deviation of stock indices/standard deviation of rates of return on government bonds/sensitivity of a given company to risk exposure in the country of investment/country risk premium from an information service was used/the premium was determined internally in the company)
10) What beta was used for the calculation (domestic beta/international beta)
11) How many methods or approaches were used to finally determine the cost of capital? (one/two/three)

Responses were collected anonymously.

III. PRESENTATION OF RESEARCH RESULTS

Tables 1 - 11 below present the survey results obtained from respondents. As Table 1 in Figure 3 shows, the majority of respondents had less than 10 years of experience in international transactions (84%), only 16% indicated that they had more than 10 years of experience (up to 20 years). This can be interpreted as a limitation of the survey or as a measure of the reality that around the year 2000, few companies in Poland were engaged in international operations.
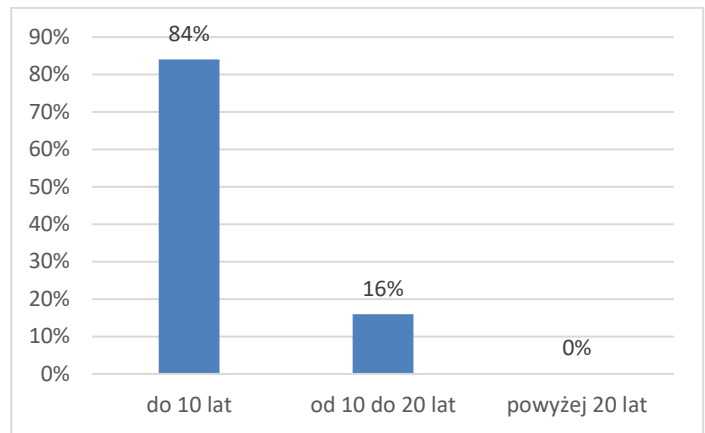
TABLE 1 . EXPERIENCE IN INTERNATIONAL TRANSACTIONS (IN YEARS)

Experience in international transactions	percent	answers
up to 10 years	84%	31

Experience in international transactions	percent	answers
from 10 to 20 years	16%	6
over 20 years old	0%	0

Source: own study based on the results of own survey research.

CHART 3. EXPERIENCE IN INTERNATIONAL TRANSACTIONS (IN YEARS)

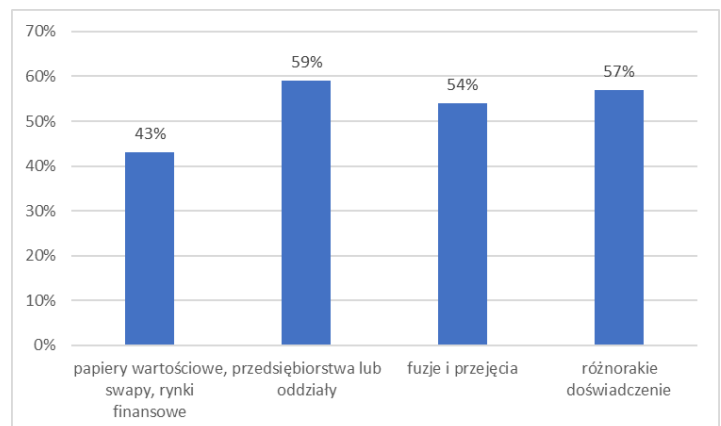Source: own study based on the results of own survey research.

Table 2 and Figure 4 present the distribution of the type of experience in international project valuations. The answers to this question did not have to add up to 100%, because respondents could have experience in many fields. As can be seen from the answers, the largest part of the respondents had experience in assessing projects relating either to internal projects of companies or in the analysis of mergers and acquisitions of other entities. Many respondents also pointed to other experiences, e.g. providing services to clients of their (consulting) company.

TABLE 2 .TYPE OF INTERNATIONAL INVESTMENT EXPERIENCE

Type of international investment experience	percent	answers
securities, swaps , financial markets	43%	16
companies or branches	59%	22
mergers and acquisitions	54%	20
diverse experience	57%	21

Source: own study based on the results of own survey research.

CHART 4. TYPE OF EXPERIENCE IN INTERNATIONAL TRANSACTIONS

Source: own study based on the results of own survey research.

The next question in the survey concerned the countries concerned by the valuations. The most common answer concerned European Union countries (73% of respondents), but

the United States (30% of respondents) and other countries in the world (24% of respondents) were also popular. The answers to this question also did not have to add up to 100%, because the question allowed multiple answers.

TABLE 3 .EXPERIENCE IN ASSESSING INTERNATIONAL PROJECTS

Experience in assessing international projects	percent	answers
between Poland and the USA	thirty%	11
between Poland and other EU countries	73%	27
other (other)	24%	9

Source: own study based on the results of own survey research.

CHART 5. EXPERIENCE IN ASSESSING INTERNATIONAL PROJECTS
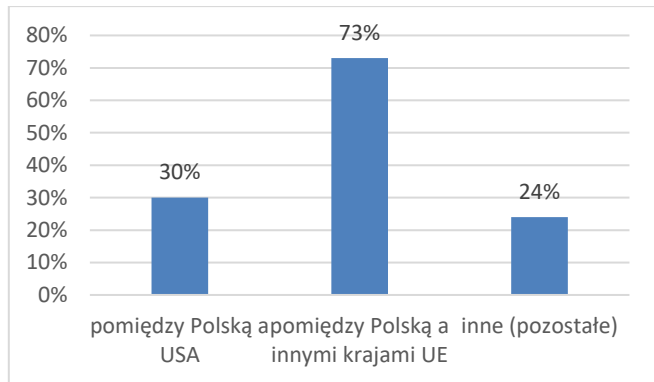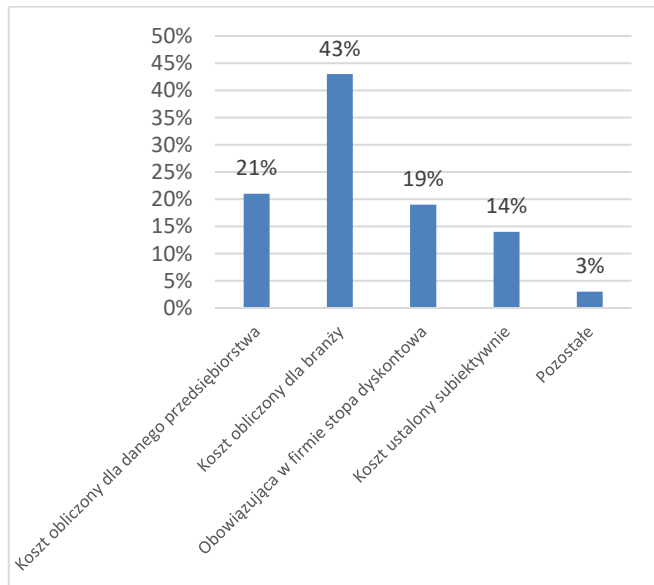

Source: own study based on own survey results.

TABLE 5 . PREFERRED METHOD FOR ESTIMATING THE COST OF CAPITAL (DISCOUNT RATE)

Preferred method for estimating the cost of capital	percent	answers
Cost calculated for a given company	21%	8
Cost calculated for the industry	43%	16
The company's discount rate	19%	7
Cost determined subjectively	14%	5
The remaining	3%	1

Source: own study based on own survey results.

CHART 7. PREFERRED METHOD OF ESTIMATING THE COST OF CAPITAL (DISCOUNT RATE)

Source: own study based on own survey results.

The sixth question of the survey (Table 6, Figure 8) concerned the method of determining the risk-free rate.

The respondents' answers show that risk-free instruments from the investor's country of origin were most often used (43% of responses), although risk-free instruments in the country of investment location were also used quite often (35%), while 22% of respondents used other approaches.

TABLE 6 . METHOD OF DETERMINING THE RISK-FREE RATE

Method of determining the risk-free rate	percent	answers
Risk-free instruments in the country of investment	35%	13
Risk-free instruments in the investor's country	43%	16
Other approaches	22%	8

Source: own study based on the results of own survey research.

CHART 8. METHOD OF DETERMINING THE RISK-FREE RATE
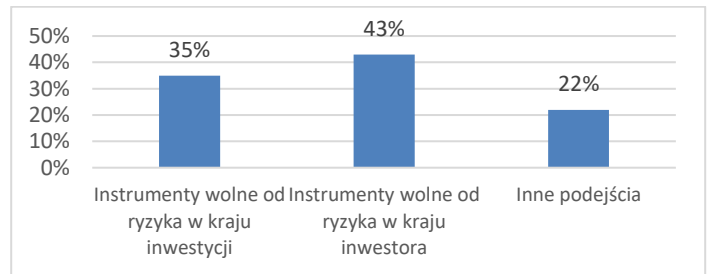
Source: own study based on the results of own survey research.

The seventh question of the survey concerned the type of model used to estimate the cost of equity capital. This question was answered only by people who estimated the cost of capital (discount rate) and did not use the rate imposed by the employer.

The majority of respondents (38%) chose the answer that they use a single-component model, but that takes into account the internationalization of investments. A national model was used by 33% of respondents, and 29% of respondents used a multi-component model. The use of the national model could result from the fact that although the capital came from another country, the investor already had a branch in Poland.

TABLE 7 . A TYPE OF MODEL USED TO ESTIMATE THE COST OF EQUITY CAPITAL

A type of model used to estimate the cost of equity capital	percent	answers
Single-component domestic	33%	8
One-component but internationalized	38%	9
Multiple	29%	7

Source: own study based on the results of own survey research.

CHART 9. TYPE OF MODEL USED TO ESTIMATE THE COST OF EQUITY CAPITAL
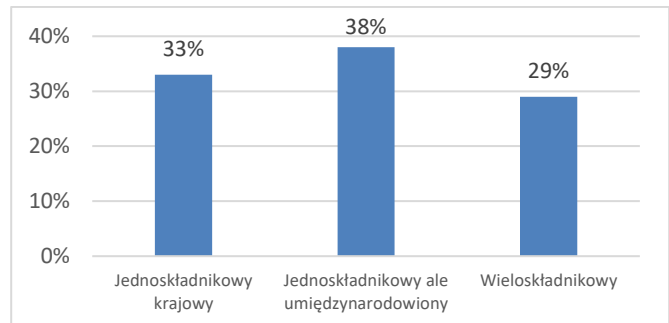
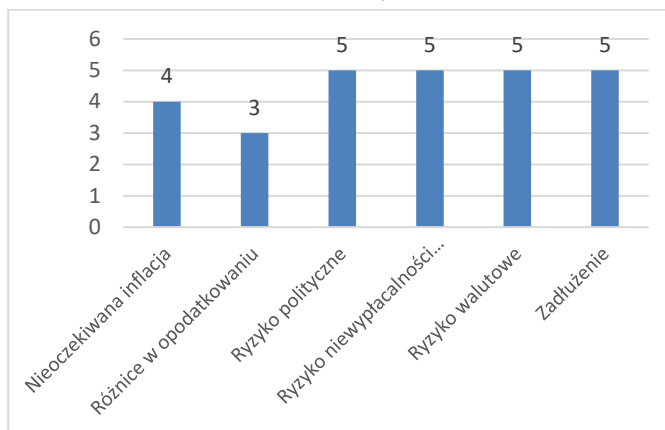Source: own study based on the results of own survey research.

The next, eighth question concerned the significance of various factors that, according to iCAPM, influence the level of the cost of capital. In particular, respondents were asked (Keck et al 2005) about the impact of unexpected inflation, differences in taxation, political risk, country default risk, currency risk and debt level). As can be seen from Table 8 and Chart 10, virtually all of the given determinants were considered very important and always taken into account (political risk, country insolvency risk, currency risk, debt), unexpected inflation was slightly less important (some respondents did not know how to forecast unexpected inflation) and differences in taxation (respondents indicated that they are not always important and do not always occur).

TABLE 8 . IMPORTANCE OF COST OF CAPITAL DETERMINANTS (1 - NOT IMPORTANT - I NEVER TAKE IT INTO ACCOUNT, 2 - NOT VERY IMPORTANT - I VERY RARELY TAKE IT INTO ACCOUNT, 3 - QUITE IMPORTANT - I SOMETIMES TAKE IT INTO ACCOUNT, 4 - VERY IMPORTANT - I USUALLY TAKE IT INTO ACCOUNT, 5 - VERY IMPORTANT, I ALWAYS TAKE IT INTO ACCOUNT, MEDIAN ANSWER)

Significance of determinants of the cost of capital (1-5)	from 1 to 5
Unexpected inflation	4
Differences in taxation	3
Political risk	5
Risk of country insolvency	5
Currency risk	5
Debt	5

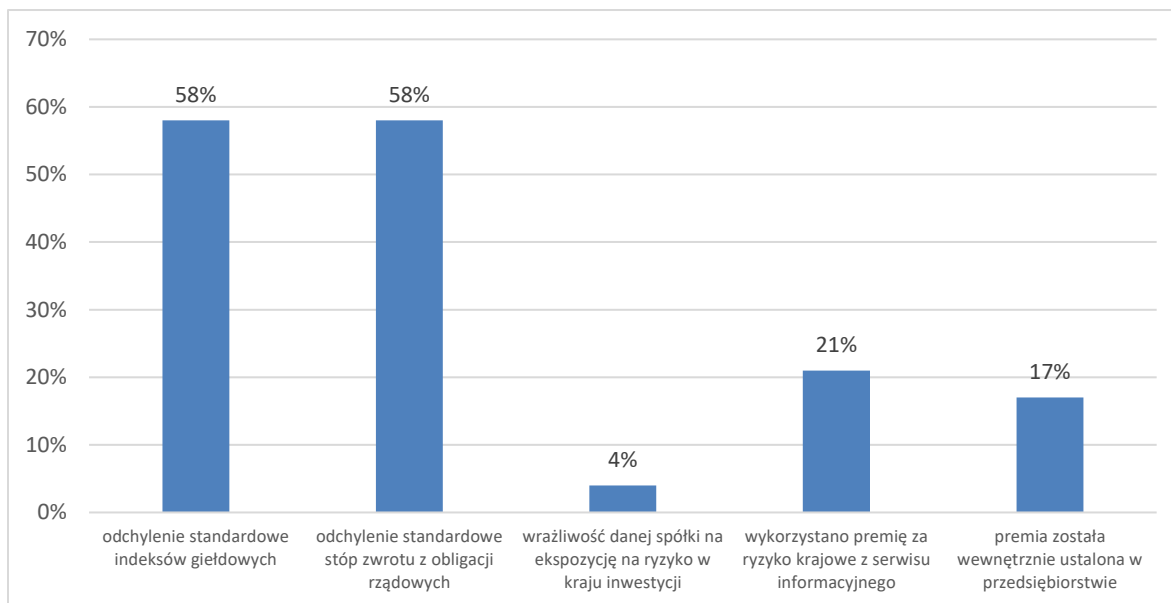Source: own study based on the results of own survey research.

CHART 10. SIGNIFICANCE OF THE COST OF CAPITAL DETERMINANTS (1 - NOT IMPORTANT - I NEVER TAKE IT INTO ACCOUNT, 2 - NOT VERY IMPORTANT - I VERY RARELY TAKE IT INTO ACCOUNT, 3 - QUITE IMPORTANT - I SOMETIMES TAKE IT INTO ACCOUNT, 4 - VERY IMPORTANT - I USUALLY TAKE IT INTO ACCOUNT, 5 - VERY IMPORTANT, I ALWAYS TAKE IT INTO ACCOUNT, MEDIAN ANSWERS)

Source: own study based on the results of own survey research.

The ninth question of the survey concerned the elements taken into account when estimating the country risk premium (Table 9 and Figure 11). The answers were provided by people who did not use discount rates imposed by the employer (and who were able to answer this question). 58% of respondents answered that they took into account the standard deviation of stock indices, the same number indicated the standard deviation of rates of return on government bonds. 21% of respondents were guided by the country risk premium obtained from news websites, and 17% used the country risk premium determined internally in the company. Only one person used the sensitivity factor for risk exposure in the country of investment.

CHART 11. WHAT ELEMENTS WERE TAKEN INTO ACCOUNT WHEN ESTIMATING THE COUNTRY RISK PREMIUM?

Source: own study based on the results of own survey research.

TABLE 9 . WHAT ELEMENTS WERE TAKEN INTO ACCOUNT WHEN ESTIMATING THE COUNTRY RISK PREMIUM?

What elements were taken into account when estimating the country risk premium?	percent	answers
standard deviation of stock indices	58%	7
standard deviation of government bond returns	58%	7
the sensitivity of a given company to risk exposure in the country of investment	4%	1
the country risk premium from the news service was used	21%	5
the bonus was determined internally within the company	17%	4

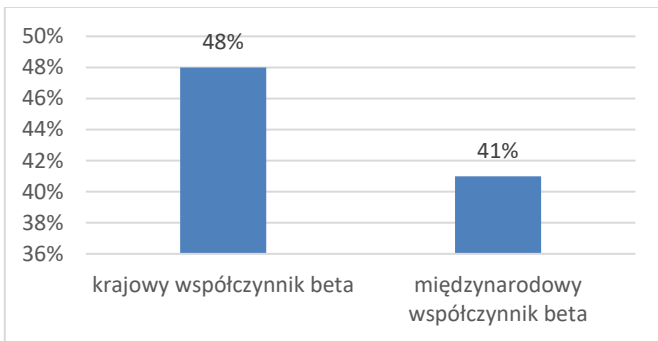Source: own study based on the results of own survey research

The tenth question of the survey concerned the beta coefficient that was used to calculate the cost of equity capital (it only concerned people who did not use discount rates imposed by the company). The responses provided showed that 48% of respondents use the domestic beta and 41% use the international beta (Table 10, Figure 12).

TABLE 10 . BETA COEFFICIENT USED FOR EQUITY CALCULATIONS

What beta coefficient was used for the calculations	percent	answers
national beta coefficient	48%	13
international beta coefficient	41%	11

Source: own study based on the results of own survey research.

CHART 12. BETA COEFFICIENT USED TO CALCULATE EQUITY

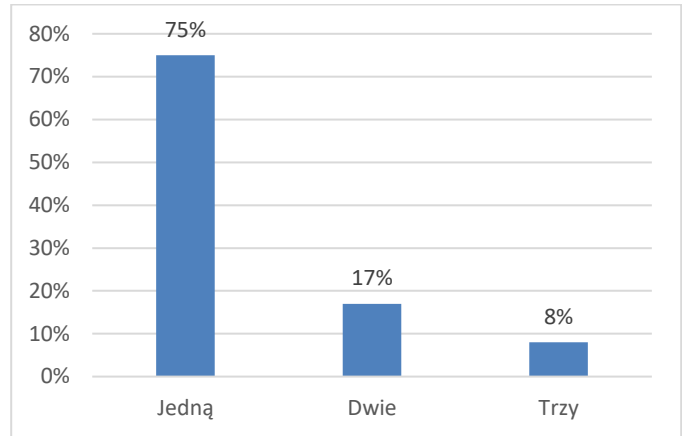Source: own study based on the results of own survey research.

The last question of the survey asked about the number of methods or approaches used to ultimately determine the discount rate for international investments. As many as 75% of respondents used only one approach, which they considered to be the most correct methodologically and with the available data, 17% of respondents based on two approaches (e.g. cost determined using iCAPM and the usual discount rate used for similar projects), 2 people used three approaches (e.g. discount rates suggested by the World Bank or other methods). The distribution of answers to question 11 is shown in table 11 and chart 13.

TABLE 11 . HOW MANY METHODS WERE USED TO FINALLY DETERMINE THE COST OF CAPITAL (DISCOUNT RATE)?

How many methods were used to finally determine the cost of capital?	percent	answers
One	75%	18
Two	17%	4
Three	8%	2

Source: own study based on the results of own survey research.

CHART 13. HOW MANY METHODS WERE USED TO FINALLY DETERMINE THE COST OF CAPITAL (DISCOUNT RATE)?

Source: own study based on the results of own survey research.

IV. SUMMARY AND FINAL CONCLUSIONS

As shown by the presented research results, it is difficult to clearly determine the method of estimating the cost of capital (discount rate) for international investments in Poland. Depending on the company, this is sometimes a predetermined discount rate (19%), but more often these rates were calculated using different versions and approaches to the international cost of capital. Although a single-component model dominated when estimating the cost of equity capital, it was adjusted for international risk and internationalization (38%), and 29% of respondents used a multi-component model. Most respondents knew and used the country risk premium based on the standard deviation of returns on stock and bond markets (58%), and 21% used the premium suggested by news outlets. As many as 48% of respondents who determined the cost of equity capital themselves used the domestic beta coefficient, and 41% used the international beta coefficient.

This shows a considerable knowledge of the issue of internationalization of investments and the use of simple but accepted methods by the theory of corporate finance. As for more advanced approaches, respondents were not familiar with them, so such questions were omitted from the survey.

To sum up, the knowledge of iCAPM among people dealing with this topic is high, although apart from a few individuals no more advanced methods and approaches are known. The large variation in the distribution of responses shows that different approaches and models are used.

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